SERVICE TEST INSTRUCTIONS

FOR

RECEIVING AMPLIFIER EE-118-T1 (TELEPHONE)

RESTRICTED

PREPARED AT

SIGNAL CORPS GENERAL DEVELOPMENT LABORATORY

FORT MONMOUTH, NEW JERSEY

AUGUST 1, 1942

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R E S T R I C T E D

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RECEIVING AMPLIFIER EE-118-T1 (TELEPHONE)

SECTION I

DESCRIPTION

1. *General.*-The Receiving Amplifier EE-118-T1 is a compact, portable auxiliary amplifier to be used in conjunction with Telephone EE-8-A. The amplifier provides gain in the receiving circuit of the telephone, under control of the listener, for improving transmission over any circuit up to the limits imposed by noise conditions. The amplifier will serve to extend the range of Telephone EE-8-A over any existing wire facilities, or it may be used to obtain increased volume in noisy locations. On a field-wire circuit (Wire W-110-B), an extension in range of about 10-15 miles may be expected. Additional gain, and consequent further extension in range may be employed by using the receiver hook as a "push to talk" switch, while talking, thereby eliminating the excessive side-tone encountered when using high gains. Connections are made to the Telephone EE-8-A by means of three prongs in the rear of the case, and a binding post on top of the case. A switch hook is provided to turn off the power supply of the amplifier when the Handset TS-9 is hung up. A combination switch and gain control is also provided by which the amplifier may be either cut in or out and the gain continuously adjusted. Access to the self-contained battery power supply and the component parts of the equipment is provided through a cover in the right-hand side of the case

2. *Weight and Dimensions.*-The unit, complete with batteries, weighs five pounds and measures 3-3/8" wide by 2-5/8" deep by 9-1/2 high. Three prongs at the top rear extend 1-1/8" horizontally for plugging into the telephone, and the receiver hook and binding post extend 5/8" above the case. The complete unit is shown in Figure 1.

3. *Parts List.*-

1 each Receiving Amplifier EE-118-T1 (Telephone).

2 each Vacuum Tube VT-264 (3Q4).

1 each Battery BA-2.

2 each Batteries BA-30.

2 each Service Test Instructions.

SECTION II

INSTALLATION AND PREPARATION FOR USE

4. *Power Supply.*-The unit is operated from a power supply consisting of two Batteries BA-30 in parallel and one Battery BA-2. These batteries are normally contained in the lower portion of the case. To install the batteries, first remove the cover on the right-hand side of the case. Install the two Batteries BA-30 by inserting them in the two clips provided, placing positive terminals downward. Then install Battery BA-2, with the two leads outward and with the red (+) lead at the top. Connect these two leads to the binding posts directly above Battery BA-2, connecting the red lead to the "+ RED" terminal and the black lead to the "BLK-" terminal. Figure 3 shows the batteries installed in the unit.

5. *Vacuum Tubes.*-The unit uses one Vacuum Tube VT-264(3Q4). This tube is mounted in a socket directly below the volume control shaft and held in place by a locking shield. A spare tube is provided, mounted in a clip on the inside of the side cover. Both the "working" tube and the spare tube may be seen in Fig. 3.

6. *Connections to Telephone EE-8-A.*-The Receiving Amplifier EE-118-T1 is provided with three prongs located at the top rear of the case. Insert the prongs into the jack on the Telephone EE-8-A. This operation automatically connects the amplifier input to the line, through the anti-sidetone circuit of the Telephone EE-8-A. This connection also serves to physically attach the amplifier to the telephone and the unit is held in place by friction. To connect the output of the amplifier to the telephone handset it is necessary to remove from the Telephone EE-8-A the "REC", (white) lead going to the receiver of the handset, and to connect it to the binding post marked "REC WHITE" on the amplifier. These connections having been made, the amplifier-telephone combination is ready for use. Figure 2 shows the Receiving Amplifier attached to the Telephone EE-8-A and Figure 6 shows the connection between the two units. *The handset should always be hung up on the receiving amplifier when these connections have been made and the telephone is not in use*

SECTION III

OPERATION

7. *Operation.*-The handset is normally left on the hook when the amplifier is not in use but attached to the Telephone EE-8-A. Removing the handset from this hook closes one side of the filament circuit but does not turn on the amplifier unless the volume control knob has been left in some position other than NORMAL TELEPHONE. At the position NORMAL TELEPHONE the receiver is disconnected from the amplifier and is connected to its normal position in the Telephone EE-8-A circuit. When the volume control is turned to the right, the amplifier is inserted in the circuit and its power supply turned on. Turning the volume control

further to the right increases the gain of the amplifier. The gain should be increased to suit the individual user and the conditions of background noise. Sidetone will limit the amount of usable gain, but sidetone can be partly overcome by using the switch hook as a "push-to-talk" switch. In this use, press down on the hook when speaking, and when listening, release the hook, thereby turning the amplifier on.

S E C T I O N I V

DETAILED FUNCTIONING OF PARTS

8. *Operation in the Telephone EE-8-A Circuit.*-Figure 7 shows the schematic diagram of the Telephone EE-8-A. The jacks for Plug PL-58 are shown on this diagram and designated R (receive), C (common) and T (transmitter). The three screwdriver binding posts on top of the telephone are also designated R, C, and T and are respectively common to the three jacks. Connections to the Receiving Amplifier EE-118-T1 are made through these jacks and the terminal on top of the amplifier. The amplifier input is inserted in the telephone circuit in the position formerly occupied by the telephone receiver, and the receiver is connected to the output of the amplifier. The common "C" connection is carried directly through the amplifier. Switching is arranged so that the circuit may or may not include the amplifier, depending upon the choice of the user. No additional loss occurs in the Telephone EE-8-A circuit with the amplifier attached but set at Normal Telephone.

9. *The Amplifier Proper.*-The amplifier proper is a single-stage amplifier having a maximum gain of 26 db when connected to the Telephone EE-8-A. The gain-frequency characteristic is reasonably flat over the voice range. The amplifier, which uses a Vacuum Tube VT-264 (3Q4) with 22-1/2 volts plate battery, is capable of a power output of 5 milliwatts. The circuit provides stability over a wide range of both "A" and "B" battery variations. Figure 4 shows the schematic diagram of the amplifier, and Figure 5 shows the wiring diagram.

S E C T I O N V

MAINTENANCE

10. *Vacuum Tube VT-264 (3Q4).*-Receiving Amplifier EE-118-T1 has a Vacuum Tube VT-264 (3Q4) mounted in a socket, held in place by a metal shield. Should replacement of the tube become necessary, replace it with the spare tube mounted in a clip on the inside of the cover. A good spare tube should be kept in the spare tube clip of the receiving amplifier at all times. Should it be found desirable to test the Vacuum Tube VT-264 (3Q4), use Test Set I-56-( ), or equivalent.

11. *Batteries BA-2 and BA-30.*-The Receiving Amplifier EE-118-T1 uses two 1-1/2 volt Batteries BA-30 and one 22-1/2 volt Battery BA-2. The Maximum drain on the two 1-1/2 volt batteries BA-30 in parallel is 100 milliamperes, and on the 22-1/2 volt battery BA-2 is 1.0 milliamperes. On continuous service, the two Batteries BA-30 will last about 90 hours. This is based on an end voltage of 0.8 volts, where the gain of the amplifier is reduced by not more than one decibel. It will be necessary to change Battery BA-2 only occasionally, as its life should exceed by about five or six times that of the two Batteries BA-30 in this amplifier. If the gain of the amplifier seems low when new Batteries BA-30 are installed, replace Battery BA-2. By checking its voltage with a voltmeter, it can be determined if Battery BA-2 has reached or exceeded its useful life. Battery BA-2 should be replaced if its voltage has fallen below 17 volts. When the amplifier is taken out of service, ALL BATTERIES SHOULD BE REMOVED.

S E C T I O N V I

SUPPLEMENTARY DATA

12. *List of Replaceable Parts and Their Manufacturers.-*

Part	Description	Manufacturer
Capacitor, equalizing	0.0005 uf	Solar Mfg. Co., Bayonne, N.J.
Resistor, cathode bias	1000 ohms, 1/2 watt	Allen-Bradley Co., Milwaukee, Wisconsin
Resistor, volume limiting	20,000 ohms, 1/4 watt	International Resistance Co. 401 Broad St., Phila., Pa.
Input Transformer	FA-520-2-4	Sonotone Corporation, Elmsford, N.Y.
Output Transformer	Plate to Line (Sonotone)	Sonotone Corporation, Elmsford, N.Y.
Handset Hook Switch	Mu Switch SPST	Mu Switch Co., Boston, Mass.
Switch and Volume Control	Modified Centralab Unit	Sonotone Corporation, Elmsford, N.Y.
Battery Holders (2)	RCA #36503	Radio Corporation of America, Camden, N.J.

13. *Data on Attenuation of Wire W-110-B.-*

Frequency c.p.s.	Attenuation db. per mile, dry	Attenuation db. per mile, wet
500	1.3	2.0
1000	1.8	2.8
2500	2.6	3.9

FIGURE 1

RECEIVING AMPLIFIER EE-118-T1 . For USE with TELEPHONE EE-8-A
Overall View

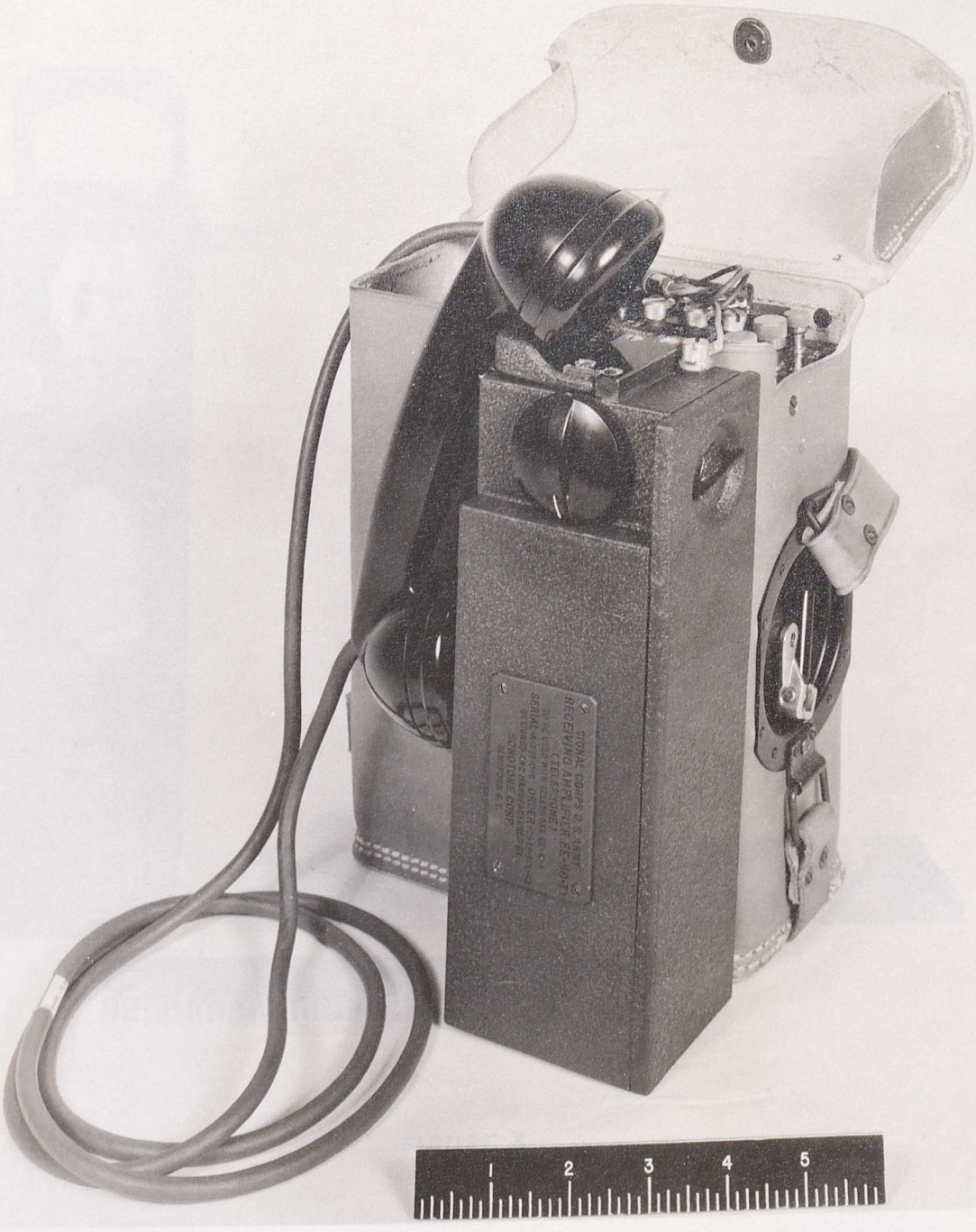

FIGURE 2

RECEIVING AMPLIFIER EE-118-T1 . For USE with TELEPHONE EE-8-A
Connection Arrangement

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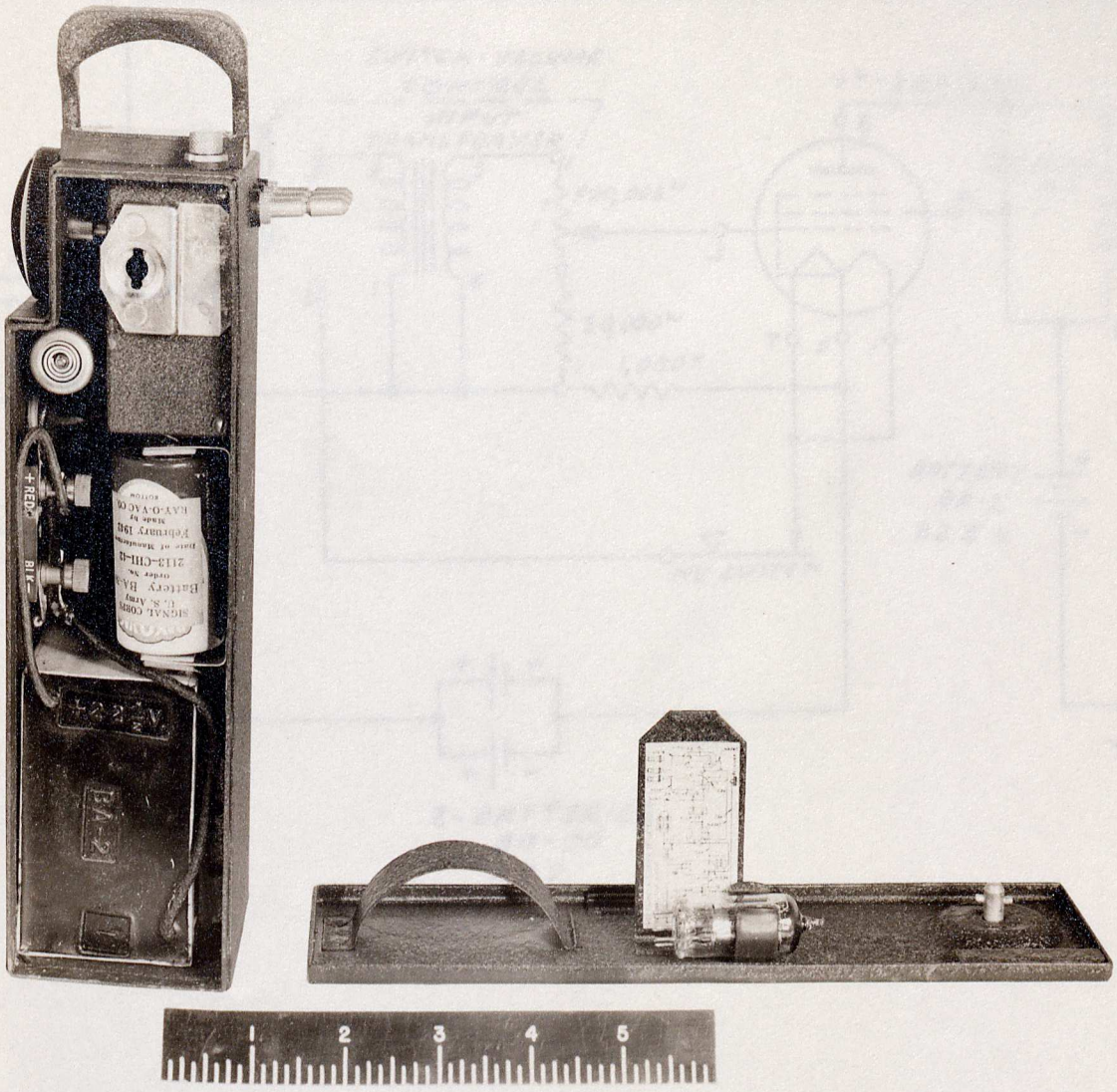
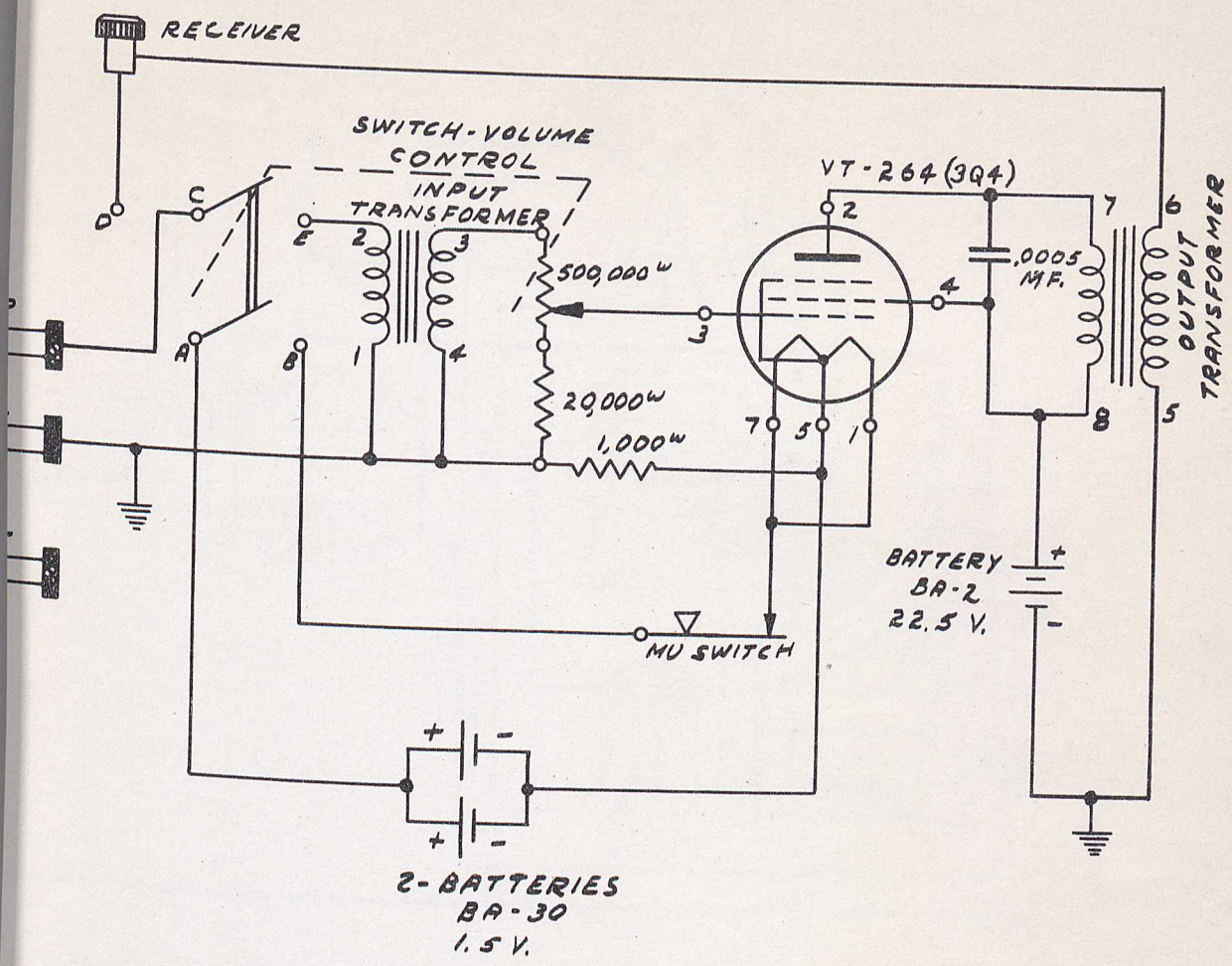


FIGURE 3

RECEIVING AMPLIFIER EE-118-T1 . For USE with TELEPHONE EE-8-A
Side View of Interior . Showing Handset Hook Raised to Form Carrying Handle

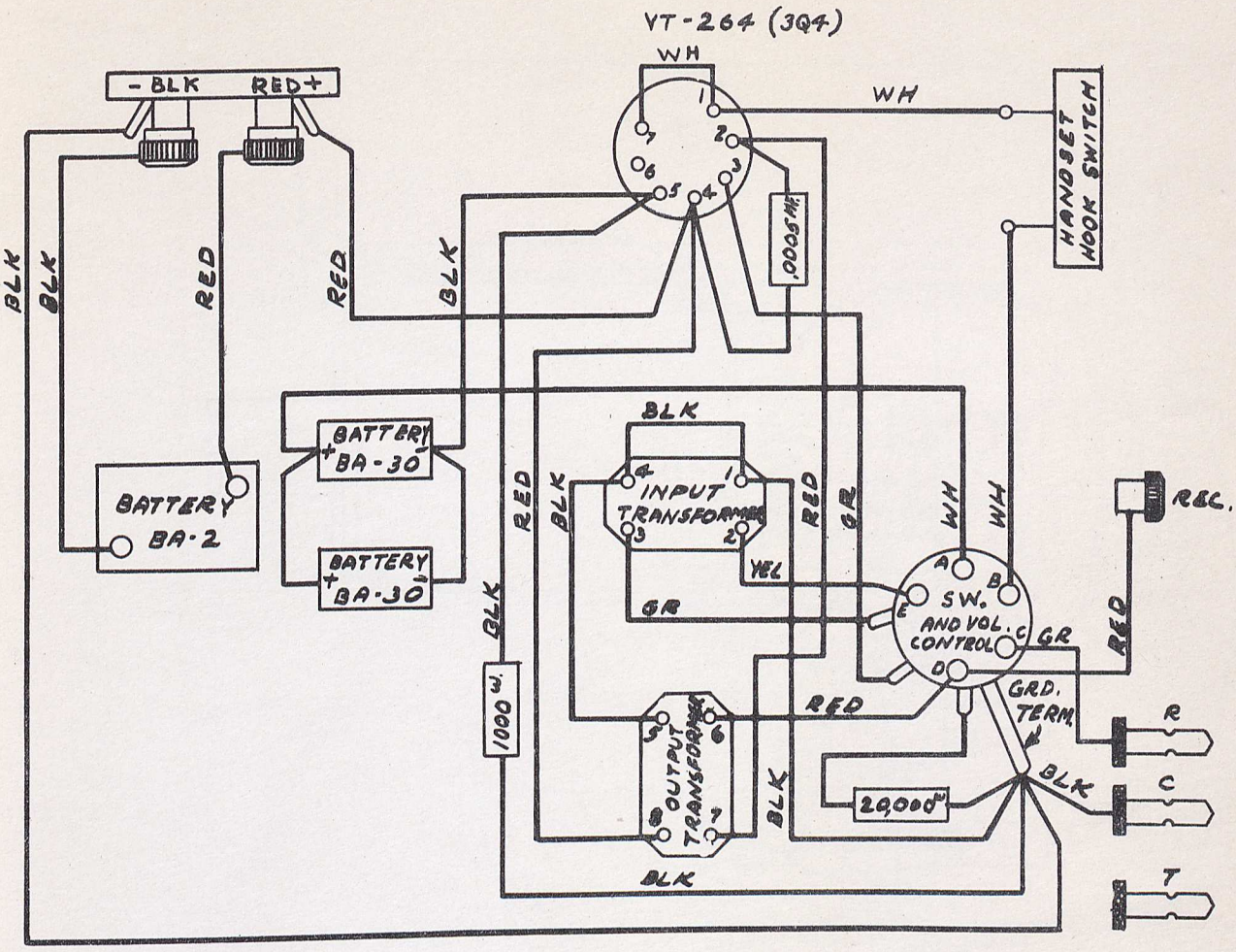


ES-A-12245-A

RECEIVING AMPLIFIER EE-118-TI

(TELEPHONE)

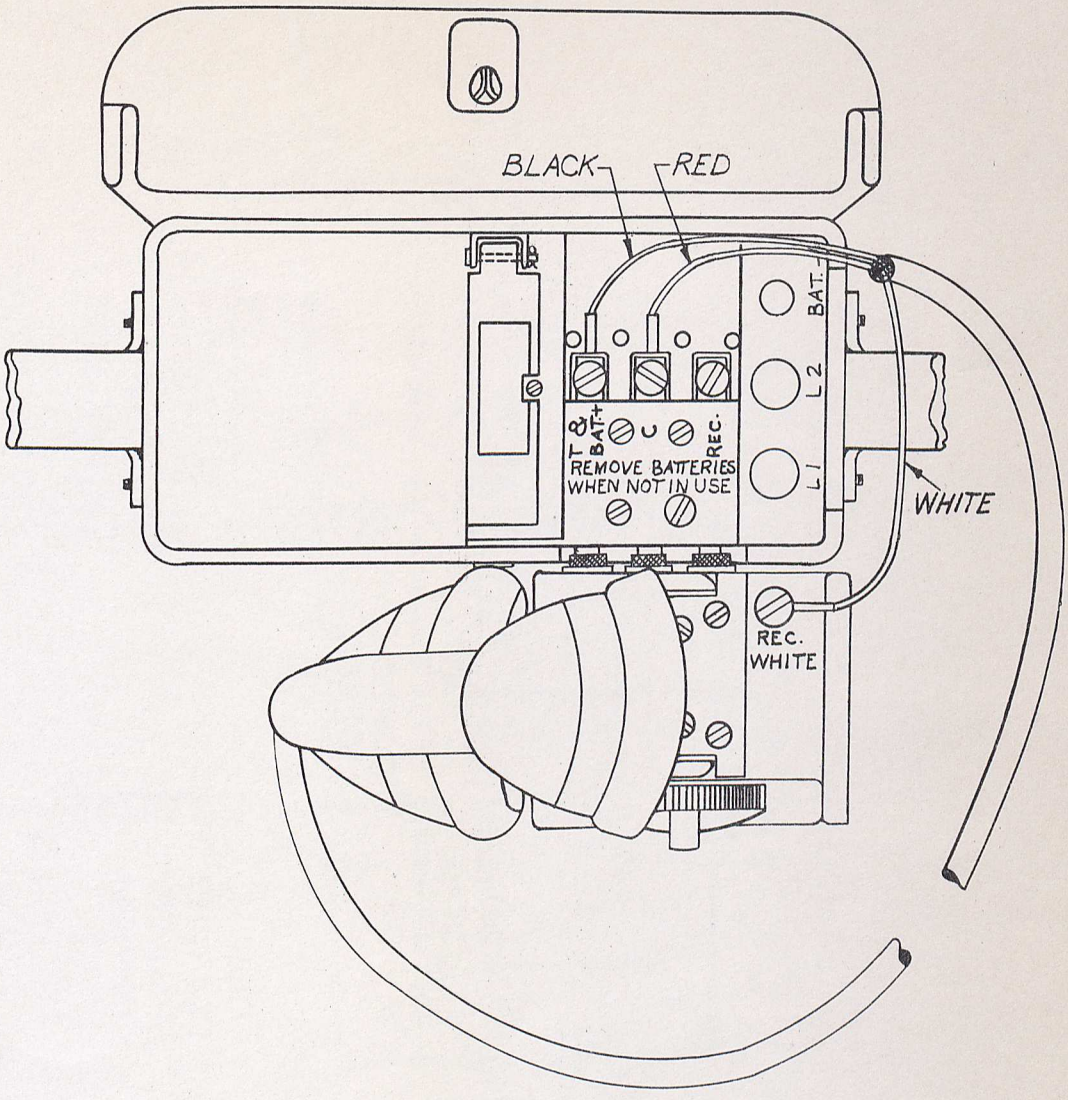
SCHEMATIC DEAGRAM



ES-A-12246-A

RECEIVING AMPLIFIER EE-118-TI
(TELEPHONE)
WIRING DIAGRAM

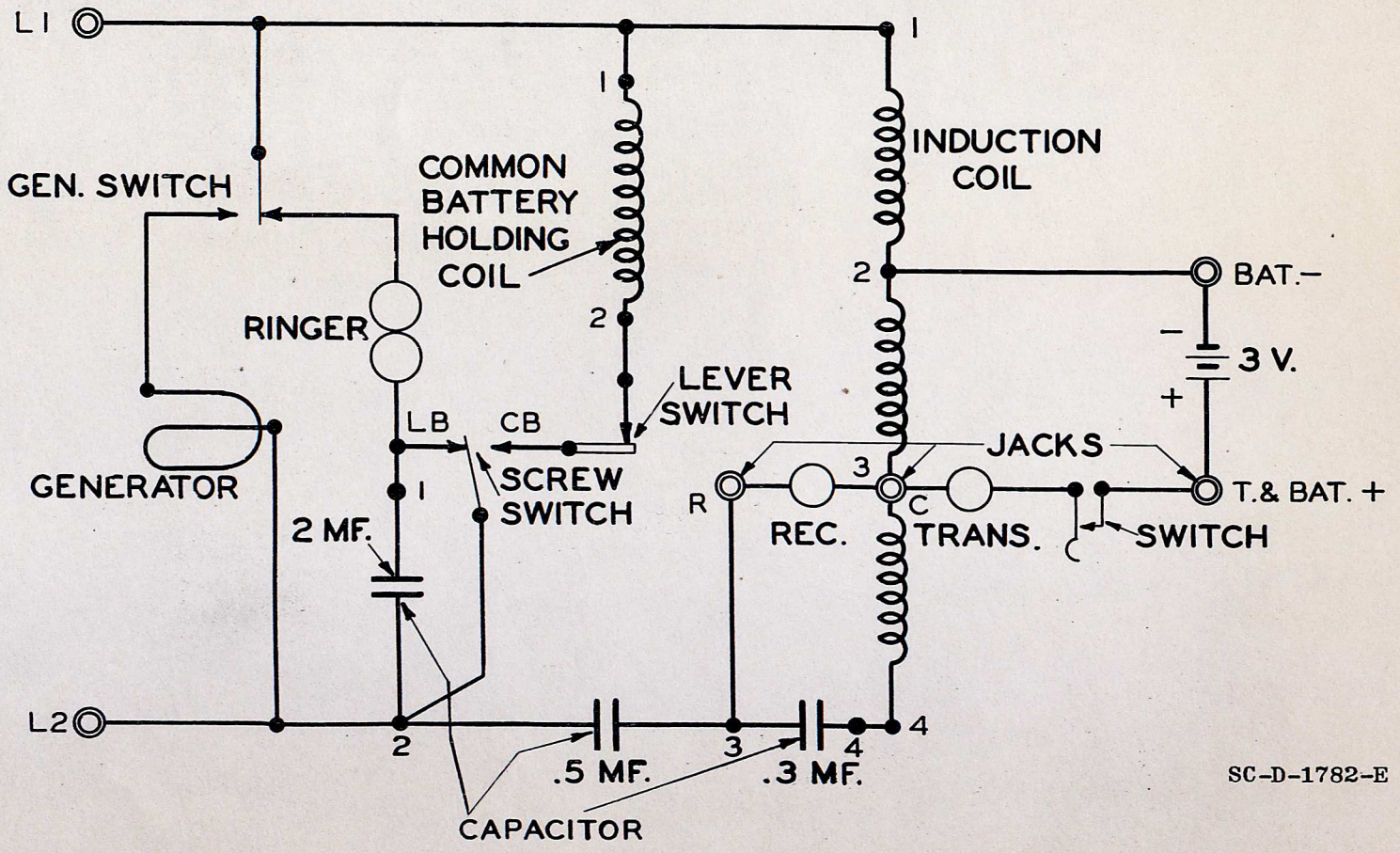
Fig. 5



ES-A-12247-A

RECEIVING AMPLIFIER EE-118-TI (TELEPHONE)
SHOWING CONNECTION TO TELEPHONE EE-8-A

Fig. 6



TELEPHONE EE-8-A

Fig. 7