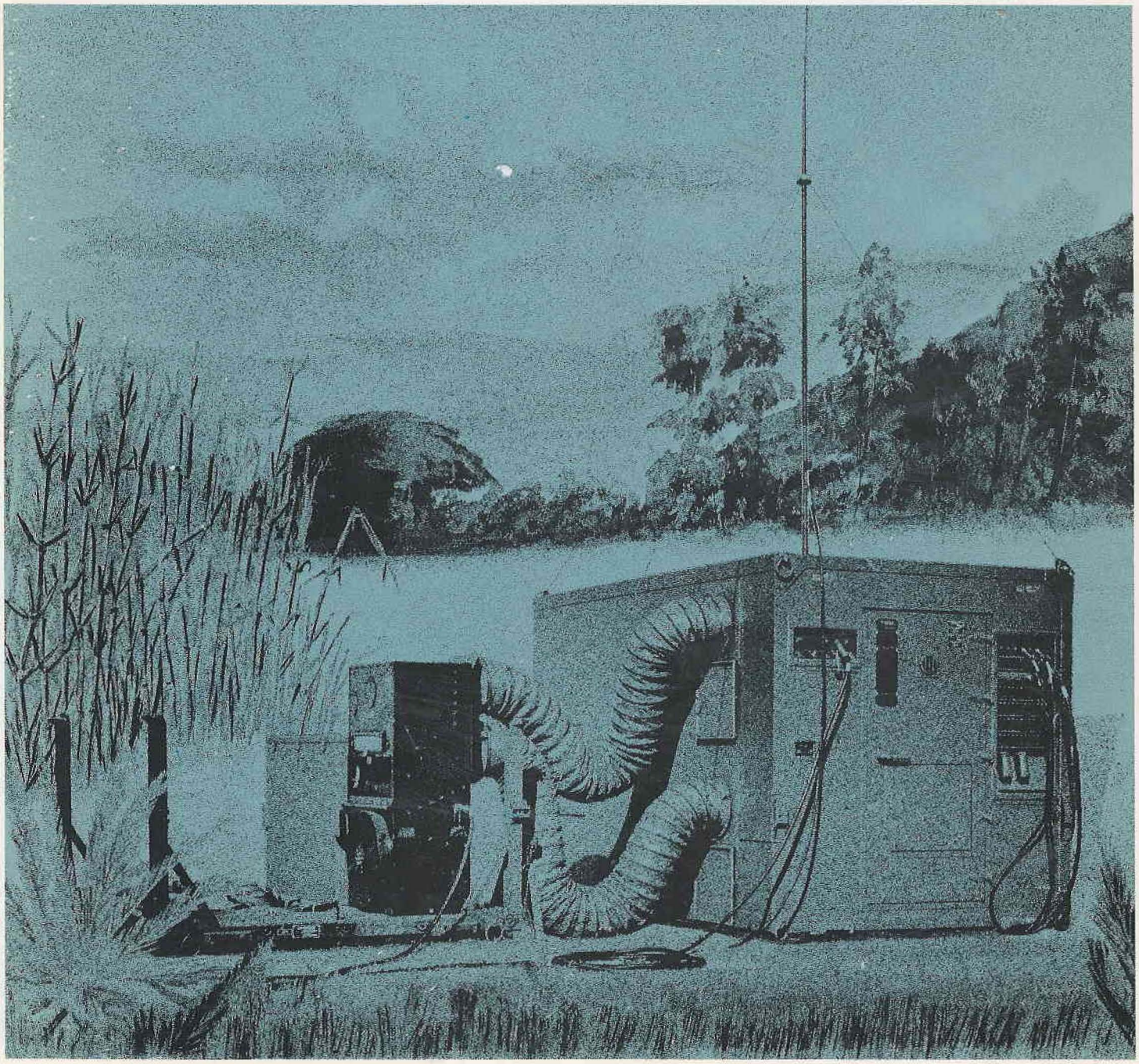
COLLINS

AN/TSC-60 (V) HF Transportable Systems



GENERAL

The AN/TSC-60(V) series is a family of transportable hf communication facilities. Single-sideband communication modes include voice, tone modulated cw, multichannel vftg tty, and compatible am.

The systems of the AN/TSC-60(V) series provide 1-, 2.5- or 10-kW power outputs in the AN/TSC-60(V)1, 2, or 3 models, respectively. Each system is dual in that it includes two independent radios. In the AN/TSC-60(V)3, for instance, one radio has a 2.5-kW output, while the other can be either 2.5 kW or 10 kW. This versatile design allows tailoring of a system to meet mission requirements.

All AN/TSC-60(V) systems use Collins state-of-the-art equipment that provides digital control, maximum interchangeability, reduced spares requirements, and ease of operation and maintenance. The equipment is designed to meet DOD standards and the requirements for TADIL-A operation.

All operation and maintenance functions of AN/TSC-60(V) systems can be conducted from the operator's console. The following operation functions can also be conducted from a remote control unit supplied with the shelter: on/off, mode and frequency selection, keying, and voice modulation and FSK audio.

Radios and terminal equipment are housed in a S-141( )/G (Modified) Transportable Shelter that can be moved by fixed-wing aircraft (C-124, C-130, C-119, or larger), helicopter, flat-bed trailer, or transporter.

Antennas and cables are contained on an MX-4521/TSQ-47 Auxiliary Pallet during storage or transportation. The external air conditioner is mounted on this pallet to meet air conditioning requirements which are minimized by venting the power amplifiers directly outside the shelter.

COMMUNICATION CAPABILITIES

The AN/TSC-60(V) series can be operated in upper sideband, lower sideband, four-channel multiplex, independent sideband, or compatible am. Modes of operation include voice, speech-plus-tty (85-Hz shift), cw, and up to 16 channels of 85-Hz-shift tty. The systems can be operated simplex or duplex (switch selectable).

By proper selection of modes, a wide variety of communications requirements can be met — from such minimum requirements as a single voice or cw channel to such maximum requirements as simultaneous full duplex operation of three speech-plus-tty channels and 16 vftg channels on one radio frequency and four speech-plus-tty channels on another. The radio functions can be controlled from the operator's console or from remote locations.

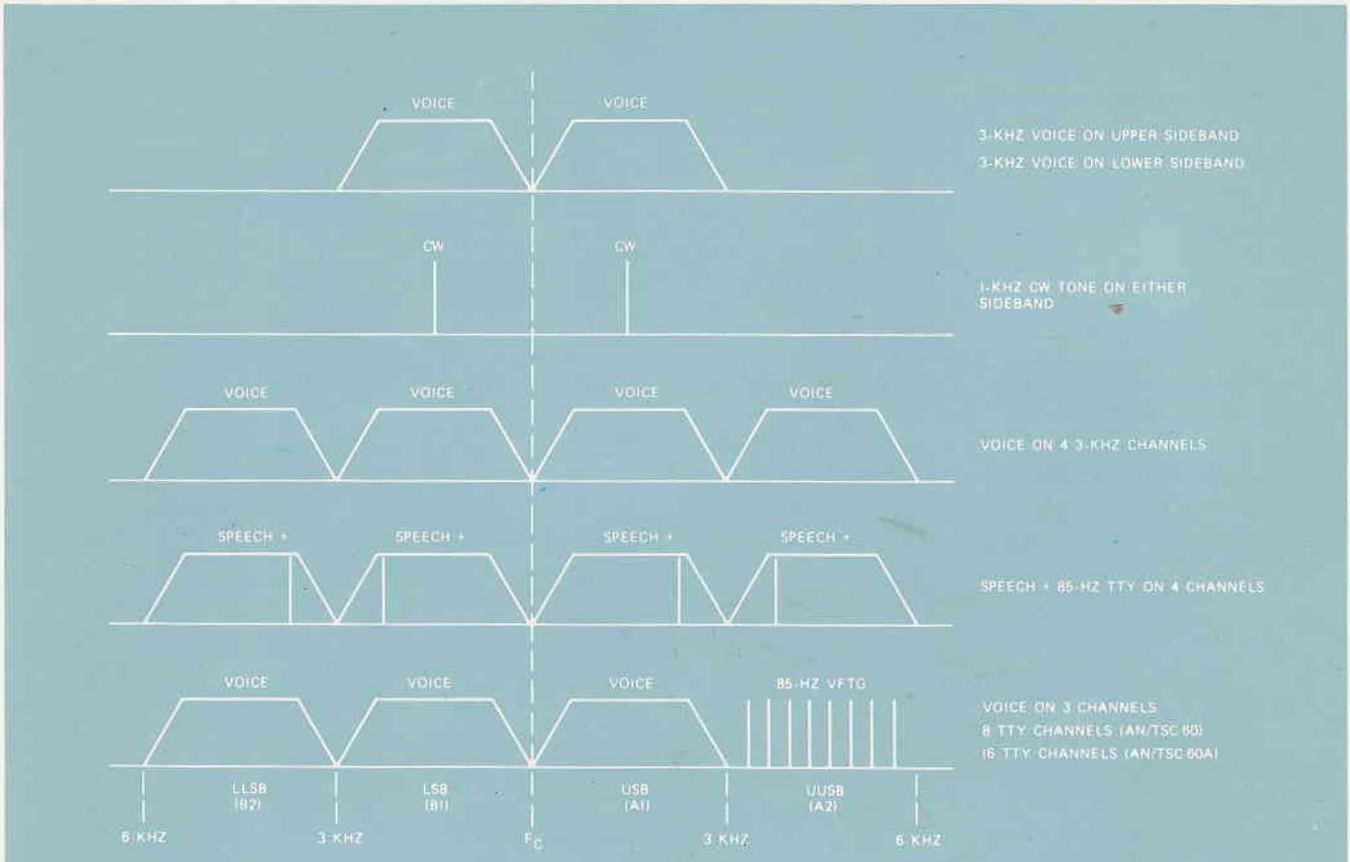
FEATURES

- DCA CIR 330-175-1 hf radio
- JCS PUBS 10 data radio (TADIL-A)
- DCA CIR 330-175-1 FSK tty terminal
- Transportable antennas
- Remote control of radios
- General purpose telephone line terminal equipment
- Helo-lift weight
- Built-in digital performance monitoring
- 280,000 selectable rf frequencies in 0.1-kHz increments
- Two independent radios per terminal
- Four 3-kHz audio channels per radio
- Ease of maintenance
- High commonality among systems for reduced spares requirements
- Air-conditioned
- Rapid deployment/installation
- Space available for equipment expansion

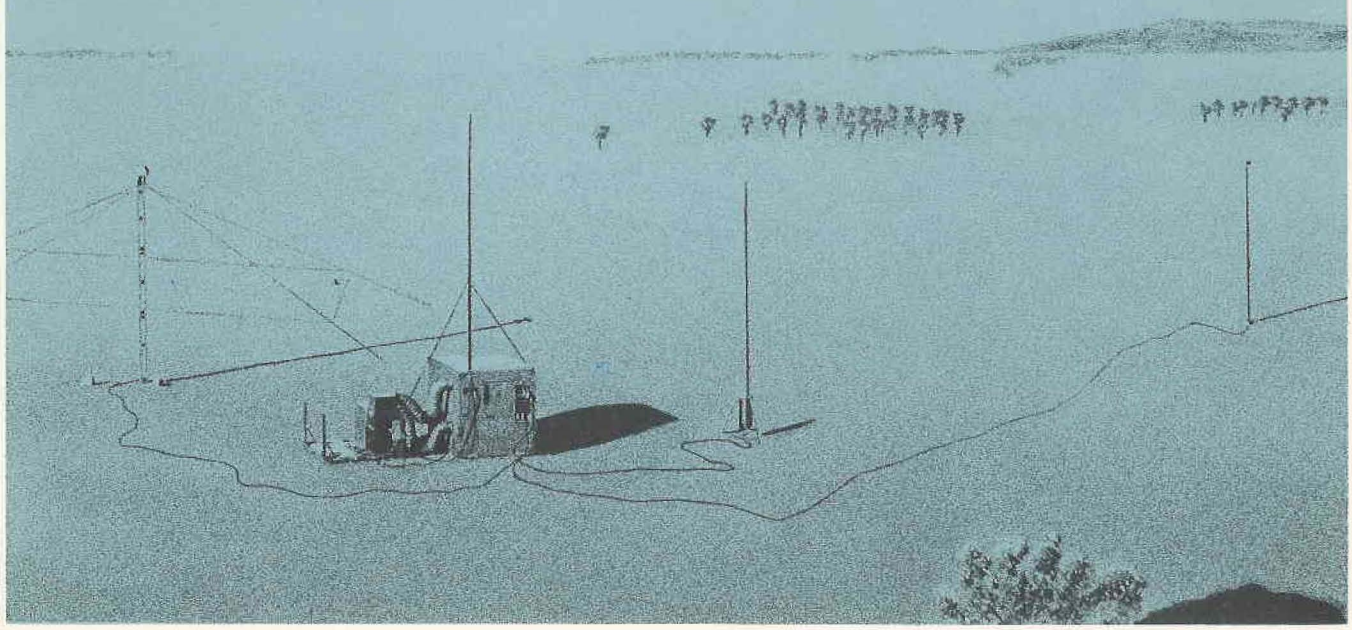
INSTALLATION

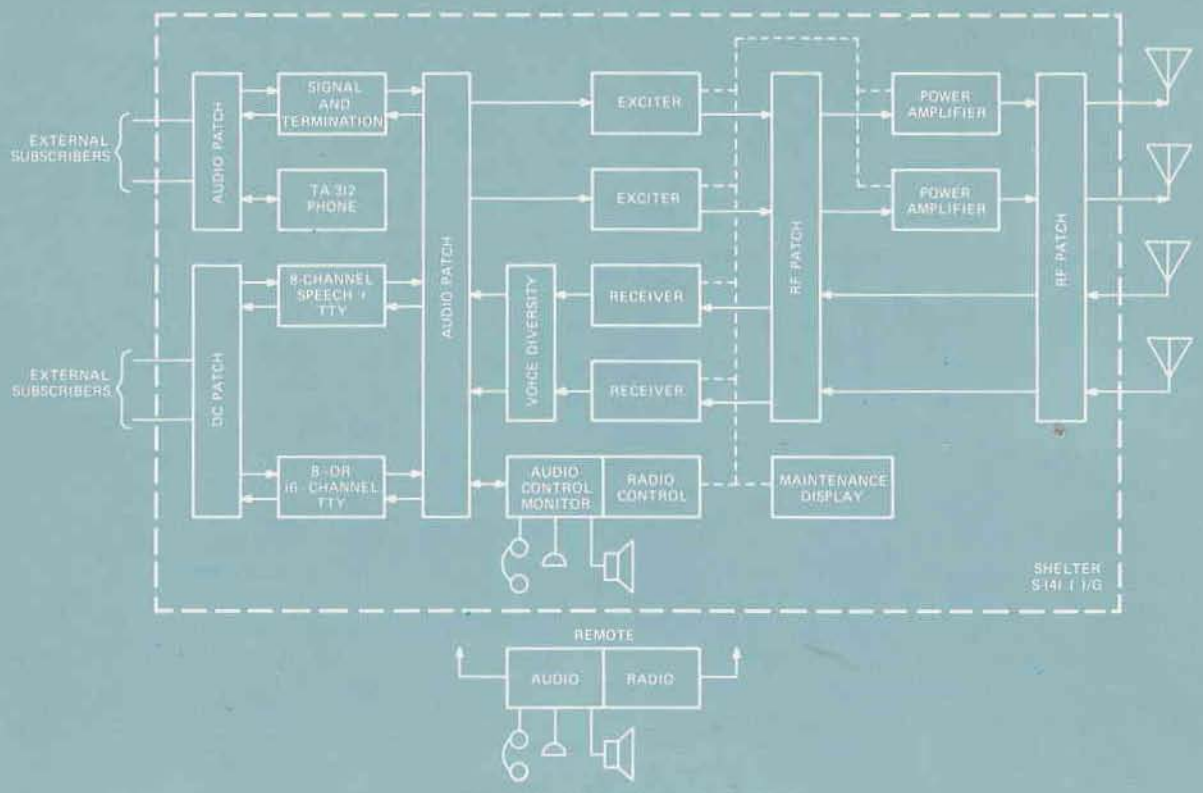
The AN/TSC-60(V) series systems are housed in modified S-141( )/G Shelters that are 142 inches long, 80 inches wide, and 90 inches high. Ancillary items, such as coaxial cable, antennas, and an air conditioner, are mounted for transportation on an MX-4521/TSQ-47 Auxiliary Pallet. The AN/TSC-60(V)1 and 2 each include one shelter and ancillary items. The AN/TSC-60(V)3 consists of a complete AN/TSC-60(V)2 plus an OZ-11/TSC-60(V)3 shelter and ancillary items.

Each system can be installed and made operational in less than 1 hour. Installation consists of placing the shelters in the desired location, erecting the necessary antennas selected from the large antenna complement supplied, and connecting the system to a suitable source of primary power. The shelters and pallets are equipped with detachable XM-720 undercarriages that provide type III mobility as required by MIL-M-8090C.



FREQUENCY SPECTRUM – TYPICAL APPLICATIONS





SYSTEM BLOCK DIAGRAM

OPERATOR'S CONSOLE

FUNCTIONAL DESCRIPTION

The AN/TSC-60(V) series equipment is functionally divided into the audio, tty, and radio systems — all of which are interconnected through the control and monitoring facilities. All operation and maintenance controls are located on the operator's console.

The various system elements are interconnected through standard interfaces for simplified operation and maintenance. Normal audio connections are 4-wire, 600-ohm, balanced, full-duplex, at a 0-dBm level. Radio frequency connections are coaxial, 50 ohms, unbalanced. Control connections are serialized digital, requiring three pairs of wires to serially distribute control data and serially collect monitor data from the devices being controlled. This digital control system permits control of radios from remote control units or the operator's console.

All of the above connections appear on the audio-dc jackfield or the rf patching and switching facilities, permitting the user to choose a wide variety of equipment configurations.

AUDIO SYSTEM

The audio system includes the jackfield, operator equipment, signaling converter, and local and remote controls.

Operator Equipment

The operator equipment includes a microphone, microphone/headset, cw key, and TA-312/PT Field Telephone with associated headset/handset. This equipment provides local or remote operation of the system.

Signaling Converter and Termination Unit

The signaling converter and termination unit converts radio signaling techniques to telephone line signaling techniques, and vice versa. The unit can accommodate up to eight lines simultaneously. Each telephone line can be 2-wire or 4-wire, regardless of the condition of the other seven lines. The 2-wire-to-4-wire signaling converter units are transformer hybrids equipped with an internal balancing network and provisions for an external balancing network. Each line section detects the 20- or 50-Hz ringing signal on the wire line and places a 1600- or 2600-Hz tone or 2150- to 2450-Hz fm ringing signal on the radio line, and vice versa. Radio signaling is selectable by a front panel switch for each line.

Local and Remote Audio Control

Three identical radio control and monitor units are provided in each of the AN/TSC-60(V)1 and 2 systems. Each unit provides a complete operator panel to control, monitor, and operate a transmit and receive radio subsystem.

Each unit contains individual switch-selectable audio controls for high-impedance bridging or terminating the four receiver audio outputs. The operator may monitor these audio outputs by observing the continuous visual call indicator lamps that light whenever audio signals are present. A headset/microphone assembly can be connected at the unit for audible monitoring, and the assembly circuit allows modulation of any one or all four radio input channels.

A key with a 1000-Hz tone is provided for cw operation on either usb or lsb. An orderwire circuit in each of the three control and monitoring units allows intercommunication between the units when they are separated.

The control and monitor units can be used inside the shelter or as far away from the shelter as 1/4 mile. Two units are mounted in the console to provide two independent operator positions in the shelter, and the third unit is stowed in a rack for transit. System design, however, allows remote use of two units while the third remains mounted in the console.

A monitor/switching panel is provided to allow use of the console-mounted control unit to control either of the two radio sets in place of their associated remote control units. This panel permits the following switch selections: local control of radio no. 1 and remote control of radio no. 2; local control of radio no. 2 and remote control of radio no. 1; and remote control of both radios by their associated individual remote control units.

The monitor/switching panel is also the facility through which the audio output of the two radio receivers may be monitored. The panel has a switch-selectable speaker with volume control, call indicator lamps for each of the four channels from each of the two receivers, and a signal level vu-meter with input from the system jackfield for easy access.

TTY SYSTEM

Speech-Plus-TTY

Each AN/TSC-60(V)1 and AN/TSC-60(V)2 system provides eight speech-plus-tty channels. Each telegraph terminal includes: eight FSK transmitters, each with audio as well as dc tty inputs and an audio output; eight FSK receiver assemblies, each with an audio input and dc and audio tty outputs; and eight filter assemblies that serve to combine the speech and 2805 ±42.5-Hz tty signals in the transmit mode and separate the speech and tty signals in the receive mode.

VFTG Terminal AN/UCC-3(V)

The AN/UCC-3(V) is a new vftg system designed to DCA CIR 330-175-1 requirements. Building block design permits convenient location of equipments and provides functional equipment that can be combined to provide maximum flexibility in other tty systems. Maximum commonality reduces spares requirements.

Each AN/TSC-60(V)1 system provides eight 85-Hz-shift tty channels (channels 5 through 12). The AN/TSC-60(V)2 provides 16 channels. In both models, an FSK transmitter assembly and an FSK receiver assembly are provided for each channel, and a combiner assembly is provided to combine the audio inputs of the FSK receivers and transmitters.

Jackfields, test panels, and power supplies of all vftg equipment are located for greatest operator convenience. All channels are full-duplex, and the 8- and 16-channel vftg's are switchable to diversity and split operation. A loop battery is provided for all lines, but an external battery may be selected.

AN/UCC-3(V) Channel Assignments

CHANNEL	FREQUENCY (Hz)	CHANNEL	FREQUENCY (Hz)
1	1785	2	425
3	1955	4	595
5	2125	6	765
7	2295	8	935
9	2465	10	1105
11	2635	12	1275
13	2805	14	1445
15	2975	16	1615

RADIO SYSTEM

The radio system includes two AN/GRR-18 Receiving Sets, two AN/GRT-17 Transmitting Sets, and two OG-88/TSC-60(V)1 or OG-90/TSC-60(V)2 Amplifier/Power Supplies. The AN/TSC-60(V)3 includes the radios of the AN/TSC-60(V)2 plus one OG-89/TSC-60(V)3 Amplifier/Power Supply. In addition to the above, each system includes a common central serial/digital radio monitoring system and a full complement of antennas and dummy loads.

Receiving Set AN/GRR-18

The AN/GRR-18 Receiving Set is a new Collins 651H-2A Receiver that is designed to meet the requirements of DCA CIR 330-175-1 and is compatible with the data requirements for TADIL-A operation.

The AN/GRR-18 is automatically tuned and remotely controlled, providing ssb 4-channel multiplex and am reception in the 2.0000- to 29.9999-MHz frequency range. The operating frequency is selectable in 0.1-kHz increments and is phase locked to an internal frequency standard, providing an error rate of only 1 part in 10^8 per day. An extremely selective rf front end permits normal receiver operation with an interfering signal at the receiving antenna of up to 1000 volts rms, 10 percent removed from the desired frequency.

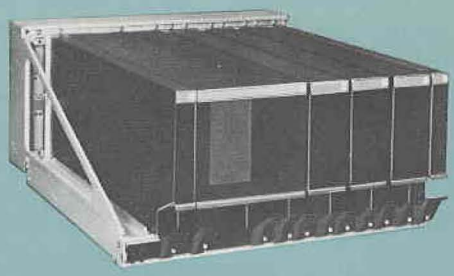
The basic receiver consists of six plug-in units: an rf translator, two if. translators, a digital unit (frequency synthesizer), an adapter unit, and a power supply.

Transmitting Set AN/GRT-17

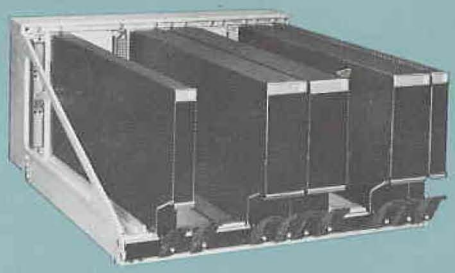
The AN/GRT-17 Transmitting Set is a new Collins 310Y-1A HF Exciter that is designed to meet the requirements of DCA CIR 330-175-1 and TADIL-A operation.

The AN/GRT-17 is automatically tuned and remotely controlled, providing ssb 4-channel multiplex and compatible am transmission in the 2.0000- to 29.9999-MHz frequency range. The operating frequency is selectable in 0.1-kHz increments and is phase locked to an internal frequency standard, providing an error rate of only 1 part in 10^8 per day. A very selective tuned rf filter is used to suppress any spurious outputs.

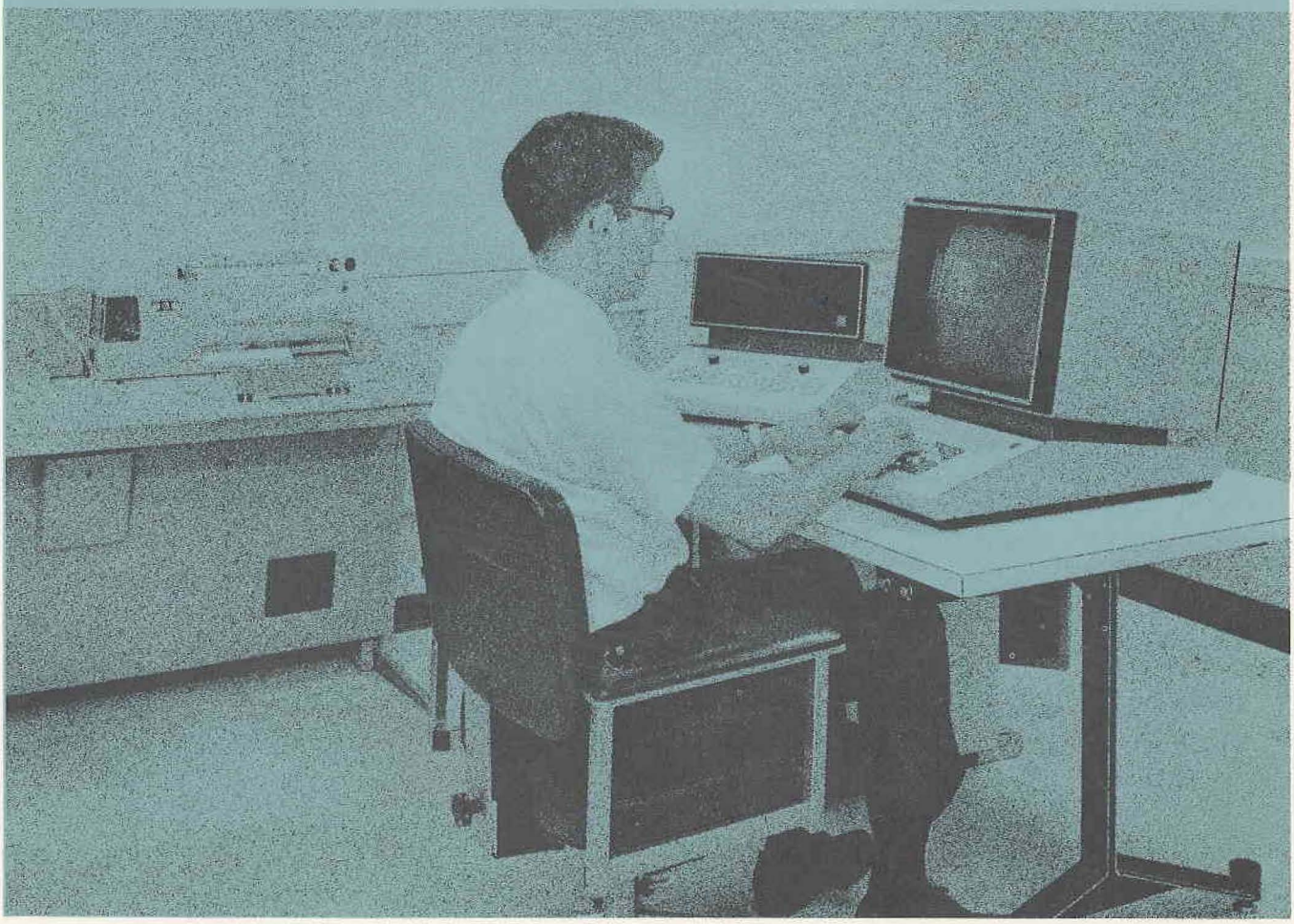
VFTG TERMINAL

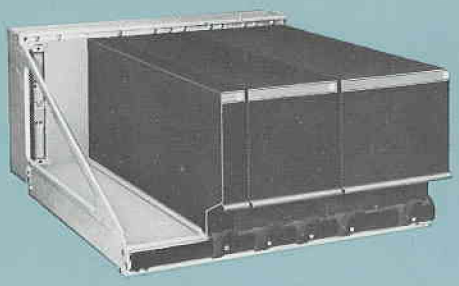


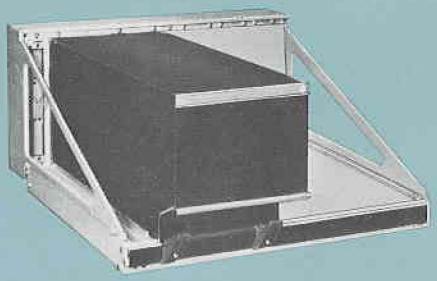
RECEIVER



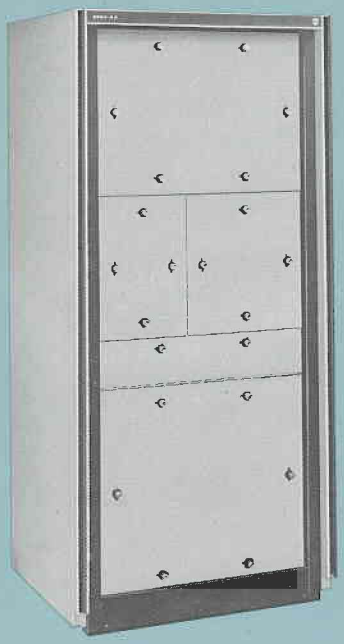
EXCITER



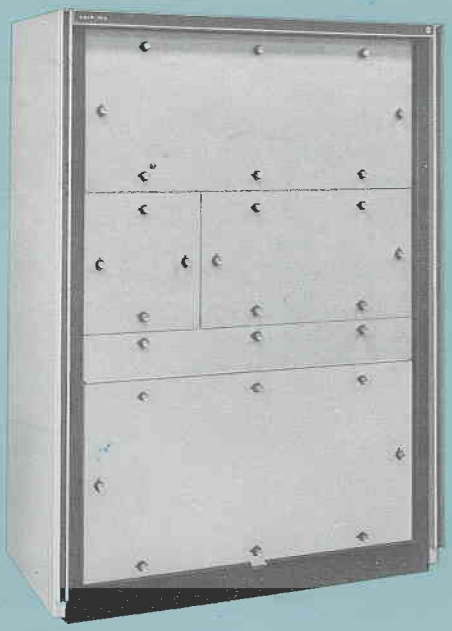




1-KW POWER AMPLIFIER

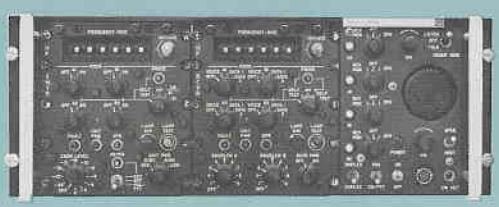


2.5-KW POWER AMPLIFIER



10-KW POWER AMPLIFIER

MAINTENANCE DISPLAY



RADIO CONTROL AND MONITOR

The basic exciter consists of five plug-in units: an rf translator, an if. translator, a digital unit (frequency synthesizer), an adapter unit, and a power supply.

Amplifier/Power Supply OG-88/TSC-60(V)1

The OG-88/TSC-60(V)1 Amplifier/Power Supply is a Collins 548U-2C Linear Power Amplifier that provides an output of 1 kW pep or average from a 100-mW input over the frequency range of 2.0000 to 29.9999 MHz.

Tuning is automatic within 5 seconds. Intermodulation distortion is maintained at a level at least 40 dB below one of two equal tones. Automatic load control maintains effective power output at the desired level. The digital control and performance monitor logic circuits are all solid state.

The OG-88/TSC-60(V)1 consists of four basic units: the rf power amplifier, the digital control and performance monitor unit, the low voltage power supply, and the high voltage power supply.

Amplifier/Power Supply OG-90/TSC-60(V)2

The OG-90/TSC-60(V)2 Amplifier/Power Supply is a Collins 208U-3A Linear Power Amplifier. Its performance characteristics are the same as those described above for the OG-88/TSC-60(V)1, except that the output level is 2.5 kW with switching to a reduced power output, the automatic tuning requires less than 10 seconds, and the output network is a mutually coupled, double-tuned network with an inductance-matching section.

Amplifier Power Supply OG-89/TSC-60(V)3

The OG-89/TSC-60(V)3 Amplifier/Power Supply is a Collins 208U-10A Linear Power Amplifier. Its performance characteristics are the same as those of the OG-90/TSC-60(V)2 above, except that the output power level is 10 kW.

Control and Monitoring System

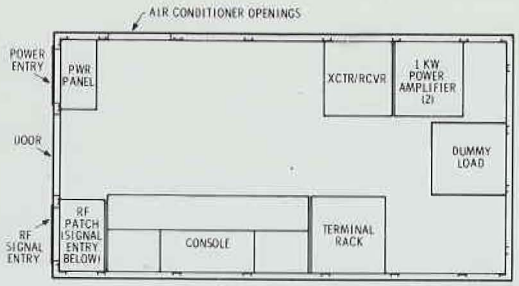
Each radio control and monitor panel contains one transmitter control unit and one receiver control unit that are separated to permit duplex operation. Transmission and reception frequencies are selected with digital thumbwheels, and the mode is selected with switches. Inductors show whether the equipment is tuning, tuned, or faulted. High or low transmitter power is selected with a switch. An indicator shows when the transmitter is keyed.

Information is processed to and from the equipment by serial digital data transfer. Data flows at a 4800-bit-per-second rate that is controlled by the clock and carrier generator in the control unit. Functions provided by the unit are frequency and mode selection, word storage, signal modulation, demodulation, word transfer, and status display. Information is monitored in parallel from the radio, then converted to serial, and automatically transmitted back to the control unit.

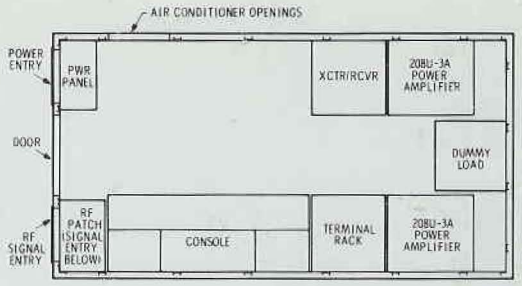
Maintenance data is displayed on a digital display unit mounted in the console. Monitor bus data from the radio equipment is received in demodulated form from the control unit. Monitor responses that may be selected for continuous display are those of the receiver, exciter, power amplifier, or antenna coupler. Also selectable for display using the 4-digit readout is analog data from the power amplifier, such as voltage or current measurements. Selection of data is made by setting the mode switch to the desired equipment and setting the address of the parameter to be displayed.

Antennas

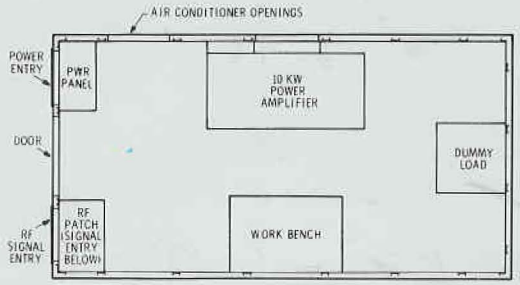
The antenna complement provides a flexible system with quick erection and dismantling techniques for tactical applications. Applicable antenna types include orthogonal antennas, whip antennas, and sloping V-shaped antennas.



FLOOR PLAN AN/TSC-60(V)1



FLOOR PLAN AN/TSC-60(V)2



PA SHELTER OZ-11/TSC-60(V)3

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