DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

RECORDER-REPRODUCER SET, SOUND AN/GSH-17

This copy is a reprint which includes current pages from Changes 1 through 3.

H E A D Q U A R T E R S , D E P A R T M E N T O F T H E A R M Y
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ORGANIZATIONAL MAINTENANCE MANUAL
RECORDER-REPRODUCER SET, SOUND AN/GSH-17

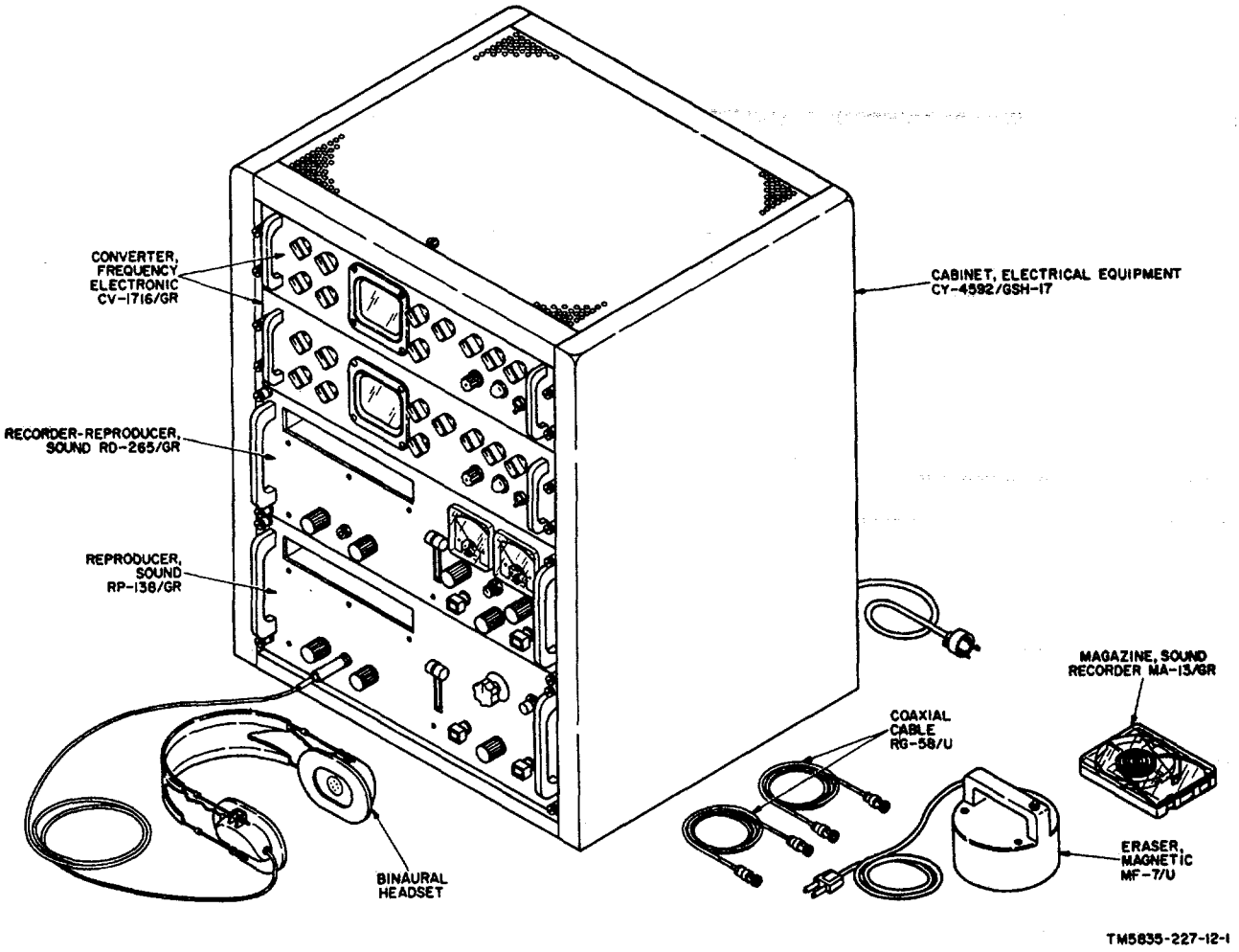

Figure 1. Recorder-Reproducer Set, Sound AN/GSH-17.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a.. This manual describes Recorder-Reproducer Set, Sound AN/GSH-17 (figure 1) and covers equipment installation, operation, operator's maintenance, and organizational maintenance. It includes operation under usual and unusual conditions, cleaning and inspection of the equipment, and replacement of parts available to operator and organizational maintenance personnel. Throughout this manual, Recorder-Reproducer Set, Sound AN/GSH-17 is referred to as the recorder-reproducer set.

b. The maintenance allocation chart is provided in appendix III.

2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/AFR 75-18/MCO P4610.19B, and DSAR 4500.15.

3.1. Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703.

Section II. DESCRIPTION AND DATA

4. Purpose and Use

a. Recorder-Reproducer Set, Sound AN/GSH-17 provides facilities for high-speed tape recording, storage, and slow-speed playback of communications data. High-speed messages (Morse code at speeds of up to 300 words per minute (wpm)) are recorded at a speed of 15 inches per second on two tracks of a three-track magnetic tape cartridge (Magazine, Sound, Recorder MA-13/GR). The recorded data is played back at slow speed (adjustable between 0.5 and 2 inches per second) to enable an operator to manually copy the high-speed code data.

b. The AN/GSH-17 is intended for use with communication receivers, operated in a diversity mode, having intermediate frequencies of either 455 kilocycles (kc) or 1.75 megacy.

cles (mc) at signal levels of from 5 to 500 milli-volts. Typical radio receivers are Radio Receive R-390A/URR (455 kc) and Receiver-Transmitter RT-662/GRC (1.75 mc).

c. Figure 2 is a typical functional block diagram. The AN/GSH-17 accepts separate intermediate frequency (if.) outputs from two type R390A/URR or RT-662/GRC radio receivers. When the receivers are operating in a diversity mode, positive reception is ensured in the event of signal fading, or the failure of one of the receivers. The dual-track recording feature assures reliability by recording the same data on two tracks of the tape. The duplicate data is played back for the operator through a binaural headset.

d. Each earpiece of the headset reproduces code data from an associated channel. A third track on the tape has an indexing signal (cue tone) recorded on it at the start of each recording cycle. When the cue tone is sensed during playback, it causes the tape to stop automatically in the proper position for the operator to begin copying the recorded code data. During playback, a fast forward speed of 20 inches per second is provided to enable the operator to rapidly locate the start of the message or portions of the message which he may have missed. A magnetic tape eraser (Eraser, Magnetic MF-7/U) is used to remove previously recorded data from all three tracks so that the tape cartridge can be reused. The output of each message channel can be continuously monitored on an associated oscilloscope which is an integral part of the AN/GSH-17.

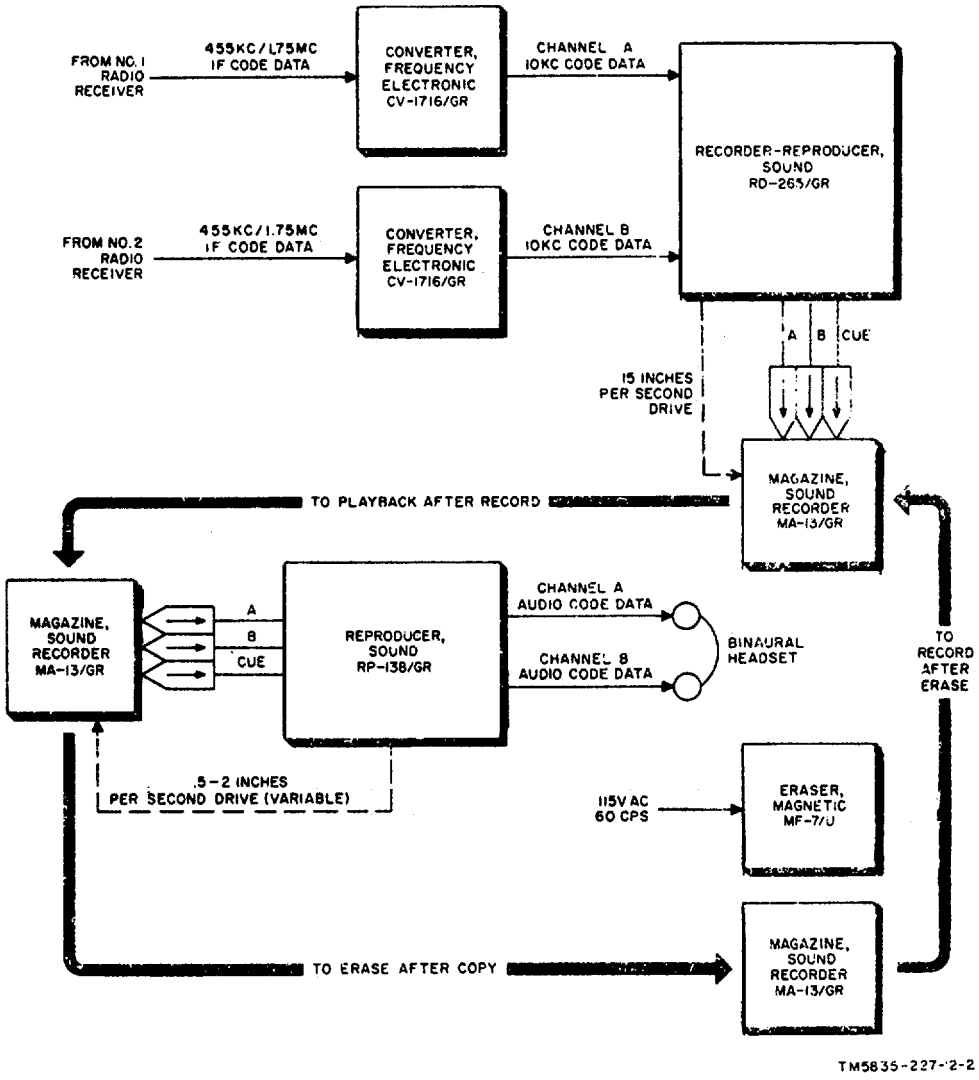

Figure 2. Recorder-Reproducer Set, Sound AN/GSH-17, system application.

5. Technical Characteristics

a. Converter, Frequency, Electronic CVE-J 716/GR.

Number of electron tubes	8, plus 1 cathode-ray tube.
Power requirement	105 to 125 volts ac, 60 cps.
Power consumption	50 watts, maximum
Input signal frequencies	455 kc or 1.75 mc.
Output signal frequency	10 kc.
Output level	Variable to 0 dbm, maximum.
Input impedance	50 ohms, unbalanced.
Output impedance	600 ohms, unbalanced.
Monitoring capability	10-kc output continuously monitored by self-contained oscilloscope.
Operating temperature limits	32° to 105° F (0° to 40° C.).

b. Recorder-Reproducer, Sound RD-265/GR.

Number of electron tubes	7.
Number of transistors	10.
Power requirement	105 to 125 volts ac, 60 cps.
Power consumption	50 watts, maximum.
Recording medium	Magnetic tape.
Tape speed	15 inches per second 0.75.
Type of recording head	Three-track, magnetic, record and playback.
Input	0.2 volt per channel, nominal.
Output level	Variable to 0 dbm, maximum.
Cue tone oscillator frequency	3,600 cps.
Cue tone duration	250 milliseconds.
Bias oscillator frequency (not normally used)	88 kc.
Input impedance (3 channels)	100K ohms, unbalanced.
Output impedance (channels A and B)	600 ohms, unbalanced.
Total harmonic distortion	3%, maximum.
Signal-to-noise ratio	40 db below total harmonic distortion level.
Overall frequency response	30 cps to 16 kc.
Motor type	4-pole, ac induction.
Operating temperature limits	32° to 105° F (0° to 40° C).

c. Reproducer, Sound Rp-138/GR.

Number of transistors	11.
Power requirement	105 to 125 volts ac, 60 cps.
Power consumption	40 watts, maximum.
Playback medium	Magnetic tape cartridge.
Tape speed, playback	Variable from 0.5 to 2 inches per second (10 to 40 wpm when recording speed is 300 wpm).
Type of playback head	Three-track magnetic.
Output level	Variable to 0 dbm, maximum.
Output impedance	600 ohms, unbalanced.
Total harmonic distortion	5%, maximum.
Signal-to-noise ratio	30 db below total harmonic distortion level of 5%.
Motor type	Dc motor-tachometer.
Operating temperature limits	32° to 105° F. (0° to 40° C.).
Tape speed, fast forward	20 inches per second.

d. Eraser, Magnetic MF-7/U.

Power requirements	100 to 130 volts ac, 60 cps.
Power consumption	800watts.

e. Magazine, Sound, Recorder MA-13/GR.

Tape material and size	Lubricated mylar, 1.0 mil thick, V4 inch wide.
Tape length	130 feet +1.
Recording time (15 inches per second)	1.7 minutes ±0.1.
Playback time (2.0 inches per second)	12.75 minutes.
Playback time (0.5 inches per second)	51 minutes.

f. Binaural Headset.

Input impedance (each earpiece)	600 ohms.

6 Items Comprising an Operable Recorder-Reproducer Set, Sound AN/GSH-17 (FSN 5835-901-4924)

FSN	*QTY*	*Nomenclature, part No.., and mfr code*	*Figure No.*
		NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, or Government agency, etc.	
5835-901-4924		Recorder-Reproducer Set, Sound AN/GSH-17: SM-D-461249-1, 80063	
	2	Cable Assembly, Radiofrequency: 12 ft 2 in. lg, Cable RG-58C/U with connectors AG-88E/U on each end; SM-C-461190, 80063 (Not installed)	9
	2	Cable Assembly, Special Purpose Electrical: 2 conductor 2 ft 7 in. lg o/a (M5CS7-A035) (Not installed)	8
6975-892-9730	1	Cabinet, Electrical Equipment CY-4592/GSH-17: Steel; wired 28-5/8 in. lg x 18 in w x 21-3/4 in h o/a; SM-D-462153-1, 80063 (Not installed) including:	8
5820-906-1111	2	Converter, Frequency, Electrical CV-1716/GR: Frequency data 455 kc or 1.75 mc input; 10 kc output; 105 to 125 vac, 60 cyc, 50 w input, 600 w output; 5-1/4 in. X 15-1/2 in. o/a; 687-DE-4, 22354 (Installed in equip)	3
5835-907-0777	1	Eraser, Magnetic MF-7: Magnetic field type 100 to 130 vac; 4-3/4 in. dia x 4-1/2 in. o/a; SM-C-461253-1; 80063 (Not installed)	7
5965-921-0522	1	Headset, Electrical: Dynamic type; 600 ohms impedance; 107890, Rownwell Corp (Not installed)	10
5835-901-1084	20	Magazine Sound, Recorder MA-13/GR: Continuous tape type, 130 ft, SM-D-461254-1, 80063 (Not installed)	6
5835-901-1086	1	Recorder-Reproducer Sound RD-265/GR: Magnetic recording; input data; 2 channels, 100 k ohms, 15 ips recording speed response data 50 to 1200 cps frequency range; 1 miv amplifier, 600 ohms imp, 105 to 125 vac; 7 in. x 14-1/2 in. x 19 in. o/a; SM-D-421251-1; 80063	4
6835-901-1085		Reproducer, Sound RP-138/GR: Magnetic reproducing; 2 channel 600 ohms imp; replaceable type stylus; 15 ips from 5 to 2.0 ips; 105 to 125 vac, 60 cyc; 7 in. x 14-1/2 in. x 19 in. o/a; SM-D-46125-1, 80063	

6.1. Components and Dimensions

The components of Recorder-Reproducer Set, Sound AN/GSH-17 (figure 1) are listed in the chart below:

Quantity	*Item*	*Height (in)*	*Width (in)*	*Depth (in)*	*Weight (lb)*
2	Converter, Frequency, Electronic CV-1716/GR	5 1/4	19	15 1/2	28
1	Recorder-Reproducer, Sound RD-265/GR	7	19	14 1/2	28
1	Reproducer, Sound RP-138/GR				
20	Magazine, Sound, Recorder MA-13/GR				
1	Binaural headset	8 3/4	19	14 1/2	25
1	Eraser, Magnetic MF-7/U	4 1/4	4	7/8	1/8
1	Cabinet, Electrical Equipment CY-4592/GSH-17				1
2	Coaxial cable	4 1/2	4 3/4		4 1/2
2	Shielded cable	28 5/8	21 3/4	18	49
4	Mounting brackets	8 feet			2
		4 feet			2
		4 feet			2 1/2

7. Common Names

A list of the nomenclature assignments for the components of Recorder-Reproducer Set, Sound AN/GSH-17 is given below. A common name is indicated after each item

.

Nomenclature	*Common name*
Recorder-Reproducer Set, Sound AN/GSH-17	Recorder-reproducer set
Converter, Frequency, Electronic CV-1716/GR	Frequency converter
Recorder-Reproducer, Sound RD-265/GR	Recorder-reproducer
Reproducer, Sound RP-138/GR	Reproducer
Magazine, Sound, Recorder MA-13/GR	Tape cartridge
Binaural headset	Headset
Cabinet, Electrical Equipment CY4592/GSH-17	Cabinet
Eraser, Magnetic MF-7/U	Magnetic eraser

8. Description of Recorder-Reproducer Set, Sound AN/GSH-17

a. Overall Description (figure 1).

(1) The recorder-reproducer set consists of two frequency converter units, a recorder-reproducer unit, a reproducer unit, and a cabinet in which the units are mounted. Also, 2 coaxial cables, 2 audio cables, 20 tape cartridges, a binaural headset, and a magnetic tape eraser are included. Each rack mounted unit is supported by chassis brackets in the cabinet and secured with screws to the front panel. Brackets are supplied to permit the cabinet to be mounted on a wall. The recorder-reproducer set may also be mounted on the floor or on a bench.
(2) The input and output cables are connected at the rear of the cabinet. A power distribution strip, located at the rear of the cabinet, furnishes power to each unit.

b. Description of Converter, Frequency, Electronic CV-1716/GR (figure 3).

(1) The frequency converter is contained in a drawer-type chassis with a front panel affixed to the chassis. The converters are mounted in the upper portion of the cabinet. Handles on the front panel permit each drawer-type chassis to be pulled out for servicing.
(2) All operating controls are located on the front panel. An oscilloscope is included to permit monitoring the 10-kc output signal. A combined light filter and shield is provided for the oscilloscope screen to make viewing easier in locations with high light intensity.
(3) The frequency converter is divided into two chassis assemblies which are mounted on the main chassis: converter chassis A1 and oscilloscope chassis A2.

All input and output connections to the frequency converter are made through connectors located at the rear of converter chassis A1. Electrical connections from the chassis assemblies to components located on the front panel, and interconnections between the two chassis assemblies are made by means of short jumper cables.

(4) Each chassis assembly of the frequency converter is equipped with a self-contained power supply which produces all the voltages required by the unit.

c. Description of Recorder-Reproducer, Sound RD-265/GR (figure 4).

(1) The recorder-reproducer unit is contained in a drawer-type chassis with a front panel affixed to the chassis. The unit is mounted in the cabinet directly beneath the converters. Handles on the front panel permit the drawer-type chassis to be pulled out for servicing.

(2) All operating controls and two volume units (vu) meters are located on the front panel. An access hole for the tape cartridge is also located on the front panel.

(3) All input connections to the recorder-reproducer are made at the rear of the chassis. Primary power is applied to the unit through a permanently attached cable which is terminated in a twist-lock plug. A fuseholder and a chassis ground terminal are located near the power cable. The channel A and B audio input signals are applied to the recorder-reproducer through two separate phone jacks. The input signals can be monitored at a second pair of phone jacks located at the rear of the chassis. An octal socket is provided for connecting a remote control device capable of starting and stopping the tape drive.

(4) The playback output of the recorder-reproducer can be obtained from a two-circuit phone jack mounted on the front panel.

d. Description of Reproducer, Sound RP-138/GR (figure 5).

(1) The reproducer is contained in a drawer-type chassis with a front panel affixed to the chassis. The equipment is mounted in the lower portion of the cabinet. Handles on the front panel permit the drawer-type chassis to be pulled out for servicing. All operating controls are located on the front panel. An access hole for the tape cartridge is also located on the front panel.

(2) All input connections to the reproducer are made at the rear of the chassis. Primary power is applied to the unit through a permanently attached cable which is terminated in a twist-lock plug. A fuseholder and a chassis ground terminal are located near the power cable. An octal socket is provided at the chassis rear for connecting a remote control device capable of starting and stopping the tape drive. The output of the reproducer is taken from a two-circuit phone jack mounted on the front panel.

9. Description of Minor Components

The minor components of the recorder-reproducer set are shown in figures 6 through 10. Special features of the minor components are described below:

a. Magazine, Sound Recorder MA-13/GR (figure 6). The tape cartridge consists of a plastic case containing 130 feet ±1 of lubricated magnetic tape. The tape is prewound in an endless loop on a tape reel that has notches on its outer circumference.

b. Eraser, Magnetic MF-7/U (figure 7). The magnetic eraser is an electromagnetic device, housed in a cylindrical container. A power cord, attached at the rear of the handle, provides connection to a 117-volt alternating current (ac) source. An on-off switch on the handle is located so that it can be thumb-actuated during the erasing operation.

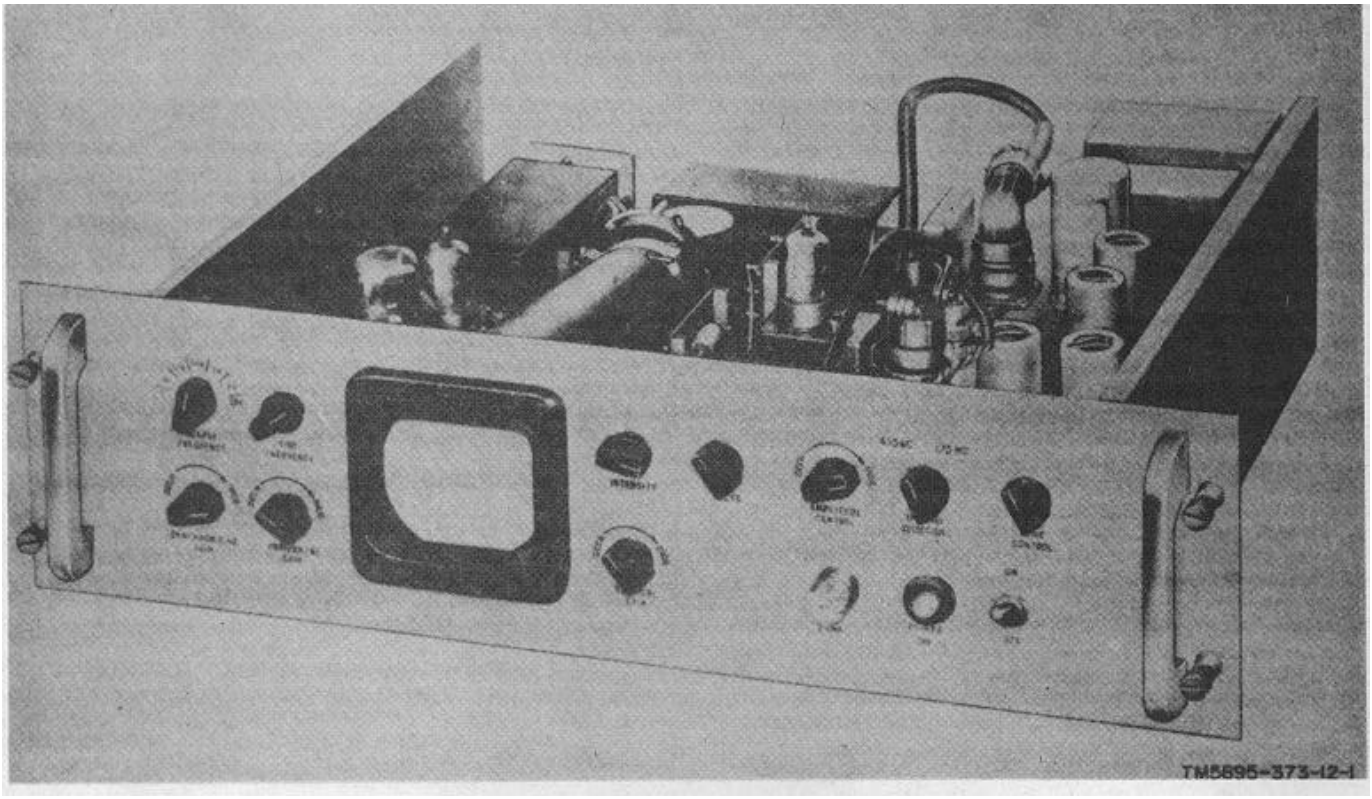

Figure 3. Converter, Frequency, Electronic CV-1716/GR.

c Cabinet, Electrical Equipment CY-4592/GSH-17 (figure 8). The cabinet serves as the mounting facility for all units of the recorder-reproducer set. Four sets of shelf brackets, mounted to the interior side walls of the cabinet provide support for the units. Screw holes are provided at the front edge of the cabinet to accommodate the captive screws located on the front panel of each unit. A mounting bracket can be installed at the rear of the cabinet to permit wall mounting. Legs which permit the cabinet to be floor or bench mounted are also supplied. A power distribution strip, mounted at the inside rear of the cabinet, contains four power connectors that mate with the four power cord connectors of the units. An opening at the lower portion of the cabinet rear permits the main power cord from the distribution strip, and the coaxial signal input cables to the frequency converter units, to be routed to external equipment. The cabinet also contains two shielded audio cables which provide interconnection between the two frequency converter output terminal boards and the INPUT A and INPUT B jacks of the recorder-reproducer unit. Both shielded audio cables are terminated on one end with spade lugs, and on the other, with standard telephone plugs.

d. Coaxial Cables (figure 9). Two coaxial cables (Cable, Radio Frequency RG-58/U are supplied with the recorder-reproducer set to provide interconnection between the external signal source (either 455 kc or 1.75 mc from two receivers) and the input connectors of the two frequency converter units. Each cable is 8 feet long and is terminated at both ends in a Connector, Plug UG-88D/U.

e. Binaural Headset (figure 10). The binaural headset supplied with the recorder-reproducer set is a standard stereo headset that contains two independent earpieces. The input impedance of each earpiece is 600 ohms. Each ear- piece is driven by an associated playback amplifier contained in the reproducer unit. The tip and ring of the connector plug are connected to channels A and B, respectively, while the sleeve provides the common signal return

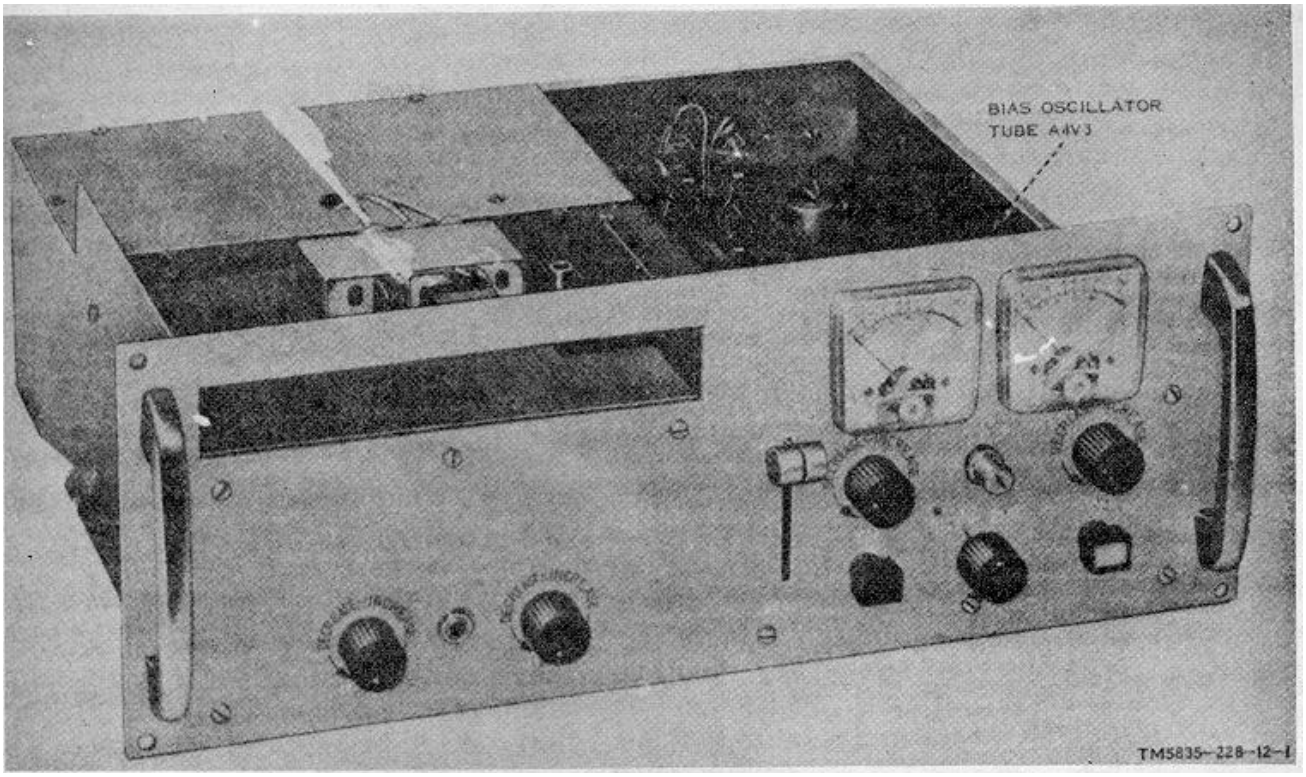

Figure 4. Recorder -Reproducer, Sound RD-265/GRC.

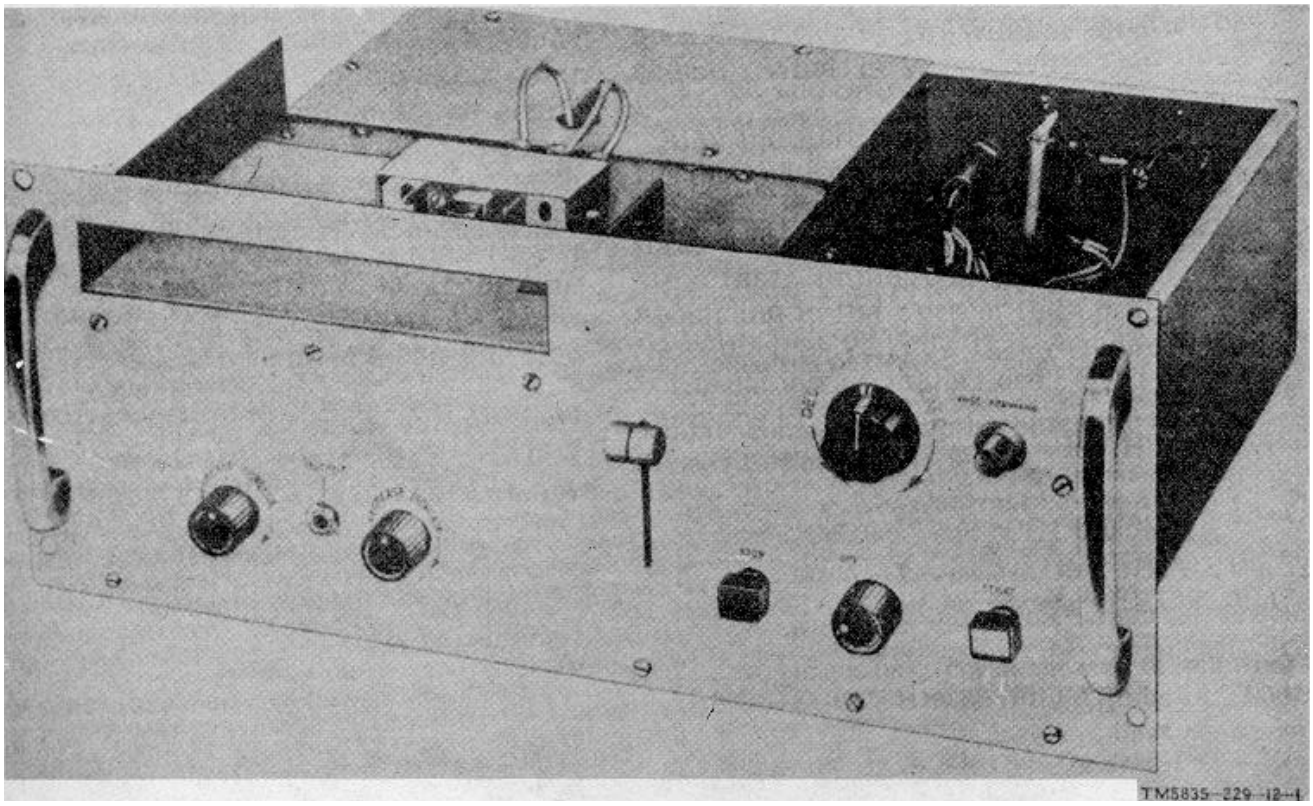

Figure 5. Reproducer, Sound RP-138/GR.

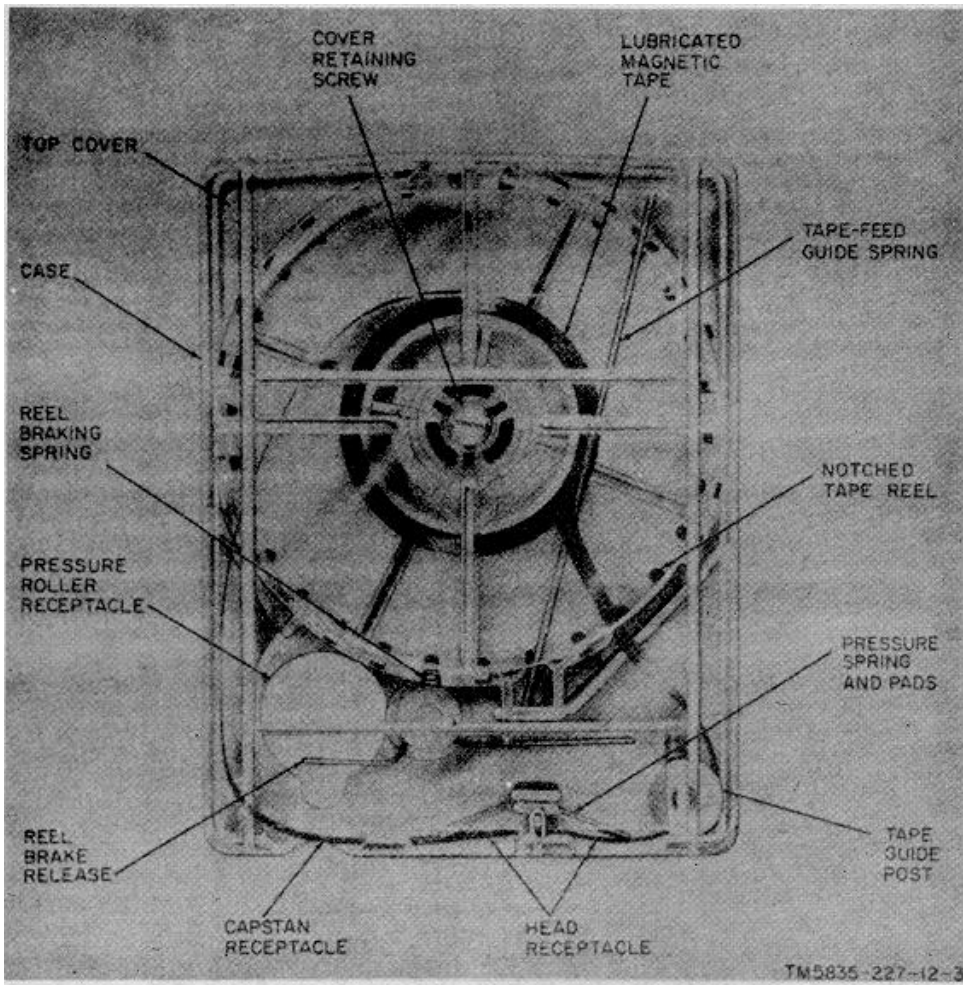

Figure 6. Magazine, Sound, Recorder -13/GR.

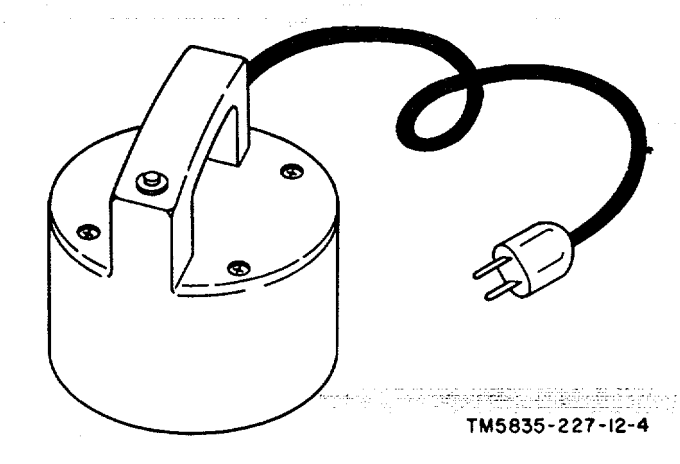

Figure 7. Eraser, Magnetic MF-7/U.

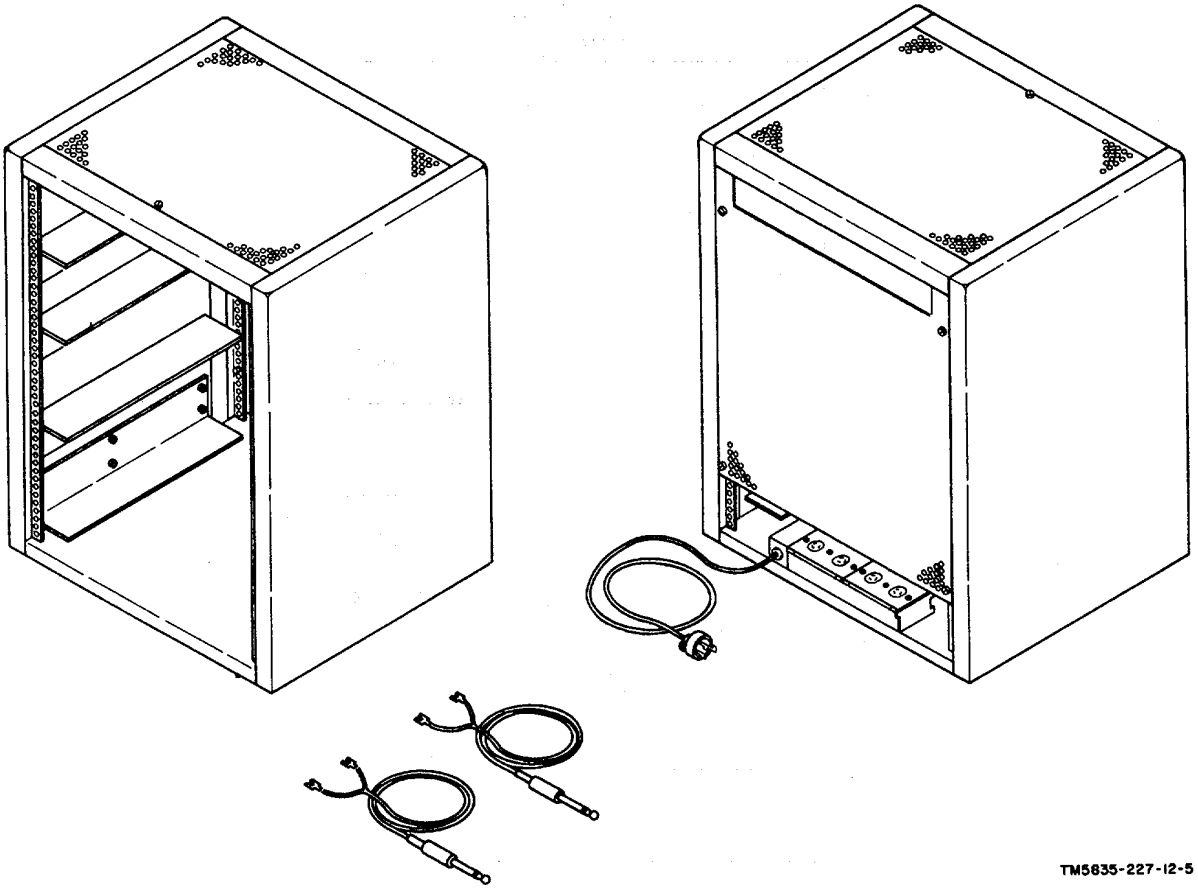

Figure 8. Cabinet, Electrical Equipment CY-4592/GSH-17

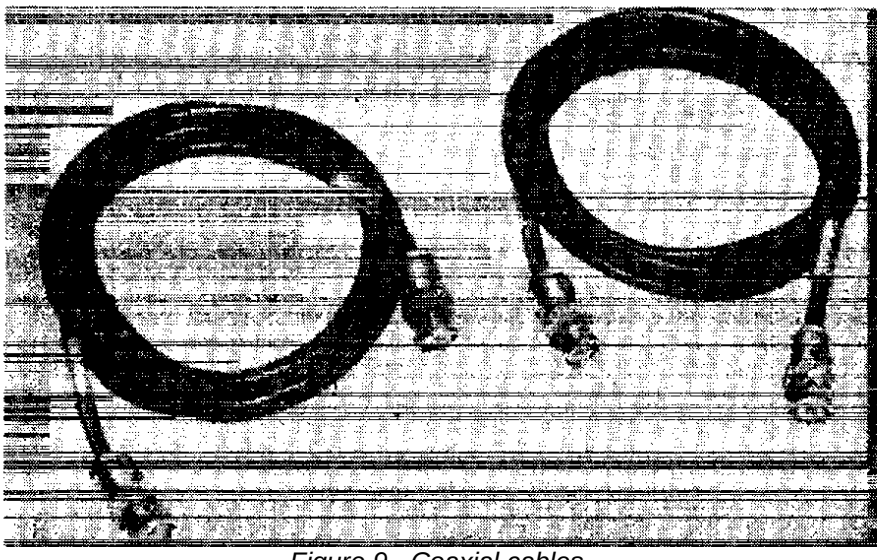

Figure 9. Coaxial cables

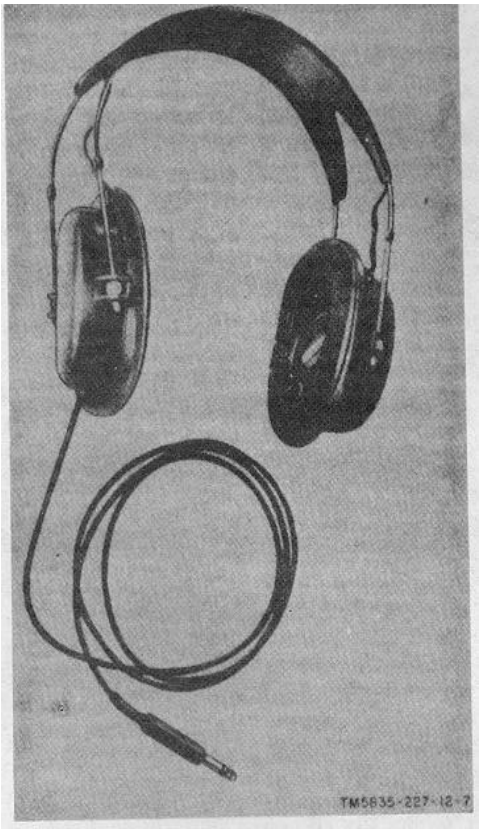

Figure 10. Binaural headset.

CHAPTER 2

INSTALLATION

10. Siting

When locating the recorder-reproducer set, consider the following:

a. The recorder-reproducer set is normally used with a pair of communication receivers. During normal operation, the operator must adjust both receiver controls and recorder-reproducer set controls to attain optimum results. I t is therefore important that the set be physically located near the receivers and in a position that permits coordination between their related controls.

b. Normal operation of the recorder-reproducer set requires that code data be played back and copied manually by the operator; therefore, it is necessary to locate the recorder-reproducer let in an area which contains a table or bench ,op on which a typewriter may be placed. The ;able or bench is also necessary to hold the magnetic tape eraser and the used and unused ape cartridges during operation.

c. The recorder-reproducer set, and especially the tape cartridges (used and unused), are suceptable to extraneous magnetic fields and, therefore, should be located in an area which is comparatively free of such fields. Tape cartridges containing recorded information, which are to be stored, must be removed from an area such as that described above.

d. Periodic servicing of the internal portions of the recorder-reproducer set requires that space be available in front to allow the units to be withdrawn from the cabinet (approximately 40 inches).

11. Unpacking

a. Packaging Data. When packed for shipment, the components of the recorder-reproducer set are placed in cartons and packed in two wooden boxes. Typical shipping boxes are shown in figures 11 and 12. The table below provides packaging data.

ox No.	Dimensions (in.)	Volume (cu ft)	Unit weight (lb)	Contents of box
of 2	34 x 27 x 24	12.4	215	Recorder-Reproducer Set, Sound AN/GSH-17.
of 2	18 x 24 x 24	6.0	42	TM 11-835-227-12 TM 11-588-228-12 TM 11-*68*322912 TM 11-5895**-**78-12 Magazine, Sound, Recorder MA-18/GR Eraser, Magnetic MF-7/U Binaural headset, 8-ft coaxial cable 4-ft shielded cable Mounting brackets.

b. Removing Contents. When unpacking equipment in wooden boxes, perform all the steps outlined below:

(1) Cut and fold back the metal straps.

(2) Remove the nails from the top and one side. Do not attempt to pry them off because the equipment may become damaged.

(3) Remove the carton from the box.

(4) Open the carton and remove the contents.

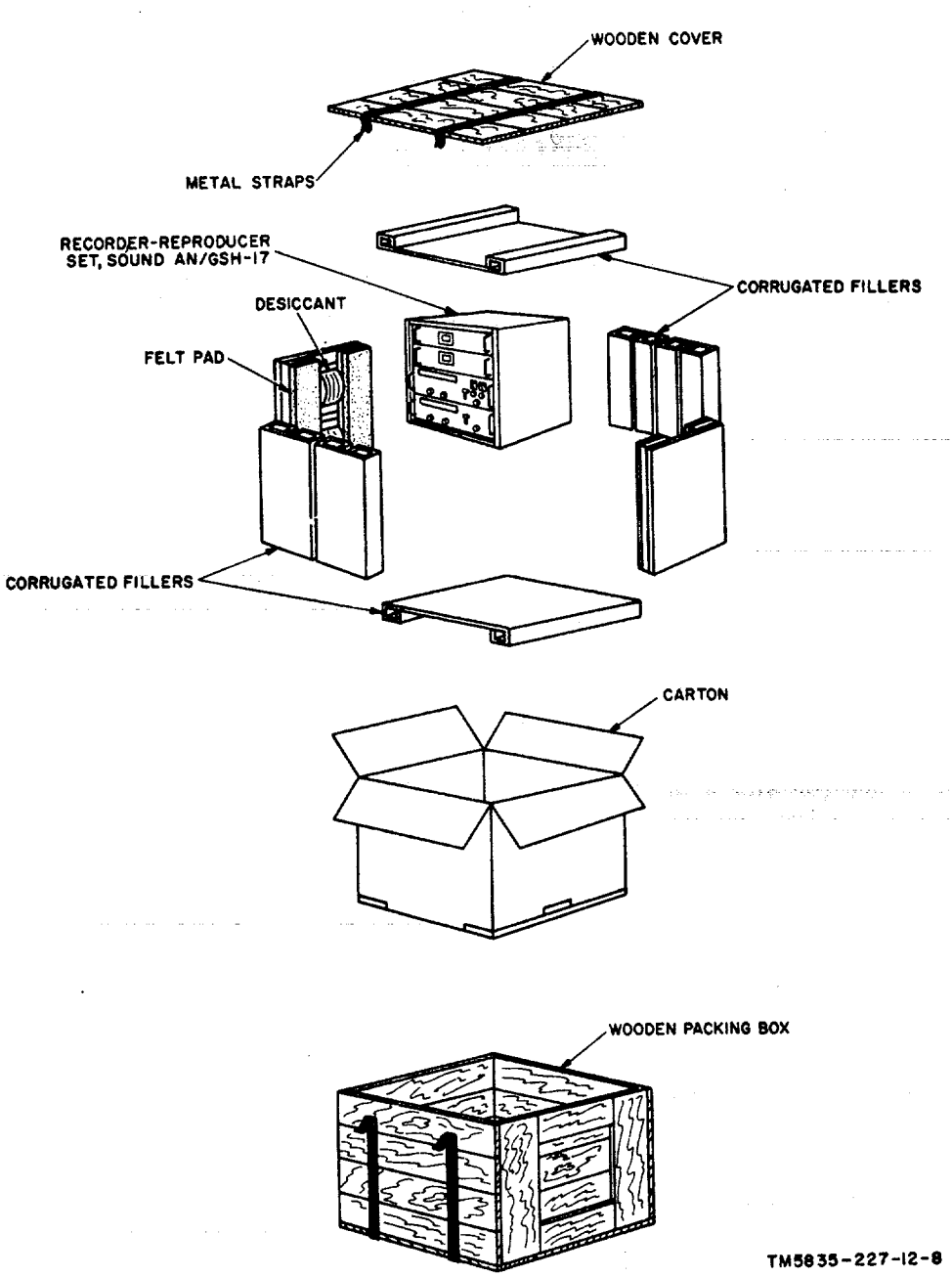

Figure 11. Recorder-Reproducers Set, Sound AN/GSH-17, Packing details

12. Checking Equipment After Unpacking

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 3b).

b. See that the equipment is complete P listed on the packing slip.

Report all discrepancies in accordance with TM 38-75C

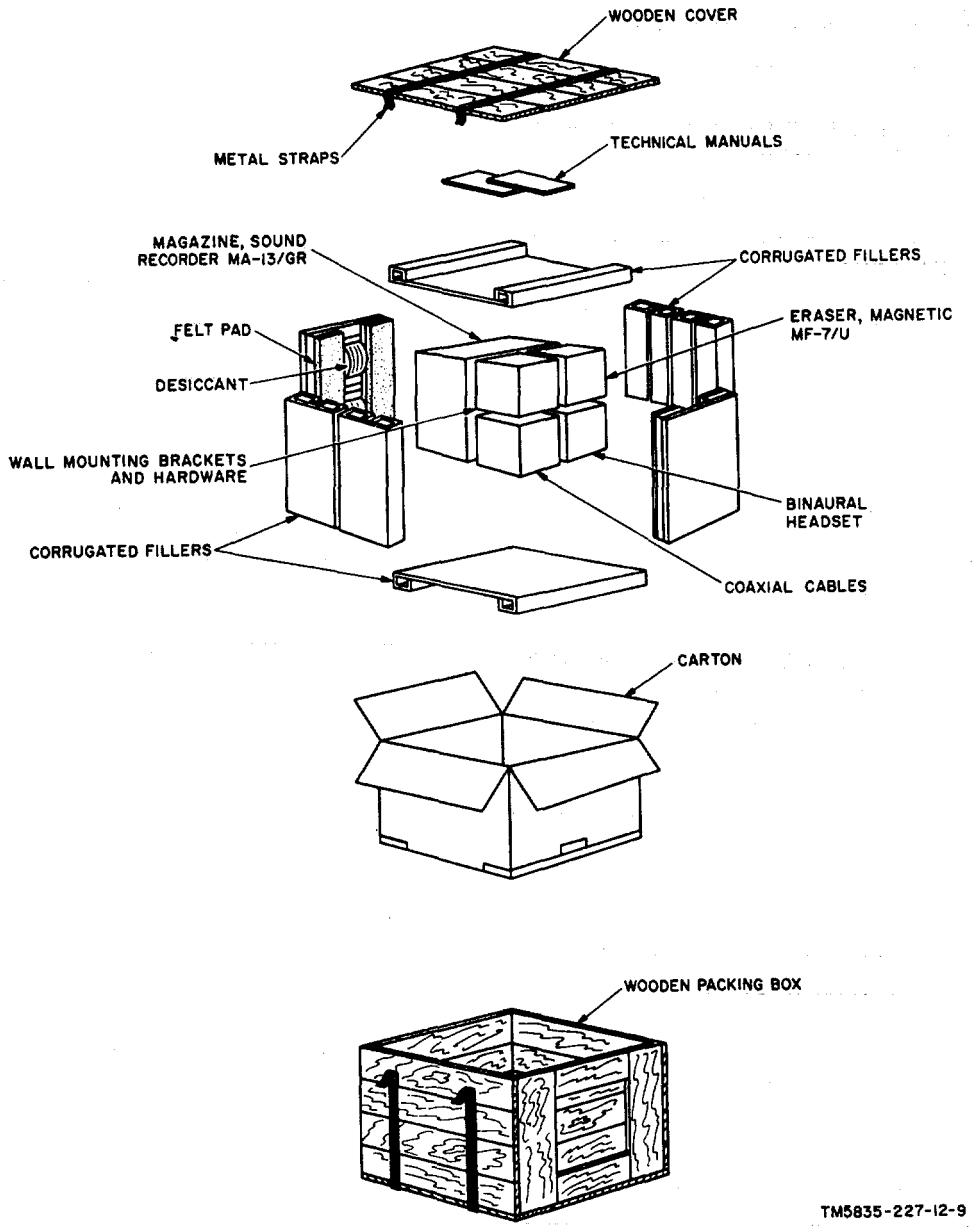

Figure 12. Recorder-Reproducer Set, Sound AN/GSH-17, minor components, packing details.

Shortage of a minor assembly or a part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Check to see weather the MWO number (if any) and appropriate notations concerning the modification have been entered in the equipment manuals.

Note: Current MWO's applicable to the equipment are listed in DA PAM 310-4.

13. Installation of Recorder-Reproducer Set, Sound AN/GSH-17

Caution: **Provide adequate ventilation for tile recorder-reproducer set to ensure sufficient heat dissipation. Avoid installing the set close to heat-producing equipment such as power units and space heaters.**

Tool Kit, Radio Repairman TK-115/G contains all the tools required to install the set. Installation is done by organizational personnel. The recorder-reproducer set is housed in a transportable equipment cabinet, and pro - vided with rubber legs for either bench top or floor installation. A set of mounting brackets is also supplied which permits wall mounting of the cabinet, when required. The recorder-re producer set is shipped with all units installed, interconnected, and ready for use. Installation consists of removing one tube; of wall mounting, bench top mounting, or floor mounting the recorder-reproducer set; and of making cabling connections to power and signal sources. Figure 13 indicates the minimum clearances required for any type of installation. If the recorder-reproducer set is to be bench top or floor mounted, perform the procedures de scribed in a below, and then proceed to para graph 14. If the recorder-reproducer set is to be wall-mounted, follow the procedures de scribed in a and b below, and the proceed to paragraph 14.

a. Remove the four panel screws and partially withdraw the recorder-reproducer unit from the cabinet. Remove bias oscillator tube A4V3 (fig. 4). It is only required for recording voice transmissions.

b. To wall mount the recorder-reproducer set, refer to figure 14 and proceed as follows:

(1) Locate the brackets in accordance with the installation instructions for the vehicle in which it is to be installed.

(2) Make a measurement of dimension d (A, fig. 14) at the rear of the cabinet.

(3) Determine the wall location (height above floor) for the upper bracket, and, using the upper bracket as a template, scribe three marks on the wall at the desired position and center punch for drilling. Make sure that the three markings are horizontal (level).

(4) Drill holes with a No. 7 drill bit.

(5) Tap the holes with a size 1/4 inch by 20 tap.

(6) Mount the upper wall bracket as shown in A, figure 14; use three size 1/4 inch by 20 bolts and washers and tighten securely.

(7) Use the measurement obtained in (2) above, and locate the position of the lower wall bracket by referring to A, figure 14. Be sure to position the lower wall bracket vertically in line with the upper bracket.

(8) Use the lower wall bracket as a template (at the position determined in (7) above), and scribe three marks on the wall and center punch for, drilling. Make sure that the three marks are horizontal (parallel to the upper wall bracket). Repeat the procedure given in (4) and (5) above.

(9) Mount the lower wall bracket as shown in A, figure 14; use the hardware described in (6) above.

Note: Before hanging the cabinet on the wall, remove the rear panel and connect the coaxial cables 'to the input jacks (J1) on the frequency converter units (fig. 15). Replace the rear panel and be sure to route the coaxial cables and power cord to the power source and external equipments (receivers).

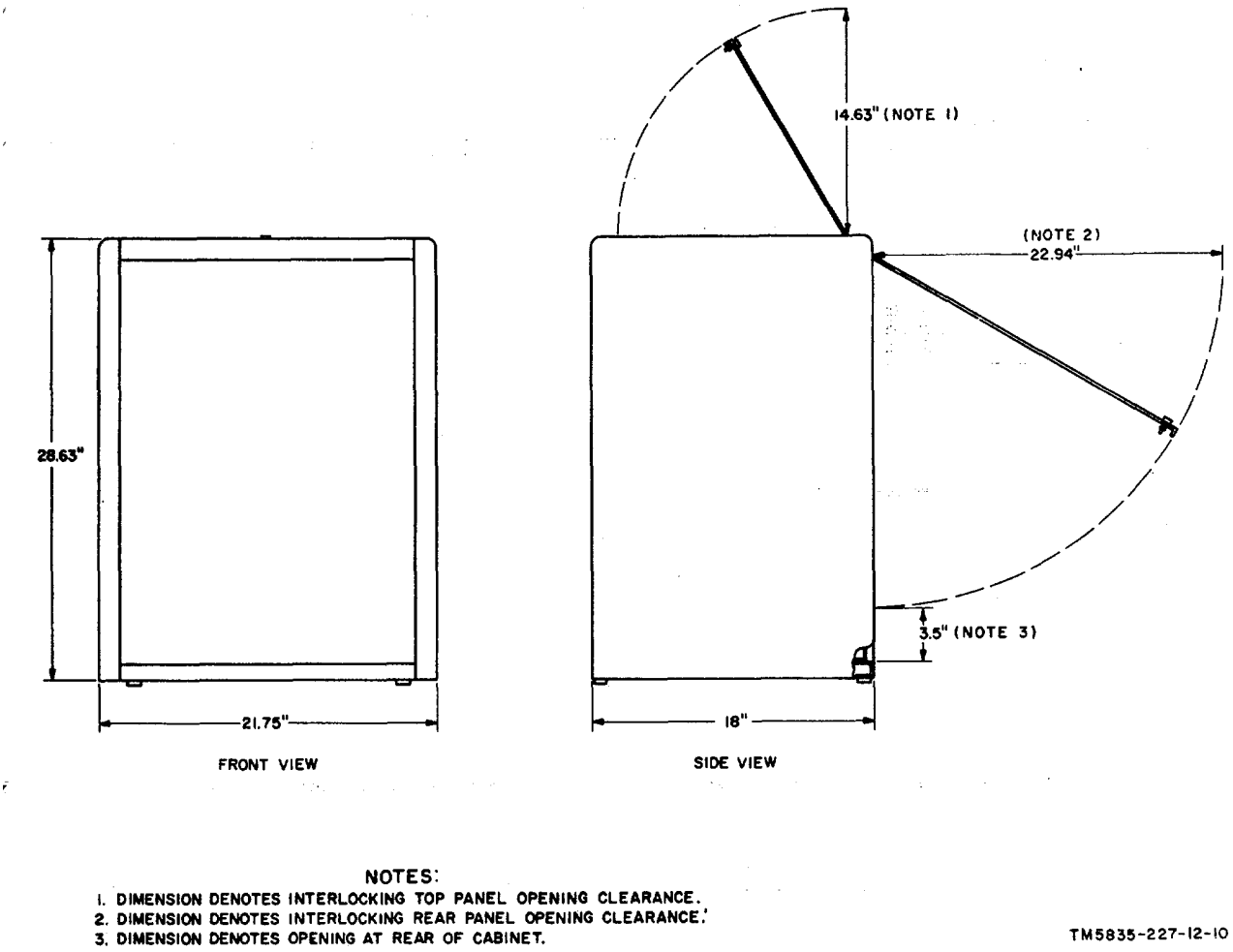

Figure 13. Recorder-Reproducer Set, Sound AN/GHS-17, dimensional drawing.

(10) Lift the recorder-reproducer set to a position which places the upper wall bracket in line with the opening in the top rear of the cabinet (A, fig. 14). With the cabinet tilted (bottom away from wall), slowly move the cabinet toward the bracket until the upper wall bracket engages the top-rear lip of the cabinet as shown in B, figure 14. Make sure that the two surfaces are fully engaged. Push the bottom of the cabinet against the wall to engage the lower wall bracket with the lower lip at the cabinet rear, as shown in B, figure 14.

14. Connections

Caution: **To avoid possible damage to transistors, due to power surges, make sure that the power switches on all four unit panels are in the off position before** making **cable connections.**

Connect the recorder-reproducer set as shown on the cording diagram (fig. 15). If the set is to be installed in a vehicle, route the cables

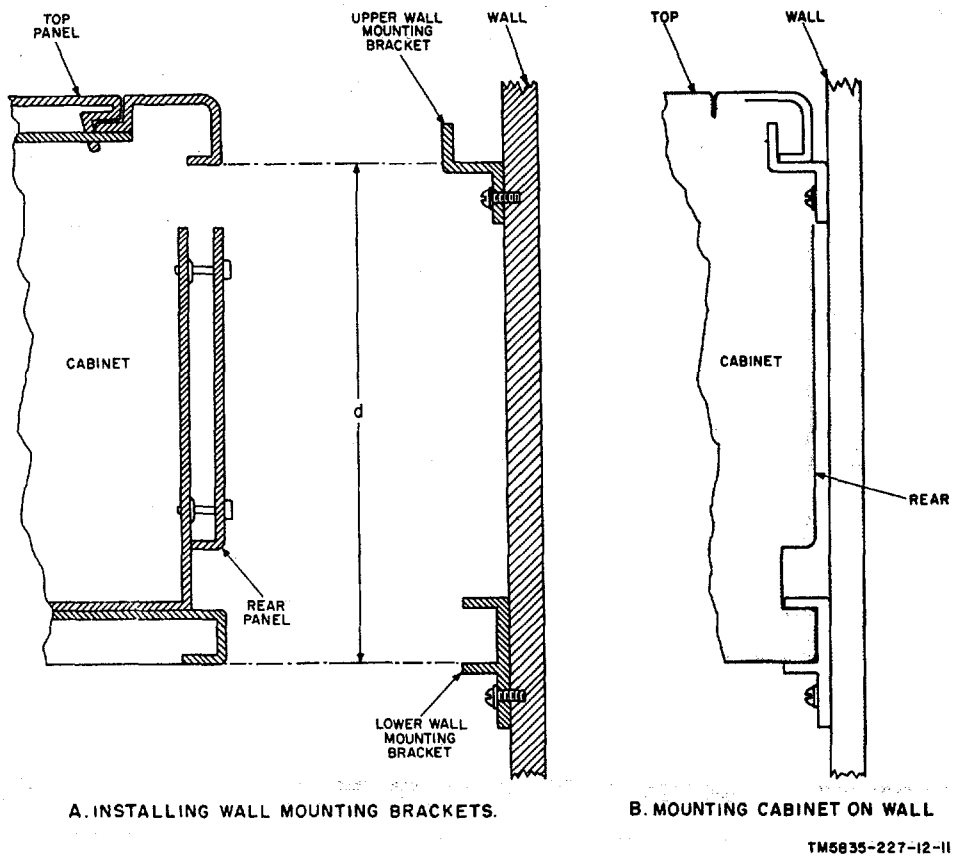

Figure 14. Recorder-Reproducer Set, Sound AN/GSH-17 wall installation.

And power line as instructed for the specific vehicle. Located a convenient 115-volt ac, 60-cycle per seconds (cps) power source for the bulk tape eraser and make connection when appropriate for the erase operation.

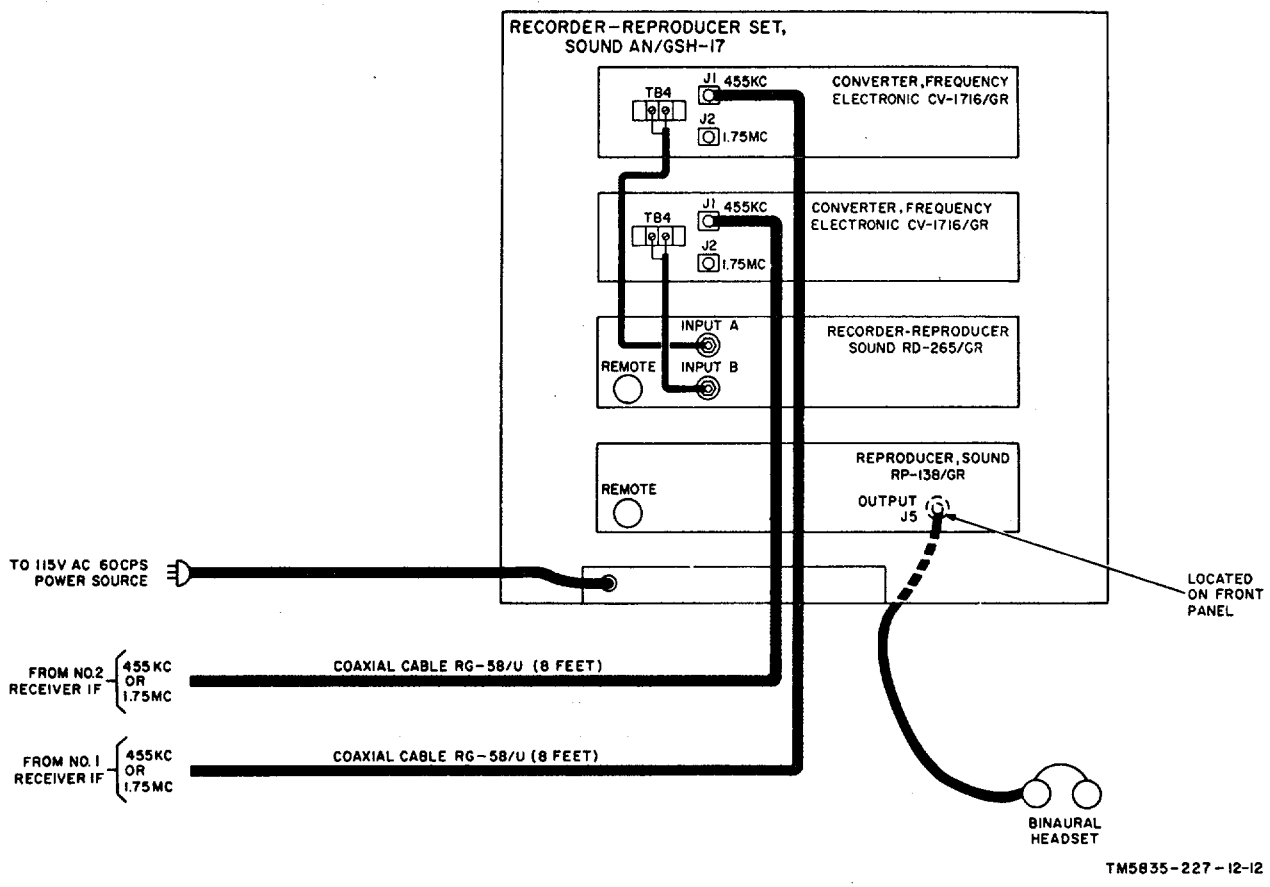

Figure 15. Recorder-Reproducer Set, AN/GSH-17, cording diagram.

CHAPTER 3

OPERATING INSTRUCTIONS

Sections I. OPERATOR,S CONTROLS, INDICATORS, AND JACKS

15. General

This section describes the operator's controls, indicators, and jacks, and their functions, for the recorder-reproducer set. The following paragraphs present the data in charts, under appropriate paragraph headings. Illustrations are also provided to aid the operator in locating the controls, indicators, and jacks.

16. Damage from Improper Settings

The monitor oscilloscope incorporated into each frequency converter panel may be damaged (burned) if a high-intensity electron beam is permitted to strike one area of the phosphor screen for a prolonged period. Make certain hat the INTENSITY controls on both frequency converter panels are set at no higher level than that required to give a visible, sharply focused trace. Also, make sure that-an electron-beam spot does not remain too long on the phosphor screen by setting the HORIZONTAL GAIN controls to provide a full-width horizontal trace.

17. Converter, Frequency, Electronic CV-1 716/GR

The following controls and indicators are located on the front panel of each frequency converter (fig. 16).

Control or indicator	Function
COARSE FREQUENCY switch,----------	Selectes one of six ranges of oscilloscope horizontal sweep frequencies. a. 8 to 80 cps.. *b*. 30 to 120 cps. c. 120 to 500 cps. d. 600 to 2,000 cps. e. 2,000 to 8,000 cps. f. 8,000 to 30,000 cps.
FINE FREQUENCY control----------	Provides accurate adjustment of desired horizontal sweep frequency in any of the coarse frequency ranges.
SYNCHRONIZING GAIN control----------	Adjusts amplitude of horizontal sweep synchronizing signal.
HORIZONTAL GAIN control----------	Adjusts amount of beam deflection along horizontal axis of screen.
Cathode-ray tube screen----------	Provides visual monitoring of detected output signal of frequency converter.
INTENSITY control ----------	Adjusts brightness of trace on cathode-ray tubescreen.
FOCUS control----------	Adjusts electron beam of cathode-ray tube to obtain sharpest trace onscreen.
VERTICAL GAIN control----------	Adjust amplitude (height)of trace pattern onscreen.
AMPLITUDE control----------	Adjusts frequency converter mixer levels to produce desired 10-kc output signal amplitude.
TUNE control----------	Fine tunes converter to match if. frequency of associated receiver.
IF SELECT switch----------	Sets up frequency converter for:
a. 455 KC.	a. 455 kc if. Input signal.
b. 1.75 MC.	*b.* 1.75 mc if. Input signal.
POWER ON lamp----------	Lamp lights when ac power is being applied to frequency converter.

Control, Indicator, or jack	Function
ON-OFF switch----------	Turns frequency converter on or off.
FUSE----------	Provides overload protection for 115-volt ac power input circuit.

18. Recorder-Reproducer, Sound RD-265/GR

The following controls, indicators, and jacks are located on the front panel of the recorder- reproducer (fig. 17).

Control, indicator, or jack	Function
Power switch (ganged to GAIN B control).	Turns recorder-reproducer on or off. Unit is energized when GAIN B control is turned clockwise from OFF.
RELEASE-READY lever.....	When actuated, secures or releases tap cartridge Lever pos — Results RELEASE — Pressure roller is positioned to permit tape cartridge removal or insertion. READY — Positions pressure roller parallel to capstan and locks tape cartridge in place; STOP lamp lights.
RECORD-PLAY switch.....	Sw Pos — Result RECORD — Switches unit circuits to record function. PLAY — Switches unit circuits to playback function.
RECORD lamp.....	Lights when RECORD-PLAY switch is in RECORD position.
Vu meters (one for each channel).	Indicates the level of various signals selected by
OUTPUT jack	Accommodates the connector plug of a binaural head-set to reproduce the outputs from channels A and B in PLAY mode.
GAIN A control	Adjusts recording signal level of channel
GAIN B control	Adjusts recording signal level of channel B.
STOP switch/indicator lamp (red)	When depressed, stops tape; associated indicator lamp lights to indicate tape is not moving. (STOP lamp lights only when RELEASE-READY lever is set to READY, indicating that tape can be put 'into motion by depressing the START push button.)
LEVEL A control	Adjusts the audio output level of the channel A playback amplifier.
LEVEL B control	Adjusts the audio output level of the channel B playback amplifier.
P-T-B switch.	Selects signal to be measured by vu meters: Sw poi — Permits vu meter to measure P — Record signal level. T — Cue tone oscillator output level. B — Bias oscillator output level (not normally used).
START switch/indicator lamp (white).	When depressed, starts tape if RELEASE-READY lever is set to READY: associated indicator lamp lights to indicate that tape is in motion; causes cue tone signal to be recorded on tape to indicate message start.

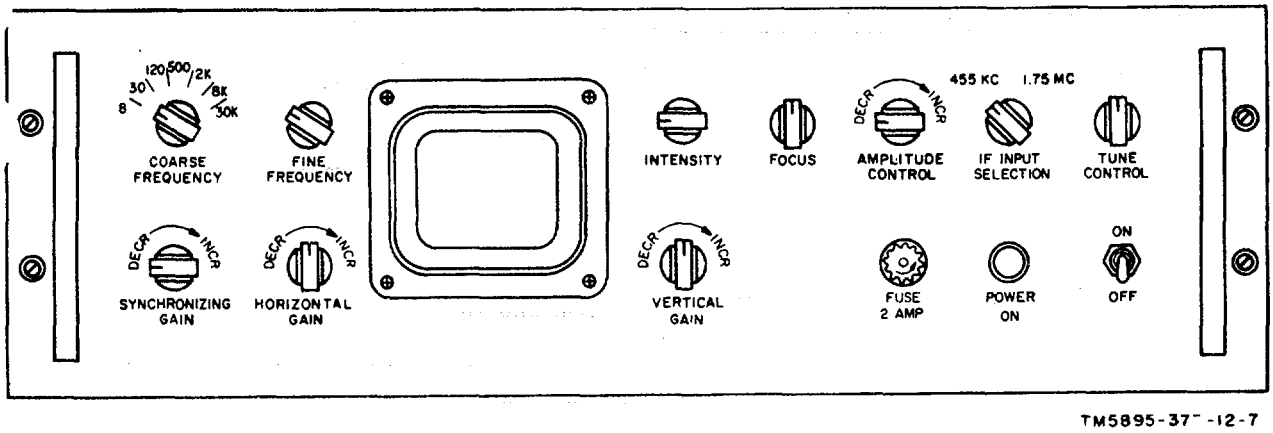

Figure 16. Converter, Frequency, Electronic CV-1716-/GR controls and indicators.

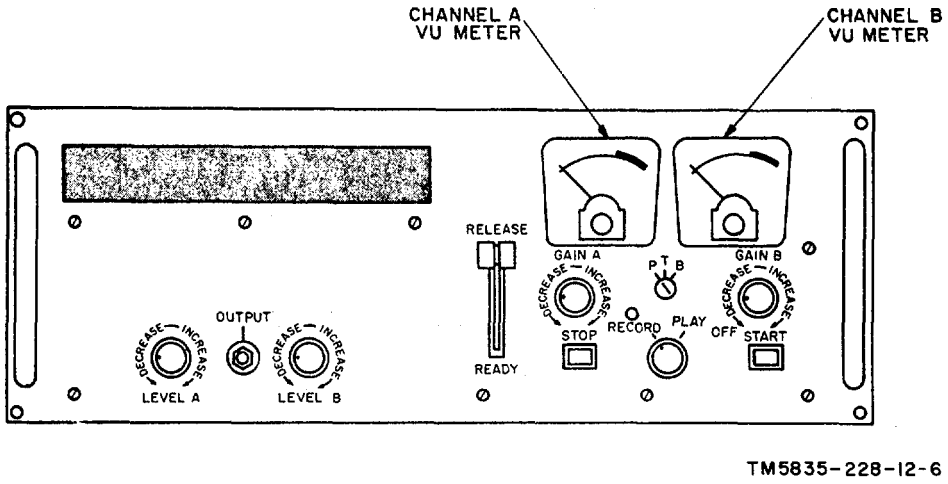

Figure 17. Recorder-Reproducer, Sounds RD-265/GR, controls, indicators, and jacks.

19. Reproducer, Sound RP-138/GR

The following controls, indicators, and jacks are located on the front panel of the **repro**ducer (fig. 18).

Control, indicator, or jack	Function
OFF-QN switch	Turns reproducer on or off.
RELEASE-READY lever	When actuated, secures or releases tape cartridge. Lever pos Results RELEASE Pressure roller is positioned to permit tape cartridge removal or insertion. READY Positions pressure roller parallel to capstan and locks tape cartridge in place; STOP lamp lights.

Control, indicator, or jack	Function
START switch/indicator	When depressed, starts tape (if RELEASE-READY lever is set to READY); associated indicator lamp lights to indicate that tape is in motion.
OUTPUT jack	Accommodates the connector plug of a binaural head-set to reproduce the outputs from channels A and B.
LEVEL A control	Adjusts the audio output level of the channel A playback amplifier.
LEVEL B control	Adjusts the audio output level of the channel B playback amplifier.
SPEED control	Adjusts tape speed between 0.5 and 2 inches per second; speed is increased by turning control in direction of arrow marked increase.
switch/indicator	When depressed, stops tape; associated indicator lamp lights to indicate tape is not moving. (STOP lamp lights only when RELEASE-READY lever is set to READY, indicating that tape can be put into motion by depressing the START pushbutton.)

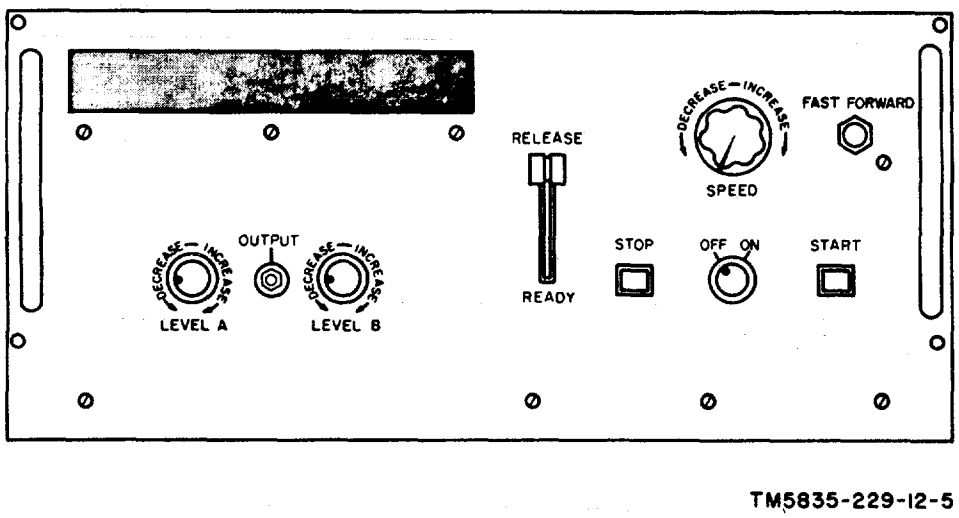

Figure 18. Reproducer, Sound RP-138/GR, controls, indicators, and jacks.

Section II. OPERATION UNDER USUAL CONDITIONS

20. Types of Operation

a. General. The recorder-reproducer set is capable of recording, storage, and playback of code data received from two radio receivers operating in a diversity communications system. The recorder-reproducer set is operated in either of two modes: record or playback.

b. Record Mode. When in the record mode, the recorder-reproducer set accepts high-speed 24 continuous-wave (cw) bursts from two associated communication receivers. A front panel selector switch permits the set to process, for recording, either 455 kc or 1.75 me input signals from the receivers. Typically, messages are received at prearranged times. This require,. that the recorder-reproducer set be brought to operating temperature, to preset, and a tape cartridge be inserted in the recorder-reproducer

unit in advance of each receiving interval. The high-speed (300 wpm) code data is processed and recorded on the tape cartridge at a tape speed of 15 inches per second.

c. Playback Mode. Depending on the station traffic load, the tape cartridge containing the recorded message may be inserted into the re producer unit and played back immediately after recording for manual copying by the operator, or the message may be retained on the tape and stored for future copying. In either case, playback is accomplished at a comparatively slow speed (from 0.5 to 2 inches per second) which reduces the words-per-minute rate to a speed suitable for manual copying. A front panel SPEED control permits the operator to adjust the rate as desired, between approximately 10 and 40 words per minute. After the message is copied by the operator, the bulk tape eraser is used to *clean* the old recorded material from the tape to make it available for future message recordings. Paragraph 22c provides instructions for erasing the tape. Paragraphs 21, 22, and 23 present a typical operating sequence for the recorder-reproducer set, assuming that the message is played back for copying immediately after being recorded. The procedures presented provide sufficient cover age to satisfy most mission requirements; how ever, the *actual* procedure used will be dictated by the *specific* mission requirements.

21. Preliminary Operating Procedures

The operational requirements of the recorder reproducer set require that the set and its associated radio receivers be adjusted prior to the reception of the desired message. Perform the preliminary adjustments described below to preset the equipment.

Note: Check to be sure that the recorder-reproducer set is connected to a 115-volt ac, 60-cps power source and that the input signal cables are connected to the correct signal sources as shown in figure 15 and described in paragraph 14.

a. Set the power switches of all units to the on position as described below. Allow approximately 10 minutes for the equipment to warm up before proceeding.

(1) On both frequency converter units(fig. 16), set the ON-OFF power switch to ON. Be sure that the IN TENSITY and HORIZONTAL GAIN controls are properly set (para 16).

(2) On the recorder-reproducer unit, set the RELEASE-READY lever to the RELEASE position; set the GAIN A and GAIN B controls fully counter- clockwise; set the RECORD-PLAY switch to RECORD: then rotate the GAIN B control clockwise from the OFF position until a click is heard. The RECORD indicator lamp lights.

(3) On the reproducer unit, set the RE LEASE-READY lever to the RE LEASE position; set the SPEED control fully counterclockwise; set the proximately one-fourth turn clock wise; then set the ON-OFF switch to ON.

Note: If an abnormal indication is obtained during the starting procedure, refer to the troubleshooting information given in paragraph 34.

b. Adjust both frequency converter units as described below:

(1) Set the HORIZONTAL GAIN, INTENSITY, and FOCUS controls to obtain a horizontal trace on the oscilloscope, approximately 1-1/2 inches wide that is sharply focused and bright enough for efficient viewing.
(2) Set the VERTICAL GAIN control to midrange.
(3) Set the SYNCHRONIZING GAIN control fully counterclockwise.
(4) Set the IF SELECT switch to the position that corresponds with the frequency of the input signals (455 KC or 1.75 MC).

the associated radio receiver for reception of a cw signal.

(6) While observing the monitor oscilloscope, adjust the AMPLITUDE CONTROL and TUNE control until some signal indication (vertical deflection) is obtained.

(7) Set the COARSE FREQUENCY control to the 500-2K range.
(8) Adjust the SYNCHRONIZING GAIN control slowly clockwise until a stationary pattern is obtained on the oscilloscope screen. Use the minimum setting required to obtain a stable pattern.
(9) Adjust the FINE FREQUENCY control and readjust the SYNCHRONIZING GAIN control, as required, to obtain the desired pattern on the oscilloscope screen.
(10) Adjust the VERTICAL GAIN control, as required, to obtain a vertical deflection which covers approximately one-half of the total screen area.
(11) Adjust the TUNE control for maximum vertical deflection on the oscilloscope screen, back off on the VERT
CAL GAIN control setting, as required, to maintain the vertical deflection within the screen area (signal peaks visible).
(12) Readjust the AMPLITUDE CONTROL, as required, to maintain undistorted wave shapes on the oscilloscope screen.

c. Adjust the recorder-reproducer unit as described below:

(1) Set the P-T-B switch to T; the vu meters should indicate approximately -1 vu.
(2) Set the P-T-B switch to P. Adjust the GAIN A and GAIN B controls until the associated vu meter reading are as, near to 0 vu as is possible without deflection into the red region.

d. Check to see that the recording tape to be used, has been thoroughly erased by performing the procedures given below, on the reproducer unit.

(1) Insert the tape cartridge into the access hole with the transparent side up and the solid end facing away from the unit (fig. 19).
(2) Set the RELEASE-READY lever to READY. The STOP lamp lights.
(3) Depress the START pushbutton; then depress and hold the FAST FOR-26 WARD pushbutton. The START lamp lights and the STOP lamp is extinguished.

Note: If the tape runs through its complete length twice (over 2.5 minutes running time) without coming to an automatic stop, the tape is considered properly erased.

(4) Depress the STOP pushbutton; the STOP lamp lights.
(5) Set the RELEASE-READY lever to RELEASE and remove the tape cartridge; the STOP lamp is extinguished.

e. Prepare the recorder-reproducer unit for recording as follows:

(1) Insert the *clean* tape cartridge *(d* above) into the access hole on the panel with the transparent side up and the solid end facing away from the panel (fig. 19). Push the tape cartridge to the right side of the access hole and as far in as it will go. The tape cartridge guide will position the tape cartridge correctly.
(2) Set the RELEASE-READY lever to READY: the STOP lamp lights (fig. 20).

22. Operating Procedure

The recorder-reproducer set must be preset as ,described in paragraph 21 and ready for recording before reception of the desired message. The procedures given below are a typical method for recording and copying messages.

a. Record Operation.

(1) On the recorder-reproducer unit, depress the START pushbutton. The STOP LAMP is extinguished and the START lamp lights. The message will be recorded automatically.

Note: Throughout the recording operation, carefully monitor variations in the signal levels at the frequency converter oscilloscope screens and vu meters on the recorder reproducer units. Make the necessary level adjustments as required.

(2) On the recorder-reproducer unit, check to see that the STOP lamp lights and the START lamp is extinguished

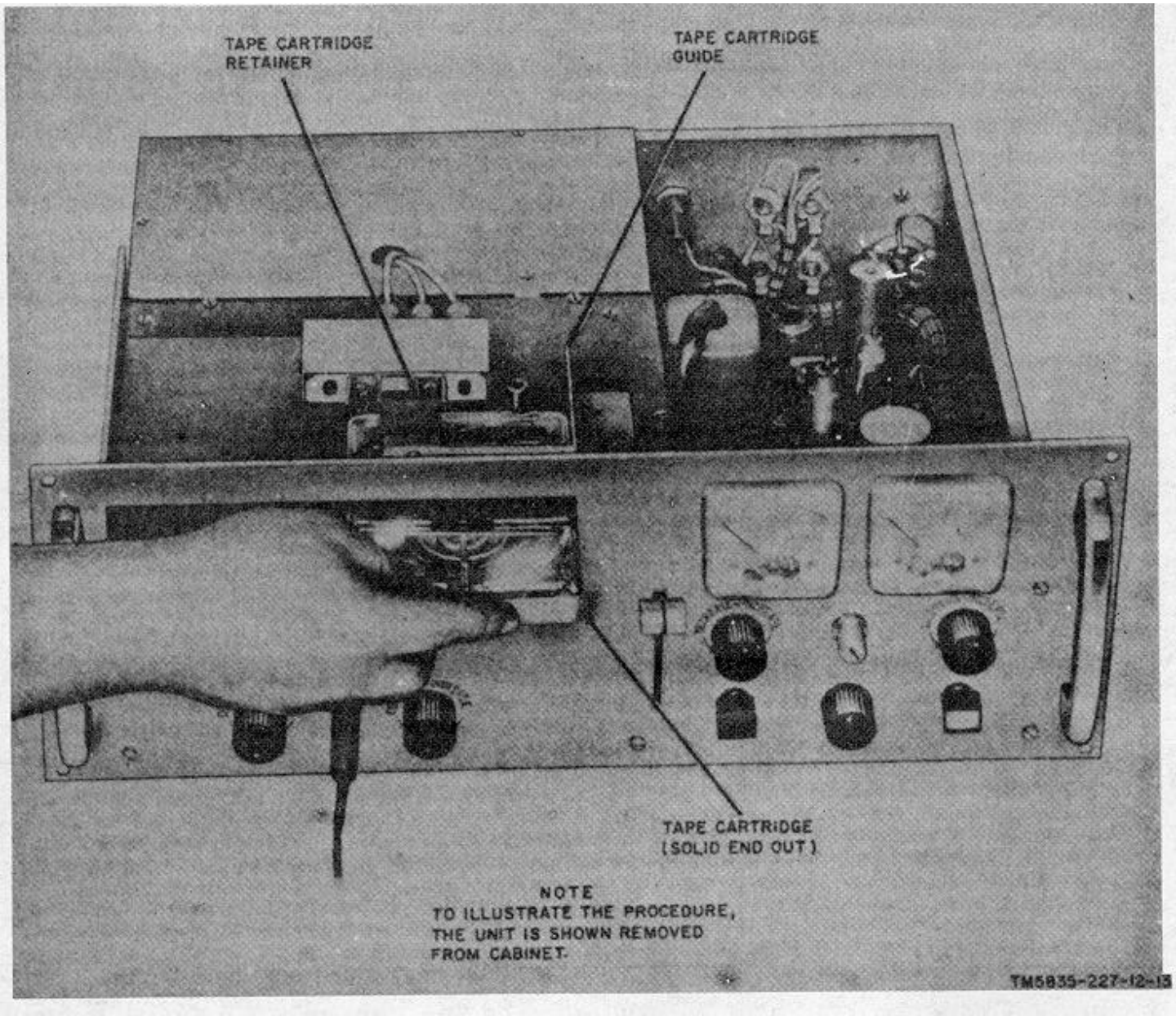

Figure 19. Inserting tape cartridge

when the tape motion stops; then set the RELEASE-READY lever to RELEASE and remove the tape cartridge.

Note: Some operational requirements may require stopping the tape at the end of the message (before the automatic stop). In these instances, the STOP pushbutton must be depressed to stop the tape. If two messages are to be recorded on one tape cartridge, depress the STOP pushbutton after the first message has been completed; then press the START pushbutton to record the second message. After the second message has been recorded, the tape can be stopped by depressing the STOP pushbutton or by waiting until the tape stops automatically. In either case, the STOP lamp will light. Set the RELEASE-READY lever to RELEASE and remove the tape cartridge.

b. Playback Operation, Reproducer Unit.

(1) Insert the tape cartridge removed in a(2) above into the recess provided on the reproducer unit as described in paragraph 21e (1).

(2) Set the READY-RELEASE lever to READY.

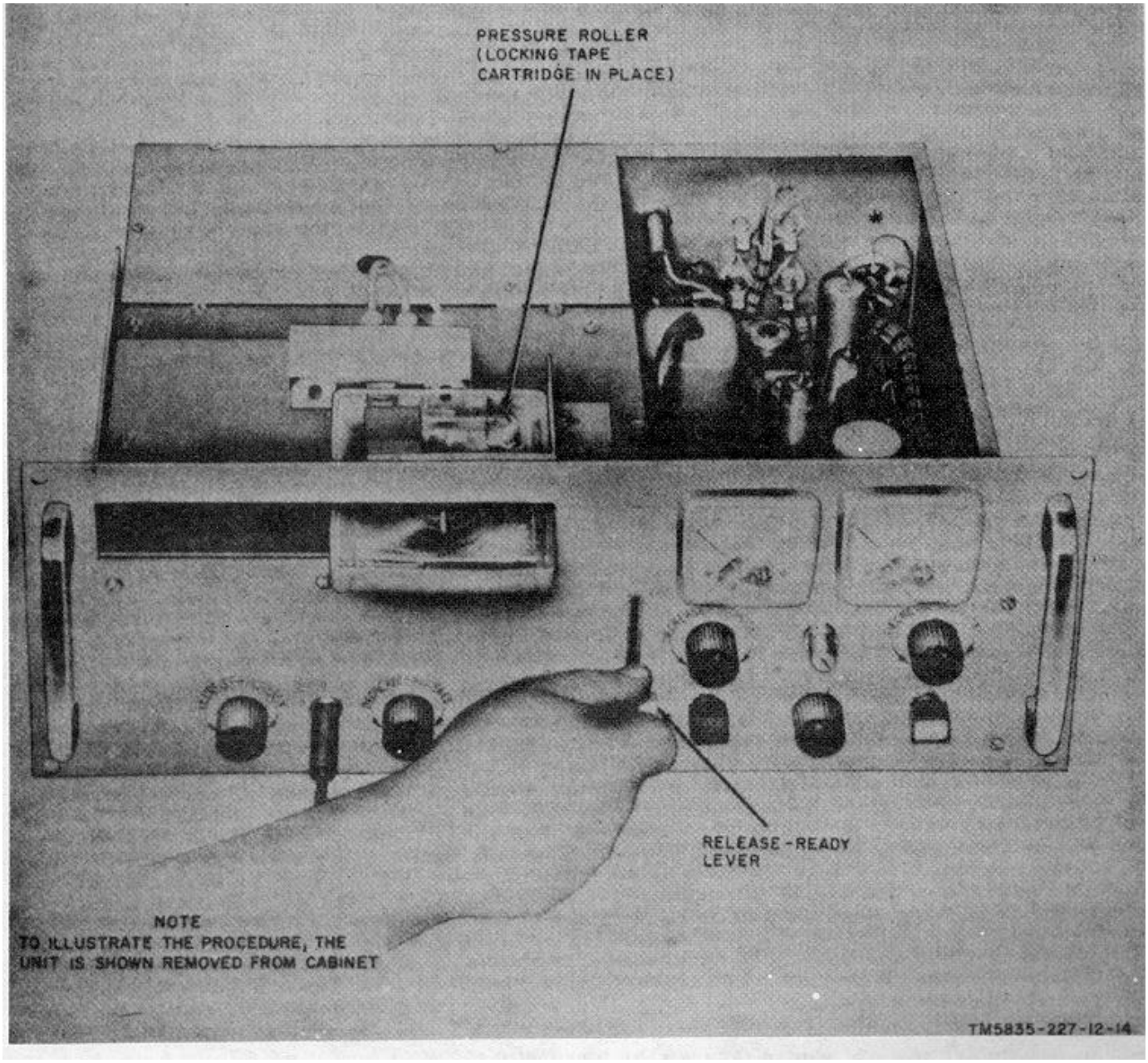

Figure 20. Establishing ready condition.

(3) On the reproducer unit, depress the START push-button momentarily, and then hold the FAST FORWARD pushbutton depressed until the STOP lamp lights and tape motion stops. This is the start of the message. Depress the START pushbutton again and proceed with the playback of the message; adjust the SPEED control for efficient copying of message; adjust LEVEL A and LEVEL B controls for a comfortable listening level at associated earpieces of the binaural headset.

Note: The recorder-reproducer has been designed to receive the same data from been designed to receive the same data from two radio receivers in a diversity communication system. Make certain that the binaural headset is worn in a conventional manner er (both earpieces in place); otherwise, a loss in message content on a channel (due to erratic reception) may result in an omission in the final copy.

(4) When the STOP indicator lamp lights, set the RELEASE-READY lever to RELEASE and remove the tape cartridge. If more than one message is on the tape, depress the START push-button again and proceed with the playback of the next message.

c. Erase Operation.

(1) Insert the power plug of the magnetic eraser into a power source of 115 volts ac, 60 cps.

(2) Obtain the tape cartridge removed in *b*(4) above, or any cartridge which is to be erased, and place it on a bench close to the magnetic eraser.

(3) Bring the magnetic eraser in close proximity to the tape cartridge (approximately 1/2 inch). Depress the on-off switch, and pass over the tape cartridge as shown in figure 21. After a few passes over the tape cartridge, slowly increase the distance between the tape cartridge and the magnetic eraser by withdrawing the eraser to the full distance permitted by the length of the power cord; at this point, release the on-off pushbutton switch.

(4) Turn the tape cartridge to other side and repeat the operations described in (3) above.

(5) Remove the magnetic eraser power plug from the power source.

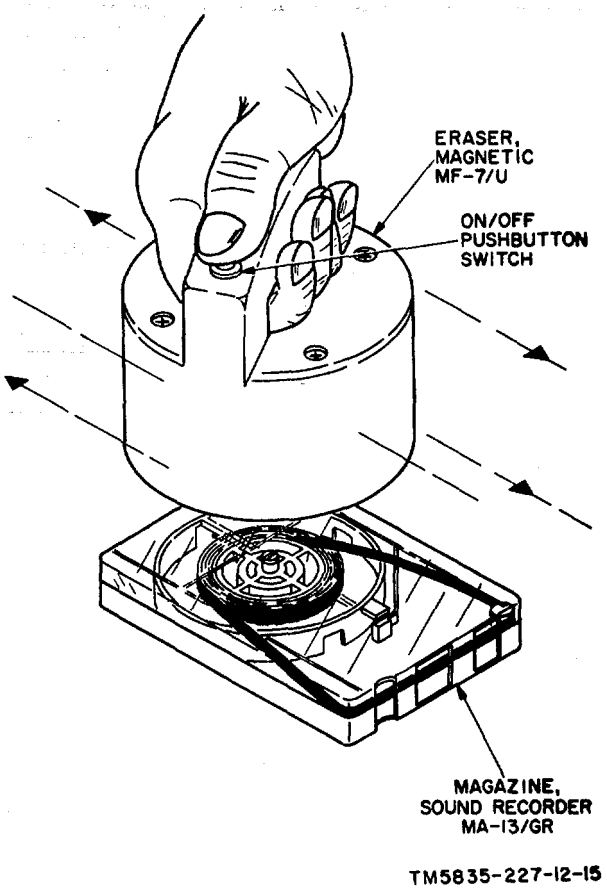

Figure 21. Erase operation.

23. Stopping Procedure

a. On the frequency converter panels, turn the INTENSITY controls counterclockwise, turn the INTENSITY controls counterclockwise, and then set the POWER switches to OFF.

b. On the recorder-reproducer panel, depress the STOP pushbutton; make certain that the RELEASE-READY lever is in the RELEASE position and that the tape cartridge has been removed; set GAIN B control fully counterclockwise (OFF).

c. On the reproducer panel, depress the STOP pushbutton; make certain that the RELEASE-READY lever is in RELEASE position and that the tape cartridge has been removed; set the ON-OFF switch to OFF.

Section III. OPERATION UNDER UNUSUAL CONDITIONS

24. Operation at Low Temperatures

At low temperatures, the lubricants used in the recorder-reproducer set may congeal and increase friction. Also, the drive belts inside the recorder-reproducer and reproducer units and the tape in the tape cartridges may become brittle and subject to breakage. Never attempt to operate the recorder-reproducer set in an area where the temperature is lower than 32° F.

25. Operation Under Tropical Conditions

At high temperatures, the transistorized circuits of the recorder-reproducer set become inefficient and unreliable. Never attempt to operate the recorder-reproducer set in an area where the temperature is higher than 105° F.

26. Operation at High Humidity

High relative humidity will cause condensation of moisture on the recorder-reproducer set, whenever the temperature of the unit is lower than that of the surrounding air. Although the vacuum, tubes in the units may generate sufficient heat to eliminate some of the moisture, a clean cloth should be used to keep the unit as dry as possible.

27. Operation in Desert Climates

When the recorder-reproducer set is operated in desert climates, three precautions must be taken.

a. Do not attempt to operate the unit if the ambient temperature of the surrounding air is higher than 105° F.

b. Be careful not to let sand get into the inside of the cabinet or in the tape cartridges.

c. Have the unit cleaned and lubricated frequently by organizational maintenance personnel.

CHAPTER 4
OPERATOR'S MAINTENANCE INSTRUCTIONS

28. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of Recorder-Reproducer Set, Sound AN/GSH-17 are listed below together with a reference to the paragraphs or technical manuals covering the specific maintenance function. The duties assigned do 'not require tools or test equipment.

a. Daily preventive maintenance checks and services (para 32).

b. Cleaning (para 33).

c. Troubleshooting (para 34).

d. Repairs (para 35).

29. Materials Required for Maintenance

The following items are required for operator's maintenance.

a. Cleaning compound (Federal stock No. 7930-395-9542).

b. Touchup paint.

Warning: **Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. Do not use near a flame.**

30. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce down-time, and to assure that the equipment is maintained operational.

a. Systematic Care. The procedures given in paragraph 33 covet routine systematic care and cleaning essential to proper upkeep and operation of the recorder-reproducer set.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services chart (para 32) outline functions to be performed daily. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to check, and what the normal conditions are; the *References* column lists the paragraphs or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by the operator, higher category of maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

31. Preventive Maintenance Checks and Service Periods

Preventive maintenance checks and services of the recorder-reproducer set are required on a daily basis. Paragraph 32 specifies checks and services that must be accomplished daily and under the special conditions listed below.

a. When the equipment is initially installed.

b. When the equipment is reinstalled after removal for any reason.

c. At least once each week if the equipment is maintained in standby condition.

32. Recorder-Reproducer Set, Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedures	References
1	Exterior surfaces.....	a. Clean front panels. *b*. Check to see that panel is securely mounted.	Para 33.

Sequence No.	Item	Procedures	References
2	Power distribution strip (rear of unit).	Check to see that plugs of unit power cables are seated securely in receptacles and that power cord of distribution strip is securely connected to 115-volt ac, 60-cps power source.	
3	Frequency converter unit.	Perform procedures given in daily preventive maintenance checks and services chart in TM 11-5895-373-12.	
4	Recorder-reproducer unit.	Perform procedures given in daily preventive maintenance checks and services chart in TM 11-5835-22812	
5	Reproducer unit	Perform procedures given in daily preventive maintenance checks and services chart in TM 11-835-229-12.	

33. Cleaning

Inspect the exteriors of the recorder-reproducer set. The exterior surfaces should be clean and free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean, soft cloth.

Warning: **Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. *Do not* use near flame.**

Caution: **Cleaning compound reacts with plastic. Do not get cleaning compound on the vu meter lenses, plastic knobs, or pushbutton indicator lenses.**

b. Remove grease, fungus, and ground-in dirt from the front panels; use a cloth dampened (not wet) with cleaning compound.

c. Remove dust and dirt from plugs and jacks with a brush.

Caution: **Do not press on the vu meter faces and lenses when cleaning; the meters may become damaged.**

d. Clean the meter lenses, indicator faces, oscilloscope safety glasses, and knobs; use a soft cloth. If dirt is difficult to remove, dampen the cloth with water; mild soap may be used.

e. Remove rust spots from the front panels with grade 000 sandpaper. Touch up bare spots with paint.

34. Troubleshooting

Operator's troubleshooting of the recorder-reproducer set is limited to replacement of the ac line fuses contained in the frequency converter units. If, after replacement, a fuse blows a second time, higher category of maintenance is required to locate the cause. Refer all other troubles to a higher category of maintenance. A line fuse on the frequency converter unit is replaced (para 36) when the ON-OFF switches are set to the ON position, and the POWER ON indicator lamps do not light.

35. Repairs

The only repair that the operator of the recorder-reproducer set is authorized to make is the replacement of the ac line fuse contained in the frequency converter unit. Refer to TM 11-5895-373-12 for fuse replacement procedures.

CHAPTER 5
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. GENERAL

36. Scope of Organizational Maintenance

a. This chapter contains instructions covering organizational maintenance for the recorder-reproducer set. It includes instructions for performing preventive and periodic maintenance services and repair functions to be accomplished by the organizational repairman. The coverage is divided into two general categories; preventive maintenance and troubleshooting and repair. For detailed procedures covering the individual units, refer to the appropriate technical manuals (appx I).

b. Organizational maintenance of the recorder-reproducer set includes the following:

(1) Preventive maintenance procedures.

(2) Cleaning of tape path.

(3) Replacement of fuses and pluck-out items.

(4) Testing and replacement of vacuum tubes and relays.

(5) Repair of damaged power and inter-connecting cables.

(6) Minor mechanical repairs and lubrication.

(7) Paint touch up and corrosion removal.

(8) Operational checks.

(9) Troubleshooting procedures to localize trouble to a defective unit and procedures for locating various troubles within each unit at organizational maintenance level.

(10) Internal adjustments of the frequency converter unit.

37. Tools, Materials, and Test Equipment Required

The tools, materials, and test equipment required for organizational maintenance (including preventive maintenance) are listed below:

a. Tools. Tool Kit, Radio Repairman TK-115/G.

b. Materials.

(1) Cleaning agents.

(a) Cleaning compound (Fed. Stock No. 7930-395-9542) for general cleaning.

(b) Cleaning fluid (Isopropyl alcohol) for cleaning tape path.

(2) Touchup paint.

c. Test Equipment.

(1) Multimeter AN/URM-105.

(2) Test Set, Electron Tube TV-2/U.

38. Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition to prevent breakdowns, and to assure maximum operational capability. Preventive maintenance is the responsibility of all maintenance categories concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and test indicate would probably fail before the next scheduled periodic service. Organizational preventive maintenance checks and services are preformed at daily, monthly, and quarterly intervals unless otherwise directed by the commanding officer. Scheduling should be so that every third monthly check coincides with the performance of the quarterly check. By coordinating the occurrence of these two periodic inspections, the equipment out-of-service time will be kept to a minimum.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38750.

39. Daily Maintenance

Clean the tape paths of the recorder-reproducer and reproducer units once each day. A day is defined as 8 hours of operation. If the units are operated 16 hours of a day, the tape paths should be cleaned twice a day at 8-hour intervals. Cleaning of the tape paths is not required if the units are maintained in a standby (ready for immediate operation) condition. Refer to TM 11-5835-228-12 and TM 11-5835-229-12 for tape path cleaning procedures for the recorder-reproducer and reproducer units, respectively.

40. Monthly Maintenance

Demagnetize the magnetic heads in the recorder-reproducer and reproducer units once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day the heads should be demagnetized at 15-day intervals. Demagnetizing the heads is required each month if the units are maintained in a standby condition. Refer to TM 11-5835-228-12 and TM 11-5835-229-12 for demagnetizing procedures for the recorder-reproducer and reproducer units respectively.

41. Quarterly Maintenance

Quarterly preventive maintenance checks and services on the recorder-reproducer set are required. Periodic daily and monthly services constitute a part of the quarterly maintenance checks and services, and must be performed concurrently. All deficiencies or shortcomings must be recorded in accordance with the requirements of TM 88-750. Perform all the checks and services listed in the quarterly preventive maintenance checks and services chart (para 42) in the sequence listed.

42. Recorder-Reproducer Set, Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedures	References
1	Completeness	See that equipment is complete (para 6).	
2	Installation	See that equipment is properly installed (para 10, 13, and 14).	
3	Preservation	Check all interior surfaces for evidence of fungus or corrosion and spot-paint bare spots.	Para 33*e*
4	Publications	See that all publications are complete, serviceable, and current.	DA Pam 310-4
5	Modifications	Check DA Pam 3104 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All ROUTINE MWO's must be scheduled.	TM 38-750 and DA Pam 310-4.
6	Mounting	See that all bolts, nuts, and washers are correctly positioned and properly tightened. Replace missing hardware required. Check for cracked, bent, or broken brackets.	
7	Frequency converter unit	Perform procedures given in quarterly preventive maintenance checks and services chart in TM 11-5895373-12.	
8	Recorder-reproducer unit	Perform procedures given in quarterly preventive maintenance checks and services chart in TM 11-5835-228-12.	

Sequence No.	Item	Procedures	References
9	Reproducer unit	Perform procedures given in quarterly preventive maintenance checks and services chart in TM 11-6835-229-12.	

43. Lubrication

Lubricate the recorder-reproducer set once each quarter. Lubrication is limited to only the recorder-reproducer and reproducer units. Lubrication procedures for the, recorder-reproducer unit are given in TM 11-5835-228-12. Lubrication procedures for the reproducer unit are given in TM 11-835-229-12.

Section II. Troubleshooting

44. General

Troubleshooting of the recorder-reproducer set is based on a set troubleshooting chart and the unit quarterly operational checks contained in the quarterly preventive maintenance checks and services charts in the unit technical manuals. To troubleshoot the set, determine which unit is defective, and then refer to the appropriate technical manual for troubleshooting procedures. Paragraph 45 is a troubleshooting chart for the recorder-reproducer set and is used to aid in sectionalizing a trouble to a defective unit. The symptoms given in the chart are based on normal operation of the set, with the proper input signal present at the input of the frequency converters and the binaural headset connected to the output jacks of either the recorder-reproducer unit or the reproducer unit as required.

45. Recorder-Reproducer Set, Troubleshooting Chart

Item No.	Trouble symptoms	Probable faulty unit	Checks and corrective measures
1	No signal indication pre sent on one oscilloscope screen. Horizontal trace may or may not be present. Both vu meters on recorder-reproducer indicate normally. sent on one oscilloscope	Frequency converter: Defect on oscilloscope chassis (converter chassis furnishing normal 10-kc output signal to recorder- reproducer),	Perform frequency converter troubleshooting procedures (TM 11-5895373-12) on frequency converter that has trouble symptoms.
2	No signal indication pre sent on one oscilloscope screen. Horizontal trace is normal. Vu meters on recorder-reproducer do not show any indication of presence of signal (with GAIN A and GAIN B controls normally advanced).	Frequency converter: Defect on converter chassis, no 10-kc output signal to recorder-	Perform frequency converter troubleshooting procedures(TM 11-5895-373-12).
	Either or both vu meters on recorder-reproducer show no signal indication with both GAIN A and GAIN B controls normally advanced. Oscilloscopes indicate normally.	Recorder-reproducer: Probable defect in record amplifier circuitry.	Perform recorder-reproducer troubleshooting procedures (TM 11-5835-228-12).

Item No.	Trouble symptoms	Probable faulty unit	Checks and corrective measures
4	No output signal heard when tape is played back in reproducer unit. Oscilloscopes indicate normally. Vu meters on recorder-reproducer indicate normally.	Recorder-reproducer, reproducer, or headset.	Isolate as follows: Insert test tape in reproducer and operate. If test signal is heard in headset, recorder-reproducer is defective. Refer to TM 11-6835-228-12. If no signal is heard, test headset by intermittently connecting ohmmeter probes (set ohmmeter to lowest range) to headset phone plug terminals, connect between tip and sleeve and the ring and sleeve. A click should be heard alternately in each earpiece. If clicks are heard, the reproducer is defective. Refer to TM 11-5835-229-12.
5	Only one channel is heard in headset. All other equipment operation appears normal.	Reproducer or headset.	Isolate by testing headset with ohmmeter as described in the *Checks and Corrective Measures* column for item No. 4. If clicks are heard in each earpiece, the reproducer is the defective unit. Perform reproducer troubleshooting procedures (TM 11-5836-229-12).
6	Only one channel is heard in headset. Both oscilloscopes indicate normally. Only one vu meter functions normally.	Recorder-reproducer: Probable defect in one channel of amplifier circuitry.	Perform recorder-reproducer troubleshooting procedures (TM 11-58356-228-12).

46. Tube Testing and Replacement Techniques

a. General. When trouble occurs in the recorder-reproducer set, check line fuses and all cabling and connections before removing any tubes. Try to isolate the trouble to the functional area or stage containing the fault, by analyzing the symptoms evident in the defective equipment (para 45). This will minimize needless testing of tubes that are functioning normally. Two methods of tube testing are described in b and c below. Use the method which will provide the fastest and most reliable evaluation of tube performance under the prevailing service conditions. A special disassembly procedure, required to gain access to tube A2A1V1 and to remove and replace cathode-ray tube A2A1 in the frequency converter units, is given in TM 11-5895373-12. The location of the tubes in the units are shown in the appropriate technical manuals (appx I).

Caution: **Do not rock or attempt to rotate a tube when removing it from a socket; pull it straight out with a tube puller where space and mounting permits.**

b. Use of Tube Tester. Remove and test one tube at a time. Follow the instructions and operating procedures applicable to the tube tester being used. Discard a tube only if its defect is obvious or if the tube tester shows it to be definitely defective. Do not discard tube that tests ai or near its minimum test lim on the tube tester. Remember, however, that the best test of tube performance; is how it performs when installed in the equipment. A tube that tests good in the tube tester may some-

times function unsatisfactorily in a given circuit but will function perfectly in another circuit using the same type of tube. After testing, return each satisfactory tube to its original socket, or replace with a new one if required, before testing the next one.

c. Tube Te8ting by Substitution. Replace a suspected tube with a new tube of the same type. If the equipment remains inoperative, remove the new tube and put back the original tube. Repeat this procedure with each suspected tube until the defective tube is located. If none of the tubes are found to be defective, higher category of maintenance is required.

47. Relay Testing Techniques

When trouble with the tape drive control circuits of the recorder-reproducer and reproducer units occur, check the line fuses, power cables, and internal connections before removing any relays. If the trouble is known to be in the automatic stop *(cue tone)* circuit, check the applicable tubes first. Refer to TM 11-583228-12 and TM 11-5835-229-12 for detailed procedures on the removal and replacement of relays in the recorder-reproducer and the reproducer units, respectively.

48. Replacem**ent of Fuses and Control Knob**

The ac line fuses in the recorder-reproducer unit, reproducer unit, and all control knobs are replaced by the organizational maintenance man. Refer to the applicable technical manual (appx I) for replacement procedures.

CHAPTER 6
SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

49. Disassembly of Equipment

Disassembly procedures for Recorder-Reproducer Set, Sound AN/GSH-17 consist of the following:

a. Disconnect the ac power cord and input signal cables.

b. Coil all disconnected cables; tape or tie each separately. Attach identifying tags or wrap in labeled packages.

c. If the recorder-reproducer set is wall-mounted, perform the following procedures:

(1) Remove the recorder-reproducer set from the wall mounting brackets (two men required).

(2) Remove the two brackets mounted on the wall.

(3) Remove the two hanger brackets from the rear of the recorder-reproducer set.

(4) Package all mounting hardware and identify the package.

50. Protecting Transported Equipment

a. Equipment that is to be removed from service for periods exceeding approximately 2 weeks, or equipment that is to be shipped for use by other personnel or activities, is normally repackaged by organizational maintenance personnel. Operators should refer equipment to the organizational level for repackaging.

b. If this equipment is to be transported over short distances under control of the using unit for immediate reuse, place the recorder-reproducer set in a corrugated or wooden box and place padding over the front panels. Use rags or crumpled paper for padding and filler material.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

51. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedures outlined in paragraph 52 will be used to prevent further use of the equipment.

52. Methods of Destruction

Use any of the following methods to destroy the equipment.

a. Smash. Smash the magnetic tape eraser, controls, tubes, coils, switches, capacitors, transformers, and cathode-ray tube; use sledges, axes, handaxes, pickaxes, hammers, or crowbars.

b. Cut. Cut the output cable and power cord and slash the radio frequency input cables; use axes, handaxes, or machetes.

c. *Burn.* Burn cords, cables, tape cartridges, and technical manuals; use gasoline, kerosene, oil, flamethrowers, or incendiary grenades.

d. Bend. Bend the panel and chassis.

e. Explode. If explosives are necessary, use firearms, grenades, or TNT.

f. Dispose. Bury or scatter the destroyed parts in slit trenches, foxholes, or throw them into streams.

APPENDIX I
REFERENCES

Following is a list of references applicable to the operator and organizational personnel of the recorded-reproducer set.

DA Pamphlet 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 4, 6, 7, 8, and 9), Supply Catalogs (type CL), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TM 11-5835-228-12	Organizational Maintenance Manual: Recorder-Reproducer, Sound RD-265/GR.
TM 11-5835-229-12	Organizational Maintenance Manual: Manual, Reproducer, Sound RP-1S8/GR.
TM 11-5895-373-12	Organizational Maintenance Manual: Converter, Frequency, Electronic CV-1716/'GR.
TM 38-750	Army Equipment Record Procedures.

APPENDIX II

BASIC ISSUE ITEMS UST

DELETED

APPENDIX III
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

This appendix provides a summary of the maintenance operations for AN/GSH-17. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

d. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to about optimum or desired performance.

f: Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

h. Replace. The act of substituting a serviceable like-type part, subassembly, model (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, end item or system. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. Overhaul. That periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc) considered in classifying Army equipment/components.

3. Column Entries

a. Column 1, Group) Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and mod-

ules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of man-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C - Operator/Crew
O - Organizational
F - Direct Support
H - General Support
D - Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

4. Tool and Test Equipment Requirements (Table 1).

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

Section II. MAINTENANCE ALLOCATION CHART
FOR
RECORDER REPRODUCER SET AN/GSH-17

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIP
			C	O	F	H	D	
00	RECORDER REPRODUCER SET AN/GSH-17	Inspect	0.1					
		Service		0.1				1
		Test		0.5				1,2,3
		Repair		0.5				1,2,3
01	CONVERTER, FREQUENCY, ELECTRONIC CV-1716/GCR (SEE TM 11-5895-373-12 FOR MAINTENANCE ALLOCATION)							
02	RECORDER-REPRODUCER, SOUND RD-265/GR (SEE TM 11-5895-228-12 FOR MAINTENANCE ALLOCATION)							
03	REPRODUCER, SOUND RP-138/GR (SEE TM 11-5835-229-12 FOR MAINTENANCE ALLOCATION)							
04	BINAURAL HEADSET	Test		0.1				2
		Repair			0.3			4
05	CABINET, ELECTRICAL EQUIPMENT CY-4592/GSH-17	Repair			1.0			4
06	ERASER, MAGNETIC MF-7/U	Repair			0.5			4
07	MAGAZINE, SOUND RP-138/GR	Repair			0.5			4
08	COAXIAL CABLES	Repair			0.2			
09	SHIELD CABLE	Repair			0.2			

TABLE 1. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
RECORDER REPRODUCER SET AN/GSH-17

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NONMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O	TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
2	O	MULTIMETER AN/URM-105	6625-00-581-2036	
3	O	TEST SET, ELECTRON TUBE TV-2/U	6625-00-669-0263	
4	F	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	

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USACDCARMA (1)
USACDCAVNA (1)
USACDCARTYA (1)
USACDCSWA (1)
MDW (1)
Armies (2)
Corps (2)
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Ft Monmouth (70)
Ft Hancock (4)
Ft Gordon (10)
Ft Hauchuca (10)
Svc Colleges (2)
BR Svc Sch (2)
GENDEP (2)
Sig Sec, GENDEP (5)
Sig Dep (12)
Army Dep (2) except SAAD (80)
LXAD, TOAD (14), FTWOAD (10)
LEAD, NAAD (5), SHAD (8)
SVAD (5), CHAD (8), ATAD (10)
USASCC (4)
USA Tml Comd (1)
Army Tml (1) except OART (6)
USATC AD (2)
USATC Armor (2)
USATC Engr (2)
USATC Inf (2)
USASTC (2)
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11-592
11-597

NG: State AG (8).

USAR: None.

For explanation of abbreviations used, see AR 320-50.

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