1. GENERAL.

The audio integrating system provides the pilots with intercom and audio control.

The VHF HF COM and HF COM (if installed) systems, as well as audio signals from the radio navigation systems, are together with the cockpit and ground crew interconnected with the audio integrating system. The audio integrating system will then provide the pilot with a corresponding number of audio channels, which can easily be selected and controlled by any of the two Audio Control Panels. The communication and the audio signals are listened to and spoken with by either headsets or cockpit loudspeakers and hand microphones.

All communication is recorded by the CVR (Cockpit Voice Recorder). The Press To Transmit signals for the COM's are recorded by the Flight data recorder.

2. MAIN COMPONENTS AND SUBSYSTEMS.

2. 1. Remote Electronic Unit (REU).

The Remote Electronic Unit, REU, which forms the central part of the audio integrating system, serves as a distribution and switching center for the systems that are interconnected with the REU.

For communication, two pilot jack panels provide connections of the headsets to the REU. There are also two loudspeakers and hand microphones connected to the REU for backup.

The REU contains two identical circuit boards powered through their associated Audio Control Panel, ACP, by L and R BAT BUS. The circuit boards perform switching and amplification as selected on the ACP of cockpit intercom, HF and VHF COM audio and of audio idents for VOR, ILS, MARKER, DME and ADF.

Aural warning, GPWS and PA chime signals have fixed audio levels and can be heard regardless of volume setting.

If one or both circuit boards should fail, the VHF COM's can be bypassed the REU and switched directly to the headsets by the NORM/EMER switch on associated ACP; VHF COM 1 to the L/P ACP and VHF COM 2 to the R/P ACP.

2. 2. Audio Control Panel (ACP).

Two ACP's are installed in the cockpit, one for each pilot. The ACP's are furnished with slide levers for volume control and a number of pushbuttons and switches that allow various controls of the audio system. The selected volume levels and switch settings are converted into digital data and sent to the REU for control of the systems interconnected with the REU.

2. 3. Loudspeakers.

Two loudspeakers are installed in the cockpit above each pilot's head. The volume of the speakers are controlled by associated SPKR slide levers, L speaker L ACP and R speaker R ACP. Aural warning, GPWS, and PA chime signals have fixed audio levels and can be heard regardless of volume setting.

2. 4. Pilot jack panel.

Two pilot jack panels provide connections of the headsets to the REU, two kinds of standard headset connectors are accepted; PJ–055B earphone and PJ–068 microphone or CANNON XLR type connectors. With Mod. No. 3144 installed, it is also possible to connect headsets with active noise reduction.
For oxygen mask use, a separate jack connects the mask microphone to the REU by the BOOM/MASK switch on associated ACP; L mask L ACP and R mask R ACP. PA calls with the mask microphone can be made by pressing the PA button on the jack panel, also see AOM 4/4.1 and 4/4.2.

2. 5. Observers jack panel.

The observers jack panel provides connection of the observers headset to the REU. The same type of connectors are accepted as for pilot jack panel. A MIC switch provides on/off function of the observers microphone. There is also a PHONE switch which allows the observer to listen to either the left or the right pilot's communication.

From a/c 180–up a microphone jack is provided for the observers oxygen mask microphone, see fig. 6. The jack is in parallel with the observers jack panel and does not require unplugging of the headset microphone.

With Mod. No. 2600 installed, a hand microphone is provided for the observer. This hand microphone provides radio communication for the observer or instructor on the jump seat. The hand microphone is connected in parallel with the left pilots hand microphone through a selector switch on the left ACP. The selector switch controls which hand microphone is active for transmission (left pilot or observer). With the observer hand microphone selected, it is still possible for the pilot to transmit using the PTT button on the ACP or control wheel.

2. 6. Ground crew jack panel.

The ground crew jack panel, located in the nose wheel well, provides intercom between ground crew and cockpit. Intercom volume is controlled with INT slide lever on both ACP's. The white ground crew light on the ground status panel will be on whenever the ground crew headset is connected.

The ground crew microphone can be switched on/off by a switch on the ground crew headset controlling the REU.

As an option the a/c can be provided with a cockpit call button located beside the ground crew jack panel. When the button is pressed a high low chime will sound in the cockpit audio system.

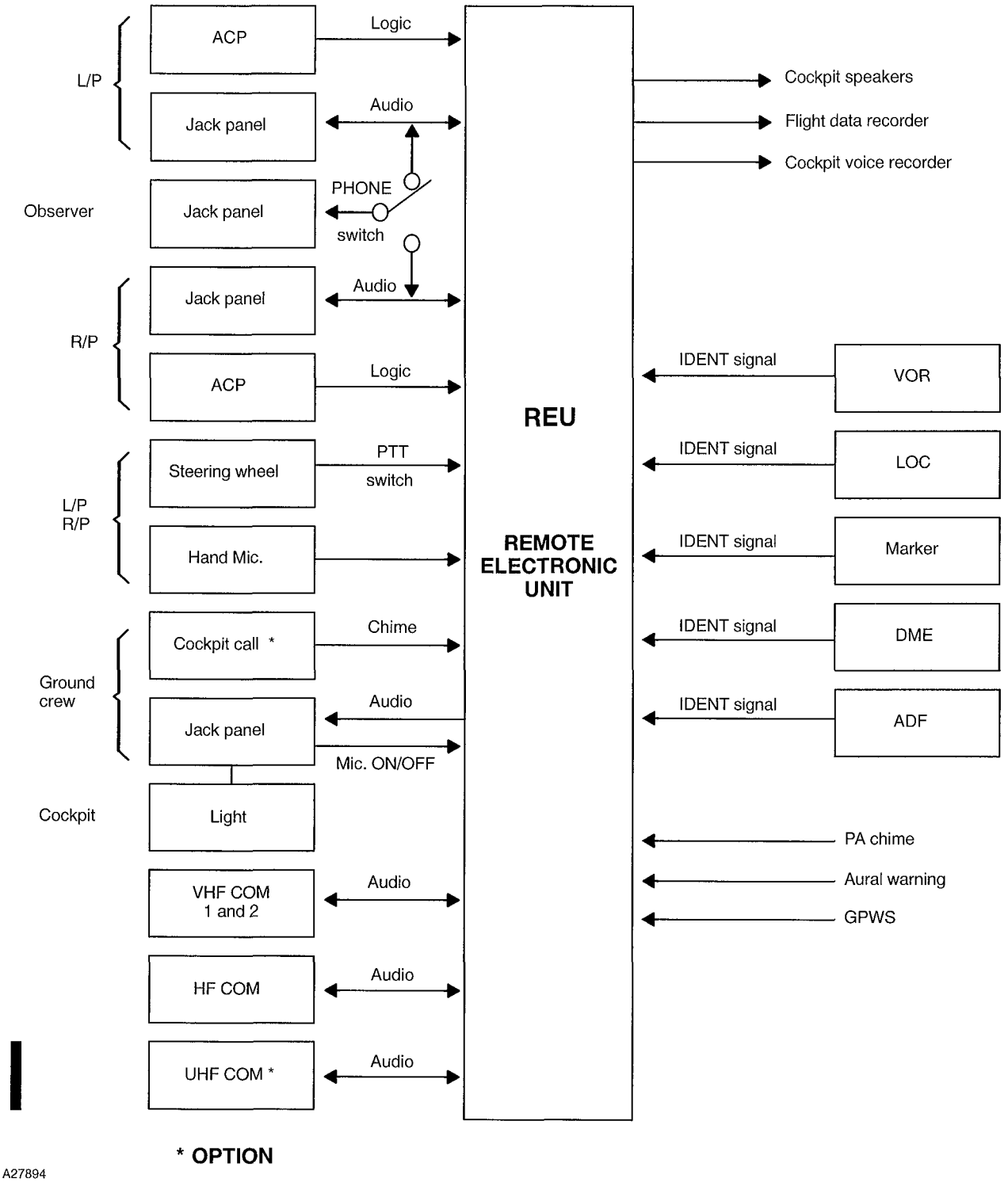
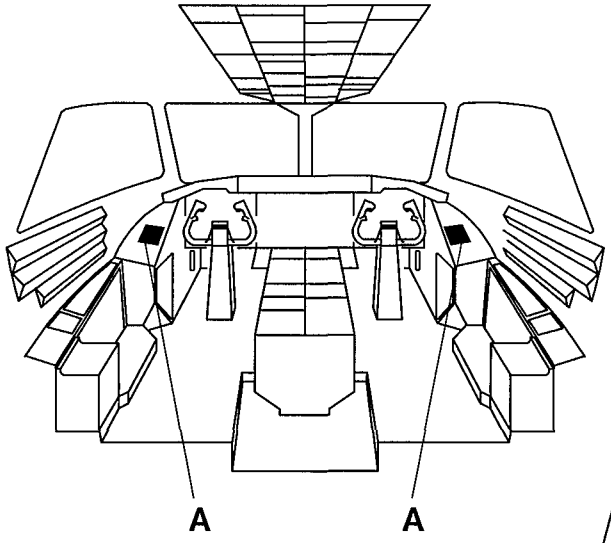


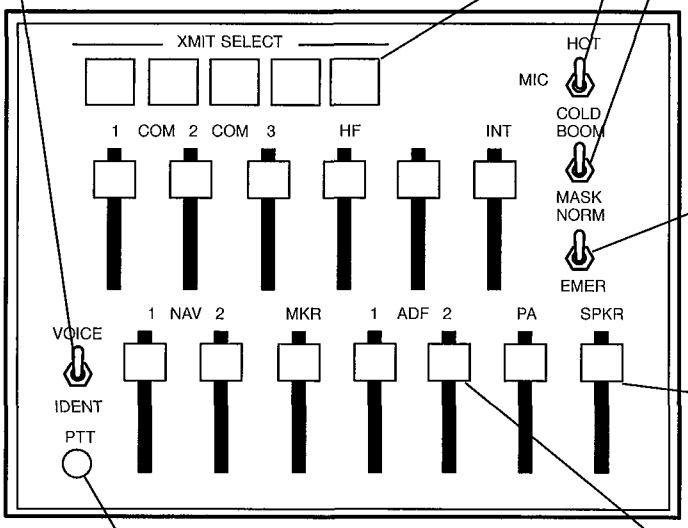
FIG. 1. Audio integrating system – schematic.

3. CONTROLS AND INDICATORS.



VOICE/IDENT switch.
VOICE – Voice signals only.
IDENT – Both audio code and voice signals.

A AUDIO CONTROL PANEL



PTT button.
Press To Transmit.

A11576

XMIT SELECT pushbuttons.
– Momentarily press associated button to select COM/HF for transmitting (HF if installed, COM 3 not used).
– Selected button illuminates.

MIC switch.
HOT– Headset or mask microphone is continuously on in the intercom.
COLD– The microphone is only on in the intercom when the PTT is de-pressed for transmission.

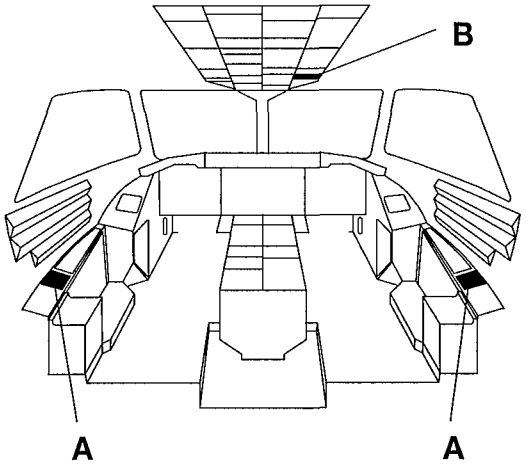
BOOM/MASK switch.
BOOM –Headset microphone selected.
MASK –Oxygen mask microphone selected.

NORM/EMER switch.
NORM– Control of the COM's is managed by the ACP.
EMER– Bypass of the REU if the audio system fails.
– Direct connection with the COM by headset and control wheel PTT button only.
– For L side ACP; COM 1, L control wheel PTT and L headset.
– For R side ACP; COM 2, R control wheel PTT and R headset.
– Fixed volume.

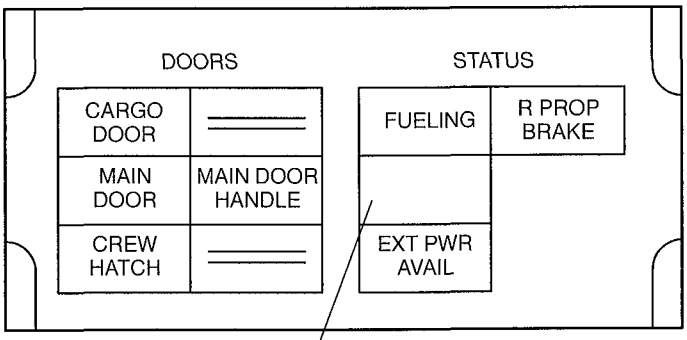
Loudspeaker volume.
Even if the volume is turned down, warning signals and PA chime signals can still be heard over the loudspeaker.

Volume controls.
Slide levers for volume control of associated system, for example:
INT – intercom
MKR – marker
PA – cabin PA
(COM 3 not used)

FIG. 2. Audio Control Panel, ACP – controls.

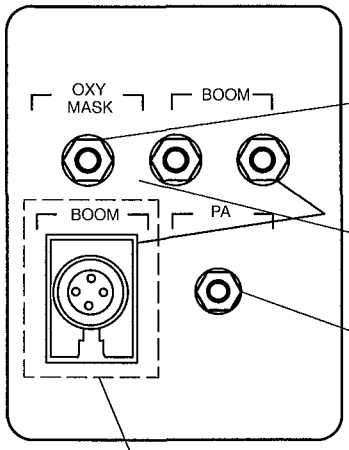


B GROUND STATUS PANEL



Ground crew light.
A white light comes on when ground crew headset is connected in the nose wheel well.

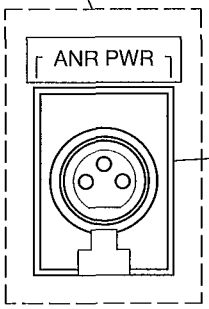
A PILOTS JACK PANEL



Connection for oxygen mask microphone.

Connections for headset.
Two types of connectors are accepted.

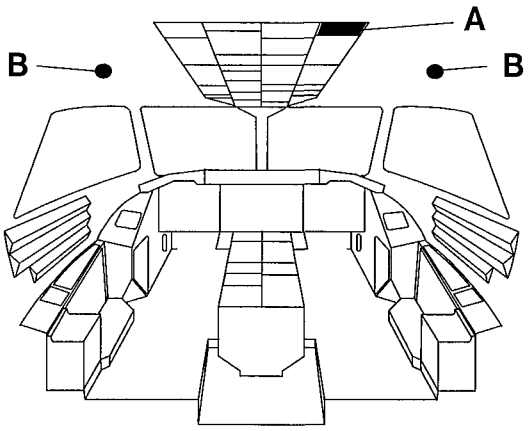
Interphone button.
Connects mask microphone to PA/Interphone when pressed. See AOM 4/4.1 and 4/4.2.



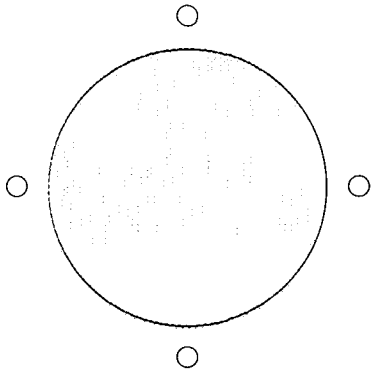
With Mod. No. 3144 installed:
Connection for power to ANR headsets.

A28633

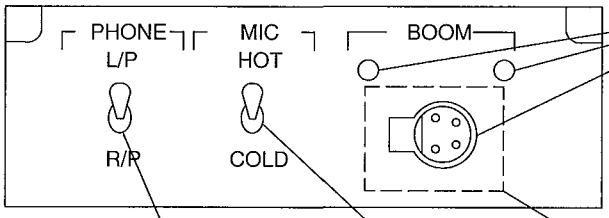
FIG. 3. Ground status and pilots jack panel – jacks and lights. (Left side shown).



B COCKPIT LOUDSPEAKER

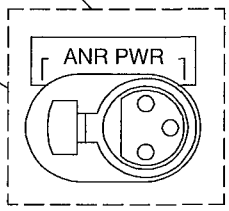


A OBSERVERS JACK PANEL



Connections for headsets.
Two types of connectors are accepted.

With Mod. No. 3144 installed:
Connection for power to ANR headsets.



PHONE (Audio) switch.

L/P– Connects the observer's headset to the left pilot audio.

R/P– Connects the observer's headset to the right pilot audio.

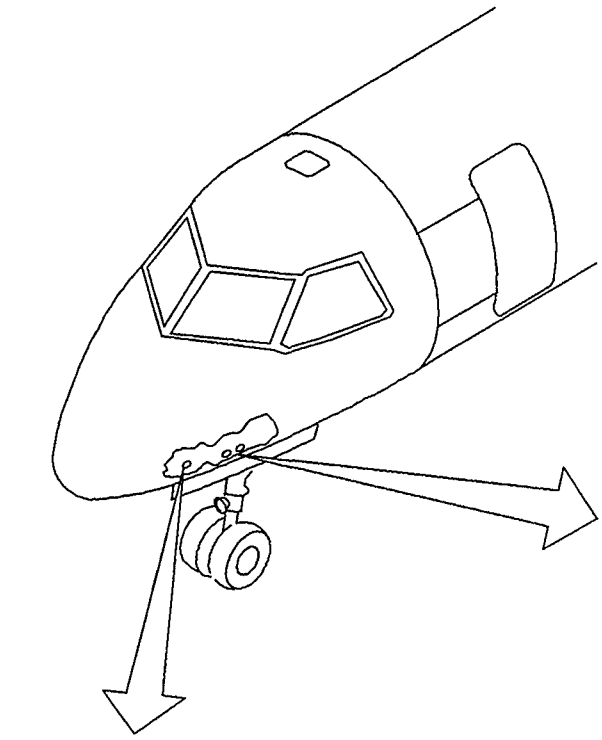
MIC switch.

HOT– Headset microphone is continuously on in the intercom.

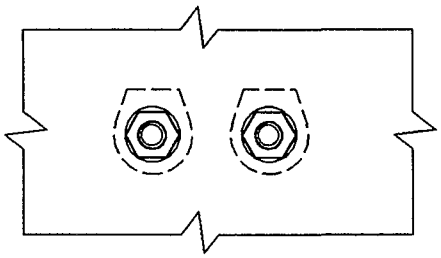
COLD– The microphone is switched off.

A28634

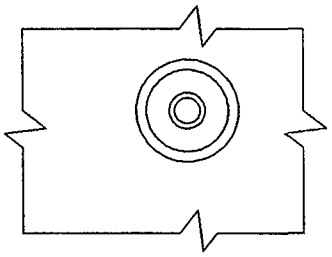
FIG. 4. Loudspeaker and observers jack panel – controls and jacks.



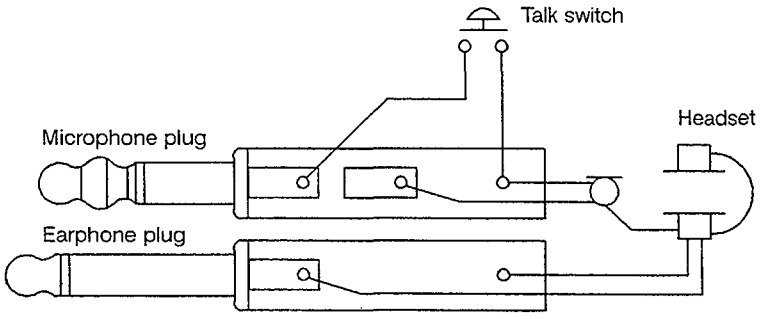
GROUND CREW JACK PANEL



COCKPIT CALL BUTTON
(option)



GROUND CREW HEADSET TALK SWITCH
(schematic)



A11579

FIG. 5. Ground crew station and schematic.

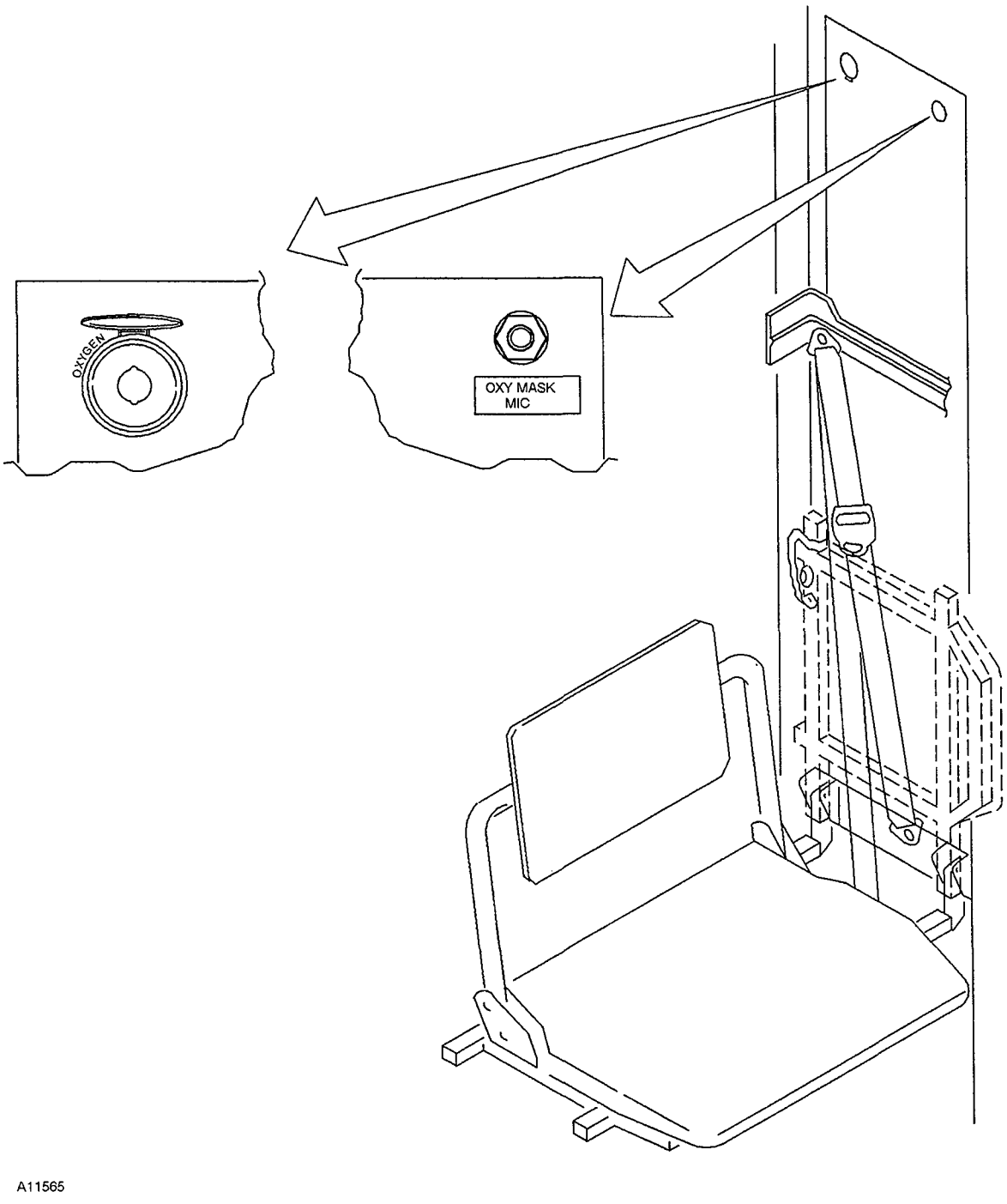


FIG. 6. Observers oxygen mask microphone jack.

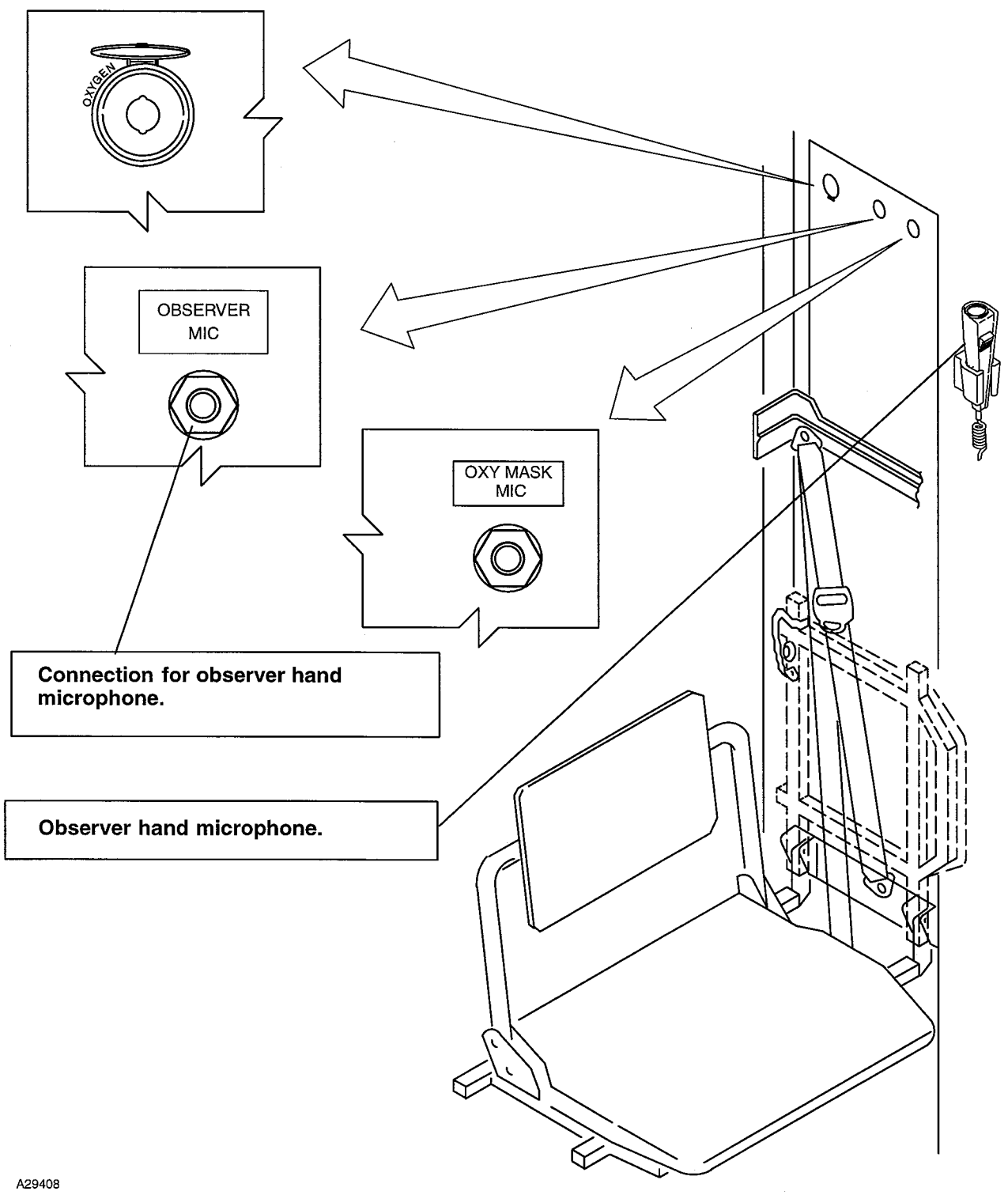
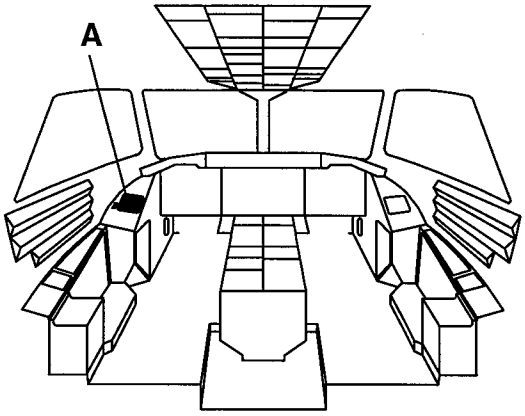
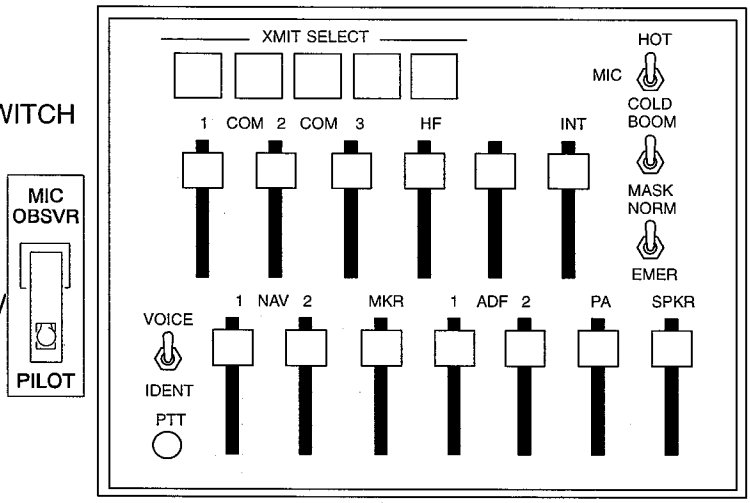


FIG. 7. Observers hand microphone jack.

With Mod. No. 2600 installed



A MIC OBSERVER SWITCH



Observer/Pilot Hand Microphone selector switch (guarded)

This switch selects which hand microphone is active for transmission.

OBSVR – Observer hand microphone selected.

PILOT – Pilot hand microphone selected.

With the switch in the OBSVR position it is still possible for the pilot to use the PTT buttons on the ACP and control wheel to transmit.

A29411

FIG. 8. Observer/pilot hand microphone switch.

With Mod. No. 2600 installed

4. ELECTRICAL POWER SUPPLY.

Left pilot audio	L BAT BUS	E–10	AUDIO L
Right pilot audio	R BAT BUS	L–10	AUDIO R
Active Noise Reduction Headsets (If installed)	RH AVIONIC BUS	N–19	ANR PWR

1. LIMITATIONS.

Not applicable.

2. NORMAL OPERATION.

The operation is described individually under each system which is connected to the Audio Integrating system; VOR/ILS, DME, ADF, PA/INTERPHONE, VHF COM, HF COM and UHF COM.

3. ABNORMAL OPERATION.

CONDITIONS	ABNORMAL PROCEDURES
3. 1. LOSS OF COMMUNICATION.	**ACTIONS.** 1. Headsets ..... CHECK – Check for faulty headset by connecting them one at a time. 2. PTT button ..... CHECK – A faulty PTT button can block the system but the COMs can never transmit longer than 2 min. when transmission will be shut off automatically. ◆ **Communication still lost.** 3. NORM/EMER switch ..... EMER – COM 1, L audio control panel. – COM 2, R audio control panel. ◇ **Communication re–established.** 4. The audio control panel failed. – Only the COM can be used with switch in EMER. All other functions must be controlled by the opposite audio control panel. – The COM audio level becomes fixed and is not adjustable. – The PTT function can only be provided from the PTT button on the control wheel. L ACP: COM 1 – L control wheel. R ACP: COM 2 – R control wheel. 5. End of procedure. ◇ **Communication still lost.** 4. Communication lost. 5. End of procedure. ◆ **Communication re–established.** 3. If headsets failed use handmicrophones and loudspeakers. 4. End of procedure.

CONDITIONS	ABNORMAL PROCEDURES
3. 2. COCKPIT INTERCOM DEAD.	**ACTIONS.** 1. CBs E–10 (AUDIO L) and L–10 (AUDIO R) ..... CHECK/RESET 2. End of procedure.

1. GENERAL.

The HF 230 communication system provides a two-way voice link in the high frequency range 2.0 to 22.9999 MHz. A 100 Hz frequency spacing allows selection of any one of 280 000 distinct frequencies. The following communication modes can be selected:

- USB = Upper side band (single side band transmission).
- LSB = Lower side band.
- AM = Amplitude modulated.
- TEL SUP CAR and TEL PLT CAR = Telephone mode. Half duplex operation on 176 preprogrammed ITU radiotelephone channels.

The system consists of a control unit in the cockpit, a transceiver and power amplifier in the avionics rack and an antenna with antenna coupler in the tail section.

Audio control and PTT are managed through the Audio Integrating system, all communication is recorded by the CVR (Cockpit Voice Recorder) and PTT by the Flight data recorder via the FDAU (Flight Data Aquisition Unit).

2. MAIN COMPONENTS AND SUBSYSTEMS.

2.1. Control unit.

The principal part of the control unit is a microprocessor, the necessary controls and a frequency/channel display.

Selected by the FREQ/CHAN switch, the two control knobs provides frequency setting in 100 Hz spacing or setting of any of the 40 user preprogrammable and 176 preprogrammed ITU telephone channels.

There are also mode and squelch controls.

The clarifier permits the pitch of the received signal to be varied ± 100 Hz in all modes except AM.

2.2. Transceiver and Power amplifier.

The transceiver contains the frequency synthesizer and the channel program memory which will automatically be tuned to the selected frequency/channel.

The transceiver also contains the receiver/exciter. The exciter is a transmitter which produces a low power signal (150 mW) which is applied to the Power amplifier during transmission, and amplified to a 100 watt peak signal for all modes except 25 watt average signal for AM operation.

2.3. Antenna coupler and Antenna.

Because the HF system operates over such a wild frequency range, it is not possible to match the actual length of the aircraft HF antenna to each of the HF frequencies.

The Antenna coupler function is to change its electrical impedance and thereby tuning the antenna to each frequency and making the antenna appear to the transmitted signal as if it were the ideal physical length.

During the tuning cycle which is started by a momentary PTT operation, the Antenna coupler requires from 5 to 15 seconds, during which a steady 1000 Hz tone will be heard. Within 1 second after completion of the tuning cycle, tone will cease, indicating that the HF is ready for transmitting. However, should the Antenna coupler fail to tune within 30 seconds the 1000 Hz tone will begin to "beep", indicating a fault has occured. The fault can be cleared by rechannelling and initiating a new tuning cycle.

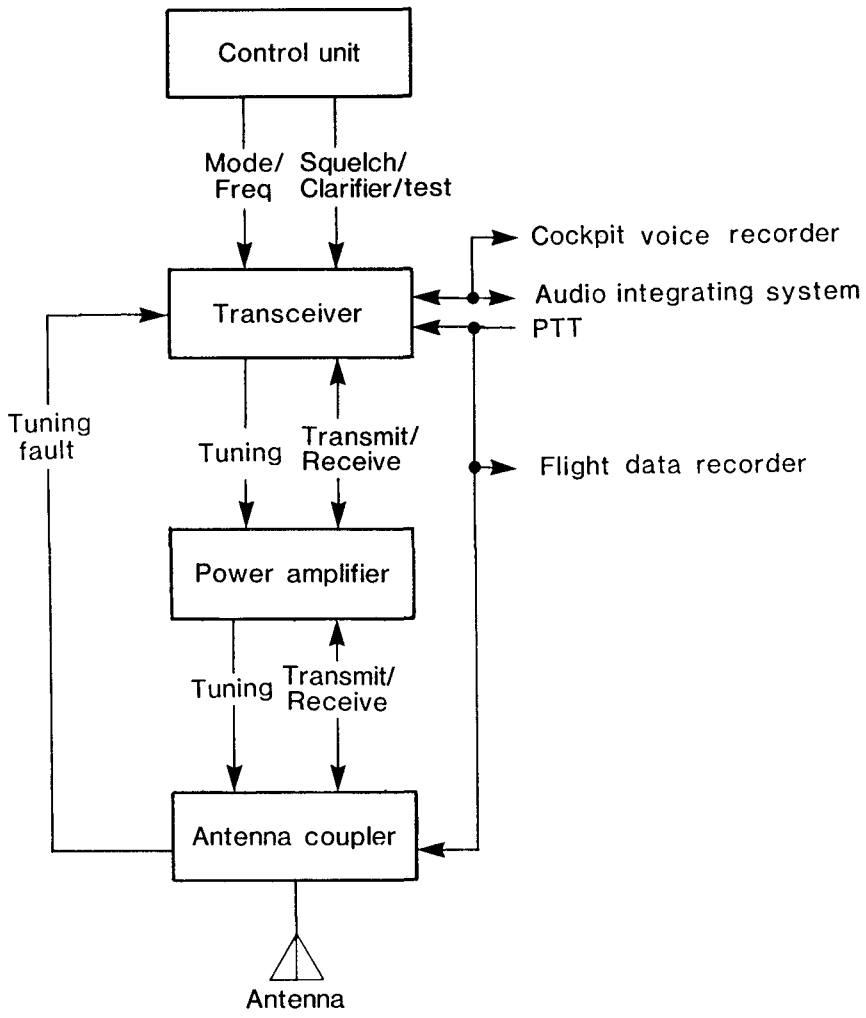
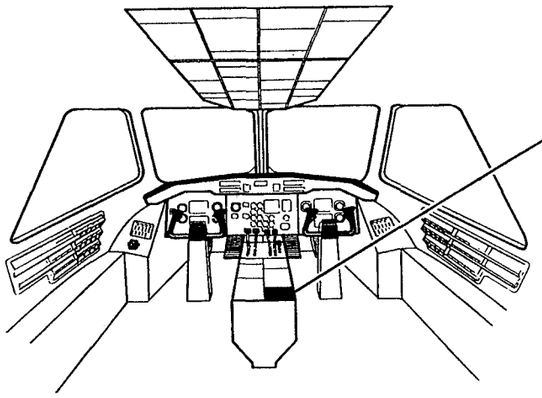


Fig. 1. HF COM - schematic.

3. CONTROLS AND INDICATORS.

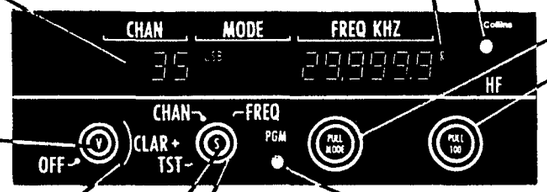


Photocell.
Controls display brightness.

R - Receive.
T - Transmit.

Channel/Mode/Frequency display.

A HF CONTROL UNIT



OFF/Volume control.
- Turning the control clockwise out of the detent applies power to the system.
- Continued clockwise rotation increases the audio volume. The volume control works in conjunction with the HF volume lever on the ACP (Audio Control Panel), both controls have to be set, see operation AOM 4/2.2.

CLAR, clarifier control.
- Permits the received signal to be varied ±100 Hz to improve audio clarity when receiving slightly "off frequency" USB, LSB or telephone signals.
- Does not affect AM reception, and it is disabled during transmission or when the control is positioned to OFF.

Squelch control.
- Rotate clockwise to mute undesired background noise.
- TST-squelch is deactivated (maximum background noise).

Channel/Frequency selector.
- Selects either channel mode or descrete frequency mode of operation.

Channel/Frequency select knobs.

Knob functions when selecting a descrete frequency.

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 (pushed 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 (pulled out) - Selects the 1 kHz digit (0 through 9) in the FREQ kHz display.

Knob functions when selecting a user programmed channel:

Left outer - Rotate until it brings up user channel number 1 or 40. If user channel 1 is being displayed, 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 thorugh the 40 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.

Knob functions when selecting an ITU telephone channel:

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.

Left inner (pushed in) - No effect on ITU channels.

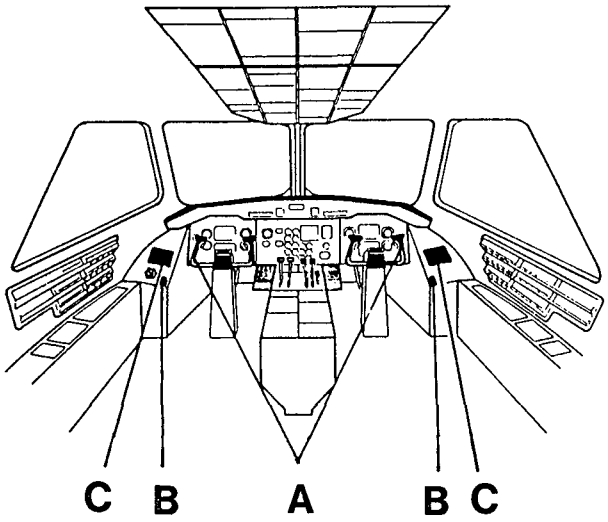
Left inner (pulled out) - Rotate to select between TEL SUP CAR and TEL PLT CAR modes.

Right outer - This knob selects the indicidual channel number within the ITU band (the two right-hand digits in the CHAN display). If the channel numbers is incremented beyond the highest channel for that band, the lowest channel for the next higher band will appear. For example, it 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.

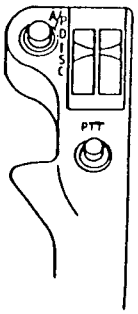
Right inner (pushed in or pulled out) - No effect on ITU channels.

PGM, program button.
Provides storage of frequencies in the 40 user programmable channels.
There are three types of channels that can be programmed:
- 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.
- 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 ARNIC, ATC (Air Traffic Control) and others.
- 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 can not 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 to name just a few.

Fig. 2. HF COM - controls.

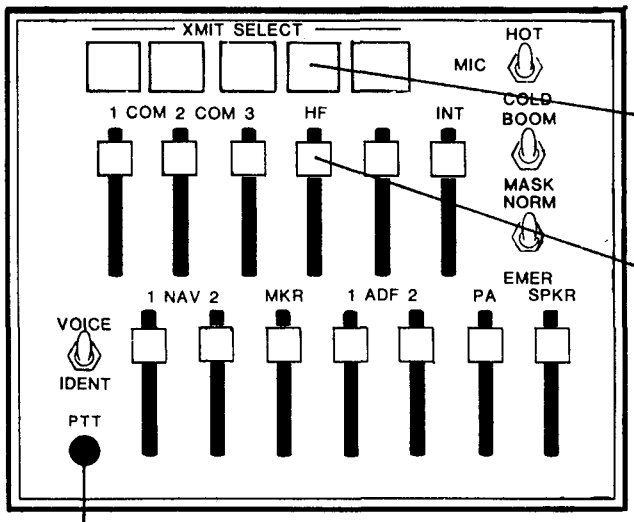


A CONTROL WHEEL
PTT BUTTON



B HAND MICROPHONE

C AUDIO CONTROL PANEL, ACP



HF XMIT SELECT button.

HF Volume control lever.

PTT button.
- Press To Transmit.

Fig. 3. HF COM - controls.

4. ELECTRICAL POWER SUPPLY.

HF ..... L AVIONIC BUS E-14 COM HF

HF-230 COM SYSTEM

For more detailed information see Collins Pilot's Guide for HF-230.

1. LIMITATIONS.

Do not tune or transmit on HF during refueling.

2. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
2.1 POWER UP.	1. L AVION switch ..... ON - Power is supplied to the HF by L AVION switch ON. 2. HF volume lever (ACP) ..... SET - Set lever to approximately middle position. 3. Squelch control ..... TST 4. HF volume lever (ACP) ..... ROTATE - Set lever to proper volume. - Rotating the volume control clockwise out of detent applies power the HF. NOTE Allow 15 minutes warmup before use.
2.2 USER CHANNELS PROGRAMMING. (Cont'd)	The 40 user programmable channels can be easily programmed on ground or in flight. All programmed information is stored in nonvolatile memory and can be easily recalled by selecting the desired user channel number. There are three types of channels that can be programmed: A. Half-duplex. The user programs two different frequencies, one for receive and one for transmit. The user also assigns one of the available operaiting 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.

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	1. Ensure that the CHAN/FREQ selector 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. The use the right outer channel select knob to select the desired channel number (from 1 to 40) to program. 3. Initiate program mode. Press the program (PGM) button once to initiate the programming sequence. At this point, the entire display 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. 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 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 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, the operator have approximately 20 seconds to begin entering the desired transmit freqyency. If no changes are made during the next 20 sec. the currently displayed transmit frequency will become invalid and a receive-only channel have been created. Set the desired transmit frequency using the four frequency select knobs.
(Cont'd)	

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	With the desired transmit frequency shown in the FREQ kHz display, press the PGM button once again to store the data. As before, the 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. B. 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 and TEL PLT CAR) to the selected channel. Simplex operation is used by ARINC, ATC (Air Traffic Control) and others. 1. Ensure that the CHAN/FREQ selector 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) to program. 3. Initiate program mode. Press the program (PGM) button once to initiate the programming sequence. At this point, the entire display will begin to slowly blink. 4. Enter the receive frequency and mode of operation. Set the desired simplex receive (and transmit) frequency using the four frequency select knobs. The selected 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 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 simplex frequency and mode being displayed, press the PGM button once again to store the data. The display will blank for a short period of time to confirm storage.
(Cont'd	

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	6. Store the transmit frequency. When the display returns, it will be blinking faster with the simplex transmit frequency displayed (this is the same as the already programmed receive frequency). At this point, the operator have approximately 20 seconds to complete the simplex programming operation. If no changes are made during the next 20 seconds, the currently displayed transmit frequency will become invalid and a receive-only channel have been created. Press the PGM button once again to store the frequency. As before, the 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 simplex frequency) showing. C. 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 can not 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 to name just a few. 1. Ensure that the CHAN/FREQ selector 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) to program. 3. Initiate program mode. Press the program (PGM) button once to initiate the programming sequence. At this point, the entire display will begin to slowly blink.
(Cont'd)	

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	4. Enter the receive frequency and mode of operation. Set the desired receive frequency using the four frequency select knobs. The selected 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 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 display will blank for a short period of time to confirm storage. 6. Terminate the programming sequence. When the display returns, it will be blinking faster with the simplex transmit frequency displayed (this is the same as the already programmed receive frequency). At this point, the operator can terminate the programming sequence in any one of the three ways. a. By momentarily pressing any PTT button. b. By positioning the CHAN/FREQ selector to FREQ and then back to CHAN. c. By waiting for the 20 second timer to run out (this is the preferred method). When the programming sequence is terminated, the display will return to normal with the new channel data (channel number, mode and receive-only frequency) showing.

CONDITIONS	NORMAL PROCEDURES
2.3 FREQUENCY/ CHANNEL TUNING.	**W A R N I N G** Do not tune or transmit on HF system during fueling since fire and/or injury to personnel may result. 1. XMIT SELECT HF pushbutton ..... PRESS - Check to be illuminated. 2. CLAR, clarifier control ..... OFF ◆----**Frequency selection.** 3. CHAN/FREQ selector ..... FREQ 4. Frequency ..... SET - The HF will mute when selecting a new frequency. Wait until the HF is no longer muted before continuing the tuning procedure. 5. PULL MODE knob ..... SELECT - Select mode of operation. - Successful HF communications depend on compatibility between the airborne and the ground station. It is extremely important that the operator select the same operating mode on the HF that the ground station the operator wish to contact will be using. The USB mode is the most popular operating mode for airborn HF ssb communications and should normally be tried first unless it is known that the ground station is operating in another mode. Proceed with item 6 below. ◆----**Channel selection.** 3. CHAN/FREQ selector ..... CHAN 4. Channel number ..... SET - Use any of the two selectors. - The HF will mute when selecting a new channel. Wait until the HF is no longer muted before continuing the tuning procedure.
(Cont'd)	

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	5. PULL MODE knob ..... SELECT AS REQUIRED - Pulling out and rotating the PULL MODE knob when one of the 176 ITU channels is selected cycles the system between TEL SUP CAR and TEL PLT CAR mode. - All five of the modes (USB, AM, LSB, TEL SUP CAR and TEL PLT CAR) are available for use on the user programmable channels. However, if one of the 40 user programmed channels is selected and the PULL MODE knob is pulled out and rotated, no mode changes will occur. This is because the modes for these channels are selected and stored in non-volatile memory during the programming sequence. 6. PTT (Press To Transmit) button ..... PRESS MOMENTARILY - Depress switch momentarily to initiate antenna tuning. This tuning is indicated by a 1000 Hz tone and takes from 5 to 15 seconds. - When the tone stops, the HF system is ready for use. - If the antenna coupler does not tune after approx. 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.

CONDITIONS	NORMAL PROCEDURES
2.4 COMMUNICATION. (Cont'd)	W A R N I N G Do not tune or transmit of HF system during fueling since fire and/or injury to personnel may result. ◆----RECEIVE. 1. HF volume lever (ACP) ..... ADJUST - Use headset or handmicrophone and loudspeaker. 2. CLAR, clarifier control ..... SET - Start with control at OFF and turn clockwise to improve audio clarity when receiving slightly "off frequency" USB, LSB or telephone signals. - Does not affect AM reception, and it is disabled during transmit or when the control is positioned to OFF. 3. Squelch control ..... SET - Start with control at TST and turn clockwise until background noise is barely audible. - Do not rotate squelch control too fast. Squelch circuit has a relatively long time constant and rotating knob too far may result in missed calls on some of the weaker signals. - Setting the squelch control too far clockwise can result in blocking out weak signals. The operator will find that there are times (depending on prevailing conditions) when it will be necessary 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 only marginally strong (unlike the conventional VHF which normally operates with a strong line-of-sight, nonfading signal).

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	4. HF volume lever ..... READJUST - If necessary, compensate squelch by increased volume. - Always be prepared to meet fading by increased volume. ◆----Transmit. 1. XMIT SELECT HF pushbutton ..... SELECT - Check to be illuminating. 2. PTT button ..... PRESS C A U T I O N HF transmission disturbs the ADF system. N O T E The HF must be retuned each time changing to new channel or frequency, before transmitting.

3. ABNORMAL OPERATION

CONDITIONS	ABNORMAL PROCEDURES
3.1 LOSS OF COMMUNICATION.	ACTIONS. 1. Squelch control ..... CHECK 2. CLAR (clarifier) control ..... CHECK 3. Channel/Frequency ..... RETUNE 4. PTT button ..... CHECK 5. ACP ..... CHECK 6. Headsets ..... CHECK 7. End of procedure.
3.2 ANTENNA COUPLER DOES NOT TUNE.	INDICATIONS. 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. ACTIONS. 1. 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. 2. End of procedure.
3.3 HF COM DEAD.	ACTIONS. 1. CB E-14 (HF) ..... CHECK/RESET 2. End of procedure.
3.4 EQUIPMENT MALFUNCTION.	If the receive (R) or transmit (T) annunciators on the HF control unit start to flash indicates that the receive or transmit (as applicable) frequency data from the Transceiver does not match that being sent by the HF control unit. An equipment malfunction is probable and the HF system should be checked by maintenance personnel.

0. MODIFICATION STANDARD. DESCRIPTION/OPERATION.

0.1. VHF COM frequency range.

Without mod. no. 2060 embodied:

– The frequency range of the VHF COM is 118.000 to 135.975 MHz.

1. GENERAL.

There are two identical VHF communication systems independent of each other. The frequency range is 118.000 to 136.975 MHz selectable in 25 kHz steps.

With Mod. No. 2938 the 25 kHz space has been modified with three frequencies, each with 8.33 kHz spacing. These frequencies are referred to as "channels", since the displayed frequency is not the actual frequency tuned. For example, a frequency with 25 kHz spacing, as 118.000 MHz, can now be selected with 8.33 kHz spacing by, in this case, selecting 118.005 on the control unit. If 118.010 is selected the actual frequency tuned is 118.008 MHz. 118.017 MHz is tuned by selecting 118.015 etc. This method ensures that the equipment will always operate in the proper spacing mode. In practice this will not cause any confusion, since the pilot will be asked to tune a channel as if it was a frequency. The control unit is also modified with three decimal places to ensure proper frequency/channel selection.

The control units are located on the center pedestal. The COM 1 antenna is mounted on the top of the fuselage and the COM 2 antenna is mounted on the bottom of the fuselage.

The transmission (PTT button keying) is recorded on the Digital Flight Data Recorder (DFDR) vie the Flight Data Acquisition Unit (FDAU). The communication will also be recorded by the Cockpit Voice Recorder via the Audio Integrating System.

2. MAIN COMPONENT AND SUBSYSTEMS.

2.1. Control unit.

The control unit contains a microprocessor which decodes selector and switch position and generates a frequency information which is transferred to the transceiver as a data code.

The control unit is also provided with a gas discharge type of display for two frequencies, one active and one standby. The display will indicate TX when the Press To Transmit (PTT) button is operated.

A programmable Memory facility is also contained in the control unit. The memory provides six preprogrammed frequencies. To select a Memory frequency, simply step through the Memory by operating the XFR/MEM switch momentarily in MEM position.

The control unit also has a squelch function which is active as long as the NORM/SQ OFF selector is in the NORM position.

2.2. Transceiver.

The transceiver produces an amplitude modulated signal of the selected frequency and this signal is directly fed to the antenna. In reception mode, the selected frequency is demodulated and the generated audio signal is transferred to the Audio Integrating System for distribution.

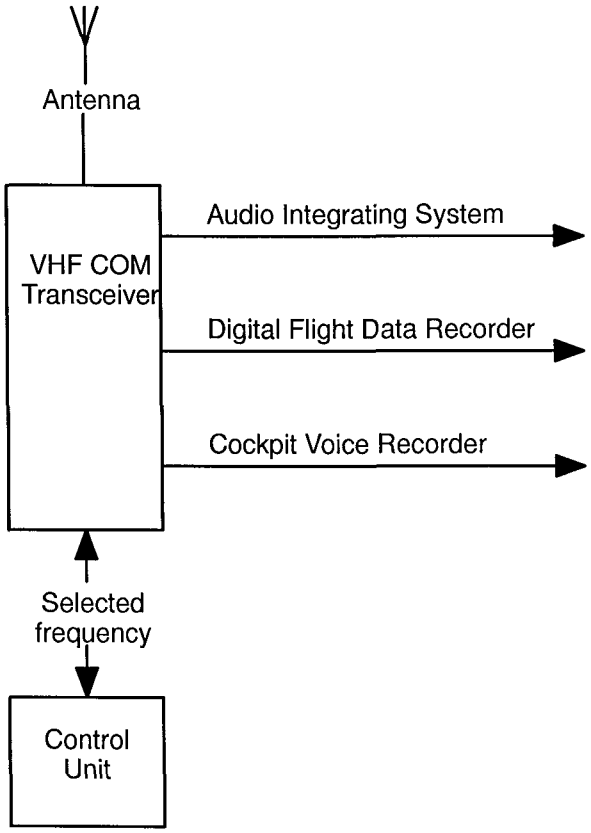
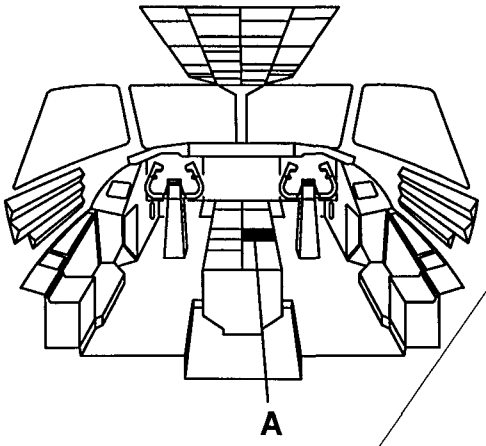
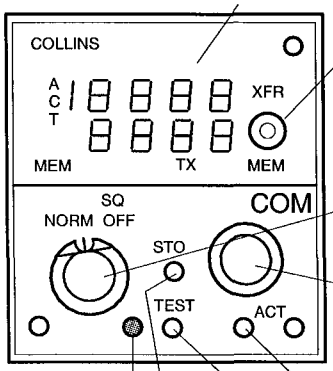


Fig. 1. VHF COM – schematic.

3. CONTROLS AND INDICATORS.



A COM CONTROL UNIT WITH MEMORY



Frequency display.
Upper display – Active frequency (ACT).
Lower display – Standby frequency.
NOTE: With Mod. No. 2938 installed, three decimal digits will be shown.
MEM – Memory frequencies available
TX – Indicates transmitting.

XFR/MEM switch.
When switched momentarily to:
XFR – Standby frequency moves to upper display and becomes active.
– Former active frequency moves to lower display and becomes standby.
– A tone will be heard when interchanging the active/standby frequencies.
MEM – Steps through the six preprogrammed frequencies.
– After frequency choice, set XFR/MEM switch to XFR position to activate memory frequency.

Function selector.
NORM – Squelch function active.
SQ OFF– Squelch function disabled.

Frequency selector.
Large knob – Controls the three left digits in 1 MHz steps.
Small knob – Controls the two (three) right digits in 50 kHz steps or 25 (8.33) kHz steps for the first two steps after the direction of rotation has been reversed.
When selecting XXX.X25 or XXX.X75, only 2 or 7 will be displayed.

Photocell.
Controls display brightness.

STO button.
Select memorycell to program (CH.–) with XFR/MEM switch then momentarily press STO button:
– Control unit enters Program mode.
– Set up frequency with frequency selector.
– Press STO button to store frequency.
– XFR/MEM switch for next memorycell (CH.–)...
– No activation for 3 sec, returns display to normal.

ACT button.
When depressed for more than 2 seconds:
– Standby frequency display goes off. Frequency selector controls active frequency display.
For return to normal:
– Depress for more than 2 seconds.

TEST button.
When momentarily pressed:
– Control unit enters and displays Diagnostic Fail Code mode.
– Two tones will be heard. (For maintenance purpose).

C0806

Fig. 2. VHF COM – controls.

1. GENERAL.

There are two identical VHF communication systems independent of each other. The frequency range is 118.000 to 136.975 MHz selectable in 25 kHz steps.

With Mod. No. 2938 the 25 kHz space has been modified with three frequencies, each with 8.33 kHz spacing. These frequencies are referred to as "channels", since the displayed frequency is not the actual frequency tuned. For example, a frequency with 25 kHz spacing, as 118.000 MHz, can now be selected with 8.33 kHz spacing by, in this case, selecting 118.005 on the control unit. If 118.010 is selected the actual frequency tuned is 118.008 MHz. 118.017 MHz is tuned by selecting 118.015 etc. This method ensures that the equipment will always operate in the proper spacing mode. In practice this will not cause any confusion, since the pilot will be asked to tune a channel as if it was a frequency. The control unit is also modified with three decimal places to ensure proper frequency/channel selection.

The control units are located on the center pedestal. The COM 1 antenna is mounted on the top of the fuselage and the COM 2 antenna is mounted on the bottom of the fuselage.

The transmission (PTT button keying) is recorded on the Digital Flight Data Recorder (DFDR) via the Flight Data Acquisition Unit (FDAU). The communication will also be recorded by the Cockpit Voice Recorder via the Audio Integrating System.

2. MAIN COMPONENT AND SUBSYSTEMS.

2.1. Control unit.

The control unit contains a microprocessor which decodes selector and switch position and generates a frequency information which is transferred to the transceiver as a data code.

Two frequencies can be selected and displayed. By means of a transfer button the operator can select one frequency to be active and the other one as standby. The active one will be indicated by a "T" when the Press To Transmit (PTT) button is operated.

The control unit is provided with a squelch function which can be disabled by pulling out the PULL TEST knob.

2.2. Transceiver.

The transceiver produces an amplitude modulated signal of the selected frequency and this signal is directly fed to the antenna. In reception mode, the selected frequency is demodulated and the generated audio signal is transferred to the Audio Integrating System for distribution.

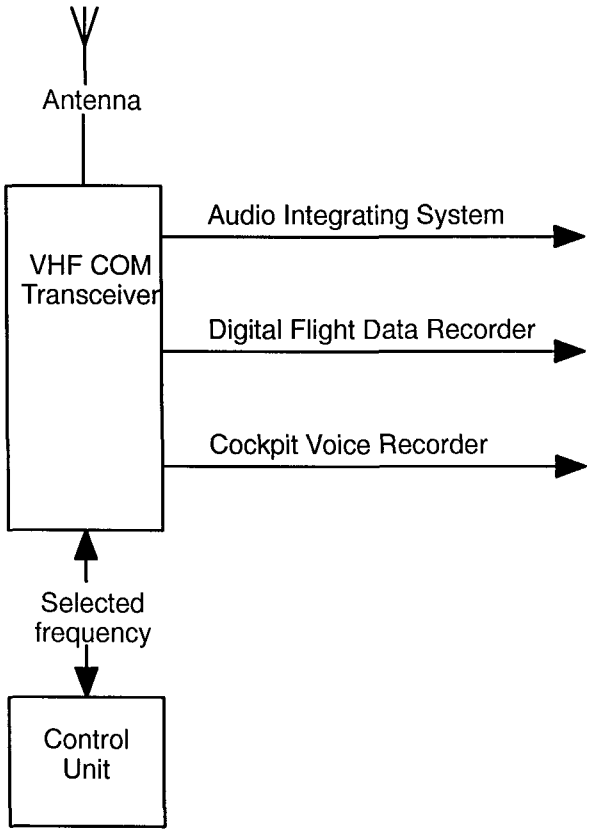
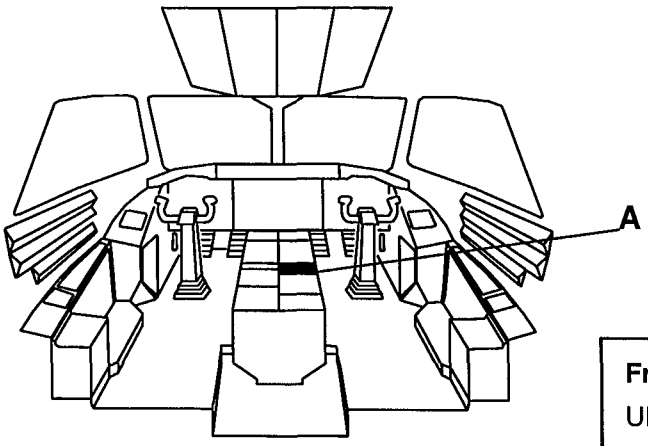
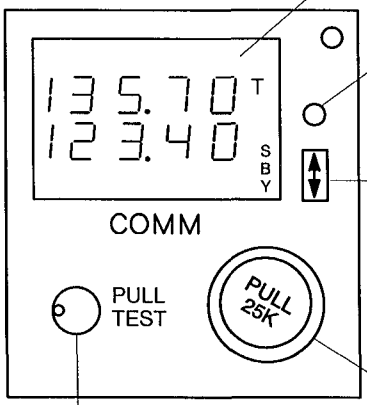


Fig. 1. VHF COM – schematic.

3. CONTROLS AND INDICATORS.



A COM CONTROL UNIT



Frequency display.

UPPER – Displays active frequency. When transmitting, a T is displayed at the right of the active frequency display.

Lower – Displays standby (SBY) frequency.

NOTE: With Mod. No. 2938 installed, three decimal digits will be shown.

Photocell.

Controls display brightness.

Transfer button.

When momentarily pressed:

– Standby frequency moves to upper display and becomes active. Former active frequency moves to lower display and becomes standby.

When depressed for more than 2 sec:

– Standby frequency display goes off. Frequency selectors control active frequency display.

When pressed again momentarily:

– Standby frequency displayed again and function back to normal.

Frequency selector.

Large knob – Controls the three left digits in 1 MHz steps.

Small knob – Controls the two (three) right digits in 50 kHz steps and in 25 (8.33) kHz steps when the knob is pulled out.

When selecting XXX.X25 or XXX.X75, only 2 or 7 will be displayed.

PULL TEST knob.

– When switch is pulled the squelch becomes disabled.

– Knob pushed in the squelch becomes active again.

A21308

Fig. 2. VHF COM – controls.

1. GENERAL.

There are two identical VHF communication systems independent of each other. The frequency range is 118.000 to 136.975 MHz selectable in 25 kHz steps.

With Mod. No. 2938 the 25 kHz space has been modified with three frequencies, each with 8.33 kHz spacing. These frequencies are referred to as "channels", since the displayed frequency is not the actual frequency tuned. For example, a frequency with 25 kHz spacing, as 118.000 MHz, can now be selected with 8.33 kHz spacing by, in this case, selecting 118.005 on the control unit. If 118.010 is selected the actual frequency tuned is 118.008 MHz. 118.017 MHz is tuned by selecting 118.015 etc. This method ensures that the equipment will always operate in the proper spacing mode. In practice this will not cause any confusion, since the pilot will be asked to tune a channel as if it was a frequency. The control unit is also modified with three decimal places to ensure proper frequency/channel selection.

The control units are located on the center pedestal. The COM 1 antenna is mounted on the top of the fuselage and the COM 2 antenna is mounted on the bottom of the fuselage.

The transmission (PTT button keying) is recorded on the Digital Flight Data Recorder (DFDR) via the Flight Data Acquisition Unit (FDAU). The communication will also be recorded by the Cockpit Voice Recorder via the Audio Integrating System.

2. MAIN COMPONENT AND SUBSYSTEMS.

2.1. Control unit.

The control unit contains a microprocessor which decodes selector and switch position and generates a frequency information which is transferred to the transceiver as a data code.

Two frequencies can be selected and displayed. By means of a transfer button the operator can select one frequency to be active and the other one as standby. The active one will be indicated by a "T" when the Press To Transmit (PTT) button is operated.

A programable Memory facility is also contained in the control unit. The memory provides eight preprogrammed frequencies, by momentarily pressing the CHAN button and thereafter, choose frequency by means of the frequency selector.

The control unit is provided with a squelch function which can be disable by pressing the PUSH TEST button.

The displays are dimmable and controlled by a photocell to give the adequate brightness.

2.2. Transceiver.

The transceiver produces an amplitude modulated signal of the selected frequency and this signal is directly fed to the antenna. In reception mode, the selected frequency is demodulated and the generated audio signal is transferred to the Audio Integrating System for distribution.

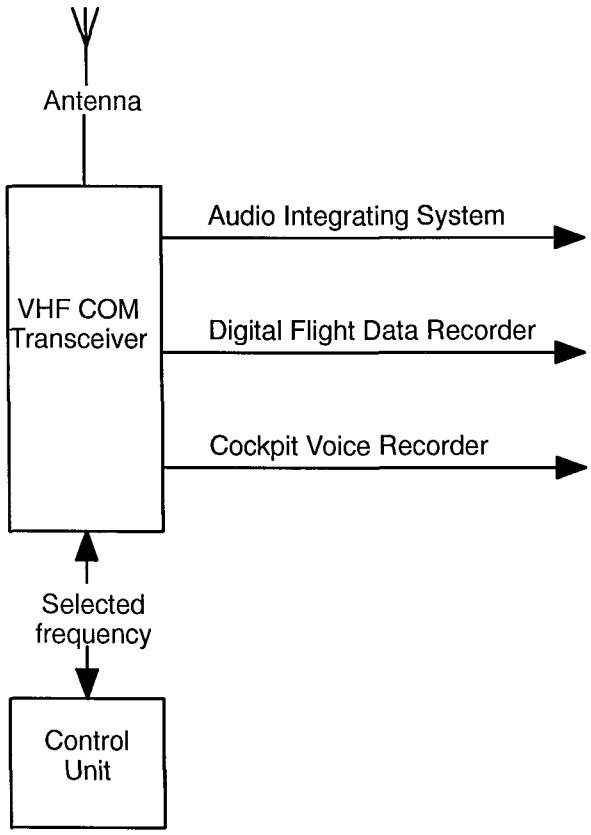
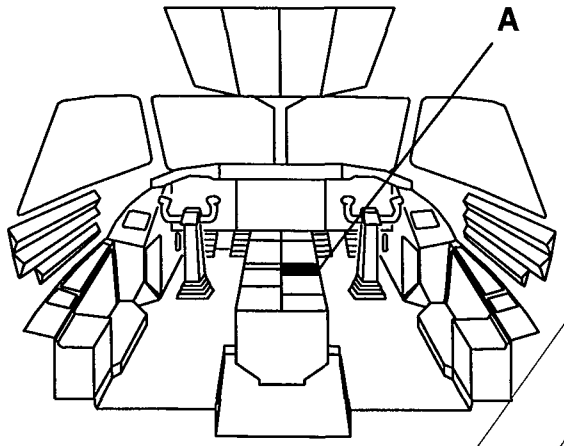
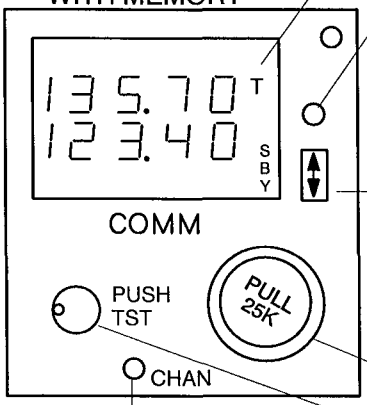


Fig. 1. VHF COM – schematic.

3. CONTROLS AND INDICATORS.



A COM CONTROL UNIT WITH MEMORY



Frequency display.

UPPER – Displays active frequency. When transmitting, a T is displayed at the right of the active frequency display.

Lower – Displays standby (SBY) frequency.

NOTE: With Mod. No. 2938 installed, three decimal digits will be shown.

Photocell.

Controls display brightness.

Transfer button.

When momentarily pressed:

- Standby frequency moves to upper display and becomes active. Former active frequency moves to lower display and becomes standby.

When depressed for more han 2 sec:

- Standby frequency display goes off. Frequency selectors control active frequency display.

When pressed again momentarily:

- Standby frequency displayed again and function back to normal.

When pressed in CHANNEL mode:

- Selected frequency becomes active and former active frequency becomes standby.

When pressed in PROGRAM mode:

- Frequency selector controls either one of Upper/Lower display for setup of Memory.

CHAN button.

When momentarily pressed:

- Unit enters 8 frequencies CHANNEL mode.
- Select frequency with frequency selector then press CHAN or wait for 5 sec (also see Transfer button).

When depressed and hold for more than 2 sec:

- Unit enters PROGRAM mode for 8 frequencies.
- Select CHANNEL to programmed, then momenarily press Transfer button.
- Select frequency to be stored. (Flashing display indicates which display is controlled by the frequency selector.)
- For return to Normal, press CHAN or wait for 20 sec.

Frequency selector.

Large knob – Controls the three left digits in 1 MHz steps.

Small knob – Controls the two (three) right digits in 50 kHz steps and in 25 (8.33) kHz steps when the knob is pulled out.

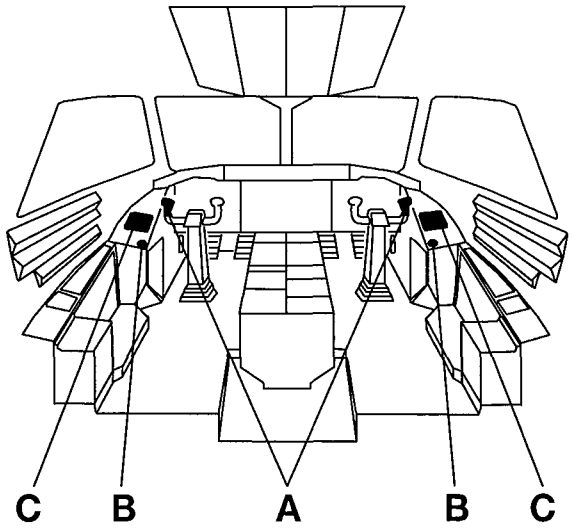
When selecting XXX.X25 or XXX.X75, only 2 or 7 will be displayed.

PUSH TEST button.

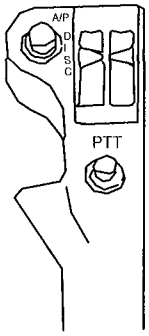
- When button is pushed the sqelch becomes disabled.
- Next push, the squelch becomes active again.

A21308

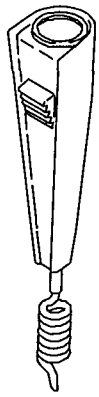
Fig. 2. VHF COM – controls.



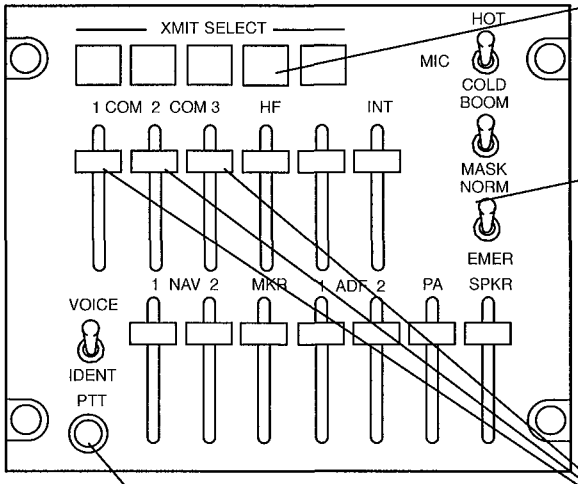
A CONTROL WHEEL
PTT BUTTON



B HAND MICROPHONE



C AUDIO CONTROL PANEL, ACP



XMIT SELECT button.
Momentarily press associated button to select COM for transmitting (COM 3 not used, except with Mod. No. 3142 installed).

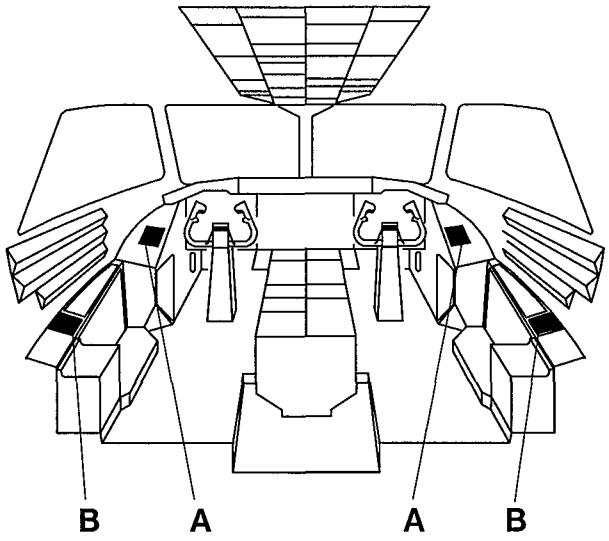
NORM/EMER switch.
NORM – Control of the COM:s are managed by the ACP.
EMER – Bypass of the REU if the audio system fails.
– Direct connection with the COM by headset and control wheel PTT button only.
– For L side ACP; COM 1, L control wheel PTT and L headset.
– For R side ACP; COM 2, R control wheel PTT and R headset.
– Fixed volume.

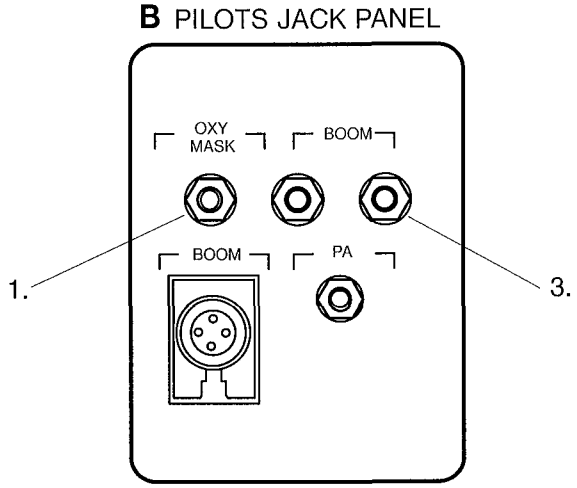
PTT button.
– Press To Transmit.

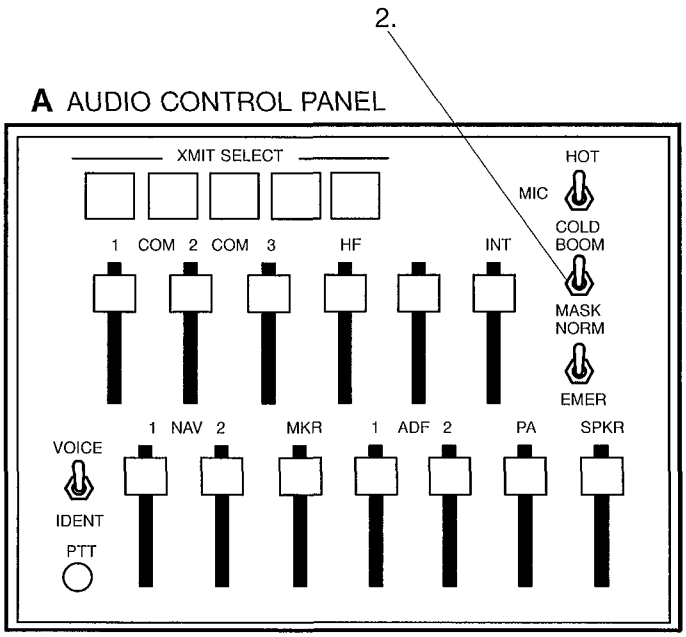
Volume control for COM 1, and COM 2.

A28636

Fig. 3. VHF COM – controls.







Oxygen mask use.

The oxygen mask microphone plug is normally connected to the OXY MASK receptacle (1) and with the BOOM/MASK switch (2) set to MASK when oxygen mask in use.

If the ACP fails and/or NORM/EMER switch is set to EMER when oxygen mask in use, the oxygen mask microphone plug must be connected to the BOOM microphone receptacle (3) to provide microphone function. Disconnect the headset microphone plug and connect the oxygen mask microphone plug.

A27911

Fig. 4. ACP failure and NORM EMERG switch – oxygen mask use.

4. ELECTRICAL POWER SUPPLY.

VHF 1	EMER AVIONIC BUS	E–13	VHF COM 1
VHF 2	R AVIONIC BUS	L–12	VHF COM 2

1. LIMITATIONS.

Not applicable.

2. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
2.1 POWER UP.	1. ESS, L and R AVION switches ..... ON - The VHF COM systems are switched ON/OFF by ESS (COM 1) and R AVION (COM 2) switches.
2.2 VHF COM SYSTEM TEST.	1. TEST button (COM control unit) ..... PRESS AND HOLD - Control unit enters and displays Diagnostic Fail Code mode (maintenance). - Two tones will be heard. 2. TEST button ..... RELEASE
2.3 PROGRAMMING OF THE FREQUENCY MEMORY.	The Control unit contains six programmable memory cells. 1. XFR/MEM switch ..... MEM PRESS - Momentarily press switch to select memorycell to be programmed. 2. STO button ..... PRESS. - Momentarily press STO to enter program mode. 3. Frequency selector ..... SET FREQUENCY - Set frequency in memorycell. 4. STO button ..... PRESS - Momentarily press STO to store frequency. - Control unit will also return to normal. 5. To set up next memory frequency, proceed with item 1 above. No activity for 3 seconds will return Control unit to normal display.

CONDITIONS	NORMAL PROCEDURES
2.4 COMMUNICATIONS.	**◆----Frequency set up.**
	1. Frequency selector ..... SET FREQUENCY
	- Proceed with item 3 below.
	◆----Frequency set up from the memory.
	1. XFR/MEM switch ..... MEM PRESS
	- Momentarily press switch to MEM, will step through the memory for choise of frequency.
	2. XFR/MEM switch ..... XFR PRESS
	- Momentarily press switch to XFR, will make chosen memory frequency active.
	◆----Receiving.
	3. COM volume lever ..... AS REQUIRED
	- Use headsets or hand microphones and loudspeakers.
	4. NORM/SQ OFF selector ..... CHECK
	- Selector normally in NORM-position. However, it may be necessary to deactivate squelch (SQ OFF) to receive weak signals.
	◆----Transmitting.
	3. XMIT SELECT - COM 1/COM 2 ..... SELECT
	- Check button to be illuminating.
	◆----4. PTT button ..... PRESS
	- Check a T to appear right of active frequency.
	5. PTT button ..... PRESS
	- After message.
	◆----4. PTT on hand microphone ..... PRESS
	- Check a T to appear right of active frequency.
	5. PTT button ..... RELEASE
(Cont'd)	- After message.

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	NOTE For Collins Pro Line II VHF COM: If transmitting on one COM with a frequency separation of 6.4 MHz or less between the two COMs, the other COM will be blocked out from receiving.

3. ABNORMAL OPERATION.

CONDITIONS	ABNORMAL PROCEDURES
3.1. LOSS OF COMMUNICATION.	**ACTIONS.** 1. Headsets ..... CHECK – Check for faulty headset by connecting them one at a time. 2. PTT button ..... CHECK – A faulty PTT button can block the system but the COMs can never transmit longer than 2 min. when transmission will be shut off automatically. ◆ **Communication still lost.** 3. NORM/EMER switch ..... EMER – COM 1, L audio control panel. – COM 2, R audio control panel. ◇ **Communication re–established.** 4. The audio control panel failed. – Only the COM can be used with switch in EMER. All other functions must be controlled by the opposite audio control panel. – The COM audio level becomes fixed and is not adjustable. – The PTT function can only be provided from the PTT button on the control wheel. L ACP: COM 1 – L control wheel. R ACP: COM 2 – R control wheel. 5. End of procedure. ◇ **Communication still lost.** 4. Communication lost. 5. End of procedure. ◆ **Communication re–established.** 3. If headsets failed use handmicrophones and loudspeakers. 4. End of procedure.
3.2. VHF DEAD.	**ACTIONS.** 1. CBs, E–13 (COM 1), L–12 (COM 2) ..... CHECK/RESET 2. End of procedure.

1. LIMITATIONS.

Not applicable.

2. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
2. 1. POWER UP.	1. ESS, L and R AVION switches ..... ON – The VHF COM systems are switched ON/OFF by ESS (COM 1) and R AVION (COM 2) switches.
2. 2. COMMUNICATION.	1. Frequency selector ..... SET FREQUENCY **Receiving.** 2. COM volume lever ..... AS REQUIRED – Use headset or hand microphones and loudspeakers. 3. PULL TEST knob ..... CHECK – Knob normally in pushed position. However, it may be necessary to deactivate squelch (Pull knob) to receive weak signals. **Transmitting.** 2. XMIT SELECT COM 1/COM 2 ..... SELECT – Check button to be illuminated. **PTT button ..... PRESS** – Check a T to appear right of active frequency. 3. PTT knob ..... RELEASE – After message. **PTT on hand microphone ..... PRESS** – Check a T to appear right of active frequency. 3. PTT button ..... RELEASE – After message. NOTE For King VHF COM: If transmitting on one COM with a frequency separation of 12.8 MHz or less between the two COMs, the other COM will be blocked out from receiving.

3. ABNORMAL OPERATION.

CONDITIONS	ABNORMAL PROCEDURES
3.1. LOSS OF COMMUNICATION.	**ACTIONS.** 1. Headsets ..... CHECK – Check for faulty headset by connecting them one at a time. 2. PTT button ..... CHECK – A faulty PTT button can block the system but the COMs can never transmit longer than 2 min. when transmission will be shut off automatically. ◆ **Communication still lost.** 3. NORM/EMER switch ..... EMER – COM 1, L audio control panel. – COM 2, R audio control panel. ◇ **Communication re–established.** 4. The audio control panel failed. – Only the COM can be used with switch in EMER. All other functions must be controlled by the opposite audio control panel. – The COM audio level becomes fixed and is not adjustable. – The PTT function can only be provided from the PTT button on the control wheel. L ACP: COM 1 – L control wheel. R ACP: COM 2 – R control wheel. 5. End of procedure. ◇ **Communication still lost.** 4. Communication lost. 5. End of procedure. ◆ **Communication re–established.** 3. If headsets failed use handmicrophones and loudspeakers. 4. End of procedure.
3.2. VHF COM DEAD.	**ACTIONS.** 1. CBs, E–13 (COM 1), L–12 (COM 2) ..... CHECK/RESET 2. End of procedure.

1. LIMITATIONS.

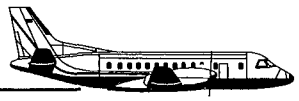
Not applicable.

2. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
2.1 POWER UP.	1. ESS, L and R AVION switches ..... ON - The VHF COM systems are switched ON/OFF by ESS (COM 1) and R AVION (COM 2) switches.
2.2 PROGRAMMING OF THE FREQUENCY MEMORY.	The Control unit contains eight programmable memorycells. 1. CHAN button ..... PRESS 2 SEC - Momentarily press CHAN button for more than 2 seconds to enter program mode. 2. Frequency selector ..... SELECT MEMORYCELL 3. Transfer button ..... PRESS - When momentarily pressed fives frequency selector control over either upper or lower display. - Controlled display is flashing. 4. Frequency selector ..... SET FREQUENCY - Any one of the two knobs will control the memorycells. ◆----**To program next frequency:** 5. Transfer button ..... PRESS - Proceed with item 2 abowe. ◆----**For return of Control unit to normal display:** 5. CHAN button ..... PRESS - No activity for 20 seconds will also return Control unit to normal display.

CONDITIONS	NORMAL PROCEDURES
2.3 COMMUNICATION.	◆----**Frequency set up.** 1. Frequency selector ..... SET FREQUENCY - Proceed with item 4 below. ◆----**Frequency set up from the memory.** 1. CHAN button ..... PRESS - Momentarily press CHAN to enter the freqyency memory. 2. Frequency selector ..... CHOSE MEMORY FREQUENCY - Any one of the two knobs will control the memorycell. 3. Transfer button ..... PRESS - Momentarily press Transfer button to make chosen memory frequency active. - Or, no activity for 5 seconds will make chosen memory frequency standby (SBY). ◆----**Receiving.** 4. COM volume lever ..... AS REQUIRED - Use headsets or handmicrophones and loudspeakers. 5. PUSH TEST button ..... CHECK - First push - squelch deactivated, next push - squelch activated again. - Sometimes it may be necessary to deactivate the squelch to receive weak signals. ◆----**Transmitting.** 4. XMIT SELECT - COM 1/COM 2 ..... SELECT - Check button to be illuminating. ◆----5. PTT button ..... PRESS - Check a T to appear right of active frequency. 6. PTT button ..... RELEASE - After message.
(Cont'd)	

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	**PTT on hand microphone ..... PRESS** – Check a T to appear right of active frequency. 5. PTT button ..... RELEASE – After message. NOTE For King VHF COM: If transmitting on one COM with a frequency separation of 12.8 MHz or less between the two COMs, the other COM will be blocked out from receiving.



3. ABNORMAL OPERATION.

CONDITIONS	ABNORMAL PROCEDURES
3.1. LOSS OF COMMUNICATION.	**ACTIONS.** 1. Headsets ..... CHECK – Check for faulty headset by connecting them one at a time. 2. PTT button ..... CHECK – A faulty PTT button can block the system but the COMs can never transmit longer than 2 min. when transmission will be shut off automatically. ◆ **Communication still lost.** 3. NORM/EMER switch ..... EMER – COM 1, L audio control panel. – COM 2, R audio control panel. ◇ **Communication re–established.** 4. The audio control panel failed. – Only the COM can be used with switch in EMER. All other functions must be controlled by the opposite audio control panel. – The COM audio level becomes fixed and is not adjustable. – The PTT function can only be provided from the PTT button on the control wheel. L ACP: COM 1 – L control wheel. R ACP: COM 2 – R control wheel. 5. End of procedure. ◇ **Communication still lost.** 4. Communication lost. 5. End of procedure. ◆ **Communication re–established.** 3. If headsets failed use handmicrophones and loudspeakers. 4. End of procedure.
3.2. VHF DEAD.	**ACTIONS.** 1. CBs, E–13 (COM 1), L–12 (COM 2) ..... CHECK/RESET 2. End of procedure.

1. GENERAL.

The Passenger Address (PA) and Interphone are two combined systems, utilizing the same amplifier unit (PA amplifier) located in the avionics rack.

The PA system provides the passengers with cabin attendant call buttons which gives a HI chime tone in the cabin loudspeaker system for attention.

The HI chime tone will also be heard as soon as "NO SMOKING" or "SEAT BELT" signs are operated on/ off.

For boarding music etc., an entertainment system can easily be connected to the PA system.

The Interphone system provides communication via two interphones, between cockpit and cabin crew and also for giving messages to the passengers. There are also three lights PA, CALL and EMER, which together with HI–LOW chime tone, alerts the cockpit/ cabin crews about any calls.

The Interphone gives the following communications:

– Cockpit to passenger.

– Cockpit to cabin attendant.

– Cabin attendant to cockpit.

– Cabin attendant to passenger.

The PA system has the following functions:

– Cabin attendant call buttons.

– NO SMOKING/ SEAT BELT signs.

– Loudspeakers for distribution of messages.

– Boarding music/entertainment systems.

2. MAIN COMPONENTS AND SUBSYSTEMS.

2.1. PA AMPLIFIER.

The PA amplifier basically consists of an amplifier circuit and a chime generator circuit.

Audio signals from the cockpit and cabin interphones are amplified as well as HI and LOW chime tones created by the chime generator. HI chime is a 585 Hz tone and LOW chime is a 495 Hz tone. The PA amplifier also distributes the audio signals out to the cabin loudspeakers.

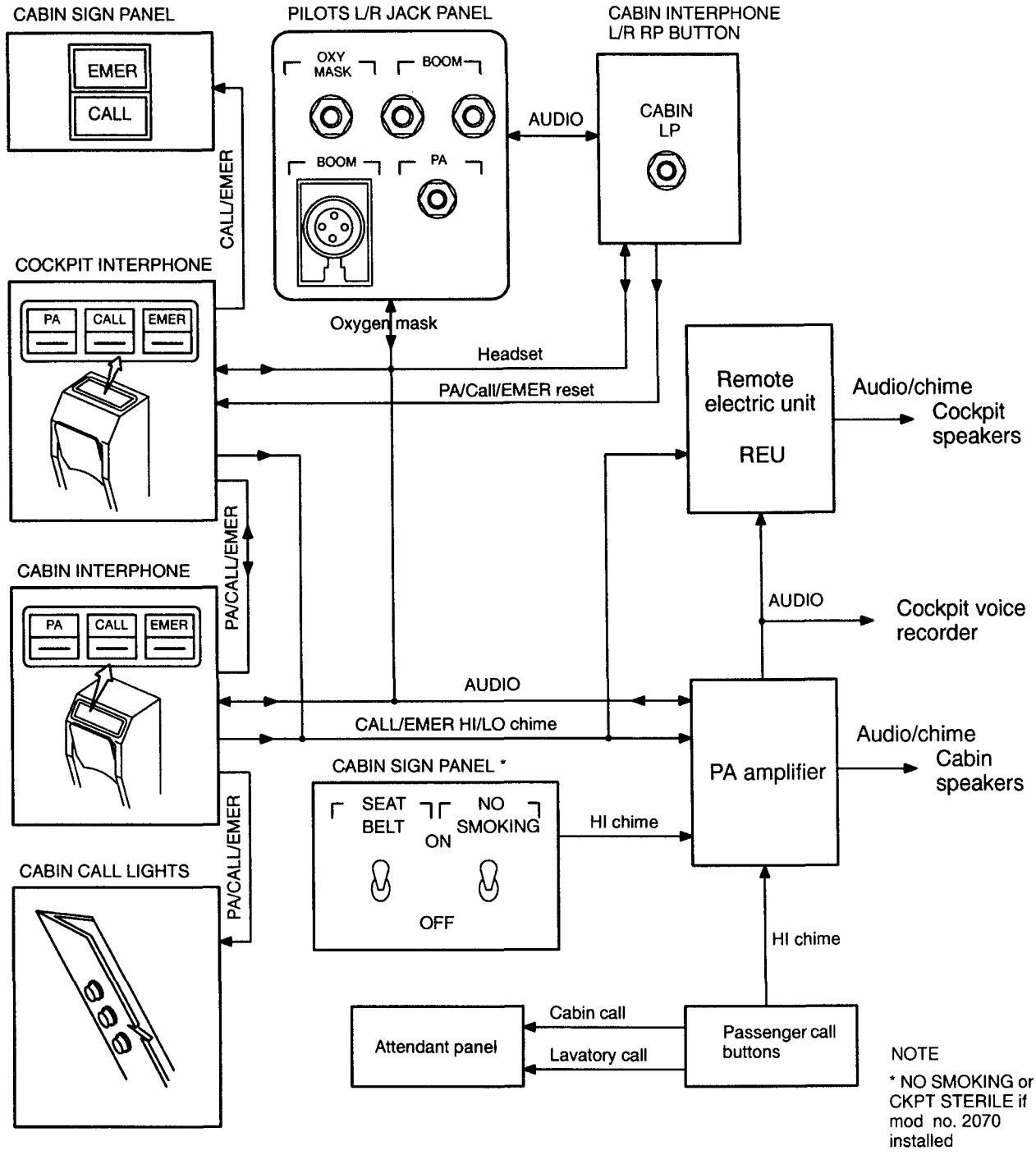
The amplifier has two fixed audio levels, one low level and one increased level for engine/propeller noise compensation, controlled by engine oil pressure.

2.2. Cockpit/cabin interphone.

The similar type of interphones is used in cockpit and cabin. The handset is provided with noise cancelling microphone. There are three buttonlights on top of the cradle, PA, CALL and EMER. The upper half of the buttonlight is lit to identify the function. The lower half of the buttonlight will come on to indicate the function in use. The amplifiers for the interphone system are located in the cradles. The cabin interphone is protected against inadvertent use, therefore the handset must be released before selecting a buttonlight.

2.3. Loudspeakers.

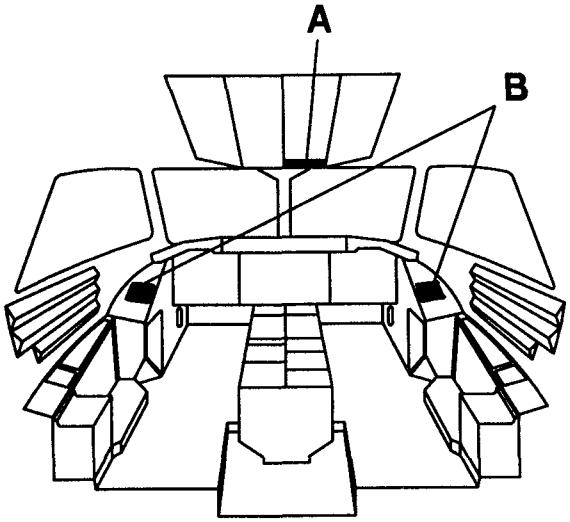
There are six loudspeakers in the cabin evenly distributed above the passenger seats and one in the lavatory area.



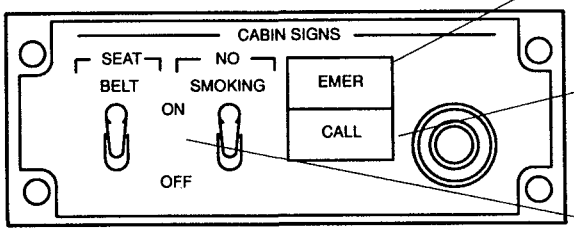
A16551

Fig. 1. PA/INTERPHONE – schematic.

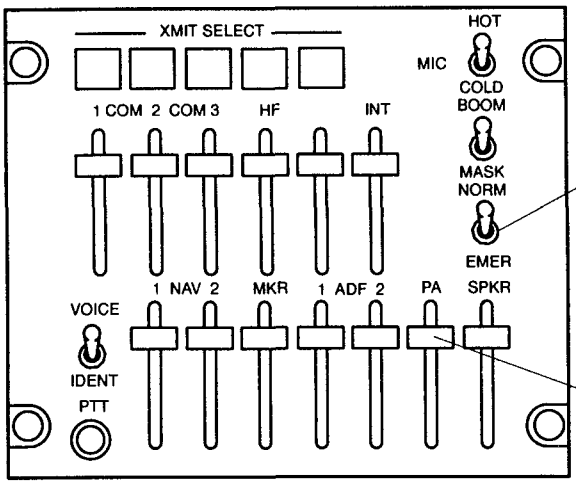
3. CONTROLS AND INDICATORS.



A CABIN SIGN PANEL



B AUDIO CONTROL PANEL, ACP



A14872

EMER (emergency) light.
Comes on flashing in red together with HI–LOW chime when cockpit is emergency called by cabin attendant.

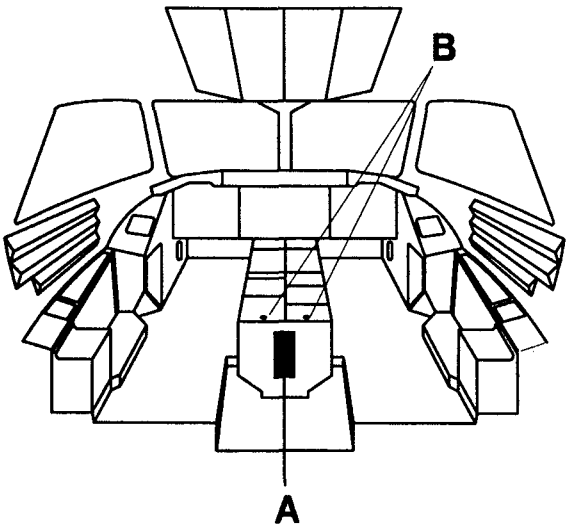
CALL light.
Comes on in amber together with HI–LOW chime when cockpit is called by cabin attendant.

SEAT BELT and NO SMOKING switches (CKPT STERILE instead of no smoking if mod. no. 2070 installed) give Hi chime in cabin whenever cabin signs are switched OFF/ON or ON/OFF.

NORM / EMER switch.
If oxygen mask in use:
If EMER selected, only PA messages can be given on that side and from the oxygen mask using the PA button on the pilot's jack panels.
All other PA/Interphone functions are inoperative.
The other pilot side is not affected.
If oxygen mask not in use:
Use Flight Deck Interphone for PA and cabin calls.

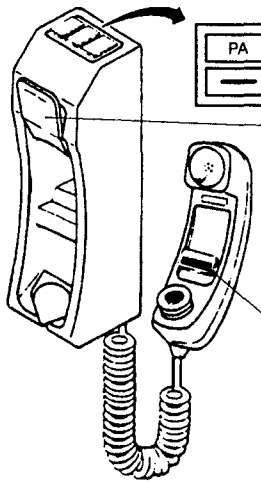
Cabin PA volume.
Only when PA selected in cockpit or cabin:
Messages given to the passenger from cockpit crew or cabin attendant can be listened to by increasing the PA volume.

Fig. 2. Cabin sign and audio control panel – controls and lights.



Call buttonlights.
PA – Select to give passenger messages.
CALL – Select to call cabin attendant.
EMER – Select to give emergency call to cabin attendant.
The selected CALL or EMER buttonlight comes on together with HI–LOW chime when cockpit crew;s called by cabin attendant.
PA buttonlight comes on without chime when cabin crew gives message to the passengers.
Selected PA/CALL buttonlight illuminates in green, EMER in red and flashing.

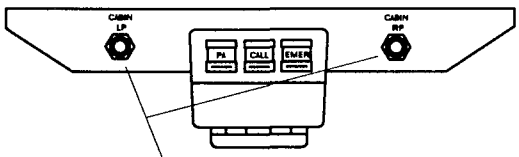
A FLIGHT DECK INTERPHONE



Handset release.
Pull the lever to release handset.

Press to talk button

B CABIN INTERPHONE BUTTON (L/P, R/P)

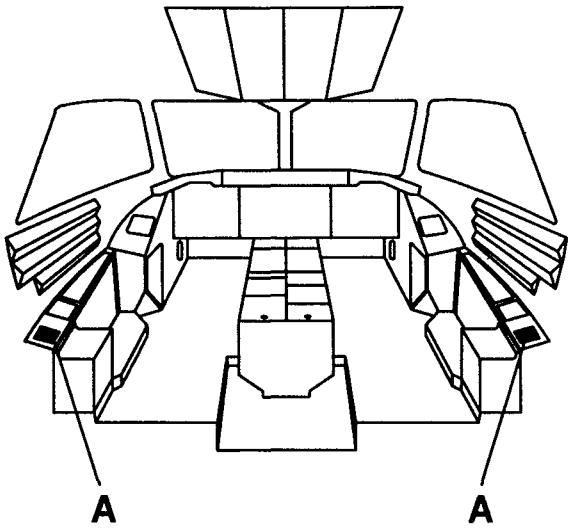


Interphone button when headset in use.
Calls to cabin:
– Select a buttonlight on the cockpit interphone.
– Press the cabin interphone button and give message in headset microphone.
– After message, release cabin interphone button which also resets the cockpit interphone button–lights.

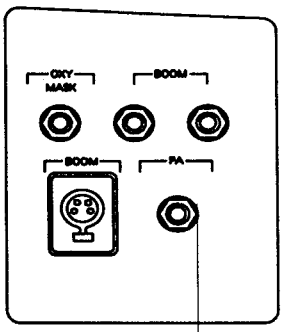
Calls from cabin:
– Press the cabin interphone button to answer message.
– After message, release cabin interphone button.

A16559

Fig. 3. Cockpit interphone and PA buttons – controls.



A PILOT'S JACK PANEL



PA calls with oxygen mask and use of the PA button.

Calls to cabin:
- When oxygen mask interphone button is pressed, the mask microphone will automatically be switched to PA for passenger messages. No other function can be selected.
- After message, release oxygen mask interphone button.

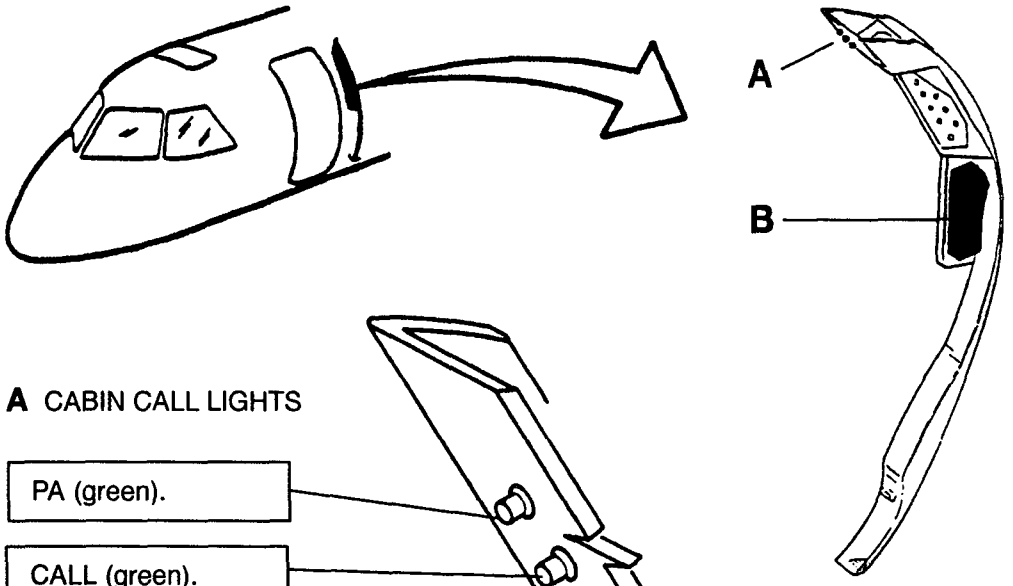
Calls from cabin:
- Press oxygen mask interphone button to answer message (the passengers will also hear the answer over the cabin loudspeakers).
- After message, release oxygen mask interphone button.

NOTE

When oxygen mask not in use, the PA button and oxygen mask is the only way to give PA calls if the NORM EMER switch on one ACP is in EMER position. The other pilot side is not affected.

A16558

Fig. 4. PA calls with oxygen mask and using the PA button.



A CABIN CALL LIGHTS

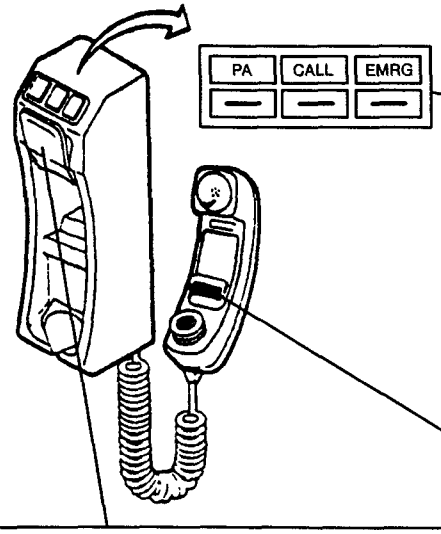
PA (green).

CALL (green).

EMERGENCY (red and flashing).

The selected CALL or EMER call light comes on together with HI–LOW chime when cabin attendant is called by cockpit crew. PA call light comes on without chime when cockpit crew gives message to the passengers.

B CABIN INTERPHONE



Call buttonlights.
PA – Select to give passenger messages.
CALL – Select to call cockpit.
EMRG – Select to emergency call cockpit.
The selected CALL or EMER buttonlight comes on together with HI–LOW chime when cabin attendant is called by cockpit crew.
PA buttonlight comes on without chime when cockpit crew gives message to the passengers.
Selected PA/CALL buttonlight illuminates in green, EMER in red and flashing.
The interphone is protected against inadvertent use, therefore the handset must be released before selecting a buttonlight.

Handset release.
Pull the lever to release handset.

Press to talk button.

A14991

Fig. 5. Cabin interphone – controls and indicators.

4. ELECTRICAL POWER SUPPLY.

PA	L BAT BUS	E–12	PA L
Passenger cabin attendant call	UTILITY BUS	L–25, L–27	CABIN READ L CABIN READ R
Boarding music (if installed)	R ESS BUS*	L–11	BOARD MUSIC

* Supplied by the R INV BUS if the boarding music is AC powered.

IF TAWS INSTALLED:

PA	L BAT BUS	E–12	PA L
Passenger cabin attendant call	UTILITY BUS	L–25, L–27	CABIN READ L CABIN READ R
TAWS Audio	R BAT BUS	L–11	AUDIO TAWS
Boarding music (if installed)	R ESS BUS*	L–13	BOARD MUSIC

* Supplied by the R INV BUS if the boarding music is AC powered.

1. GENERAL.

The Passenger Address (PA) and Interphone are two combined systems, utilizing the same amplifier unit (PA amplifier) located in the avionics rack.

The PA system provides the passengers with cabin attendant call buttons which gives a HI chime tone in the cabin loudspeaker system for attention.

The HI chime tone will also be heard as soon as "NO SMOKING" or "SEAT BELT" signs are operated on/ off.

For boarding music etc., an entertainment system can easily be connected to the PA system.

The Interphone system provides communication via two interphones, between cockpit and cabin crew and also for giving messages to the passengers. There are also three lights PA, CALL and EMER, which together with HI–LOW chime tone, alerts the cockpit/ cabin crews about any calls.

The Interphone gives the following communications:

– Cockpit to passenger.

– Cockpit to cabin attendant.

– Cabin attendant to cockpit.

– Cabin attendant to passenger.

The PA system has the following functions:

– Cabin attendant call buttons.

– NO SMOKING/ SEAT BELT signs.

– Loudspeakers for distribution of messages.

– Boarding music/entertainment systems.

2. MAIN COMPONENTS AND SUBSYSTEMS.

2.1. PA AMPLIFIER.

The PA amplifier basically consists of an amplifier circuit and a chime generator circuit.

Audio signals from the cockpit and cabin interphones are amplified as well as HI and LOW chime tones created by the chime generator. HI chime is a 585 Hz tone and LOW chime is a 495 Hz tone. The PA amplifier also distributes the audio signals out to the cabin louspeakers.

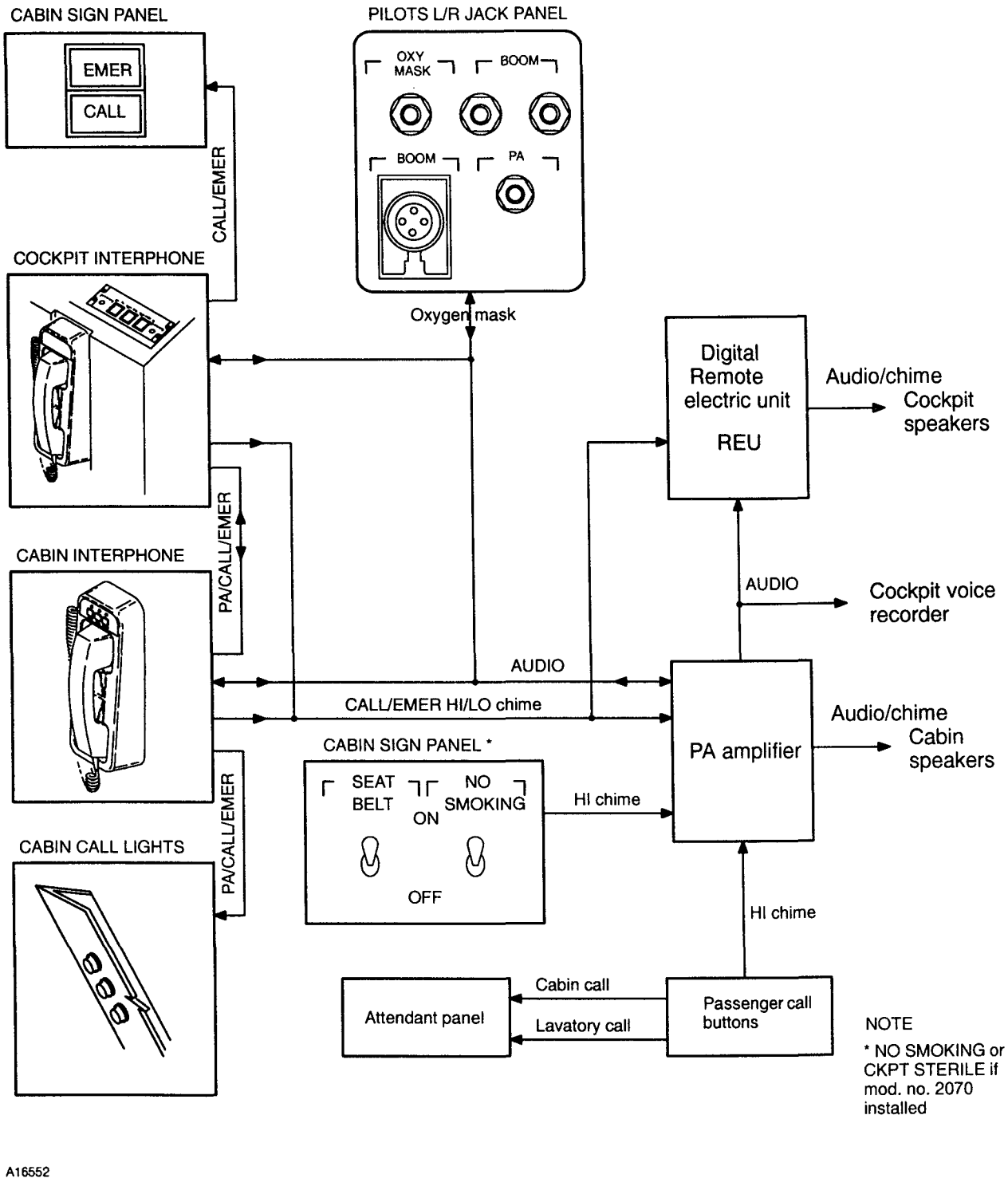
The amplifier has two fixed audio levels, one low level and one increased level for engine/propeller noice compensation, controlled by engine oil pressure.

2.2. Cockpit/cabin interphone.

The similar type of interphones is used in cockpit and cabin. The handset is provided with noise cancelling microphone. There are three buttonlights on top of the cradle, PA, CALL and EMER. The upper half of the buttonlight is lit to identify the funciton. The lower half of the buttonlight will come on to indicate the function in use. The amplifiers for the interphone system are located in the cradles. The cabin interphone is protected against inadvertent use, therefore the handset must be released before selecting a buttonlight.

2.3. Loudspeakers.

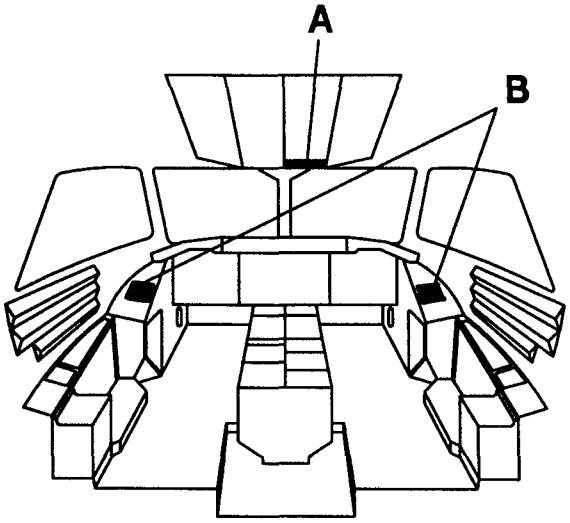
There are six loudspeakers in the cabin evenly distributed above the passenger seats and one in the lavatory area.



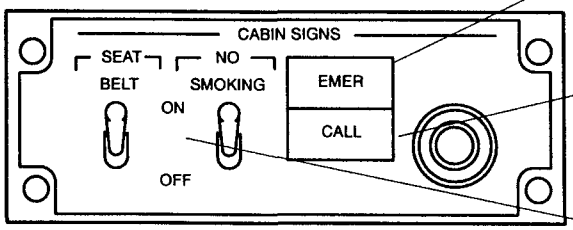
A16552

Fig. 1. PA/INTERPHONE – schematic.

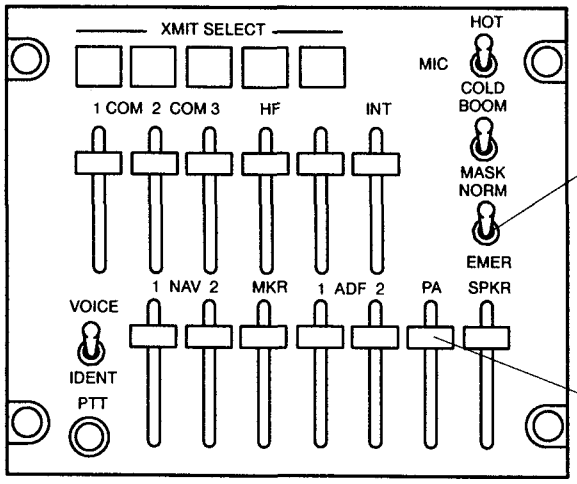
3. CONTROLS AND INDICATORS.



A CABIN SIGN PANEL



B AUDIO CONTROL PANEL, ACP



A14872

EMER (emergency) light.
Comes on flashing in red together with HI–LOW chime when cockpit is emergency called by cabin attendant.

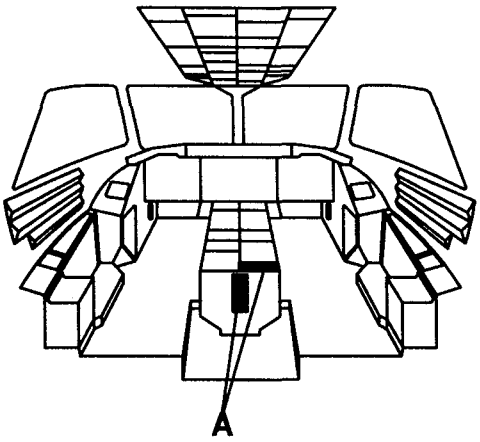
CALL light.
Comes on in amber together with HI–LOW chime when cockpit is called by cabin attendant.

SEAT BELT and NO SMOKING switches (CKPT STERILE instead of no smoking if mod. no. 2070 installed) give Hi chime in cabin whenever cabin signs are switched OFF/ON or ON/OFF.

NORM / EMER switch.
If oxygen mask in use:
If EMER selected, only PA messages can be given on that side and from the oxygen mask using the PA button on the pilot's jack panels.
All other PA/Interphone functions are inoperative.
The other pilot side is not affected.
If oxygen mask not in use:
Use Flight Deck Interphone for PA and cabin calls.

Cabin PA volume.
Only when PA selected in cockpit or cabin:
Messages given to the passanger from cockpit crew or cabin attendant can be listened to by increasing the PA volume.

Fig. 2. Cabin sign and audio control panel – controls and lights.



Interphone calls with headset (with or without oxygen mask) in use.

Calls to cabin:

– Select a function button (PA, CALL, or EMER).

– Press the CAB interphone button and give message in headset/mask micro–phone.

– After message, release CAB inter–phone button which also resets the selected function button.

Calls from cabin:

– Press the cabin interphone button to answer message.

– After message, release cabin interphone button.

NOTE

If oxygen mask is used together with headset, the BOOM MASK switch on the ACP must be in MASK position.

Interphone calls.

Calls to cabin:

– Lift the handset and select (PA,CALL, or EMER).

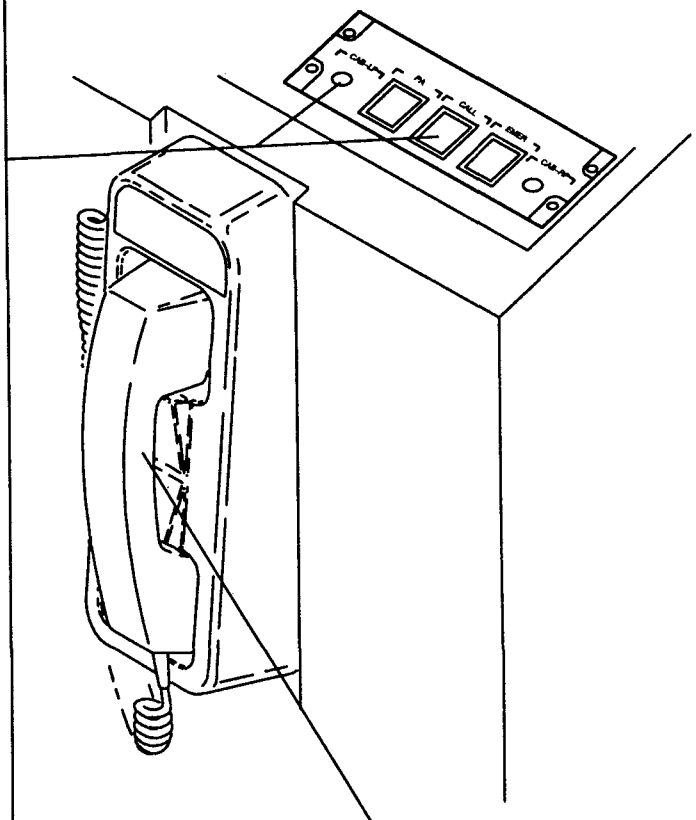
Calls from cabin:

– Lift the handset and answer message.

Emergency calls are identified by triple HI–LOW chimes and a red message EMER CALL on PED.

Flight deck calls are identified by single HI–LOW chime and a green CALL message on SED.

A FLIGHT DECK INTERPHONE

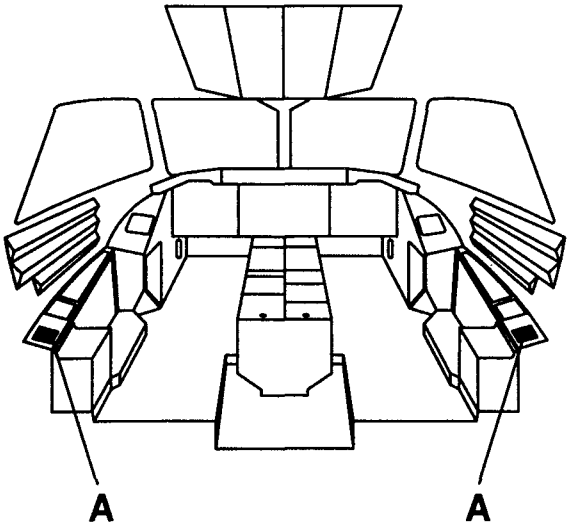


Push To Talk button

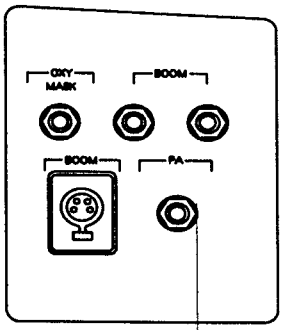
Only needed for PA calls.

A14854

Fig. 3. Cockpit interphone and PA buttons – controls.



A PILOT'S JACK PANEL



PA calls with oxygen mask and use of the PA button.

Calls to cabin:
- When oxygen mask interphone button is pressed, the mask microphone will automatically be switched to PA for passenger messages. No other function can be selected.
- After message, release oxygen mask interphone button.

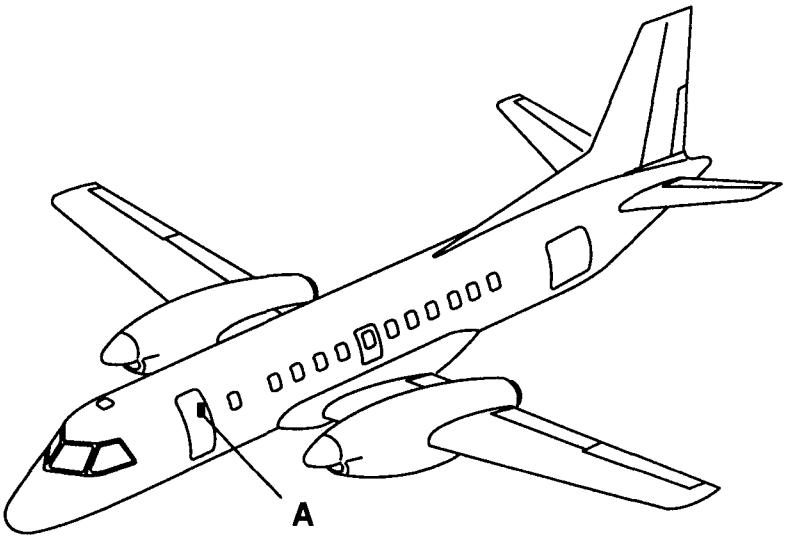
Calls from cabin:
- Press oxygen mask interphone button to answer message (the passengers will also hear the answer over the cabin loudspeakers).
- After message, release oxygen mask interphone button.

NOTE

When oxygen mask not in use, the PA button and oxygen mask is the only way to give PA calls if the NORM EMER switch on one ACP is in EMER position. The other pilot side is not affected.

A16558

Fig. 4. PA calls with oxygen mask and using the PA button.



A CABIN INTERPHONE

Call buttons

EMG – Emergency call to flight deck

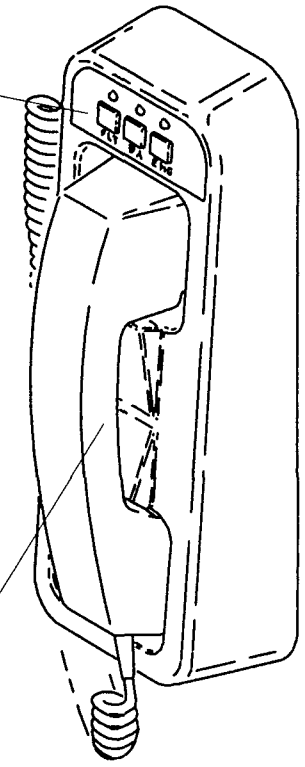
PA – Passenger calls

FLT – Flight deck call

The phone is protected against inadvertent use, the handset must be released before use.

EMG calls are identified by triple HI–LOW chimes.

FLT calls are identified by single HI–LOW chime.

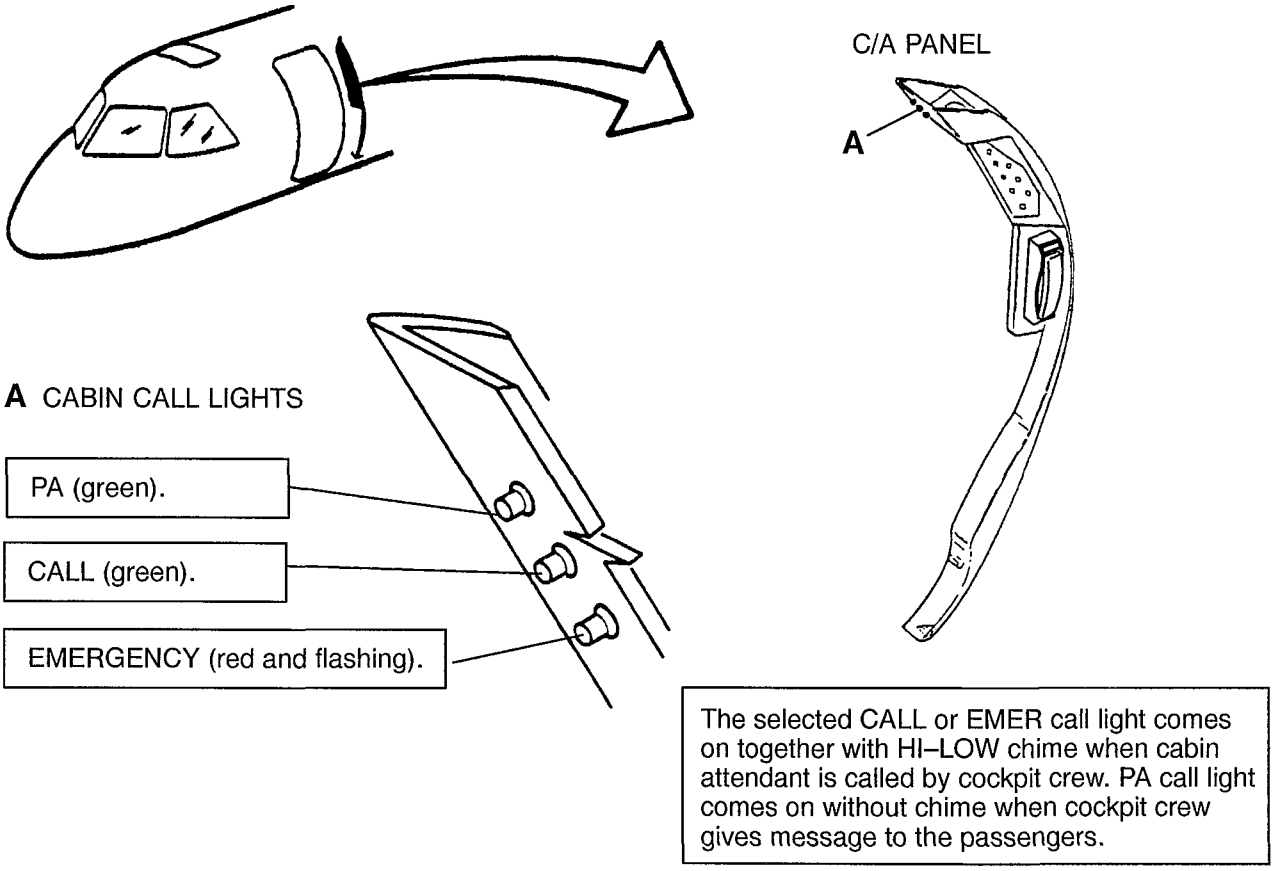


Push To Talk button

Only needed for PA calls.

A14853

Fig. 5. Cabin interphone – controls and indicators.



A16564

Fig. 6. Cabin call light.

4. ELECTRICAL POWER SUPPLY.

PA	L BAT BUS	E–12	PA L
Passenger cabin attendant call	UTILITY BUS	L–25, L–27	CABIN READ L CABIN READ R
Boarding music (if installed)	R ESS BUS*	L–11	BOARD MUSIC

* Supplied by the R INV BUS if the boarding music is AC powered.

IF TAWS INSTALLED:

PA	L BAT BUS	E–12	PA L
Passenger cabin attendant call	UTILITY BUS	L–25, L–27	CABIN READ L CABIN READ R
TAWS Audio	R BAT BUS	L–11	AUDIO TAWS
Boarding music (if installed)	R ESS BUS*	L–13	BOARD MUSIC

* Supplied by the R INV BUS if the boarding music is AC powered.

4. LIMITATIONS.

Not applicable.

5. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
5. 1. POWER UP.	1. L BAT switch ..... ON – Power is applied to the PA/INTERPHONE system by L BAT switch. 2. R AVION switch ..... ON – Power is applied to the passengers attendant call buttons by R AVION switch.
5. 2. ANNOUNCE-MENT FROM COCKPIT TO CABIN. (Cont'd)	◆ - **Call buttonlights.** PA – Select to give passenger messages. CALL – Select to call cabin attendant. EMER – Select to give emergency call to cabin attendant. **Via cockpit interphone.** 1. Buttonlight (cockpit interphone) ..... SELECT – Selected buttonlight comes on. 2. Handset ..... LIFT 3. Handset talk button ..... PRESS AND HOLD – Wait for answer (CALL/EMER). – Make announcement. After message: 4. Handset ..... REPLACE – Selected buttonlight goes out indicating the inter–phone is reset. ◆ - **Via headset.** 1. Buttonlight (cockpit interphone) ..... SELECT – Selected buttonlight comes on.

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	2. CABIN interphone button ..... PRESS AND HOLD – Wait for answer (CALL/EMER). – Make announcement. After message: 3. CABIN interphone button ..... RELEASE – When released, the interphone will reset which is indicated by selected buttonlight going out. ◆ **- Via oxygen mask microphone.** 1. Oxygen mask interphone button ..... PRESS AND HOLD – The mask microphone is automatically switched to PA. – Make announcement. After message: 2. Interphone button ..... RELEASE
5. 3. CALLS FROM CABIN. (Cont'd)	Cabin attendant announcements to the passengers is indicated by the PA buttonlight coming on, and can be listened to via the PA volume lever (ACP). Answer cabin attendant calls: ◆ **- Via cockpit interphone.** 1. Handset ..... LIFT 2. Handset talk button ..... PRESS AND HOLD – Answer the call. After message: 3. Handset ..... REPLACE The selected buttonlight goes out indicating the interphone is reset when the cabin attendant replaces the cabin handset. ◆ **- Via headset.** 1. CABIN interphone button ..... PRESS AND HOLD – Answer the call.

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	After message: 2. CABIN interphone button ..... RELEASE The selected buttonlight goes out indicating the interphone is reset when the cabin attendant replaces the cabin handset. ◆ - **Via oxygen mask microphone.** 1. Oxygen mask PA button ..... PRESS AND HOLD – Answer the call. After message: 2. PA button ..... RELEASE The selected buttonlight goes out indicating the interphone is reset when the cabin attendant replaces the cabin handset.
5. 4. ANNOUNCE-MENT FROM CABIN INTER-PHONE. CABIN ATTENDANT (Cont'd)	**Call buttonlights.** PA – Select to give passenger messages. CALL – Select to call cockpit crew. EMER – Select to give emergency call to cockpit crew. 1. Handset ..... LIFT – The interphone is protected against inadvertent use, therefor the handset must be released before selecting a buttonlight. 2. Buttonlight (cabin interphone) ..... SELECT – Selected buttonlight comes on. 3. Handset talk button ..... PRESS AND HOLD – Wait for answer (CALL/EMER). – Make announcement. After message: 4. Handset ..... REPLACE – Selected buttonlight goes off indicating the interphone is reset.

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	NOTE When calling the cockpit: If the pilots are using oxygen masks, the answer will come over the cabin loudspeakers (PA).
5. 5. CALLS FROM COCKPIT. CABIN ATTENDANT	Cockpit announcement to the passengers are indicated by the PA buttonlight comes on. 1. Handset (cabin interphone) ..... LIFT 2. Handset talk button ..... PRESS AND HOLD – Answer the call. After message: 3. Handset ..... REPLACE The selected buttonlight goes off indicating the interphone is reset when the cockpit handset/interphone button is replaced/reset. NOTE When calling the cockpit: If the pilots are using oxygen masks, the answer will come over the cabin loudspeakers (PA).

6. ABNORMAL OPERATION.

It is recommended that the individual operator develop alternative procedures for normal operation in case of interphone system failure.

CONDITIONS	ABNORMAL PROCEDURES
6. 1. INTERPHONE SYSTEM DEAD.	**ACTION.** 1. CB E–12 (PA L) ..... CHECK/RESET 2. End of procedure.
6. 2. PASSENGERS ATTENDANT CALL BUTTONS DEAD.	**ACTION.** 1. CB L–11 (PA R) ..... CHECK/RESET 2. End of procedure.

4. LIMITATIONS.

Not applicable.

5. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
5. 1. POWER UP.	1. L BAT switch ..... ON – Power is applied to the PA/INTERPHONE system by L BAT switch. 2. R AVION switch ..... ON – Power is applied to the passengers attendant call buttons by R AVION switch.
5. 2. ANNOUNCEMENT FROM COCKPIT TO CABIN. (Cont'd)	◆ - **Call buttonlights.** PA – Select to give passenger messages. CALL – Select to call cabin attendant. EMER – Select to give emergency call to cabin attendant. **Via cockpit interphone.** 1. Handset ..... LIFT 2. Buttonlight ..... SELECT – Selected buttonlight comes on. 3. Handset talk button ..... PRESS AND HOLD – Only required for PA calls. After message: 4. Handset ..... REPLACE – Selected buttonlight goes out indicating the interphone is reset. ◆ - **Via headset (with or without oxygen mask).** 1. Buttonlight (cockpit interphone) ..... SELECT – Selected buttonlight comes on.

CONDITIONS	NORMAL PROCEDURES
(Cont'd)	2. CAB (LP or RP) button ..... PRESS AND HOLD – Wait for answer (CALL/EMER) or make announcement. After message: 3. CAB button ..... RELEASE – Selected buttonlight goes out indicating the interphone is reset.
5. 3. CALLS FROM CABIN.	Cabin attendant announcements to the passengers is indicated by the PA buttonlight coming on, and can be listened to via the PA volume lever (ACP). Answer cabin attendant calls: ◆ **- Via cockpit interphone.** 1. Handset ..... LIFT – Answer the call. After call: 2. Handset ..... REPLACE The selected buttonlight goes off indicating the interphone is reset when the cabin attendant replaces the cabin handset. ◆ **- Via headset (with or without oxygen mask).** 1. CAB (LP or RP) button ..... PRESS AND HOLD – Answer the call. After message: 2. CAB button ..... RELEASE The selected buttonlight goes out indicating the interphone is reset when the cabin attendant replaces the cabin handset.

CONDITIONS	NORMAL PROCEDURES
5. 4. ANNOUNCE-MENT FROM CABIN INTER-PHONE. CABIN ATTENDANT	**Call buttonlights.** PA – Select to give passenger messages. CALL – Select to call cockpit crew. EMER – Select to give emergency call to cockpit crew. 1. Handset ..... LIFT – The interphone is protected against inadvertent use, therefor the handset must be released before selecting a buttonlight. 2. Call button (cabin interphone) ..... SELECT – Selected buttonlight comes on. 3. Handset talk button ..... PRESS AND HOLD – Make announcement. After announcement: 4. Handset ..... REPLACE – Selected buttonlight goes out indicating the interphone is reset.
5. 5. CALLS FROM COCKPIT.	Cockpit announcement to the passengers are indicated by the PA buttonlight coming on. 1. Handset (cabin interphone) ..... LIFT 2. Handset talk switch ..... PRESS AND HOLD – Answer the call. After message: 3. Handset ..... REPLACE The selected buttonlight goes out indicating the interphone system is reset first when the cockpit handset/interphone button is replaced/reset. NOTE When calling the cockpit: If the pilots are using oxygen masks, the answer will come over the cabin loudspeakers (PA).

6. ABNORMAL OPERATION.

It is recommended that the individual operator develop alternative procedures for normal operation in case of interphone system failure.

CONDITIONS	ABNORMAL PROCEDURES
6. 1. INTERPHONE SYSTEM DEAD. CABIN ATTENDANT	**ACTION.** 1. CB E–12 (PA L) ..... CHECK/RESET 2. End of procedure.

1. GENERAL

ACARS is an abbreviation for ARINC communication and reporting system. The system is designed to reduce the requirement of voice communications by reporting automatically the arrival and departure times of the aircraft and other operational flight data. The system uses an assigned VHF airborne frequency to transmit and receive data from a ground station that is similarly equipped.

The system provides current up-to-date information to the aircrew without increasing the workload of voice communication systems. The ACARS allows the aircrew to send information such as departure time, arrival time, fuel status, and flight delay information to the airline command center. In essence, the ACARS system provides an information service to the aircrew and the airline command while still maintaining a manageable workload for the aircrew. Other benefits of ACARS include ground monitoring of aircraft engines and other parameters, more efficient exchange of information concerning arrival and connecting flights, reduction of multiple frequency changes in the aircraft, and a more reliable aircraft selective calling system.

2. MAIN COMPONENTS AND SUBSYSTEMS.

2. 1 ACARS system.

The ACARS system consists of an airborne subsystem and a ground station network. The airborne ACARS consists of a Management unit, Control display panel, VHF com transceiver and a VHF antenna. The ground station network consists of a VHF com ground station controlled by a central processing computer, and a switching network connected to individual airline computer systems, see fig. 2.

2. 2 Management unit.

The Management unit contains the circuits required to control sampling of data from aircraft systems and sensors through the FDAU. The Management unit receives the ground-to-air digital messages from the VHF com transceiver and controls the transmission of air-to-ground messages through the VHF com transceiver, see fig. 1.

2. 3 Control display panel.

The Control display panel provides the aircrew interface with ACARS. The touch sensitive display screen provides Keypads, Alphabetic and Numeric Keyboards to allow entering of the text portions of the departure/arrival reports, ETA reports, company messages etc. The display screen is covered with an infrared touch-matrix for data input. The touch is detected as a breach in the infrared matrix and is activated until the breach (finger, pen etc.) is no longer present.

The infrared touch technology always permits operation even in direct sunlight and at all touch angles.

The display supplies both bit mapped graphics and text with a text range from 14 lines with 24 columns, to 24 lines with 40 columns.

2. 4 Printer.

The printer provides a hard copy printout of data, collected by the Management unit. Data that will be printed includes upbrushed printer messages and data entered into the Control display panel not queued for transmission. Upbrushed messages could include weather reports, dispatch information etc.

2. 5 ACARS ground facilities.

The ACARS ground stations consist of an ARINC central computer, a switching network system and a VHF com radio station. Individual Airline computer systems are commuting with the ARINC central computer through the switching network. Fig. 2.

The ARINC Electronics Switching Systems (ESS) network provides VHF radio coverage to enroute aircraft and terminal coverage at more than 150 airports in North America. The network covers all of the United States, some US possessions, and portions of Mexico and Canada.

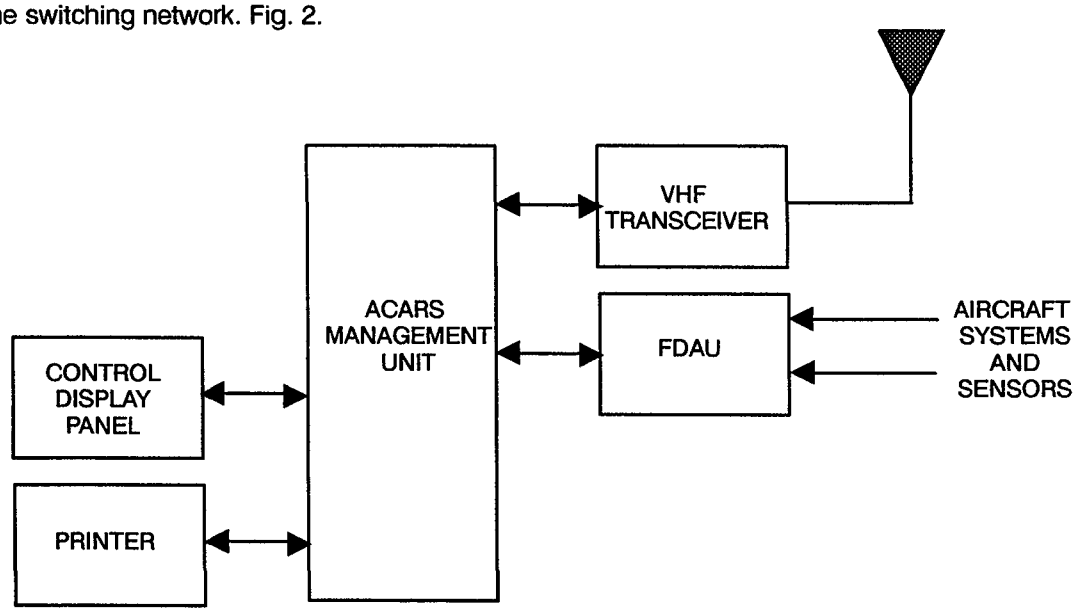


Fig. 1 ACARS system schematic.

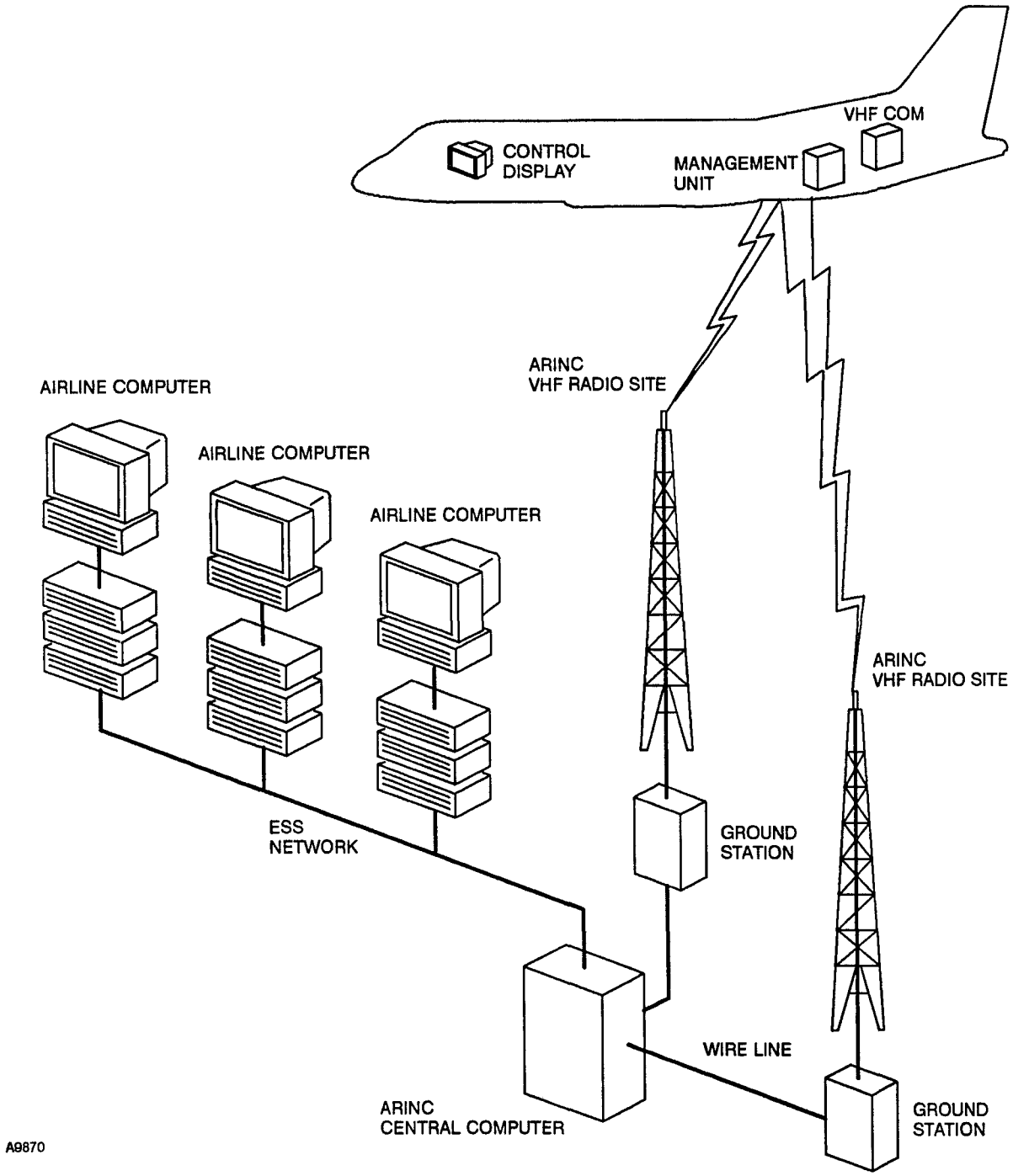
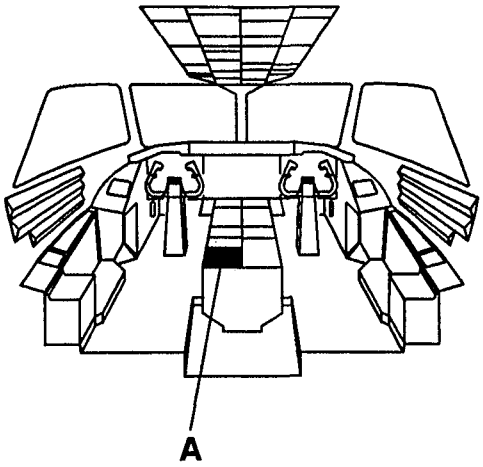
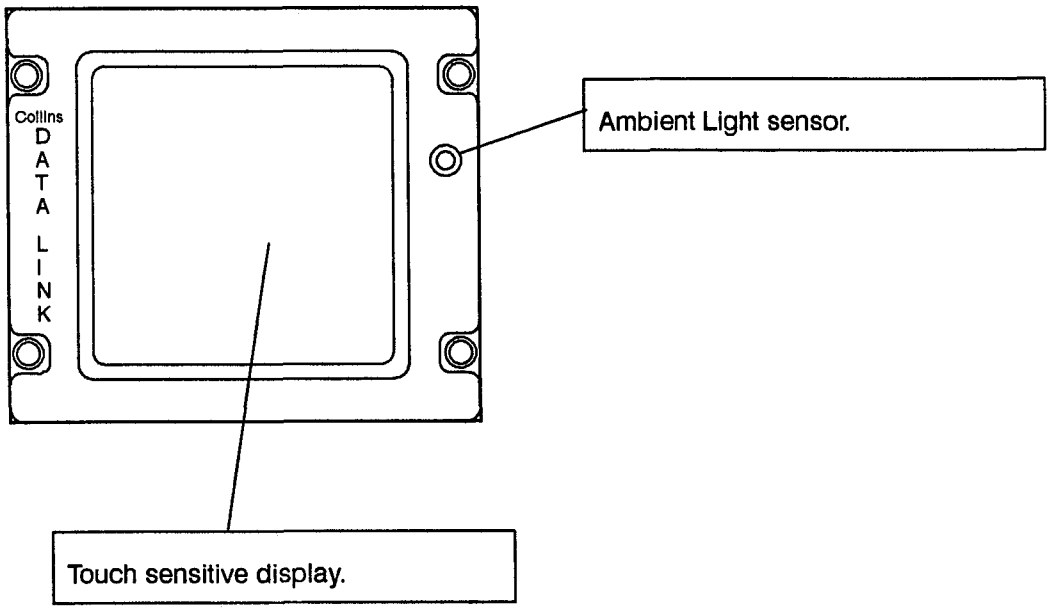


FIG 2 ACARS ground network.

3. CONTROLS AND INDICATORS

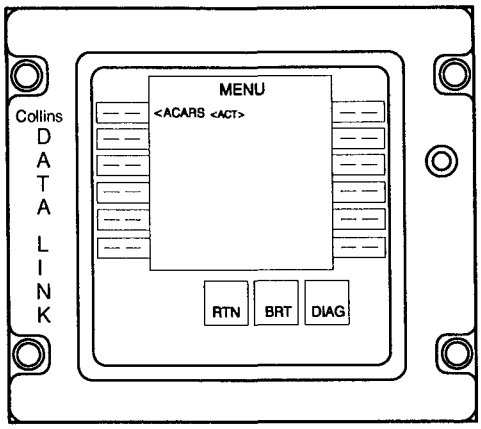


A ACARS CONTROL DISPLAY PANEL



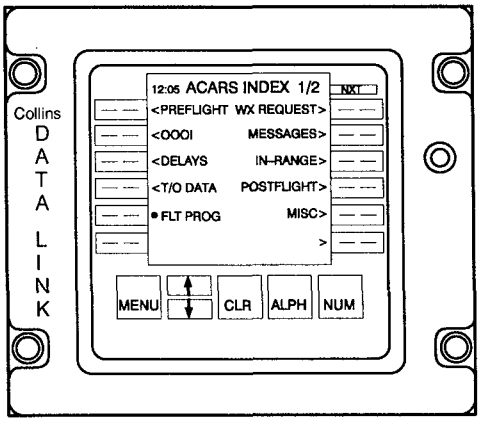
A9866

FIG 1 ACARS control display panel - controls.



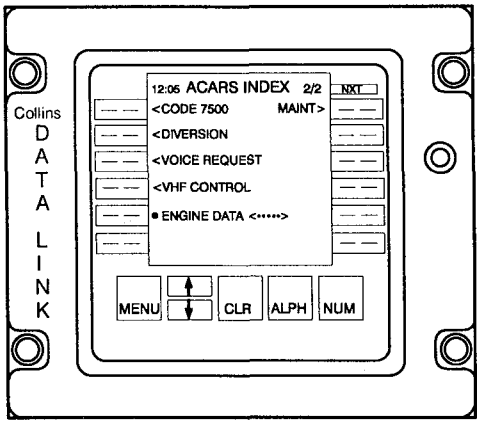
Menu page keypads

Label	Function Performed
RTN	Displays subsystem display page.
BRT	Displays brightness control page.
DIAG	Displays MIDU location page which shows pgm pin status.



Select / User Function page keypads 1/2

Label	Function Performed
MENU	Displays MIDU MENU page.
↑	Up arrow (not operational)
↓	Down arrow (not operational)
CLR	Clears last operation/ Clears last entry.
ALPH	Displays alphabetic keyboard page.
NUM	Displays numeric keyboard page.

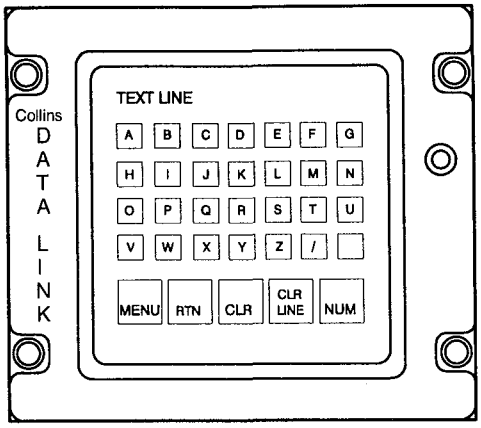


Select / User Function page keypads 2/2

Label	Function Performed
Same as above.	

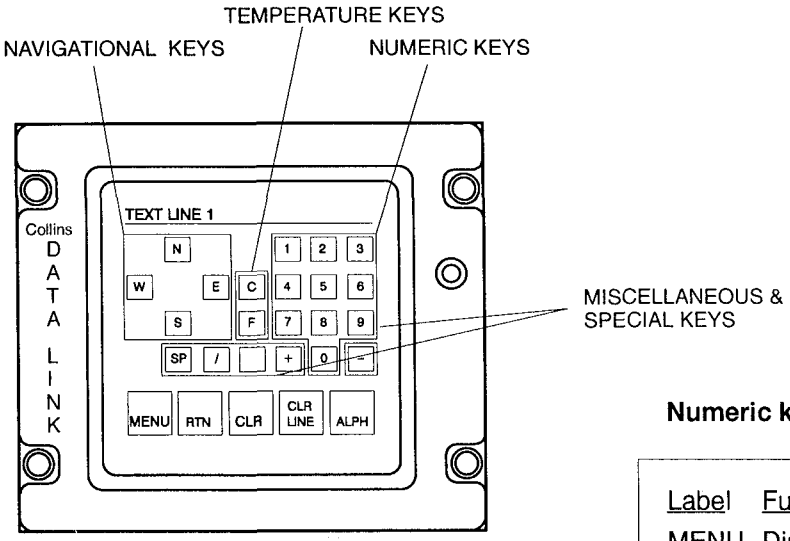
A9867

FIG 2 Menu and Index pages – keypads.



Alphabetic keyboard

Label	Function Performed
MENU	Displays MIDU MENU page.
RTN	Displays subsystem page.
CLR	Clears last operation/Clears last character.
CLR LINE	Clears scratch pad of last message/text entry.
NUM	Displays numeric keyboard page.

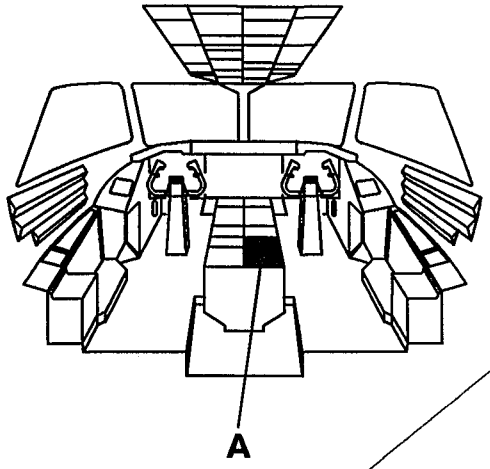


A9868

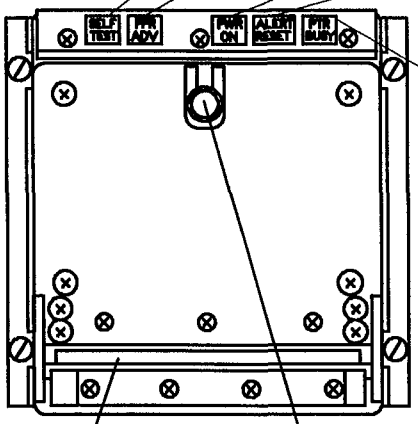
Numeric keyboard

Label	Function Performed
MENU	Displays MIDU MENU page.
RTN	Displays subsystem page.
CLR	Clears last operation/Clears last character.
CLR LINE	Clears scratch pad of last message/text entry.
ALPH	Displays alphabetic keyboard page.

FIG 3 Alphabetic and Numeric pages – keyboard



A PRINTER



SELF TEST button.
Starts the self test and will print a test pattern as long as the button is depressed.

PPR ADV paper advance button.
Depress for paper advance. The paper will advance as long as the button is depressed.

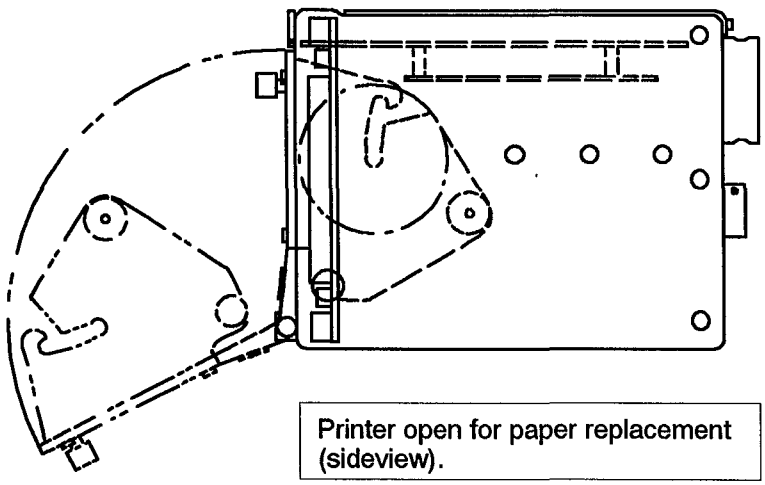
PWR ON light (green).
Indicates when printer is under power (115 VAC).

ALERT RESET button.
Press button to reset the PTR BUSY alert.

PTR BUSY light (amber).
The printer busy light comes on when the printer receives the first text character and goes out when paper has advanced move than three lines. Light start to flash after that PPR ADV has been used and must then be reset with ALERT RESET button.

Paper cut edge

Paper magazine latch knob



Printer open for paper replacement (sideview).

A9869

FIG 4 Printer – controls and indicators.

4. ELECTRICAL POWER SUPPLY.

Normal power.

VHF COM 3	R MAIN BUS	L-14	VHF COM3
ACARS	R INV BUS 115 VAC	N-18	ACARS PWR

Back-up power.

ACARS	R HOT BAT BUS	N-19	ACARS BACK UP

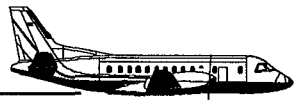
With Mod No 2544 installed, the power supply for ACARS COM3 and Inverter is changed. The VHF COM3 power supply is changed to R BAT BUS. The Inverter power supply is changed to L and R BAT BUS respectively.

1. LIMITATIONS.

Not applicable

2. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
2. 1 POWER UP	1. INVERTER Switch ..... 1 or 2 – ACARS will be powered with one generator on Line or with external power available. – During engine start, ACARS is power supplied from R HOT BAT BUS to assure the engine trend monitoring. NOTE With Mod No 2544 installed, the power supply for ACARS COM3 and Inverter is changed so that the ACARS can be used on battery power.
2. 2 PRINTER SELF TEST.	1. SELF TEST button ..... PRESS –A test pattern will be printed as long as the button is depressed.
2. 3 CONTROL DISPLAY PANEL	Keep the display area clean form foreign objects which otherwise could cause inadvertent keying.
2. 4 PRINTER; MESSAGE TRANSFER BREAKS	A time-out of 1.7 minutes starts when a break occurs in a transmitted message from the MU to the printer. The printer transmits the status condition "Printer Ready" and prints "Message incomplete" if the transmitted message does not resume within 1.7 minutes.
2. 5 ACARS OPERATION	For ACARS operation instruction see COLLINS INSTRUCTION/PILOTs GUIDE.



3. ABNORMAL OPERATION.

CONDITIONS	ABNORMAL PROCEDURES
3.1 ACARS FAILURE (POWER SUPPLY)	**INDICATIONS.** ACARS display control panel is black and PWR ON light on the printer is extinguished. **ACTIONS.** 1. CB N-18 (ACARS PWR) ..... CHECK/RESET 2. CB N-19 (ACARS BACK UP) ..... CHECK/RESET 3. INVERTER ..... CHECK/SELECT THE OTHER. 4. End of procedure.
	Also see COLLINS INSTRUCTIONS/PILOT's GUIDE.

1. GENERAL.

The Bendix/King KTR 909B UHF comminication system is a two–way voice communication system. It is amplitude modulated in the 225.000 to 399.975 MHz frequency range with 25 kHz frequency spacing.

System utilization is through the Audio Integrating System.

2. MAIN COMPONENT AND SUBSYSTEMS.

2.1. UHF Transceiver.

The UHF transceiver is located in the Avionics Rack. It contains two receivers with the second receiver fixed at the internationally recognized 243.000 MHz emergency frequency. The transceiver allows continuos monitoring of that frequency while simultaneously receiving on the tuneable main receiver. The operating frequency may be set manually or by a preprogrammed channel.

2.2. UHF control unit.

The UHF control unit is located in the center pedestal in the cockpit. It provides channel, frequency and mode selections. The transceiver power ON/OFF is also controlled by the control unit.

2.3. Antenna.

The transmitting and receiving is through a combined VHF/UHF antenna mounted on the bottom of the aircraft.

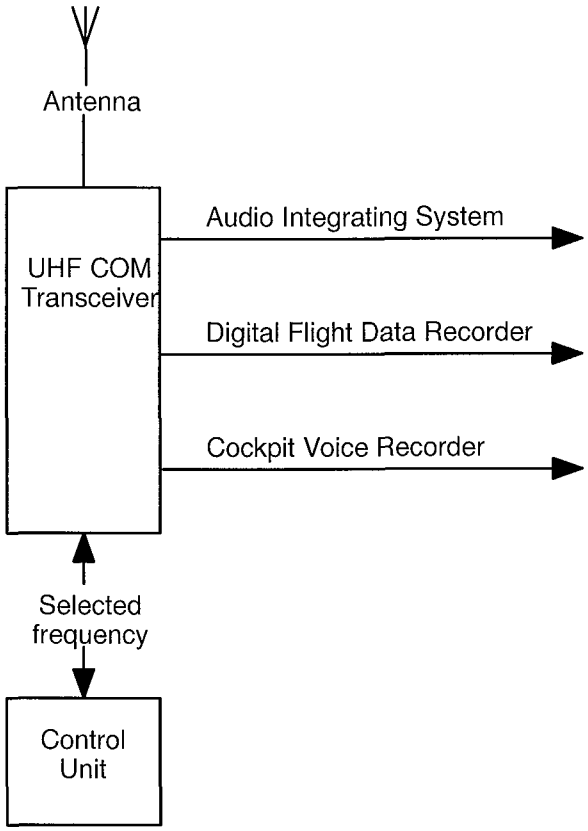
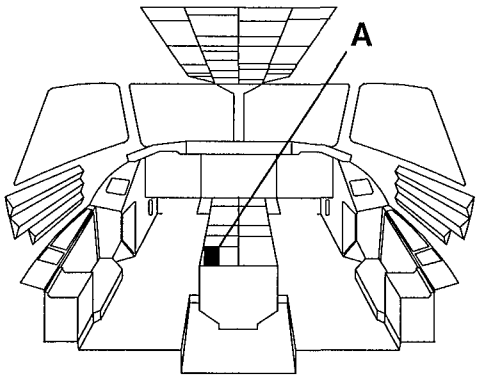
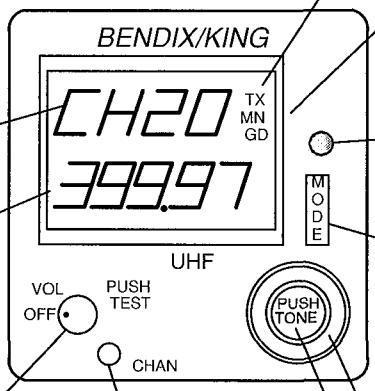


Fig. 1. UHF COM – schematic.

3. CONTROLS AND INDICATORS.



A UHF COM CONTROL UNIT



Transmit annunciation.

Receive Mode annunciation.

MN – Displayed when the MAIN or the BOTH mode is selected as receive mode.

GD – Displayed when the BOTH mode is selected as receive mode.

Channel number display.

Photocell.

Frequency display.

Receive Mode select.

Each momentary press cycles through the following modes:

MAIN – Allows transmitting and receiving on the selected frequency. The guard receiver is not active.

BOTH – Same as MAIN exept that guard receiver is active.

ON/OFF/VOL/TEST knob.

ON/OFF – Selects tranceiver and controlunit ON/OFF.

VOL – Volume control. This function can also be operated from the ACP.

TEST – When momentarily pressed, alternately disables and enables the squelch.

Frequency/Channel select.

PUSH TONE button.

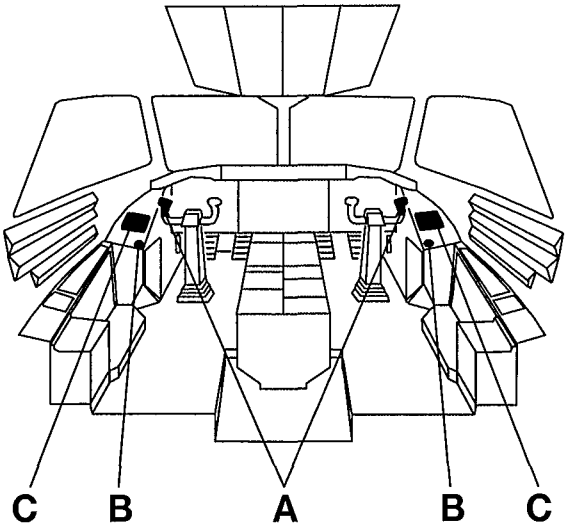
Press and hold this button to activate a 1 kHz tone transmitter test.

CHAN button.

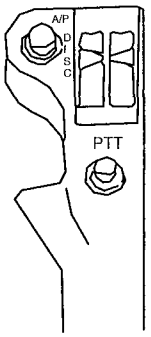
When pressed momentarily, selections between preset channel mode or manually selected frequency mode is provided.
When pressed and held, the programming mode for channels is activated.

A28637

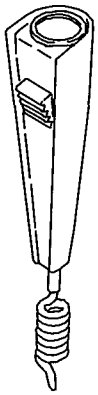
Fig. 2. UHF COM – controls.



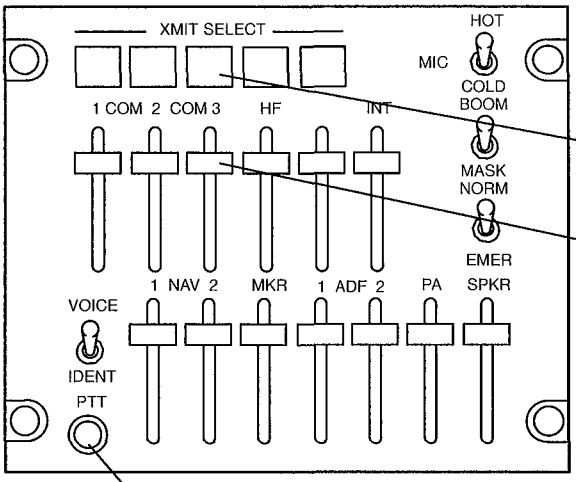
A CONTROL WHEEL
PTT BUTTON



B HAND MICROPHONE



C AUDIO CONTROL PANEL, ACP



UHF XMIT SELECT button.

UHF Volume control lever.

PTT button.
– Press To Transmit.

A28635

Fig. 3. UHF COM – controls.

4. ELECTRICAL POWER SUPPLY.

UHF	RH AVIONIC BUS	L–14	UHF

1. LIMITATIONS.

Not applicable.

2. NORMAL OPERATION.

CONDITIONS	NORMAL PROCEDURES
2. 1. POWER UP.	1. R AVION switches ..... ON – Power is supplied to the UHF by setting R AVION switch ON. 2. UHF volume lever (COM 3 on ACP) ..... SET – Set volume lever to approximately middle position. 3. UHF volume knob (Control unit) ..... ROTATE – Rotating the volume knob clockwise out of the OFF detent position applies power to the UHF. – Received audio volume is controlled by rotating the knob clockwise to increase the volume and counter clockwise to decrease the volume.
2. 2. UHF COM SYSTEM TEST.	1. PUSH TONE button (COM control unit) ..... PRESS AND HOLD – Pressing this button modulates the signal with a 1 KHz tone. This verifies the operation of the transmitter and the audio system (this feature is disabled in the BOTH mode). 2. PUSH TONE button ..... RELEASE.
2. 3. SQUELCH TEST.	1. MODE button (COM control unit) ..... PRESS – Press and release the MODE button until the unit is in MAIN mode of operation (indicated by the MN annunciator being illuminated). 2. Volume knob ..... PRESS. – Press and release the volume knob to remove automatic squelch. To place the radio back in automatic squelch, momentarily press the volume knob.

CONDITIONS	NORMAL PROCEDURES
2. 4. MODE SELECTION.	1. MODE button (COM control unit) ..... PRESS – Press and release the MODE button until the unit is in desired receiver mode. NOTE When the receiver is in the BOTH mode, the Guard (GD) and Main (MN) annunciators come on. If the guard channel is selected in preset mode or the guard frequency is selected in manual mode, it is not possible to select the BOTH mode.

CONDITIONS	NORMAL PROCEDURES
2. 5. PRESET OR GUARD CHANNEL PROGRAMMING	The control unit allows programming of up to 20 channels 1. CHAN button (COM control unit) ..... PRESS AND HOLD – Press and hold (about two seconds) the CHAN button until the top display line contains either the letter "P" followed by the channel number, or "GdP" for the Guard channel. 2. Channel selector ..... TURN – Use the channel selector knobs to change the channel number. 3. MODE button ..... PRESS – Momentarily press the MODE button until the frequency display begins to flash. 4. Frequency selector ..... SET FREQUENCY – Rotate the frequency selector knobs to select the desired receive/transmit frequency (see 2.6). The display now indicates the desired receive/transmit frequency. Different transmit and receive frequencies (Semi–Duplex) may be programmed into every channel except the Guard channel. If the semi–duplex operation is not desired, then the procedure is completed by momentarily pressing the CHAN button or waiting 20 seconds. If semi–duplex operation is desired, then perform the following steps: 5. PUSH TONE button ..... PRESS. – Momentarily press the PUSH TONE button to designate the displayed frequency as the transmit frequency. 6. Frequency selector ..... SET FREQUENCY – Rotate the frequency selector knobs to select the desired receive frequency. The display now indicates the desired receive frequency. To program another channel, momentarily press the CHAN button until the top display is flashing. Rotate the knobs to select the desired channel number. 7. CHAN button ..... PRESS – Momentarily press the CHAN button to exit the program mode (or wait for 20 seconds).

CONDITIONS	NORMAL PROCEDURES
2. 6. REMOVING PRESET CHANNELS.	1. CHAN button (COM control unit) ..... PRESS AND HOLD – Press and hold (about two seconds) the CHAN button until the top display line contains either the letter "P" followed by the channel number, or "GdP" for the Guard channel. 2. Channel selector ..... TURN – Use the channel selector knobs to change the channel number. 3. MODE button ..... PRESS – Momentarily press the MODE button until the frequency display begins to flash. 4. Frequency selector ..... SET FREQUENCY – Rotate the frequency selector knobs to change the MHz portion of the frequency to 225 or 399. Decrement one step from 225 or increment one step from 399 and the display will show dashes in the frequency display. 5. CHAN button ..... PRESS – Momentarily press the CHAN button to remove the channel as a preset and exit the program mode. NOTE Selecting a new channel number will also remove the channel as a preset.
2. 7. PRESET CHANNEL SELECTION.	The CHAN button is used to toggle the radio between manual and preset channel selection. To select a preset or guard frequency: 1. CHAN button ..... PRESS – Momentarily press the CHAN button until the channel number display (top line) displays either "CH" followed by a number or "Gd". 2. Channel selector ..... TURN – Turn either knob to cycle through the available channels. Only programmed channels will be displayed. The Guard channel is located between the highest and lowest numbered programmed frequencies.

CONDITIONS	NORMAL PROCEDURES
2. 8. MANUAL FREQUENCY SELECTION.	The CHAN button is used to toggle the radio between manual and preset channel selection. When a frequency is selected manually, semi–duplex operation is not available. To enter a frequency manually: 1. CHAN button (COM control unit) ..... PRESS – Momentarily press the CHAN button until the channel number display (top line) goes blank. 2. Frequency selector ..... SET FREQUENCY – Rotate the small frequency selector knob to change the frequency in 25 KHz steps. – Rotate the large frequency selector knob to change the frequency in 1 MHz steps.
2. 9. COMMUNICATIONS.	**Receiving.** 1. UHF (COM 3) volume lever (ACP) ..... ADJUST – Use headsets or hand microphones and loudspeakers 2. Squelch ..... CHECK 3. Volume knob (COM control unit) ..... READJUST **Transmitting.** 1. XMIT SELECT – COM 3 ..... SELECT. – Check button to be illuminating. 2. PTT button ..... PRESS – Check a TX to appear right of active frequency. If both the guard and main receivers are active, the transmitter will operate on the main receiver frequency. To transmit on the guard channel, it must be selected first. CAUTION Do not transmit for more than 90 seconds. If the transmitter is active for more than 90 seconds, a transmit timeout error occurs.

3. ABNORMAL OPERATION.

CONDITIONS	ABNORMAL PROCEDURES
3.1. LOSS OF COMMUNICATION.	**ACTIONS.** 1. SQUELCH ..... CHECK. 2. Channel/Frequency ..... RETUNE. 3. PTT button ..... CHECK. 4. ACP ..... CHECK. 5. Headsets ..... CHECK. 6. End of procedure.
3.2. UHF DEAD.	**ACTIONS.** 1. CBs L–14 (UHF) ..... CHECK/RESET 2. End of procedure.
3.3. TRANSMIT TIMEOUT.	If the transmitter is active for more than 90 seconds, a transmit timeout error occurs. This is indicated by the flashing of every illuminated segment of the display. The transmitter will go inactive until the fault is found or an interruption in the DC power supply occurs. In most cases, this is caused by the microphone PTT button being stuck or a transmission in excess of 90 seconds.
3.4. FAULT REPORTING.	**ACTIONS.** 1. CHAN and MODE buttons ..... PRESS AND HOLD – When the CHAN and MODE buttons are simultaneously pressed and held, the display shows software version and revision along with any currently present faults. 2. Display ..... CHECK. – The fault display shall be shown on the right side of the bottom row of the display. It shall be made up of the alphabetic character "F" and a number as shown below: CODE FAULT 0 None 1 Internal processor communications error 2 Non violate memory error 4 Synthesizer lock error 8 Not used 3. End of procedure.