

COMMUNICATIONS

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COMMUNICATIONS SYSTEMS

23-1. COMMUNICATIONS SYSTEMS.

The communication system consists of two separate radio communication systems. The UHF AM transceiver (KTR 909) system is designated COMM 1. The VHF AM Transceiver (KY-196) is designated COMM 2. The two systems are presented to the aircrew through the audio control system/ICS to allow for flexible, well integrated, voice communications. Both transceivers are located in the radio console (Figure 23-1). Both systems may be selected/operated simultaneously by either or both aircrew members. (Refer to Chapter 98 for wiring diagram.

23-2. INSPECTION PROCEDURES.

NOTE

Directions contained in paragraphs 23-2 through 23-4 apply equally to all avionics components, parts, and bits and pieces. Instructions in these paragraphs are cited only one time, but apply throughout Chapter 23.

1. Inspect control panels for completeness, proper installation, cleanliness and security of mounting.
2. Inspect switches, controls and circuit breakers for proper mechanical action.
3. Inspect panel and indicator lights for housing conditions and proper operation.
4. Inspect electrical connectors for corroded or bent pins, proper mating, and cables for frayed or broken insulation.

23-3. GENERAL CLEANING PROCEDURES.

1. Remove moisture and loose dirt with a clean, soft cloth.
2. Remove dust and dirt from panels (with or without exterior hardware), and light housings with a soft clean cloth. To remove fingerprints or contaminants not responding to a soft clean cloth; use a cloth dampened with water; if necessary, mild soap may be used to make the cleaning more effective.

WARNING

**CLEANING COMPOUND IS
FLAMMABLE AND ITS FUMES ARE
TOXIC.**

3. Remove grease, fungus and ground –in dirt with a soft cloth dampened (not wet) with cleaning compound (C-304).
4. Remove dirt from connectors with a brush, remove moisture with a dry cloth.

23-4. GENERAL REPAIR OR REPLACEMENT.

1. Tighten or replace loose or cracked control knobs.
2. Replace defective panel light bulbs or housings.
3. Repairs beyond removal and replacement must be conducted by an authorized repair station.

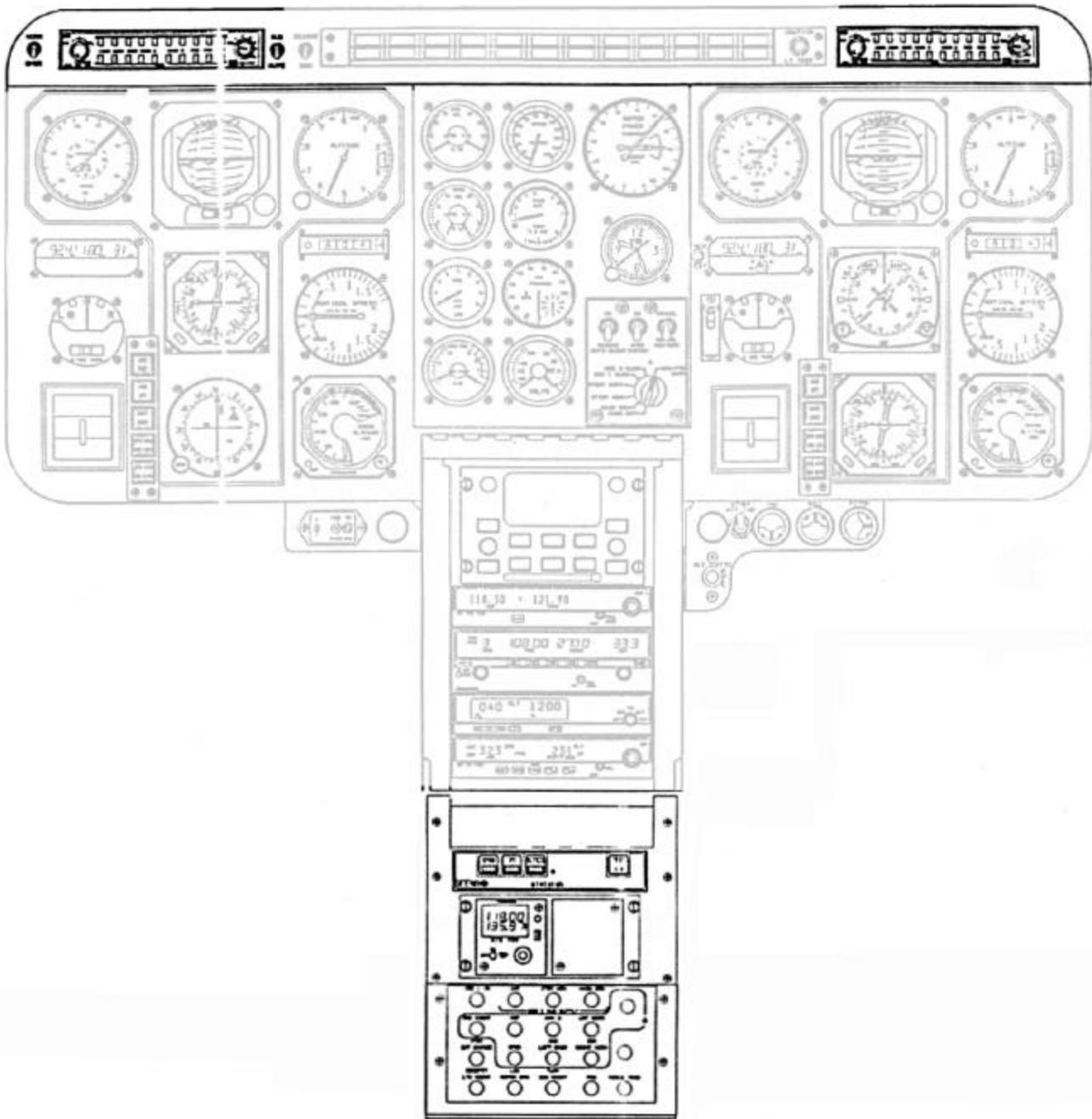


Figure 23-1. Avionic Console TH-57C

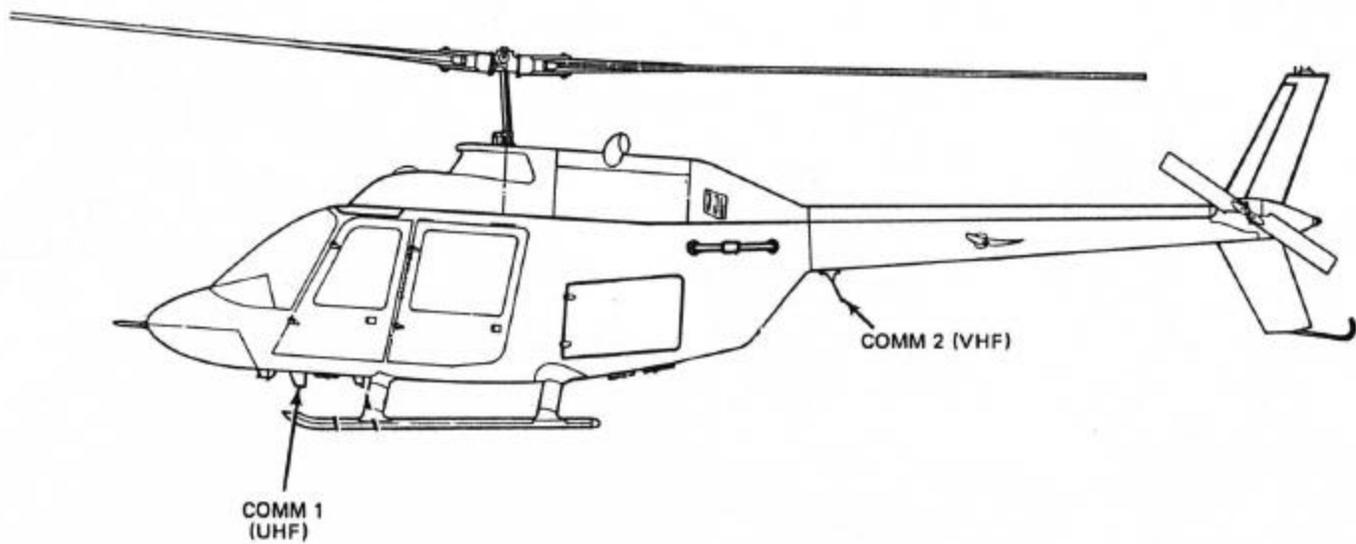


Figure 23-3. Antenna Location

23-5. AUDIO/ICS DESCRIPTION.

1. The audio system features one audio control panel (KMA-24H) for each aircrew member (Figure 23-4.); the panels are directly in front of each operator. All audio, except ICS, is individually selectable. Selected audio is channeled to and from both control panels. RAD ALT DH, low rotor RPM, and engine out audio are products of an audio generator, and are not selectable. Audio associated with navigation and navigational aid systems are generated in the respective receivers and directly applied to the audio/ICS; these audio signals are selectable.
2. The ICS employs two audio control panels and two isolation amplifiers (KA-65). Design of ICS offers on-board communication between four stations; pilot, copilot, and two rear compartment positions; headphone/microphone connections at these locations provide access to the ICS. The pilot hears ICS audio in his headphones at all times, even during transmit.
3. An EMER/NORM switch is located outboard and immediately adjacent to each audio control panel. When positioned to EMER, it activates headset audio retention for pilot and/or copilot, in the event of system malfunction(s).
4. An AUD MUTE switch, located immediately to the right of the left audio control panel, allows the aircrew to silence the low rotor RPM and engine out alarm in the headset(s).

23-6. ENERGIZING POWER BUSES FOR OPERATIONAL CHECKS.

The following is a general procedure for energizing the essential 1 and 2 buses when utilizing external power for operational checks of the avionics systems. (Refer to Figure 23-1.)

1. Close the following circuit breakers:

- a. Upper Circuit Breaker Panel.

VHF COMM
ICS RIGHT EMER
ICS LEFT NORM
NAV 1
HSI
DME
RMI LEFT
MKR BCN
AVIONICS INV
ENC ALT
RAD ALT

- b. Lower Circuit Breaker Panel.

UHF COMM
ICS RIGHT NORM
ICS LEFT EMER
NAV 2
ADF
RMI RIGHT
XPDR

2. Ensure BUS TIE RELAY circuit breaker is closed.
3. On both upper and lower circuit breaker panels, position AVIONICS MASTER/OFF switch to AVIONICS MASTER.
4. To energize particular avionics system(s), refer to operational procedures for the individual system(s).

23-7. AUDIO / INTERCOMMUNICATIONS CONTROL SYSTEMS (ICS).

1. The two KMA-24H audio control panels (Figure 23-1) enable the pilot and copilot to control the audio functions of both communication systems, navigation systems, distance measuring equipment (DME), marker beacon, and the automatic direction finder (ADF). Refer to Chapter 98 for wiring diagram.
2. The KMA-24H has built-in intercommunication capability, with its own amplifier. There are four intercom inputs: pilot, copilot, and two inputs from the rear compartment via the KA-65 isolation amplifiers. The INT VOL knob on left side of panel, controls the volume of intercom audio without affecting the audio levels selected with the pushbuttons. Turning the knob all the way counterclockwise cuts off the intercom.
3. Keying either the pilot or copilot microphone mutes all other microphone inputs to ensure a single source of transmitted audio. All receiver inputs are also muted during transmit.
4. If the pilot and copilot key their microphones at the same time, the pilot microphone will override the copilot. The microphones can be keyed by either the pilot or copilot footswitch or the trigger switch on either cyclic stick grip. The foot switches permit ICS keying only, while the trigger switches key ICS at the first detent, and effect external transmission at the second detent.
5. Receiver selection is made by pushbuttons on the face of each panel. The bottom row of pushbuttons (identified as PHONE) selects audio of all available functions for application to the headphones.
6. In case of pilot and/or copilot (internal) audio amplifier failure or power source malfunctions the AUDIO NORM/EMER switch, in the EMER position, allows function selection with the top row of pushbuttons (identified as SPEAKER). Only received signals of the various functions can be processed for headset presentation; no transmit action is possible. When operating in this mode the ICS cannot be keyed.
7. Separate isolation amplifiers are provided for headphones to provide separation even when the same source is selected for both headphones and speaker. Helicopter power for the headphone isolation amplifiers is derived from separate

sources to ensure a high degree of audio integrity. The amplifiers are always on, regardless of function selector positions.

8. A separate audio generator produces audio alarm signals to indicate low rotor RPM and engine out conditions, as well as transition through decision height (DH) determined by a radar altimeter function. Generated audio is routed to audio/ICS control for presentation to the aircrew headsets.

23-8. OPERATIONAL CHECK – AUDIO CONTROL SYSTEM.



BEFORE CONNECTING EXTERNAL ELECTRICAL POWER, VERIFY THE FOLLOWING:

1. **ESS 1 BUS SUPPLY BAT CIRCUIT BREAKER IS OPEN.**
2. **BUS TIE RELAY CIRCUIT BREAKER IS OPEN.**
3. **BOTH AVIONICS MASTER/OFF SWITCHES ARE OFF.**

1. Accomplish the following:
 - a. Connect external power to helicopter.
 - b. Apply power to the essential 1 and essential 2 buses. Refer to paragraph 23-7.
2. Position MIC selector from OFF to COMM1.
3. Select COMM 1 in switch bank.
4. establish communication with external UHF transceiver. Check for sidetone and received audio resolution.
5. Alternate audio checks between aft and right control panel.
6. Deselect COMM 1 and select COMM 2.
7. Perform steps 4. and 5. With COMM 2 selected, using an external VHF transceiver.
8. Deselect COMM 2.
9. Perform audio check with NAV 1, DME, MKR and ADF selected, alternately, for left and right audio control panel. Ensure external audio source (operating transmitter or test equipment) is available.

10. Check ICS operation at all four stations. For pilot and copilot position, alternately use foot switch and first detent of cyclic stick trigger for operational check.

e. Repeat steps b and c for copilot position.

f. Close ICS LEFT NORM circuit breaker.

11. Check emergency ICS operation as follows:

a. Open ICS RIGHT NORM circuit breaker.

b. Position pilot AUDIO NORM/EMER switch to EMER.

c. Check that all of the pilot audio control panel functions are selectable with the top row of push buttons, and received signals are present in headphones.

d. Close ICS RIGHT NORM circuit breaker, and open ICS LEFT NORM circuit breaker.

23-9. TROUBLESHOOTING – AUDIO CONTROL SYSTEM.

NOTE

For troubleshooting, refer to audio/ICS wiring diagram, Chapter 98.

NOTE

Reference to position(s) of operation(s) in troubleshooting chart is intended to mean “pilot” and/or “copilot”.

Table 23-1. AUDIO CONTROL SYSTEM

| INDICATION OF TROUBLE | PROBABLE CAUSE | CORRECTIVE ACTION |
|--|---|--|
| Audio control inoperative, one or both position(s). | Dirty/loose/defective power and/or ground wiring and/or connection(s) or circuit breaker. | Clean/tighten/repair/replace wiring and/or connection(s) or circuit breaker. |
| | Dirty/loose/defective audio cabling/wiring/connection(s). | Clean/tighten/repair cabling/wiring/connection(s). |
| | Defective respective audio control. | Replace audio control. |
| Control panel lights inoperative, one or both position(s). | Dirty/loose/defective wiring/connection(s). | Clean/tighten/repair/replace wiring connection(s). |
| | Defective respective audio control. | Replace audio control. |
| No sidetone or interphone signals, one position. | Defective microphone. | Replace microphone. |
| | Defective cyclic stick switch. | Replace switch or cyclic stick. |
| | Defective audio control. | Replace control |
| ICS foot switch inoperative, one position. | Dirty/loose/defective wiring audio cabling/connection(s). | Clean/tighten/repair/replace wiring/cabling/connection(s). |
| | Defective foot switch. | Replace switch. |

Table 23-1. AUDIO CONTROL SYSTEM (Cont.)

| INDICATION OF TROUBLE | PROBABLE CAUSE | CORRECTIVE ACTION |
|--|--|--|
| ICS inoperative at rear station(s). | Dirty/loose/defective power and/or ground wiring/connection(s) or circuit breaker. Dirty/loose/defective audio cabling/wiring connection(s). Defective headset. Defective audio control. Defective isolation amplifier. Defective switch. | Clean/tighten/repair/replace wiring/connection(s) or circuit breaker. Clean/tighten/repair/replace wiring/connection(s). Replace headset. Replace control. Replace amplifier. Replace switch. |
| No audio with EMER/NORM switch in EMER (emergency) position, one position. | Defective audio control. Dirty/loose/defective wiring/connection(s). | Replace control. Clean/tighten/repair wiring/connection(s). |

23-10. AUDIO CONTROL (KMA-24H).

Two KMA-24H audio control panels, one for the pilot and one for the copilot, are mounted in the upper right and left corners of the instrument panel, respectively. (Refer to Figure 23-1.)

23-11. REMOVAL – AUDIO CONTROL (KMA-24H).

1. Ensure that electrical power is off.
2. Insert a 3/32-inch Allen wrench through hole in the front panel of the audio control (Figure 23-1).
3. Turn screw counterclockwise until audio control disengages from rack.
4. Remove audio control.

23-12. INSTALLATION – AUDIO CONTROL (KMA-24H).

1. Ensure that electrical power is off.
2. Slide audio control (Figure 23-1) into rack.
3. Insert 3/32-inch Allen wrench through hole in front panel of audio control.



DO NOT OVERTIGHTEN SCREW.

4. Turn screw clockwise until audio control is mounted securely in rack.
5. Perform operational check of audio control system. Refer to paragraph 23-9.

23-13. ISOLATION AMPLIFIER (KA-65).

The two KA-65 isolation amplifiers enhance communications with the rear stations. To isolate input audio, the signals are initially attenuated, and subsequently amplified, to reconstitute the output to be equal to the input. The power gain of isolation (interphone) amplifiers is 1 (0db) at a nominal input/output impedance of 500 ohms. The amplifier gains can be adjusted if the one-to-one voltage ratio is too low. The isolation amplifiers are mounted on the forward bulkhead of the baggage compartment. (Refer to Figure 23-4.)

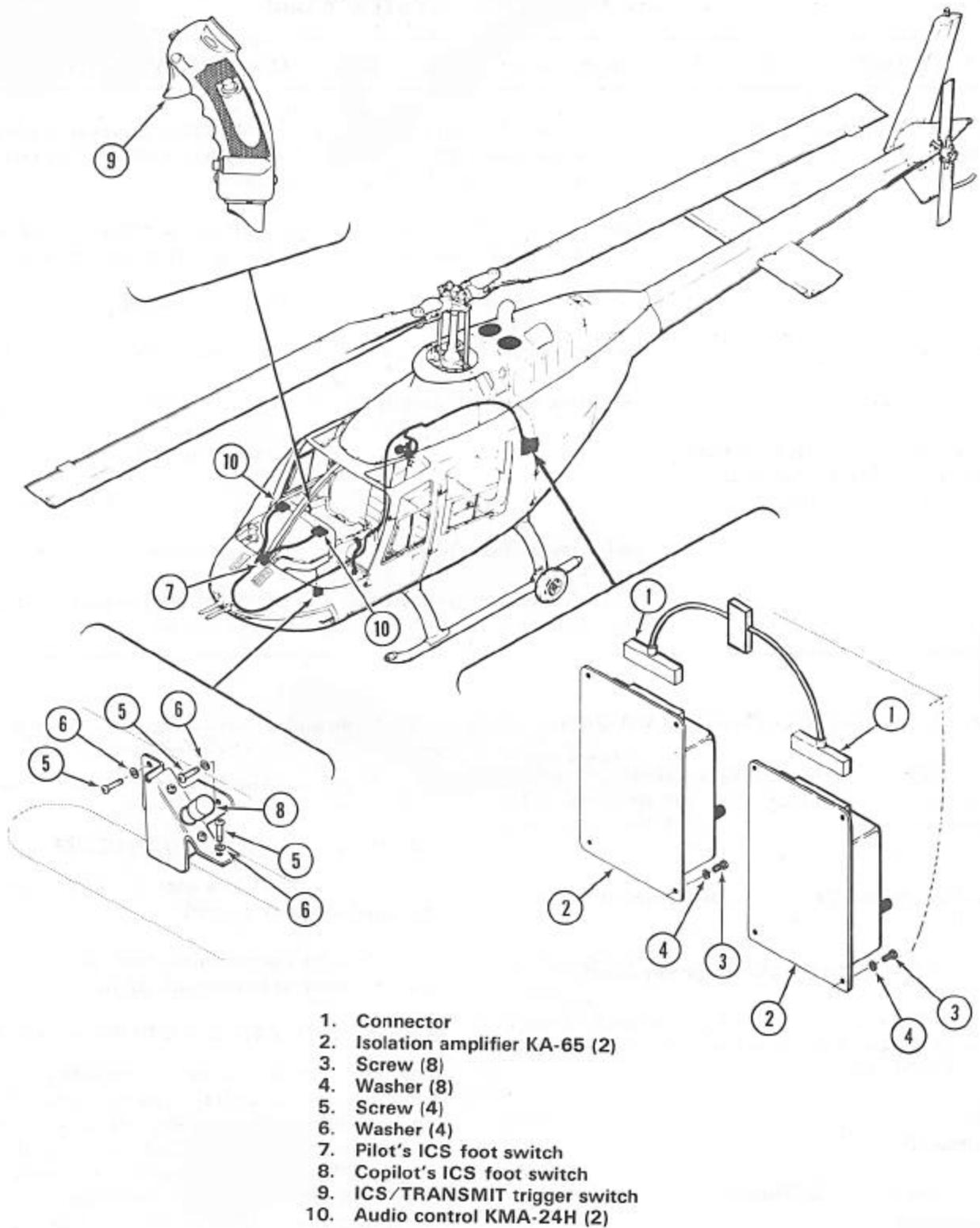


Figure 23-4. Audio/ICS System Component Locations

23-14. REMOVAL – ISOLATION AMPLIFIER (KA-65).

1. Ensure that electrical power is off.
2. Gain access to baggage compartment.
3. Disconnect electrical connector (1, Figure 23-4) from isolation amplifier (2).
4. Remove screws (3), and washers (4), attaching isolation amplifier to forward bulkhead of the baggage compartment.
5. Remove isolation amplifier.

23-15. INSTALLATION – ISOLATION AMPLIFIER (KA-65).

1. Ensure that all electrical power is off.
2. Align isolation amplifier units (2, Figure 23-4) with mounting holes and install washers (4) and screws (3).
3. Connect electrical connector (1) to isolation amplifier (2).
4. Perform operational check of audio control system. (Refer to paragraph 23-9.)

23-16. ICS FOOT SWITCH.

NOTE

Removal and installation procedures for pilot and copilot foot switch are identical. Only one procedure is cited.

23-17. REMOVAL – ICS FOOT SWITCH.

1. Ensure that all electrical power is off.
2. Remove screws (5, Figure 23-4) and washers (6) attaching switch (7 or 8) to console.
3. Remove switch from console. Disconnect, identify and tag electrical wires.

23-18. INSTALLATION – ICS FOOT SWITCH.

1. Ensure that all electrical power is off.
2. Connect electrical wires to switch as identified.
3. Install switch (7 or 8, Figure 23-4) using screws (5) and washers (6).
4. Perform operational check of audio control system. (Refer to paragraph 23-9.)

23-19. COMM 1 SYSTEM (UHF) (C Model Only).

The COMM 1 system consists of an KTR 909 transceiver located in the lower portion of the radio console, a UF 10-76 antenna located on a panel under the copilot seat area, two transmit switches, one on the pilot and one on the copilot cyclic stick and two KMA-24H audio/control ICS panels in the upper left and right corners of the instrument panel. The audio system controls provide a (transmit) side tone, contain transmit keying circuitry. and process all audio.

23-20. OPERATIONAL CHECK – COMM 1 SYSTEM (UHF).



BEFORE CONNECTING EXTERNAL ELECTRICAL POWER, VERIFY THE FOLLOWING:

- 1. ESS 1 BUS SUPPLY BAT CIRCUIT BREAKER IS OPEN.**
- 2. BUSS TIE RELAY CIRCUIT BREAKER IS OPEN.**
- 3. BOTH AVIONICS MASTER/OFF SWITCHES ARE OFF.**

1. Accomplish the following:
 - a. Connect external power to the helicopter.
 - b. Apply power to the essential 1 and essential 2 buses. (Refer to paragraph 23-7.)
2. On the KMA-24H audio control panel, depress COMM 1-PHONE button. Position MIC selector to COMM 1 and INT Volume control midrange.
3. On the KFS-599A control head, position the OFF/ON selector to ON. Noise should be present in headset, and the frequency channel display should light up.
4. Position volume control fully clockwise (CW) and listen to receiver. Volume should be maximum.
5. Position volume control to midrange. Position SQUELCH ON-OFF switch to ON. NO background noise should be heard in headset.

6. Position GUARD/MANUAL/PRESET selector to MANUAL. Operate frequency selectors through the ranges to ensure all digits light up on frequency display.
8. Select and tune transceiver to a known operating frequency and initiate communications check. Sidetone will be audible as part of the transmission cycle.

NOTE

When PRESET channelization is selected, channel numbers 1 through 20 replace frequency readout in frequency/channel display window. Channel numbers appear in number three and four position of the six digit readout.

- a. Initiate preset channel tuning by positioning GUARD/MANUAL/PRESET selector to PRESET. The channel number for a given channel selector (CHAN SEL) position appears in display window.
- b. Momentarily position the READ switch (springloaded to normally off) to READ. Frequency for channel selected appears in display window for approximately 10-15 seconds (if more time is required, depress again or hold switch.) To alter frequency readout, position frequency toggle selectors (springloaded to center-off position) up or down; in the up position frequency digits will be incremented, in the down position digit(s) will be decremented.
- c. When desired frequency appears in display window, momentarily depress LOAD switch. Frequency readout disappears to be replaced by previously selected channel, after approximately 10-15 seconds.
- d. Frequencies inserted into channels by this method are available for recall by positioning GUARD/MANUAL/PRESET selector to PRESET, and calling up desired channel with CHAN SEL. All 20 channels can be pre-tuned using this procedure.
- e. Channel/frequency chart in the bottom of the control panel has to be annotated with currently inserted frequencies for optimum benefit of the PRESET option.

9. Position OFF/MAIN/BOTH/ADF selector to BOTH. Perform communications checks.
10. Position GUARD/MANUAL/PRESET selector to PRESET. Position channel selector to a known operating channel. Perform communications checks.
11. Position GUARD/MANUAL/PRESET selector to GUARD, and initiate communications check.
12. Communication check should verify that transceiver transmits and receives on the 243.00 MHz guard-channel (emergency) frequency.
13. Repeat communications checks of steps 8, 9, and 10, by using the 1020 Hz TONE button. The 1020 Hz tone is also evidenced in the sidetone.
14. Position function selector to OFF.
15. Terminate operational check by complying with Paragraph 23-7 in reverse order.
16. Remove external power from helicopter.

23-21. TROUBLESHOOTING – COMM 1 SYSTEM (UHF).

NOTE

For troubleshooting (KTR-909), refer to COMM 1 system and audio/ICS wiring diagrams, Chapter 98.

NOTE

Reference to position(s) of operator(s) in troubleshooting chart is intended to mean “pilot” and/or “copilot”.

Table 23-2. COMM 1 SYSTEM (UHF)

| INDICATION OF TROUBLE | PROBABLE CAUSE | CORRECTIVE ACTION |
|--|---|---|
| Transceiver inoperative in transmit and receive in both positions. | Dirty/loose/defective power/ground wiring/connection(s), and/or circuit breaker. Dirty/loose/defective coaxial cabling/connection(s). Defective antenna. Defective transceiver. Defective KMA-24H audio/ICS control. | Clean/tighten/repair wiring/connection(s) and/or circuit breaker. Clean/tighten/repair wiring/connection(s). Replace antenna. Replace transceiver. Replace audio/ICS control. |
| Transceiver receives, but does not transmit from both positions. | Defective transceiver. | Replace transceiver. |
| Transceiver receives, but does not transmit from one position. | Defective cyclic stick (trigger) switch in one position. Defective KMA-24H audio/ ICS control in one position. Defective NORM (one position) circuit breaker or EMER (one position) circuit breaker. Dirty/loose/defective wiring/connection(s). | Replace cyclic stick. Replace audio/ICS control. Replace respective NORM or EMER circuit breaker. Clean/tighten/repair wiring/connection(s). |
| No sidetone in transmit in both positions. | Defective transceiver. Dirty/loose/defective coaxial cabling/connection(s). Dirty/loose/defective power/ground wiring/connection(s). | Replace transceiver. Clean/tighten/repair cabling/connection(s). Clean/tighten/repair cabling/connection(s). |
| No sidetone in transmit in one position. | Defective KMA-24H audio/ICS control in one position. Dirty/loose/defective power/ground wiring/connection(s). Dirty/loose/defective coaxial cabling/connection(s). | Replace audio/ICS control. Clean/tighten/repair power/ground wiring/connection(s). Clean/tighten/repair cabling/connection(s). |

Table 23-2. COMM 1 SYSTEM (UHF) (Cont.)

| INDICATION OF TROUBLE | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|--|--|
| Transceiver transmits, but does not receive in both positions. | Defective transceiver. | Replace transceiver. |
| Transceiver transmits, but does not receive in one position. | Defective headset in one position. Defective KMA-24H audio/ICS control in one position. Defective ICS (one position) EMER circuit breaker. Dirty/loose/defective coaxial cabling/connection(s). Dirty/loose/defective power/ground wiring/connection(s). | Replace headset. Replace audio/ICS control. Replace respective EMER circuit breaker. Clean/tighten/repair cabling/connection(s). Clean/tighten/repair power/ground wiring/connection(s). |
| Transmission weak or distorted from both stations. | Dirty/loose/defective coaxial cabling/connection(s). Defective antenna Defective transceiver. | Clean/tighten/repair cabling/connection(s). Replace antenna Replace transceiver. |
| Squelch inoperative (SQUELCH switch in ON position does not eliminate noise). | Defective transceiver. | Replace transceiver. |
| Transceiver operates properly in MANUAL, but not in PRESET. | Improperly aligned preset channels. Defective transceiver. | Align channels to proper frequency(ies). Replace transceiver. |
| Transceiver operates properly in MAIN, but not in BOTH. | Defective transceiver. | Replace transceiver. |

Table 23-2. COMM 1 SYSTEM (UHF) (Cont.)

| INDICATION OF TROUBLE | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|--|
| VSWR exceeds 3:1 ratio. (As established with thru-line wattmeter during transmissions.) | Defective antenna Dirty/loose/defective cabling/connection(s). Defective low pass filter. Defective transceiver. | Replace antenna Clean/tighten/repair cabling/connection(s). Replace low pass filter. Replace transceiver. |
| No audio in headset and/or no evidence of transmission when TONE button depressed. | Defective transceiver. | Replace transceiver. |
| Frequency display inoperative, or will not dim. | Dirty/loose/defective power/ground wiring/connection(s). Defective transceiver. | Clean/tighten/repair power/ground wiring/connection(s). Replace transceiver. |
| Panel lights inoperative. | Dirty/loose/defective power/ground wiring/connection(s). Defective transceiver. | Clean/tighten/repair power/ground wiring/connection(s). Replace transceiver. |

23-22. UHF TRANSCEIVER (AN/ARC-159).

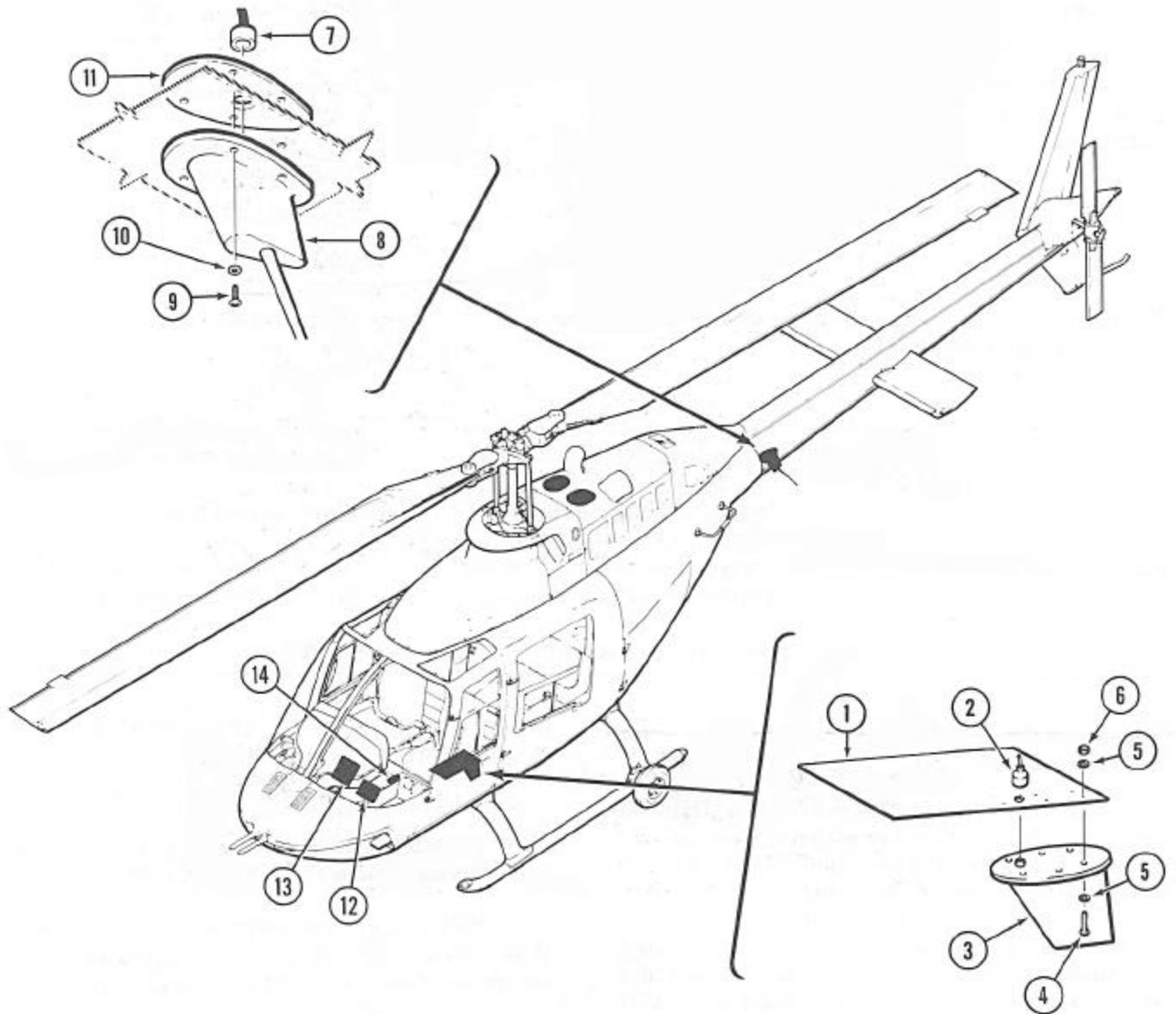
1. The AN/ARC-159 (Figure 23-5) is a UHF AM communication transceiver which can be tuned to any one of 25-k Hz wide channels in the 225.00 to 399.75 MHz range. A separate guard receiver allows continuous monitoring of 243.00 MHz. The transceiver is compatible with secure voice equipment and is capable of retransmission and tone transmission. The receiver output is suitable for ADF usage. Transceiver is tuned equipment and is capable of retransmission and tone transmission. The receiver is suitable
2. Frequency selection may be made using the PRESET frequency selector, which is capable of inserting/storing frequencies of up to 20 channels; preselected frequencies are called up by positioning the GUARD/MANUAL/PRESET to PRESET. Manual frequency selection is accomplished using four tuning selectors. Tuned frequencies of the transceiver are displayed in a six segment readout.

23-23. REMOVAL – UHF TRANSCEIVER (AN/ARC-159).

1. Ensure that electrical power is off.
2. Loosen spring lock fasteners attaching transceiver (Figures 23-5) to radio console.
3. Pull transceiver partially out of console. Disconnect electrical and antenna cable connectors from back of transceiver.
4. Remove transceiver.

23-24. INSTALLATION – UHF TRANSCEIVER (AN/ARC-159).

1. Ensure that electrical power is off.
2. Connect electrical and antenna cable connectors to back of transceiver.
3. Install transceiver in radio console. Secure with springlock fasteners.
4. Perform operational check of COMM 1 system (UHF). (Refer to paragraph 23-22.)



- | | |
|-------------------------|--------------------------------|
| 1. Panel | 8. VHF antenna DMC 70-1/A |
| 2. UHF cable connector | 9. Screw (4) |
| 3. UHF antenna UF 10-76 | 10. Washer (4) |
| 4. Screw (6) | 11. Doubler |
| 5. Washer (12) | 12. UHF transceiver AN/ARC-159 |
| 6. Nut (6) | 13. VHF transceiver KY-196 |
| 7. VHF cable connector | 14. Low pass filter |

Figure 23-5. COMM 1 and COMM 2 Systems Component Locations and Identification (Sheet 1 of 2)

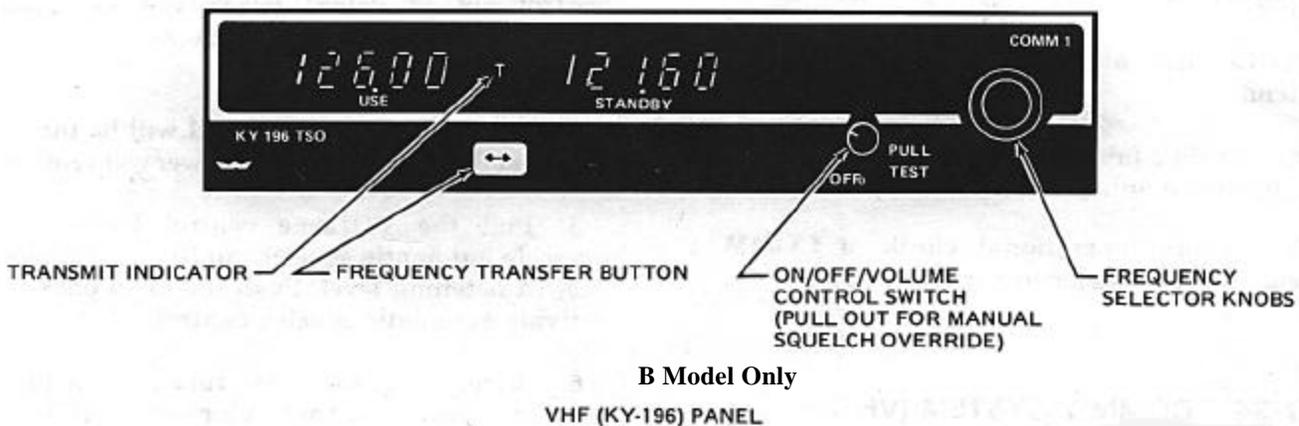
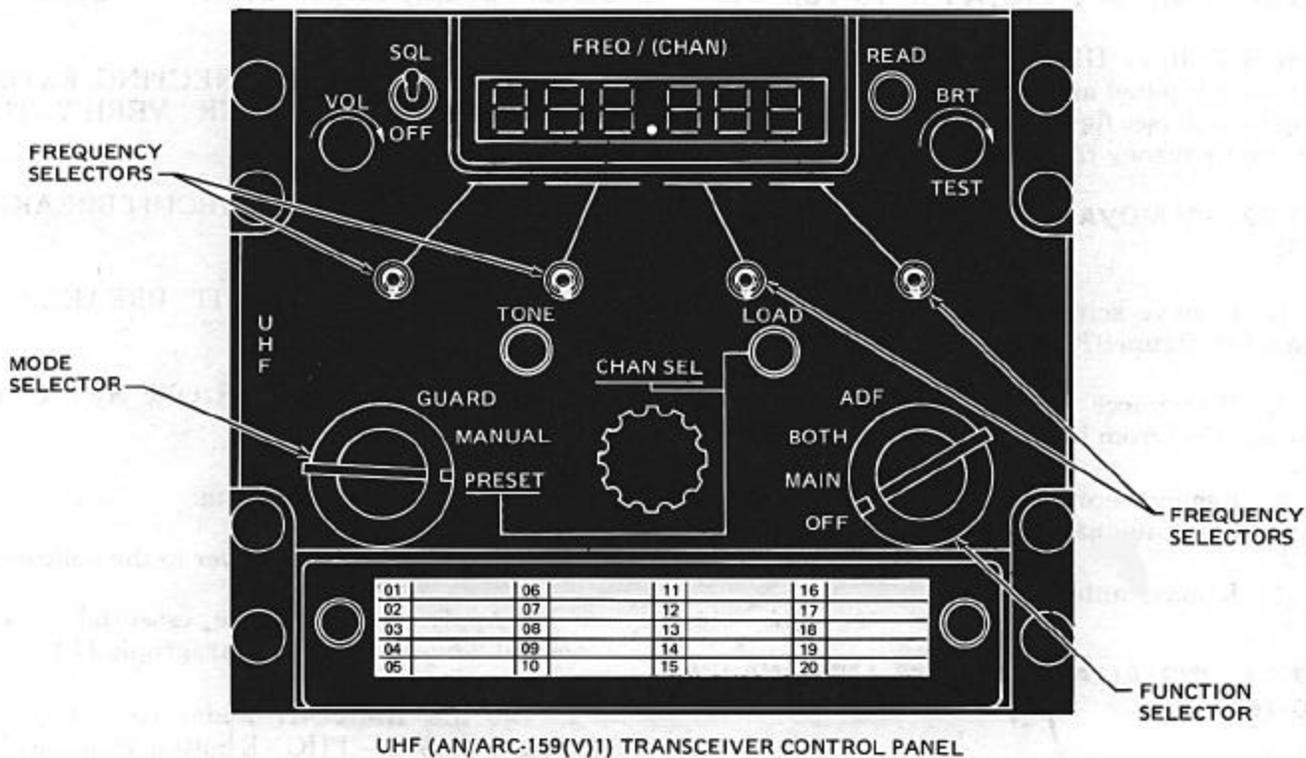


Figure 23-5. COMM 1 and COMM 2 Systems Component Locations and Identification (Sheet 2 of 2)

23-25. UHF ANTENNA (UF 10-76).

The UF 10-76 UHF antenna is located on a removable panel under the helicopter beneath the copilot seat (see Figure 23-3). The antenna operates in the frequency range of 225-400 MHz.

23-26. REMOVAL-UHF ANTENNA (UF 10-76).

1. Remove screws attaching antenna access panel (1, Figure 23-5).
2. Disconnect antenna cable connector (2, Figure 23-5) from back of antenna (3).
3. Remove screws (4), washers (5), and nuts (6), attaching antenna to panel.
4. Remove antenna.

23-27. INSTALLATION-UHF ANTENNA (UF 10-76).

1. Remove old potting compound from antenna mounting area.
2. Attach antenna (3, Figure 23-5) to panel (1) using screws (4), washers (5), and nuts (6).
3. Connect antenna cable connector (2) to antenna.
4. Apply a faying seal around edge of antenna using silicon adhesive (C-300).
5. Perform operational check of COMM 1 system (UHF). (Refer to paragraph 23-22.)

23-28. COMM 2 SYSTEM (VHF).

The COMM 2 system consists of a KY-196 VHF transceiver located in the upper portion of the radio console, a DMC70-1/A antenna on the underside (forward) on the tail boom, two transmit switches, one on the pilot and one on the copilot cyclic stick and two KMA-24H audio/ICS panel controls in the upper left and right corners of the instrument panel. The audio system controls provide a (transmit) sidetone, contain transmit keying circuitry, and process all audio.

23-29. OPERATIONAL CHECK – COMM 2 SYSTEM (VHF).



BEFORE CONNECTING EXTERNAL ELECTRICAL POWER, VERIFY THE FOLLOWING:

- 1. ESS 1 BUS SUPPLY BAT CIRCUIT BREAKER IS OPEN.**
 - 2. BUS TIE CIRCUIT BREAKER IS OPEN.**
 - 3. BOTH AVIONICS MASTER/OFF SWITCHES ARE OFF.**
1. Accomplish the following:
 - a. Connect external power to the helicopter.
 - b. Apply power to the essential 1 and essential 2 buses. (Refer to Paragraph 23-7.)
 2. On the KMA-24H audio control panel, depress COMM 2-PHONE button. Position MIC selector to COMM 2 in INT VOLume control to midrange.
 3. On the KY-196 panel. Position the VOLume control out of detent (clockwise) to activate transceiver. No warm-up is required.
 4. The frequencies displayed will be the ones used last (before the last time power was removed).
 5. Pull the VOLume control knob out to override automatic squelch control, and rotate to desired listening level. Push the knob back in to activate automatic squelch control.
 6. Select frequency by rotating frequency selector knobs either clockwise (CW) or counterclockwise (CCW) until desired frequency is displayed in the STANDBY display window. A CW rotation will increase frequency, while a CCW rotation will decrease it. The outer, larger selector knob is used to control the mega-hertz (MHz) portion of the frequency; the smaller knob affects the kilo-hertz (KHz) portion.

This smaller knob changes the frequency in steps of 50 KHz when pushed in, and in 25KHz steps when pulled out. At either limit of the 118-135 MHz frequency spectrum, an off-scale rotation will wrap the display around to the other frequency band-edge (i.e., 135 MHz advances to 118 MHz).

7. To tune the COMM transceiver to a desired frequency, the frequency must first be entered into the STANDBY display and then activated by depressing the transfer button. This will interchange the USE and STANDBY displays, and the transceiver will be tuned to the frequency appearing in the USE display.
8. Select and tune transceiver to a known operating frequency, and initiate communication checks. Sidetone will be audible as part of the transmission cycle.

9. Position VOLume control on KY-196 panel to OFF.
10. Terminate operational check by complying with Paragraph 23-7 in reverse order.
11. Remove external power from helicopter.

23-30. TROUBLESHOOTING-COMM 2 SYSTEM (VHF).

NOTE

For troubleshooting the COMM 2 system (VHF) (KY-196) refer to COMM 2 system and audio/ICS wiring diagrams, Chapter 98.

NOTE

References to position(s) of operator(s) in troubleshooting chart is intended to mean “pilot” and/or “copilot”.

Table 23-3. COMM 2 SYSTEM (VHF)

| INDICATION OF TROUBLE | PROBABLE CAUSE | CORRECTIVE ACTION |
|--|--|--|
| Transceiver inoperative in transmit and receive in both positions. | Dirty/loose/defective power/ground wiring/connection(s), and/or circuit breaker. Dirty/loose/defective coaxial cabling/connection(s). Defective antenna. Defective transceiver | Clean/tighten/repair wiring/connection(s) and/or circuit breaker. Clean/tighten/repair cabling/connection(s). Replace antenna. Replace transceiver. |
| Transceiver receives, but does not transmit in both positions. | Defective transceiver. | Replace transceiver. |
| Transceiver receives, but does not transmit in one position. | Defective cyclic stick (trigger) switch in one position. Defective KMA-24H audio/ICS control in one position. Defective ICS (one position) NORM or ICS (one position) EMER circuit breaker. Dirty/loose/defective wiring/connection(s). | Replace cyclic stick. Replace audio/ICS control. Replace respective NORM or EMER circuit breaker. Clean/tighten/repair wiring/connection(s). |

Table 23-3. COMM 2 SYSTEM (VHF) (Cont.)

| INDICATION OF TROUBLE | PROBABLE CAUSE | CORRECTIVE ACTION |
|--|--|---|
| No sidetone in transmit in both positions | Defective transceiver. Dirty/loose/defective coaxial cabling/connection(s). Dirty/loose/defective power/ground wiring/connection(s). | Replace transceiver. Clean/tighten/repair cabling/connection(s). Clean/tighten/repair power/ground wiring/ connection(s). |
| No sidetone in transmit in one position. | Defective KMA-24H audio/ICS control in one position. Defective transceiver. Dirty/loose/defective power/ground wiring/connection(s). Dirty/loose/defective coaxial cabling/connection(s). | Replace audio/ICS control. Replace transceiver. Clean/tighten/repair power/ground wiring/ connection(s). Clean/tighten/repair cabling/connection(s). |
| Transceiver receives, but does not transmit in both positions. | Defective transceiver. | Replace transceiver. |
| Transceiver receives, but does not transmit in one position. | Defective headset in one position. Defective ICS (one position) EMER circuit breaker. Dirty/loose/defective coaxial cabling/connection(s). Dirty/loose/defective wiring/connection(s). | Replace headset. Replace respective EMER circuit breaker. Clean/tighten/repair cabling/connection(s). Clean/tighten/repair wiring/connection(s). |
| Transmissions weak or distorted from both positions. | Dirty/loose/defective coaxial cabling/connection(s). Defective antenna. Defective transceiver. | Clean/tighten/repair cabling/connection(s). Replace antenna. Replace transceiver. |

Table 23-3. COMM 2 SYSTEM (VHF) (Cont.)

| INDICATION OF TROUBLE | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|--|--|
| Reception weak or distorted at both positions. | Dirty/loose/defective coaxial cabling/connection(s). Defective antenna. Defective transceiver. | Clean/tighten/repair cabling/ connection(s). Replace antenna. Replace transceiver. |
| Squelch inoperative (VOLUME control knob pushed in does not eliminate noise). | Defective transceiver. | Replace transceiver. |
| Transceiver does not switch in USE and STANDBY frequency readouts. | Defective transceiver. | Replace transceiver. |
| Transceiver displays will not illuminate. | Dirty/loose/defective power/ ground wiring/ connection(s). Defective transceiver. | Clean/tighten/repair power/ ground wiring/ connection(s). Replace transceiver. |

23-31. VHF TRANSCEIVER (KY-196).

1. The KY-196 transceiver (Figure 23-5) provides two-way voice communication within the frequency range of 118.00 MHz to 135.975 MHz in 25 KHz increments.
2. The transceiver is console mounted and connected to power and associated avionic systems through 20 pin Molex connector and a coax connector at the rear of the unit.
3. The transceiver store “in use” and “standby” frequencies in nonvolatile memory (NVM) for instant callup/recall. Active (in use) and standby frequencies are offered as digital readouts in the face of the transceiver. Transceiver displays are dimmed by automatic intensity control circuitry.

23-32. REMOVAL – VHF TRANSCEIVER (KY-196).

1. Ensure that electrical power is off.
2. Using 3/32 inch Allen wrench, turn transceiver (Figure 23-5) locking screw counterclockwise until transceiver is free of connectors.

3. Remove transceiver from mounting rack.

23-33. INSTALLATION – VHF TRANSCEIVER (KY-196).

1. Ensure that electrical power is off.
2. Looking at top of transceiver (Figure 23-5), ensure front lobe of holddown device is in vertical position.
3. Slide transceiver into mounting tray until front lobe of holddown device contacts rack.



DO NOT OVERTIGHTEN LOCKING SCREW.

4. Using 3/32 inch Allen wrench, turn locking screw until rear lobe engages with rear slot. Continue turning wrench until screw is tight.
5. Perform operational check of COMM 2 system (VHF). (Refer to paragraph 23-31.)

23-34. VHF ANTENNA (DMC70-1/A).

The VHF antenna is located on the forward under section of tailboom access door.

23-35. REMOVAL-VHF ANTENNA (DMC70-1/A).

1. Gain access to tailboom antenna area through tailboom access door.
2. Disconnect VHF cable connector (7, Figure 23-5) from antenna (8).
3. Remove screws (9) and washers (10) attaching antenna (8) to tailboom.
4. Remove antenna (8) and doubler (11).

23-36. INSTALLATION – VHF ANTENNA (DMC70-1/A).

1. Align doubler (11, Figure 23-5) and antenna (8) with mounting holes in tailboom.
2. Attach antenna (8) and doubler (11) to fairing using screws (9), and washers (10).
3. Connect VHF cable connector (7) to antenna (8).
4. Replace tailboom access door.
5. Perform operational check of COMM 2 system (VHF). (Refer to paragraph 23-31.)