TM 11-617

& Supp.

WAR DEPARTMENT TECHNICAL MANUAL

RADIO SET AN/TRC-7

WAR DEPARTMENT 22 FEBRUARY 1945

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(For explanation of symbols see FM 21-6.)

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DESTRUCTION NOTICE

WHY—To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

HOW—1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut—Use axes, handaxes, machetes.

3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. Explosives—Use firearms, grenades, TNT.

5. Disposal—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT

WHAT—1. Smash—Tubes, crystals, capacitors, resistors, coils, chokes, transformers, meter, sockets, generator, batteries, connectors.

2. Cut—All wiring, cabling, coils, transformer windings.

3. Burn—All parts.

4. Bend—All mast sections, antenna sections, all cases, cabinets.

5. Bury or scatter—All parts.

DESTROY EVERYTHING

Figure 1. Radio Set AN/TRC-7.

PART ONE
INTRODUCTION

SECTION I

DESCRIPTION OF RADIO SET AN/TRC-7

1. GENERAL.

a. Radio Set AN/TRC-7 (fig. 1) is a 16-tube, portable, low-power receiver-transmitter, operated by battery, hand generator, or a combination of both. It is designed for a-m (amplitude-modulated), two-way communication over short distances in the v-h-f (very-high-frequency) range. This equipment is intended primarily to provide communication from ground troops to aircraft using transmitting and receiving equipment which operates in the same r-f (radio-frequency) range. It may be operated with either whip Antenna AT-59/TRC-7 or Antenna Assembly AS-110/TRC-7, using Battery BA-70, hand Generator G-3/TRC-7, or a combination of both as the source of power. Radio Set AN/TRC-7 may be operated from a remote position by Remote Control Unit RM-52 and Control Unit RM-53.

b. Throughout this manual, basic nomenclature followed by ( ) refers to all models of an item of equipment. For example, Crank GC-7-( ) refers to Cranks GC-7 and GC-7-AW.

2. APPLICATION.

a. General. The main component of Radio Set AN/TRC-7 (fig. 1) is Receiver-Transmitter RT-53/TRC-7. The receiver uses a single superheterodyne circuit; the transmitter is amplitude-modulated. For a block diagram of the receiver, see figure 49; for a block diagram of the transmitter, see figure 48. Either one of the two channels provided is selected by means of the CHANNEL SELECTOR switch on the front panel of

the receiver-transmitter unit. The circuits of the receiver and the transmitter are switched simultaneously, so that transmission and reception are always maintained on the same frequency. Each channel is crystal-controlled separately in the receiver and the transmitter (par. 25).

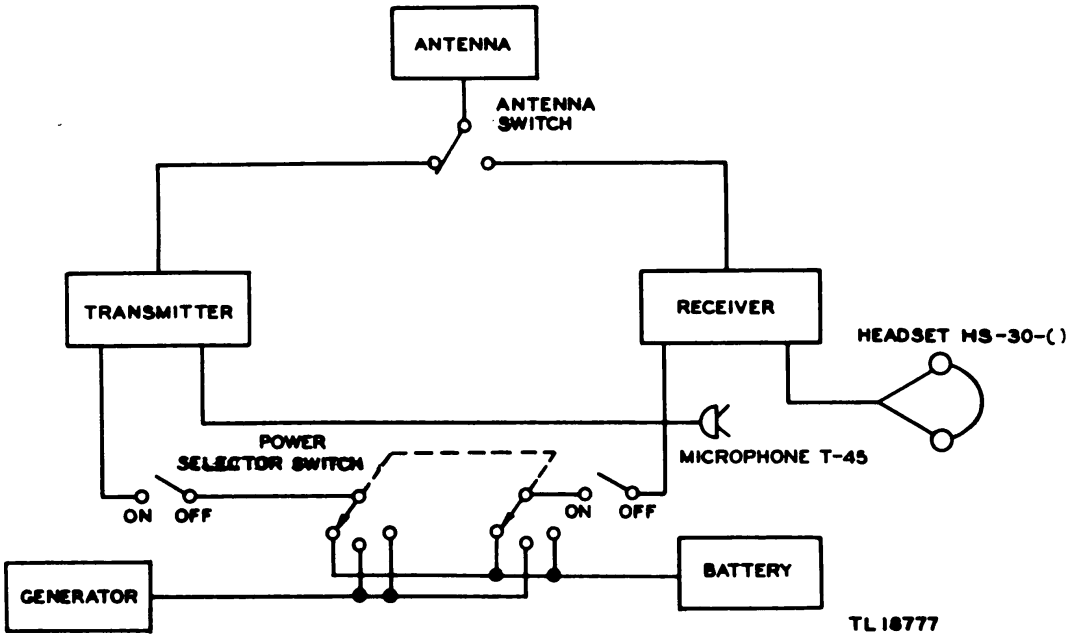


Figure 2. Radio Set AN/TRC-7, simplified block diagram.

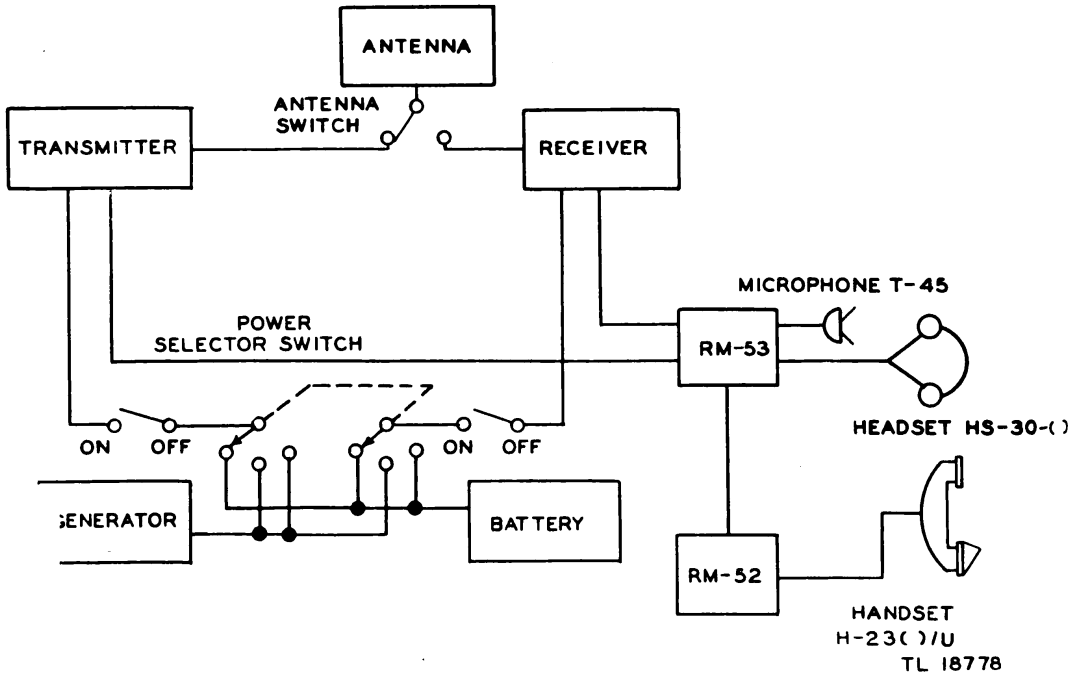


Figure 3. Radio Set AN/TRC-7, simplified block diagram with remote control equipment.

b. Receiver-transmit Switch. Change-over from reception to transmission is accomplished by operating the receiver-transmit switch located on the microphone cord (fig. 14) or on the handle of the handset (fig. 12), depending upon the particular installation.

c. Type of Antenna. Radio Set AN/TRC-7 is designed for transmission and reception with a vertically polarized antenna (figs. 1 and 18).

d. Application of Power. Two series switches control the application of power to the set. Since these switches are in series, both must be closed to make the set function. Inserting the plug into the jack marked PHONES closes one switch, and turning the POWER VOLUME control in a clockwise direction closes the other.

3. TECHNICAL CHARACTERISTICS.

Frequency range:

Transmitter	100 to 156 mc
Receiver	100 to 156 mc
Types of signals emitted	a-m, voice
Types of signals which can be received	a-m, voice
Type of modulation	amplitude modulation
Antenna type	whip or ground-plane conical
Number of tubes	16
Type of transmitter	a-m, with crystal-controlled oscillator
Type of receiver	superheterodyne
Sidetone in set	yes

Power output:

Transmitter	0.5 to 1.5 watts
Power supply	Battery BA-70, Generator G-3/TRC-7, or both

Power input:

Transmitter:			
Filaments	600 ma (normal)	510 ma (min)	600 ma (max)
Plate	106 ma (normal)	68 ma (min)	106 ma (max)
Receiver:			
Filaments	370 ma (normal)	325 ma (min)	370 ma (max)
Plate	30 ma (normal)	19 ma (min)	30 ma (max)

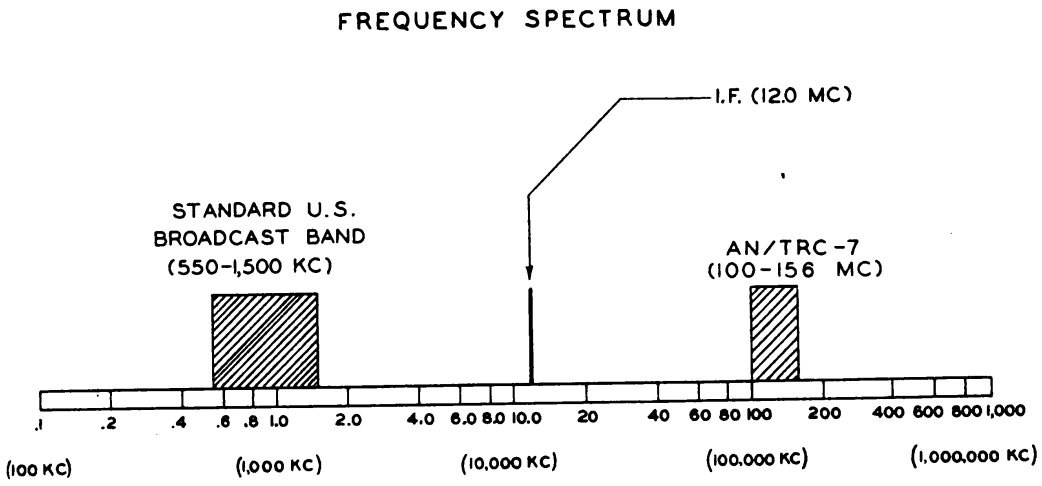


Figure 4. Radio Set AN/TRC-7, frequency spectrum chart.

4. COMMUNICATION WITH OTHER RADIO SETS.

a. Radio Set AN/TRC-7 has a frequency coverage (fig. 4) of 100 to 156 mc (megacycles) which is the same as used by standard v-h-f equipment. It will therefore communicate with any v-h-f set which operates in that range and uses amplitude modulation.

b. Some of the radio sets which can be used for communication with Radio Set AN/TRC-7 are:

Radio Set SCR-522-( )

Radio Set SCR-542-( )

Radio Set AN/VRC-1

Radio Set SCR-562-( )

Radio Set SCR-563-( )

Radio Set SCR-567-( )

Radio Set SCR-632-( )

Radio Set SCR-633-( )

Radio Set SCR-637-( )

Radio Set SCR-643-( )

Radio Set SCR-644-( )

Radio Set SCR-573-( )

Radio Set SCR-574-( )

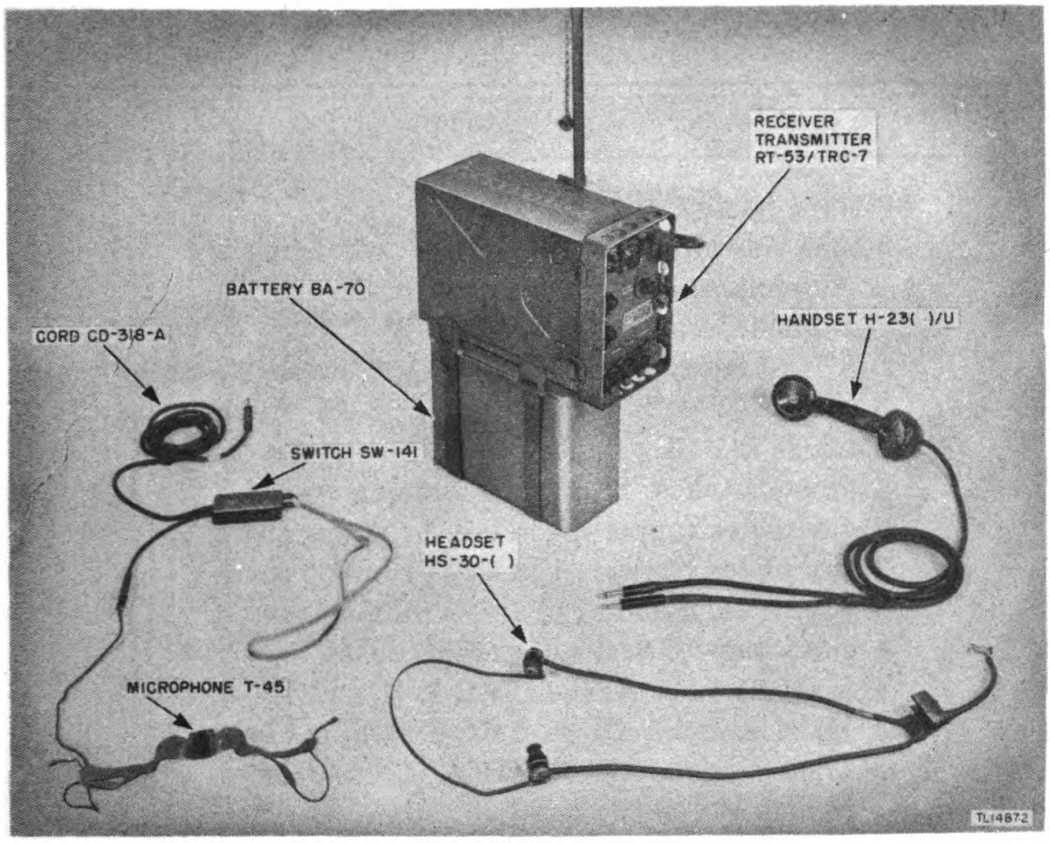


Figure 5. Radio Set AN/TRC-7, over-all illustration, whip antenna and battery in place.

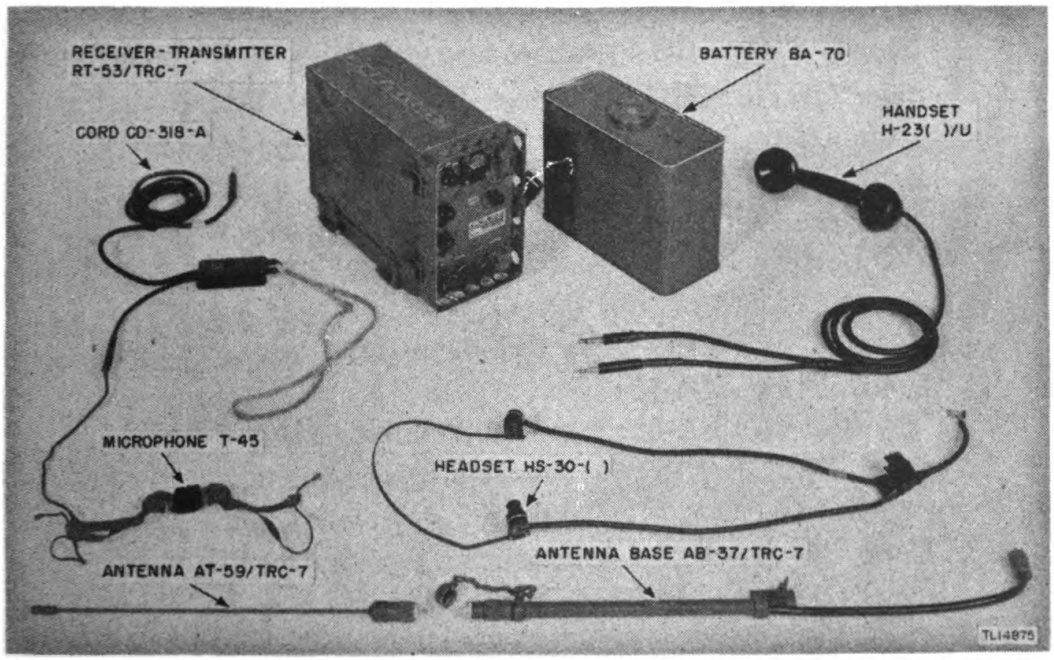


Figure 6. Radio Set AN/TRC-7, with accessories, disassembled.

5. TABLE OF COMPONENTS.

Quantity	*Component*
1	Antenna AT-59/TRC-7.
1	Antenna Assembly AS-110/TRC-7; consisting of:
	1 Antenna Assembly AS-112/TRC-7:
	1 Mast Base AB-77/TRC-7.
	8 Mast Sections AB-78/TRC-7; 6 in use, 2 running spares.
	1 base plate.
	2 Cords CG-102/TRC-7.
	4 ground stakes; 3 in use, 1 running spare.
	2 guy plates (upper); 1 in use, 1 running spare.
	2 guy plates (lower); 1 in use, 1 running spare.
	8 guy ropes, nylon; 6 in use, 2 running spares.
	4 guy straps; 3 in use, 1 running spare.
	4 Mast Sections AB-34/TRC-7 (1¼ in.).
	5 Mast Sections AB-35/TRC-7 (1½ in.).
	3 Mast Sections AB-36/TRC-7 (1 in.).
	1 Mallet MX-185/TRC-7.
	3 Plugs PL-258; 1 in use, 2 running spares.
	4 Reels RL-28; for guy ropes (2 per reel).
	1 swivel ground stake.
1	Antenna Base AB-37/TRC-7.
1	Battery BA-70.
2	Bags CW-47/TRC-7; carries Bag CW-49/TRC-7 and contents.
2	Bags CW-48/TRC-7; carries Roll CW-50/TRC-7 and contents.
2	Bags CW-49/TRC-7; carries:
	1 Receiver-Transmitter RT-53/TRC-7 and accessories.
	1 Battery BA-70, test cords, Control Unit RM-52, and Remote Control Unit RM-53.
1	Case CY-275/TRC-7; for running spare tubes.
1	Control Unit RM-53:
	4 Batteries BA-30; 2 in use, 2 running spares.
1	Cord CX-220/TRC-7; connects generator to receiver-transmitter.
1	Cord CD-318-A; for Microphone T-45.
1	Cord CD-604; for Headset HS-30-( ).
1	Cord CG-127/U; (test).
1	Cord CD-307-A; headset extension cord.

Quantity	*Component*
1	Cord CX-240/U; (test).
2	Cranks CG-7-( ).
1	Generator G-3/TRC-7; includes:
	1 voltage regulator, plug-in.
	1 set brushes, running spare.
1	Headset HS-30-( ).
1	Handset H-23-( )/U (or Handset TS-15).
1	Leg LG-2-B.
2	Legs LG-3-B.
1	Microphone T-45.
1	Phantom Antenna TS-281/TRC-7.
3	Plugs PL-57; 2 in use, 1 running spare.
1	Receiver-Transmitter RT-53/TRC-7;
4	Crystal Unit CR-1/AR (or Crystal Unit DC-11).
	3 Tubes 1AB5.
	3 Tubes JAN-1L4.
	1 Tube JAN-1S5.
	1 Tube JAN-1A3.
	1 Tube JAN-3Q4.
	5 Tubes JAN-3A5.
	2 Tubes JAN-3A4.
	1 Alignment Tool TL-314/U.
	1 wrench.
	5 Batteries BA-58.
1	Remote Control Unit RM-52:
	8 Batteries BA-30; 4 in use, 4 running spares.
2	Rolls CW-50/TRC-7; carries:
	1 Antenna Assembly AS-110/TRC-7.
	1 Generator G-3/TRC-7 and accessories.
1 set	Spare tubes; in Case CY-275/TRC-7; includes:
	1 tube 1AB5.
	1 Tube JAN-1L4.
	1 Tube JAN-1S5.
	1 Tube JAN-1A3.
	1 Tube JAN-3Q4.
	2 Tubes JAN-3A5.
	1 Tube JAN-3A4.
1	Tube Puller TL-310/U.

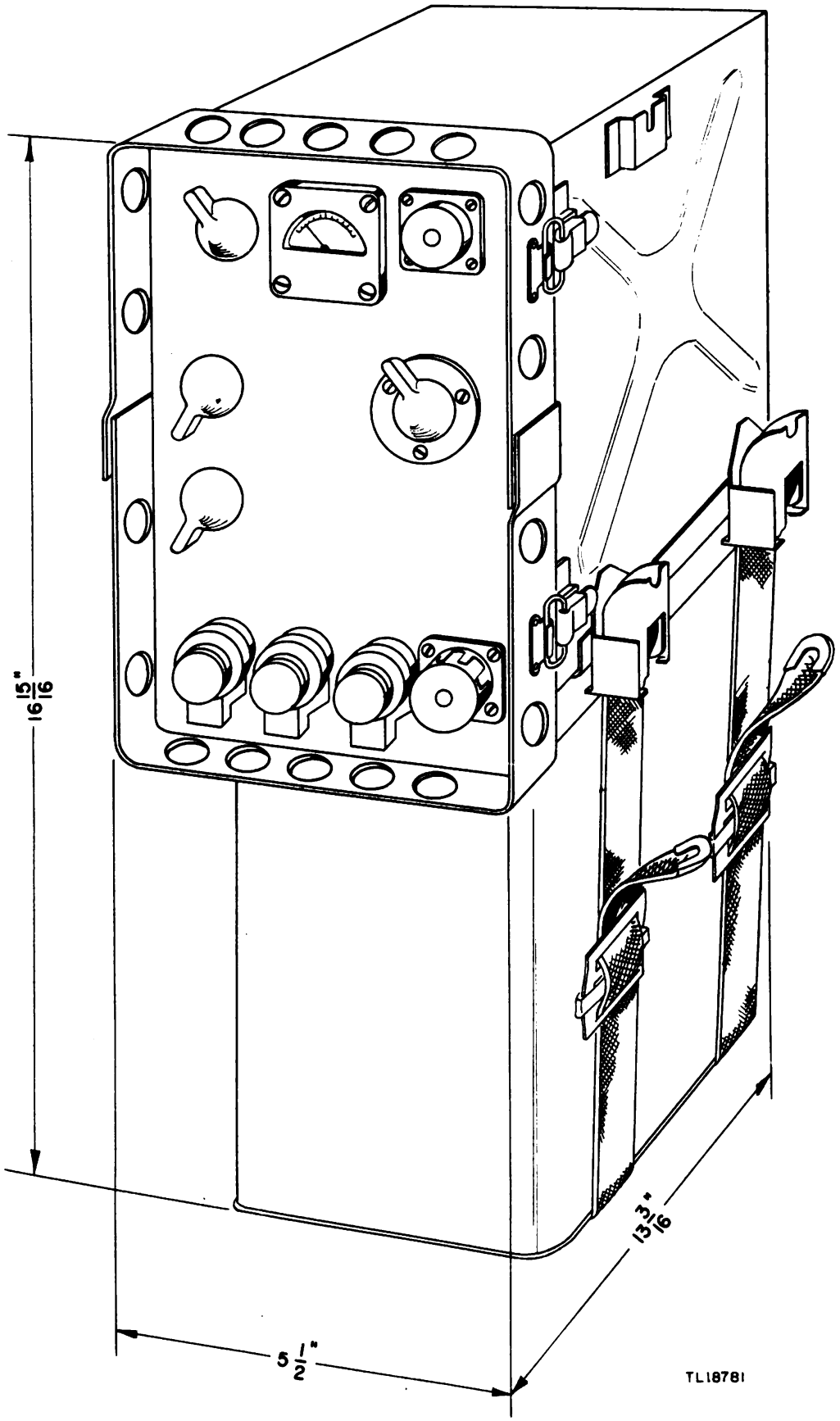


Figure 7. Radio Set AN/TRC-7, outline dimensional drawing.

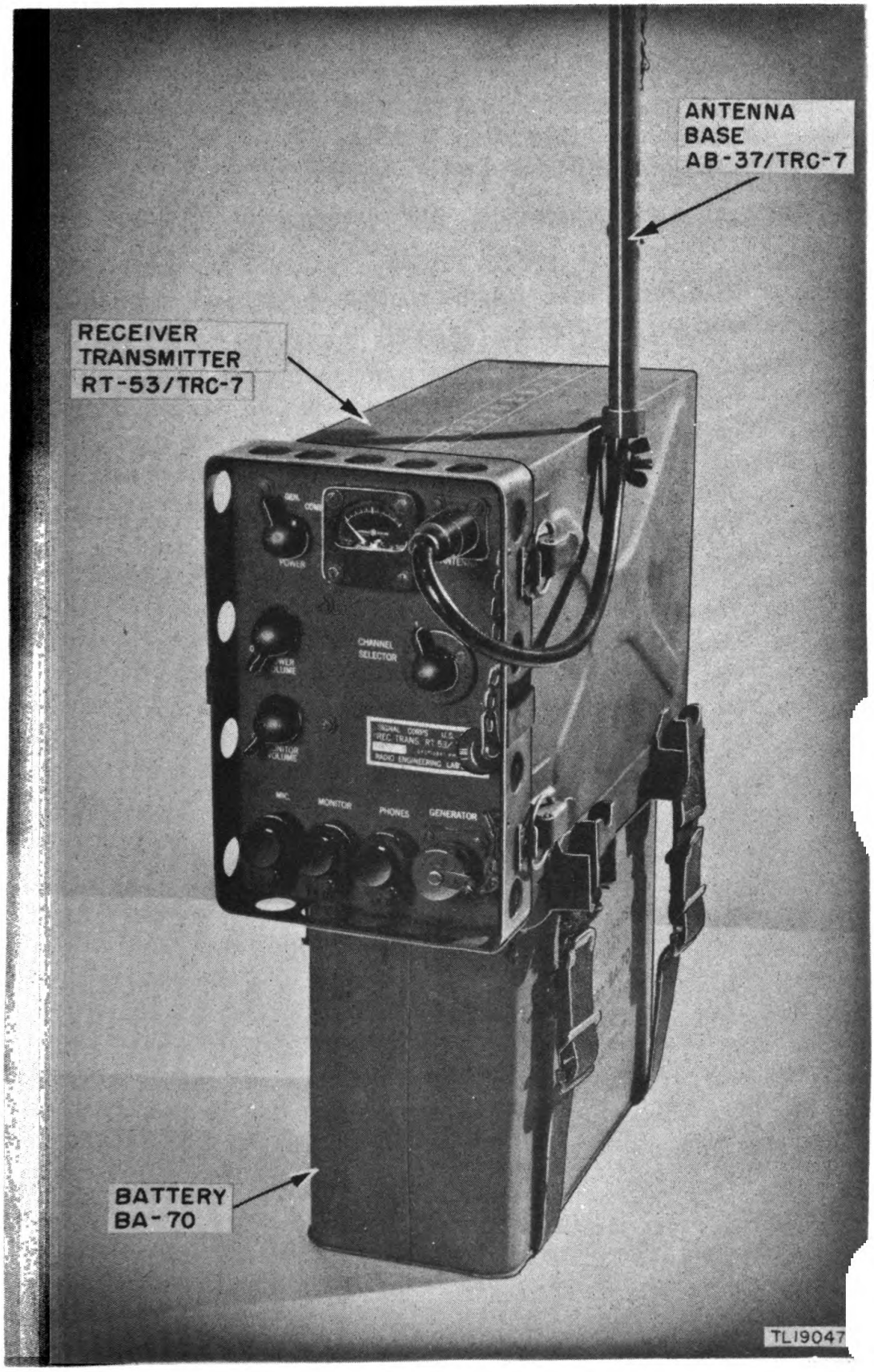


Figure 8. Receiver-Transmitter RT-53/TRC-7, with Battery BA-70 attached.

6. PACKAGING DATA.

Radio Set AN/TRC-7 is packed in two wooden boxes. Case 1 is 25½″ long, 18¾″ wide, 17½″ deep, and weighs 96 pounds when packed. Case 2 is 41″ long, 22″ wide, 15½″ deep, and weighs 150 pounds when packed. For dimensions of the unpacked set see figure 7.

7. RECEIVER-TRANSMITTER RT-53/TRC-7 (fig. 8).

Receiver-Transmitter RT-53/TRC-7 consists of the radio chassis mounted in a metal case. All the controls, jacks, and terminals are mounted on the front panel (fig. 36).

a. Housing. The one-piece waterproof housing has a dual purpose. The top section (part of the receiver-transmitter unit) houses the radio chassis. The bottom of the housing (fig. 8) covers, waterproofs, and carries the weight of Battery BA-70. On the bottom of the chassis case, a socket with a captive cover provides connection to Battery BA-70 (fig. 30).

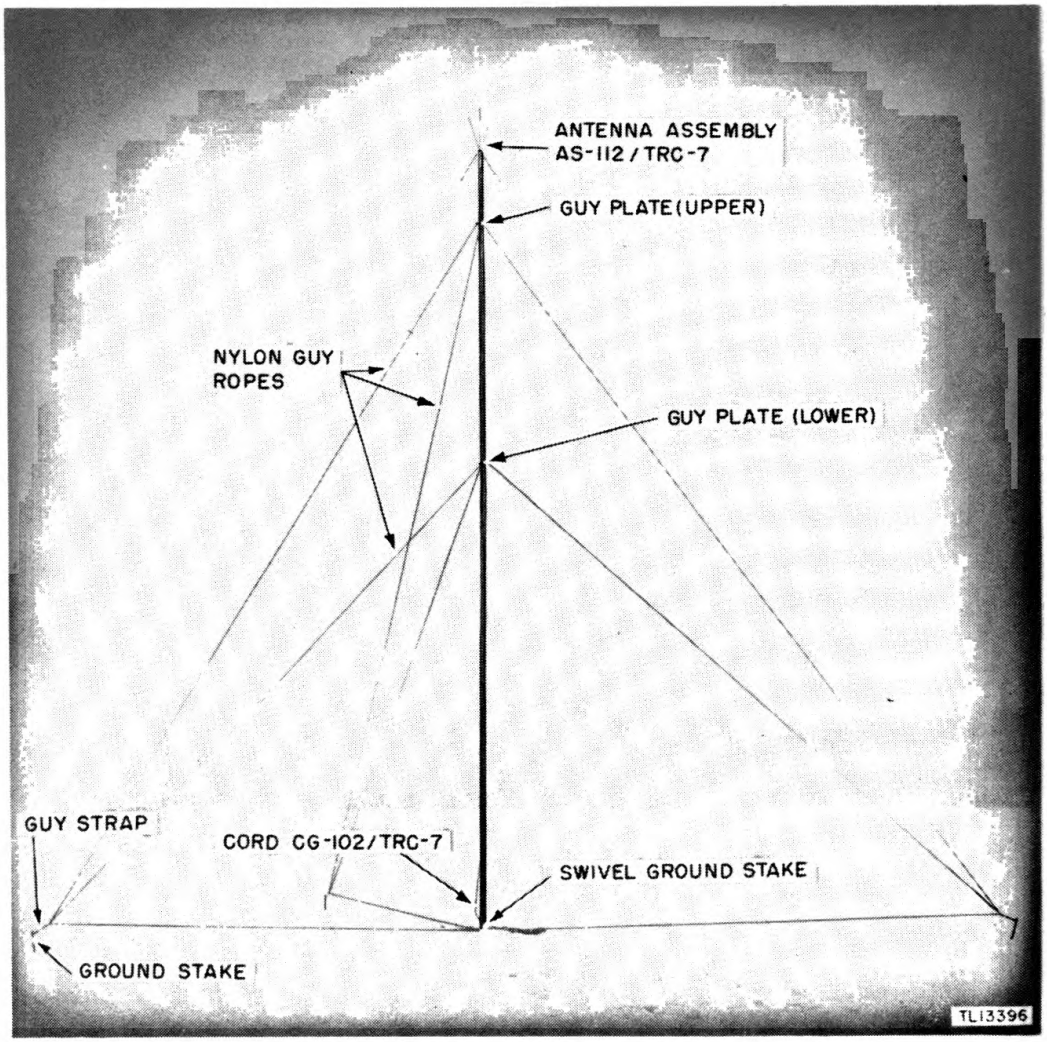


Figure 9. Antenna Assembly AS-110/TRC-7.

b. Controls. For a description of the controls of Receiver-Transmitter RT-53/TRC-7 see paragraph 28.

c. Waterseals. Synthetic rubber gaskets act as waterseals to provide protection against moisture. Special jack waterseal assemblies prevent moisture from entering through the jacks on the front panel (fig. 71).

d. Bags. The receiver-transmitter and accessories are carried in Bag CW-49/TRC-7 (fig. 33) which is carried in Bag CW-47/TRC-7 (fig. 31).

8. ANTENNA ASSEMBLY AS-110/TRC-7 (fig. 9).

a. Antenna Assembly AS-110/TRC-7 is a 12-section, 30-foot unit which is used for fixed location operation of Radio Set AN/TRC-7. The mast sections provide support for the conical antenna (fig. 20). The antenna assembly is anchored in place by three sets of two each nylon guy ropes arranged so that one man can erect it (par. 19). A coaxial cable connects the upper section of the antenna to the ANTENNA receptacle on the receiver-transmitter unit.

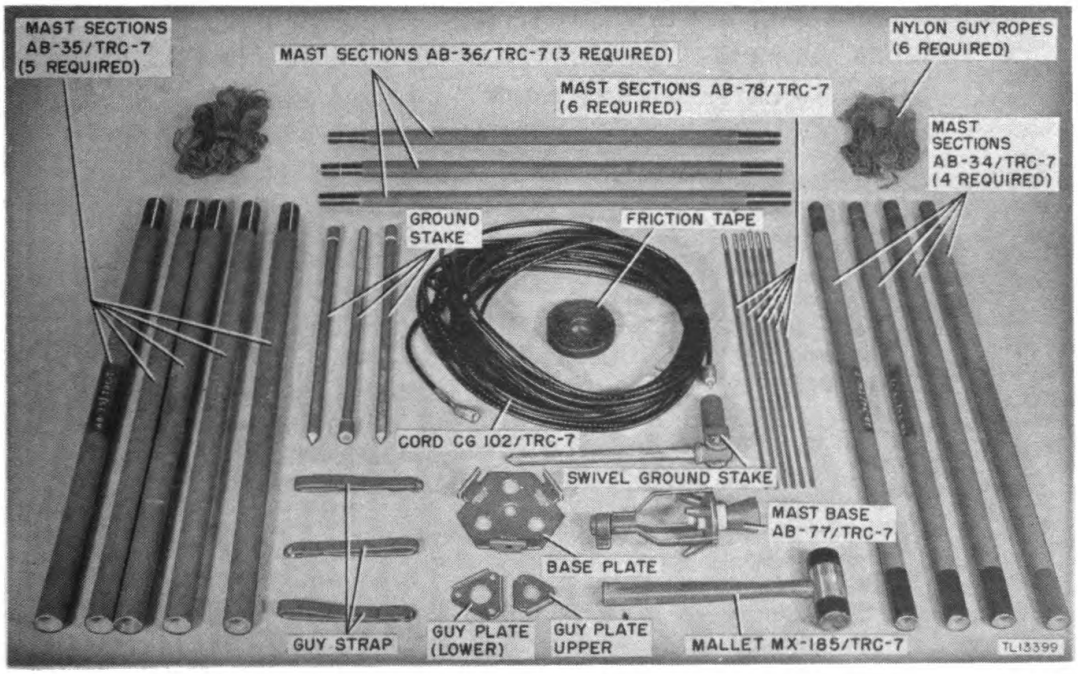


Figure 10. Antenna Assembly AS-110/TRC-7, components.

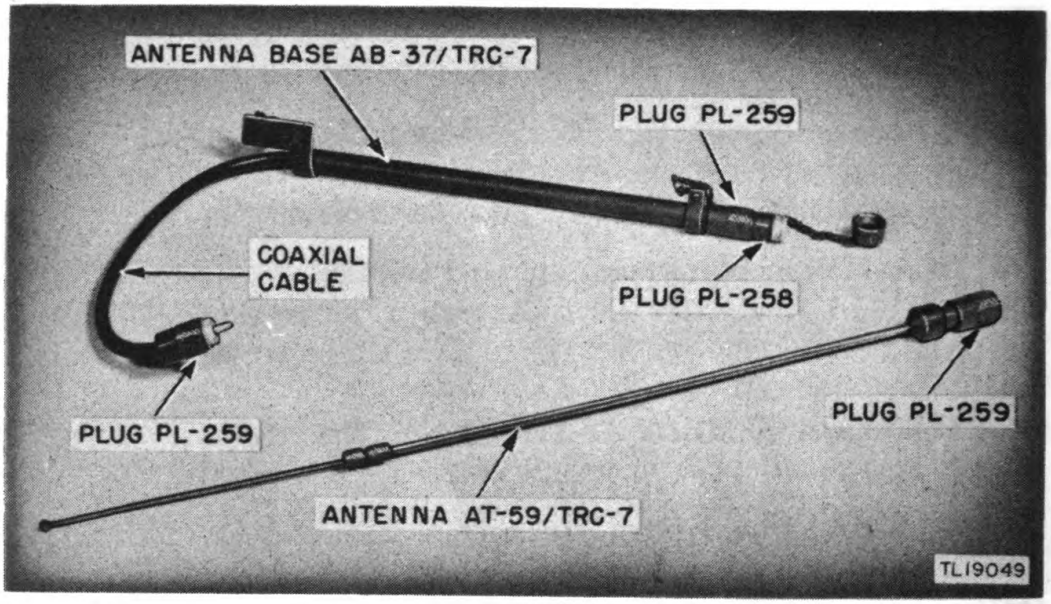


Figure 11. Antenna AT-59/TRC-7 and Antenna Base AB-37/TRC-7.

b. The antenna assembly is packed in the pockets provided (fig. 35) in a canvas Roll CW-50/TRC-7. Then the whole roll is secured and placed in outer Bag CW-48/TRC-7 (fig. 32).

c. Antenna Assembly AS-110/TRC-7 is used in place of Antenna AT-59/TRC-7 to obtain greater range.

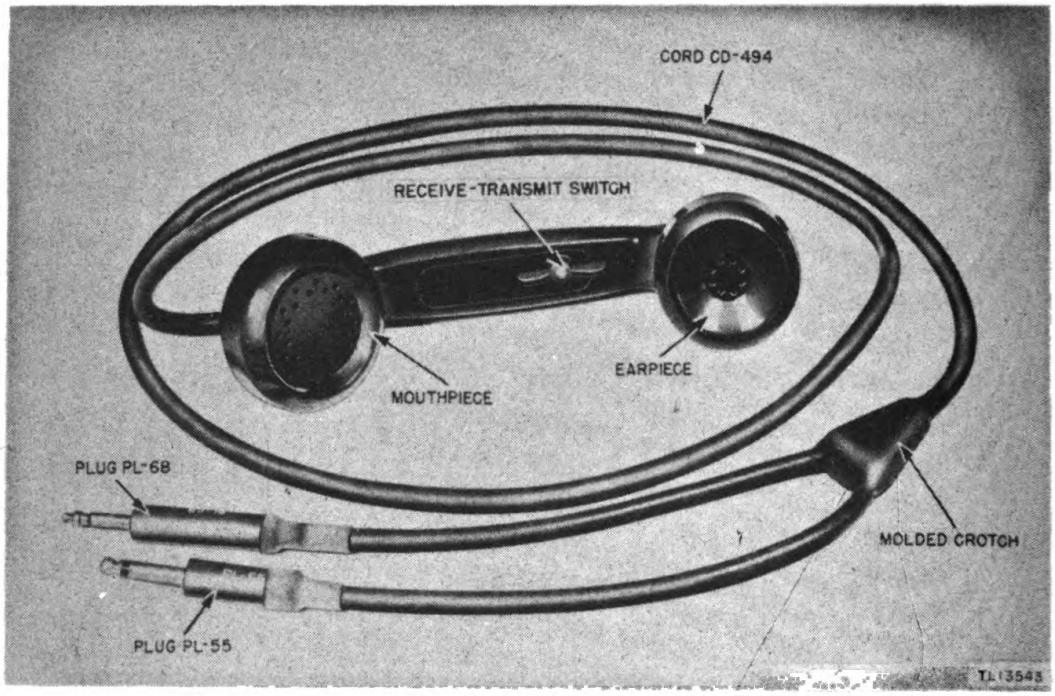


Figure 12. Handset H-23( )/U.

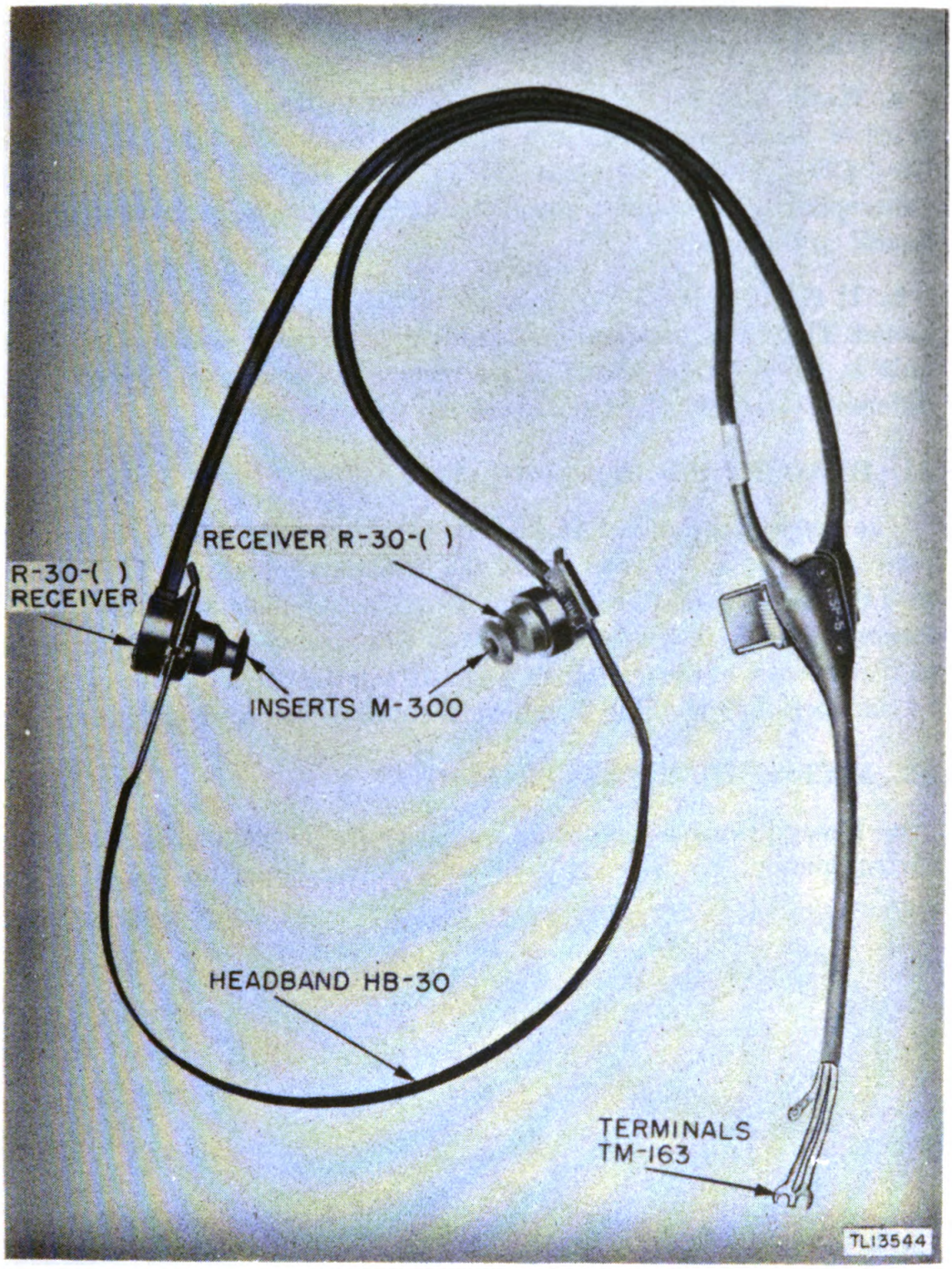


Figure 13. Headset HS-30-( ).

9. ANTENNA AT-59/TRC-7 (fig. 11).

Whip Antenna AT-59/TRC-7 is an adjustable, 28-inch, telescopic antenna used with Radio Set AN/TRC-7 when it is necessary to put the set into operation quickly, to limit range, or to conceal the set. It is also used before Antenna Assembly AS-110/TRC-7 is erected. Antenna Base AB-37/TRC-7 (fig. 11) using coaxial cable connects the radio set and the antenna.

10. HANDSET H-23( )/U (fig. 12).

a. Handset H-23( )/U may be used with Radio Set AN-TRC-7 in place of Microphone T-45 and Headset HS-30-( ). The handset uses Cord CD-494 which terminates in Plugs PL-55 (receiver) and PL-68 (microphone). A receive-transmit butterfly switch is incorporated in the handle of the handset.

b. If Handset H-23( )/U is not available, Handset TS-15 will be issued. These two handsets are identical in physical design. They differ only in the electrical wiring of the receive-transmit wafer switch. This difference does not affect the operation with the set.

11. HEADSET HS-30( ) (fig. 13).

The headset is lightweight and close-fitting. Special soft rubber earpieces snapped to the receivers of the headset are designed to fit snugly into the ear cavities. These earpieces exclude outside noises and aid in receiving weak signals. The headband is a thin, steel band, adjustable to the contours of the operator's head. Attach the clip on the headset cord to the operator's clothing to relieve the pull of the cord (fig. 13).

12. MICROPHONE T-45 (fig. 14).

a. Description. Microphone T-45 is a noise-cancelling, single-button, carbon microphone designed to be worn on the upper lip (fig. 27). The

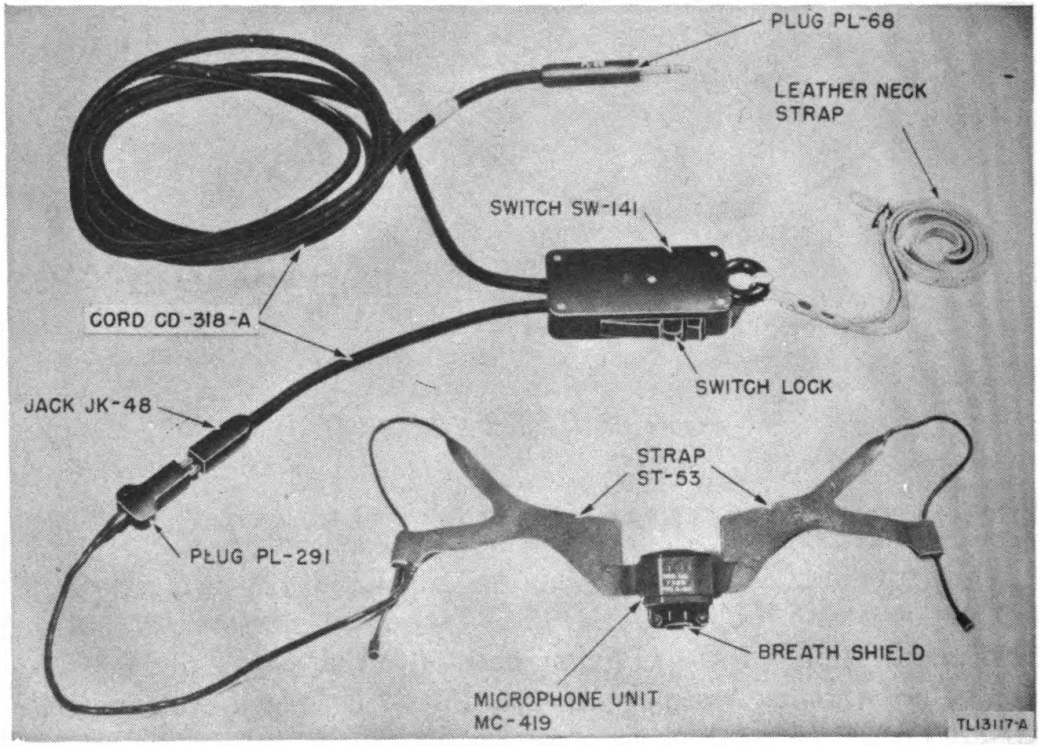


Figure 14. Microphone T-45 and Cord CD-318-A.

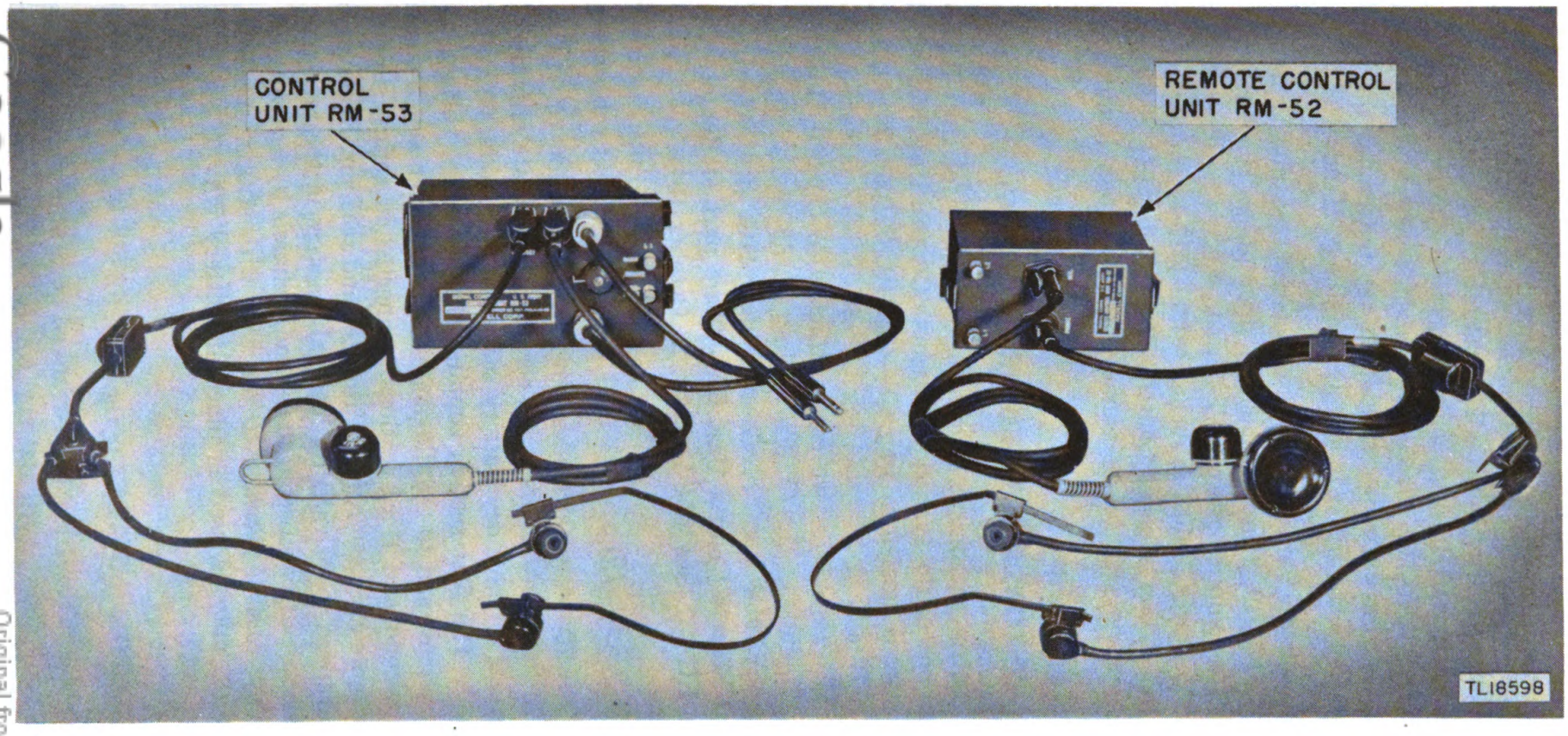


Figure 15. Remote Control Unit RM-52 and Control Unit RM-53.

design of the microphone reduces background noise and allows speech to be reproduced clearly under all conditions. This microphone is used with Radio Set AN/TRC-7 in conjunction with Cord CD-318-A, which contains Switch SW-141, the receive-transmit switch (fig. 14). Switch SW-141 is used in a manner similar to the button on the handle of Microphone T-17 and the switch on the handle of Handset H-23( )/U.

b. Components. Microphone T-45 consists of differential Microphone Unit MC-419, a breath shield, a microphone bracket, right and left face straps comprising Strap ST-53, and a short cord terminating in Plug PL-291. Cord CD-318-A includes Jack JK-48 into which microphone Plug PL-291 is inserted; Switch SW-141; Plug PL-68 for insertion into a microphone jack; cords connecting these items; and a leather neck strap for support of the switch.

13. REMOTE CONTROL EQUIPMENT (fig. 15).

Remote control equipment comprising local Control Unit RM-53 at the radio set end of the system and Remote Control Unit RM-52 at the remote station, is carried in Bag CW-49/TRC-7 (par. 27) along with Battery BA-70 and test cords. Bag CW-49/TRC-7 is carried in Bag CW-47/TRC-7 (fig. 31). Two cords attached to Control Unit RM-53 connect to Radio Set AN/TRC-7. Plug PL-55 is inserted into the PHONES jack, and Plug PL-68 into the MIC. jack. Control Unit RM-53 and Remote Control Unit RM-52 are part of Remote Control Equipment RC-261. See TM 11-2632, 28 October 1944.

14. BATTERY BA-70.

Battery BA-70, which provides power for operation of Radio Set AN/TRC-7, gives 20 to 25 hours of service in moderate climates. This battery consists of three dry battery sections of 4.5 volts, 60 volts, and 90 volts each. The first section supplies the necessary voltage to the microphone circuit and to the filaments of the receiver and transmitter tubes. The second and third sections, connected in series, supply 150 volts to the plate circuits of the transmitter and receiver. Receiver plate voltage is dropped to 90 volts by internal resistors in the receiver. The battery is electrically connected to the radio chassis by a receptacle and plug assembly, and is fastened to the case with straps. If necessary, Battery BA-80 may be used in place of Battery BA-70, but it has a shorter life.

15. GENERATOR G-3/TRC-7 (fig. 16).

Generator G-3/TRC-7 is a hand-cranked generator which supplies all or part (in conjunction with Battery BA-70) of the voltages required

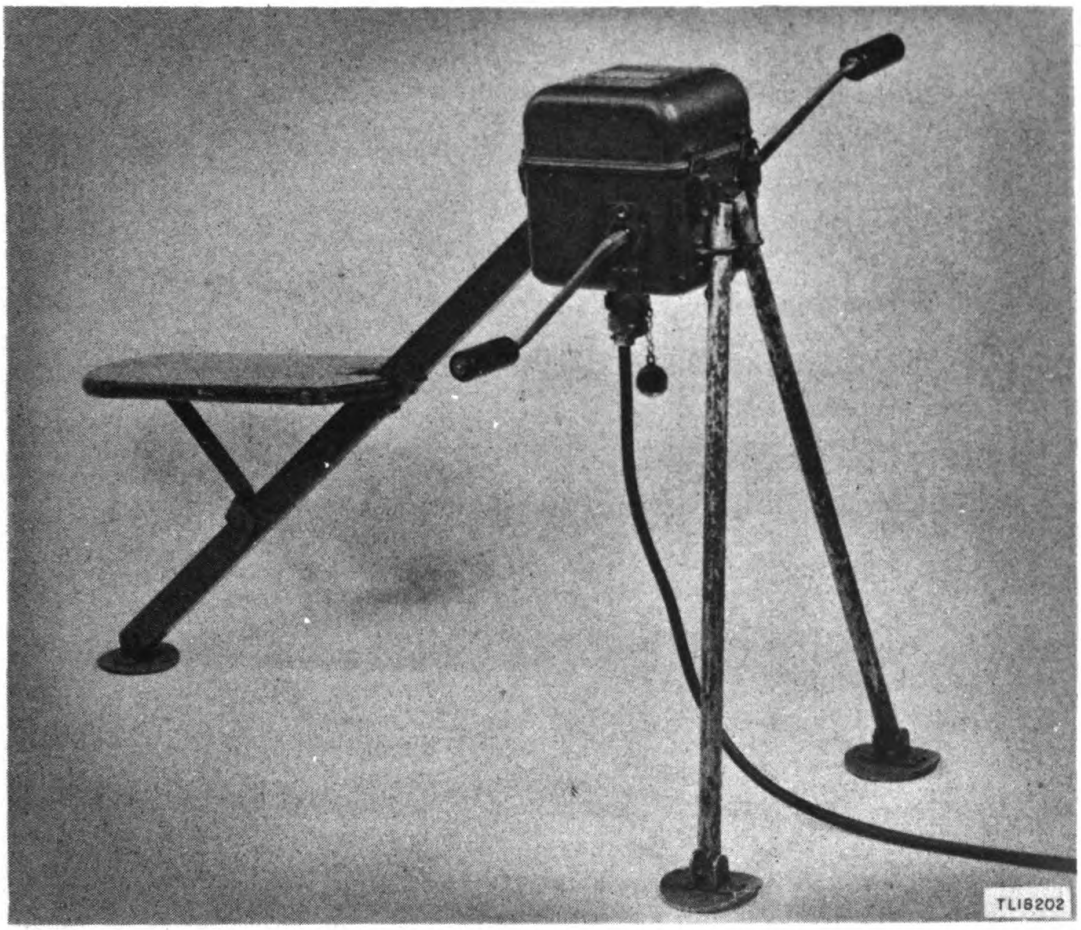


Figure 16. Generator G-3/TRC-7, set up for operation.

for the operation of Radio Set AN/TRC-7. The accessories required by the generator: Leg LG-2-B, two Legs LG-3-B, two Cranks GC-7-( ), and Cord CX-220/TRC-7; along with the generator are carried in Roll CW-50/TRC-7 (fig. 34) which, in turn, is carried in Bag CW-48/TRC-7 (fig. 32).

SECTION II

INSTALLATION OF RADIO SET AN/TRC-7

16. UNPACKING, UNCRATING, AND CHECKING (par. 27).

Use particular care when packing or handling the equipment, because it may be easily damaged when not protected by the packing case. Check each item as it is removed from the packed bag against the packing list. The list in paragraph 5 is supplied as a guide and is not to be used as a basis for issue. In unpacking the equipment, follow the steps below.

a. Place the wooden boxes (or canvas bags, if export packaging has been removed) as near the operating location as possible.

b. Cut the steel straps.

c. Remove the nails with a nail puller, then remove the sides of the packing case. **Do not pry the sides off. It may injure the equipment.**

d. Remove the top of the packing case and all protective wrappings.

e. Lift out the two bags from each carton.

f. Receiver-Transmitter RT-53/TRC-7.

(1) Unzip Bag CW-47/TRC-7. Lift the inner rubber insulation, and remove inner Bag CW-49/TRC-7.

(2) Unsnap the inner bag and remove the set. Remove the cloth bags which contain the silica gel.

g. Battery BA-70 and Remote Control Equipment.

(1) Open the remaining Bag CW-49/TRC-7.

(2) Lift out the remote control accessories: Control Unit RM-53, and Remote Control Unit RM-52.

(3) Lift up the flap which separates the remote control equipment from the battery, and lift out the battery.

(4) Remove the silica gel containers.

h. Antenna Assembly AS-110/TRC-7.

(1) Unzip Bag CW-48/TRC-7.

(2) Remove Roll CW-50/TRC-7.

(3) Remove the silica gel containers.

(4) Open Bag CW-50/TRC-7 and remove the antenna assembly components from their compartments.

i. Generator G-3/TRC-7.

(1) Open Bag CW-48/TRC-7.

(2) Remove Roll CW-50/TRC-7.

(3) Remove the bags containing the silica gel.

(4) Open Roll CW-50/TRC-7.

(5) Remove the generator and its components.

17. CONNECTIONS AND INTERCONNECTIONS.

a. For instructions on connecting the battery to the receiver-transmitter, refer to paragraph 23. The battery receptacle on the bottom of the

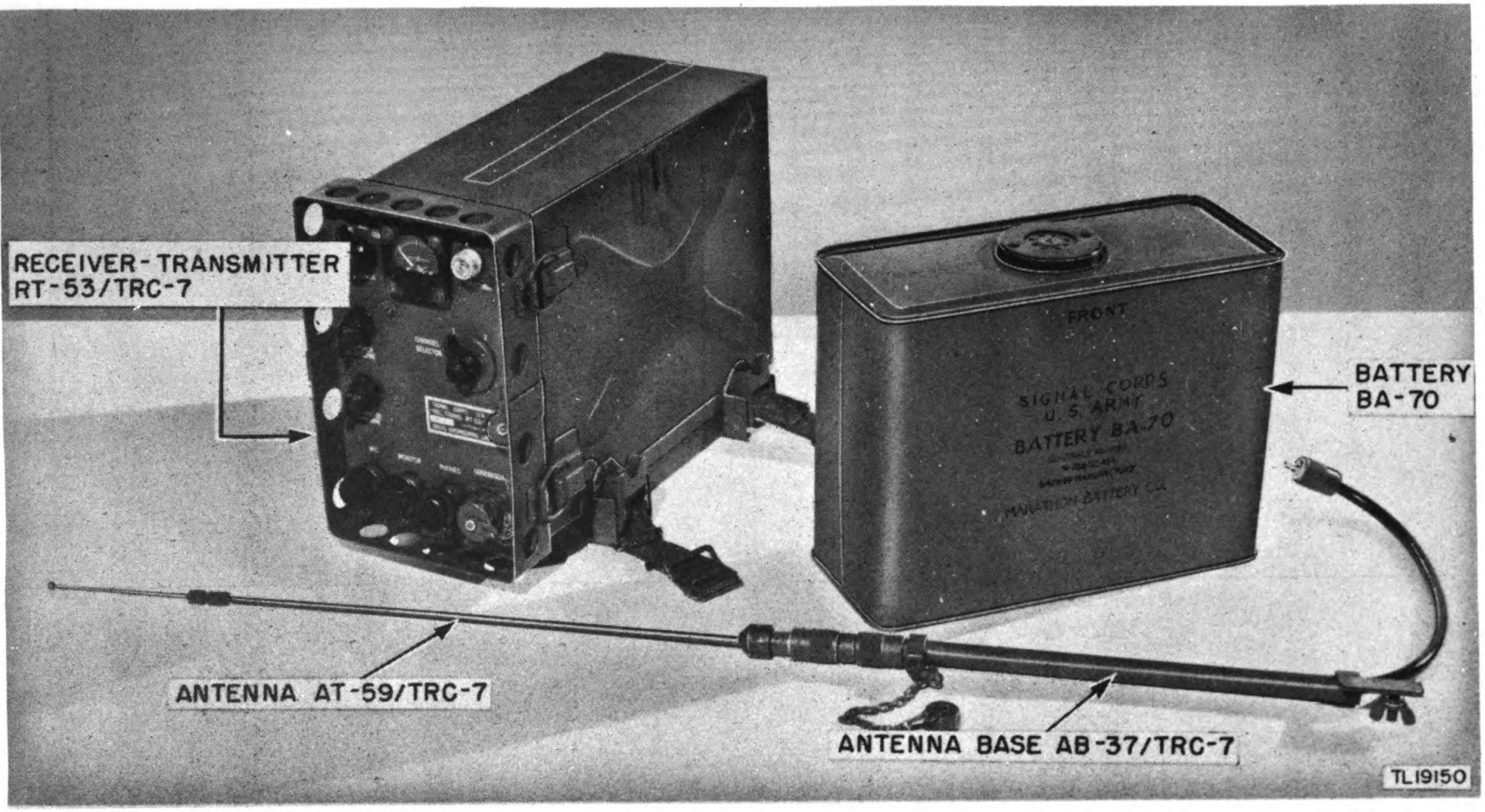


Figure 17. Radio Set AN/TRC-7, disassembled.

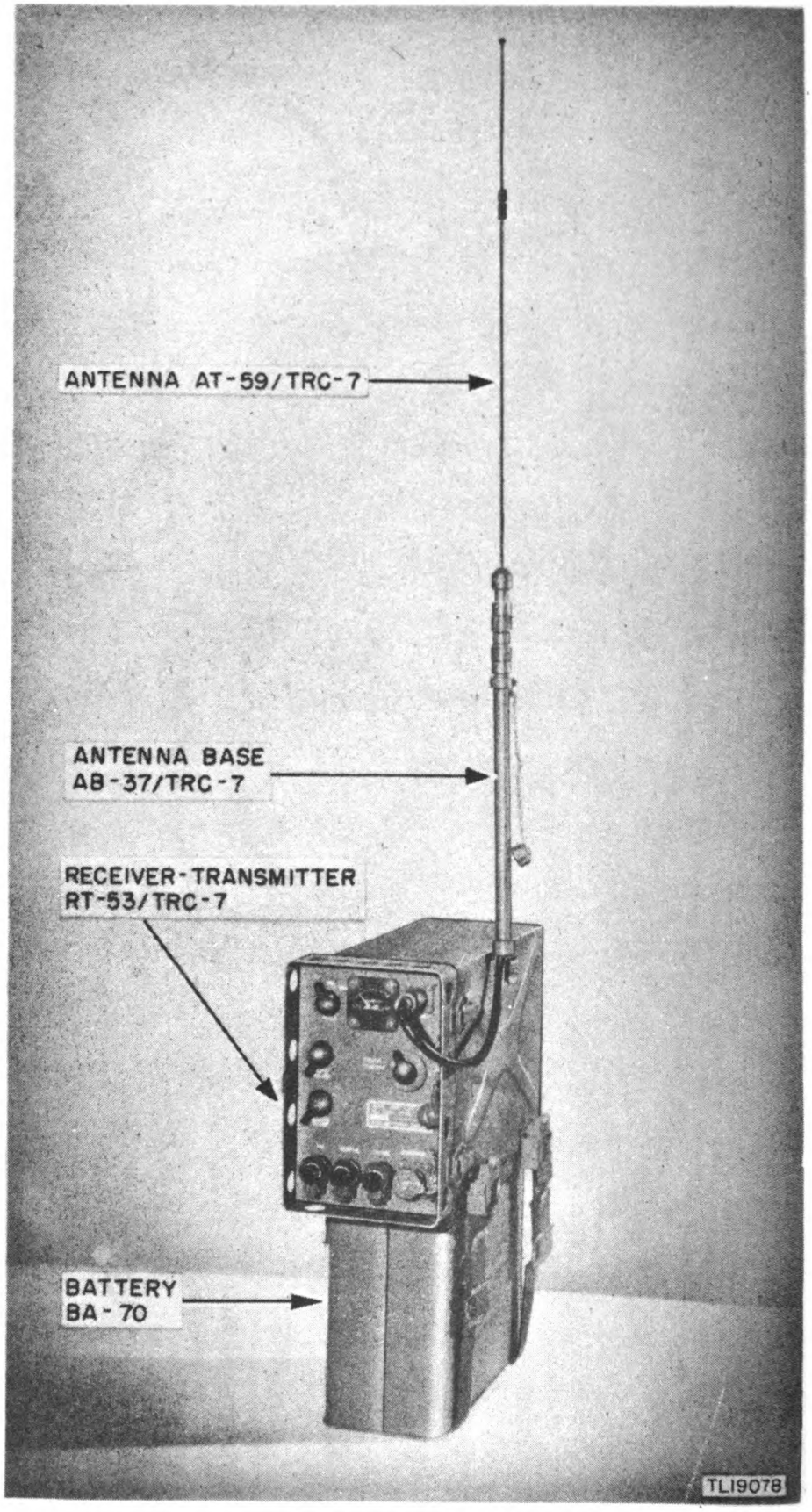


Figure 18. Radio Set AN/TRC-7.

set is connected by wiring on the interior of the case to the back of the housing and thence by plug P1 to the receiver-transmitter.

b. The generator is connected to the receiver-transmitter by plugging Cord CX-220/TRC-7 into the GENERATOR receptacle on the front panel, and tightening the connector securely.

18. RECEIVER-TRANSMITTER RT-53/TRC-7.

Receiver-Transmitter RT-53/TRC-7 is shipped in Bag CW-49/TRC-7 with all tubes installed, but it is necessary to install the crystals (fig. 78). The receiver and transmitter circuits must be preset (pars. 116 and 117). Installation of the battery and the antenna, and connection of Handset H-23( )/U or a combination of Headset HS-30-( ) and Microphone T-45 are required for a complete installation.

19. ANTENNA ASSEMBLY AS-110/TRC-7.

a. Siting (fig. 19). After selecting a site for the operation of the radio set (fig. 42), locate a clearance in the center of it of at least 45 feet in diameter for erecting Antenna Assembly AS-110/TRC-7. There must be a clear line of sight between sets for ground operation.

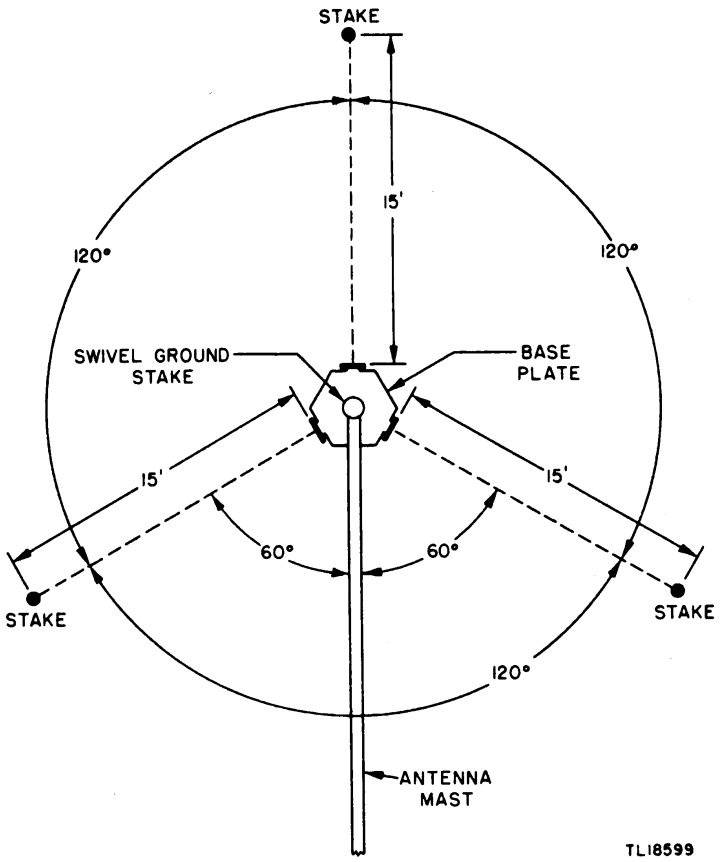


Figure 19. Antenna installation, stake layout.

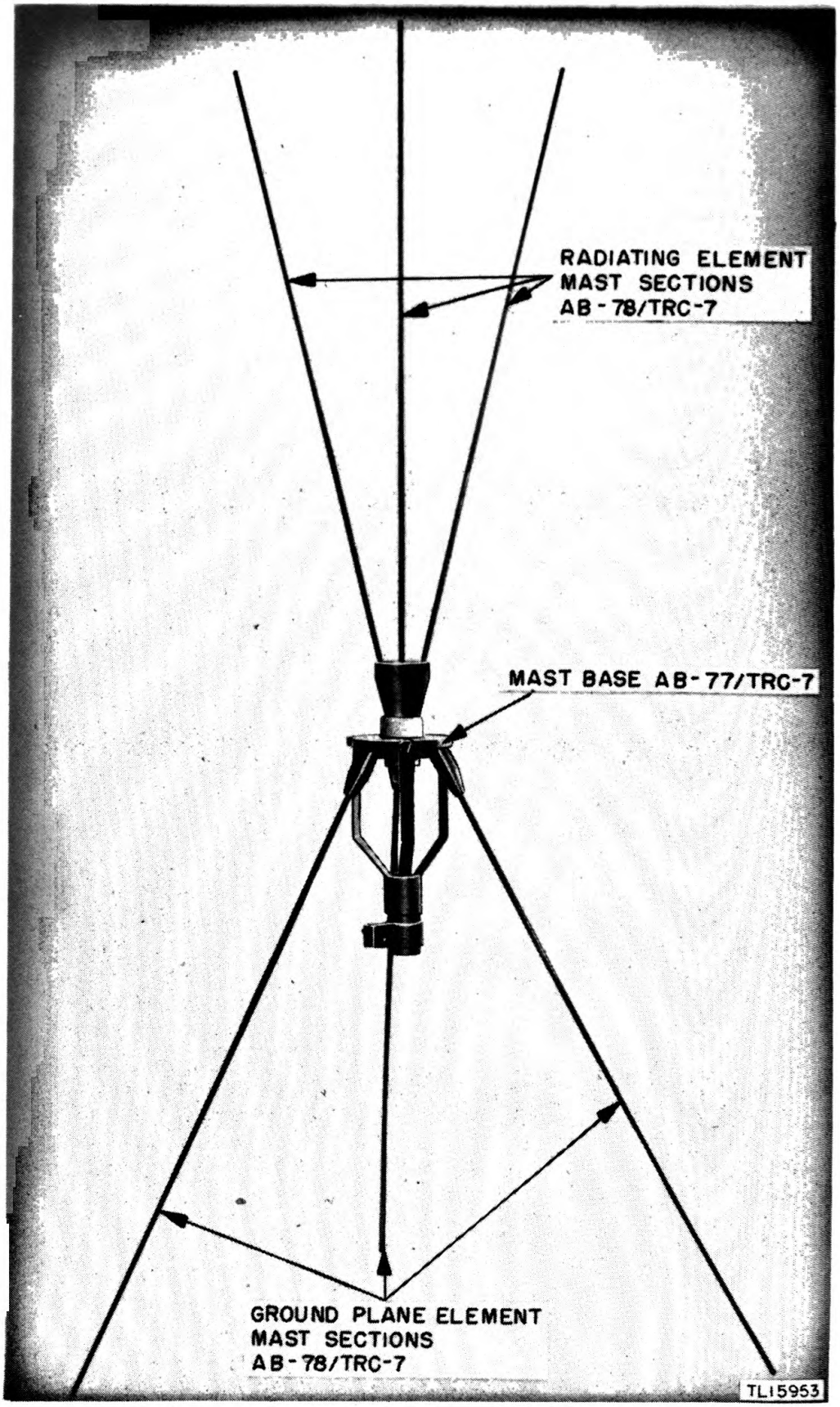


Figure 20. Antenna Assembly AS-112/TRC-7.

b. Preparation.

(1) In the approximate center of the antenna location, place the base plate. With the mallet provided, drive the swivel ground stake through the center hole in the base plate.

(2) Pace off 15 feet from the base plate in the three directions indicated by the tabs on the plate (fig. 19). Drive each ground stake at the 15-foot mark.

(3) Anchor the straps as shown in figure 88.

(4) If possible, erect the antenna assembly with two or more men. However, in an emergency, one man can assemble the antenna as follows:

c. Assembly. Assemble the antenna mast flat on the ground, laid out so the assembly bisects the angle made by any two ground stakes.

(1) Mast Sections and Guy Plates.

(a) Fit the five Mast Sections AB-35/TRC-7 into one another and the bottom one into the swivel ground stake.

(b) Fit two Mast Sections AB-34/TRC-7 together and into the top Mast Section AB-35/TRC-7. Slip the lower (larger) guy plate on the second section, then add the remaining two Mast Sections AB-34 TRC-7.

(c) Fit two of the three Mast Sections AB-36/TRC-7 togethe add them to the mast assembly, slip the upper (smaller) guy plate o the second section, then add the final mast section.

(2) Antenna.

(a) Screw the six Mast Sections AB-78/TRC-7 into Mast Base AB-77/TRC-7.

(b) Connect the assembled antenna to the assembled mast with the clamp and wingnut provided.

(3) Cord.

(a) Connect Cord CG-102/TRC-7 to Mast Base AB-77/TRC-7 with Plug PL-258.

(b) Between the antenna connection and the joint of the first mast section, make a large radius bend in the cord and lash it to Mast Section AB-36/TRC-7 with friction tape. This will relieve the strain o the connector and plug.

(c) Twist the cord around the mast about three times.

(4) Guy Ropes.

(a) Snap the nylon guy ropes into place on the upper and lower guy plates.

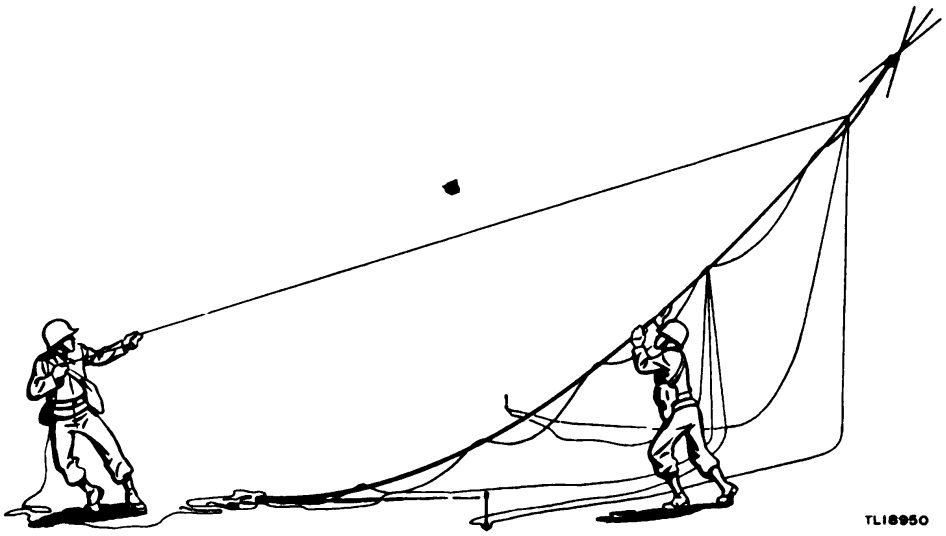


Figure 21. Antenna Assembly AS-110/TRC-7, erection by two men.

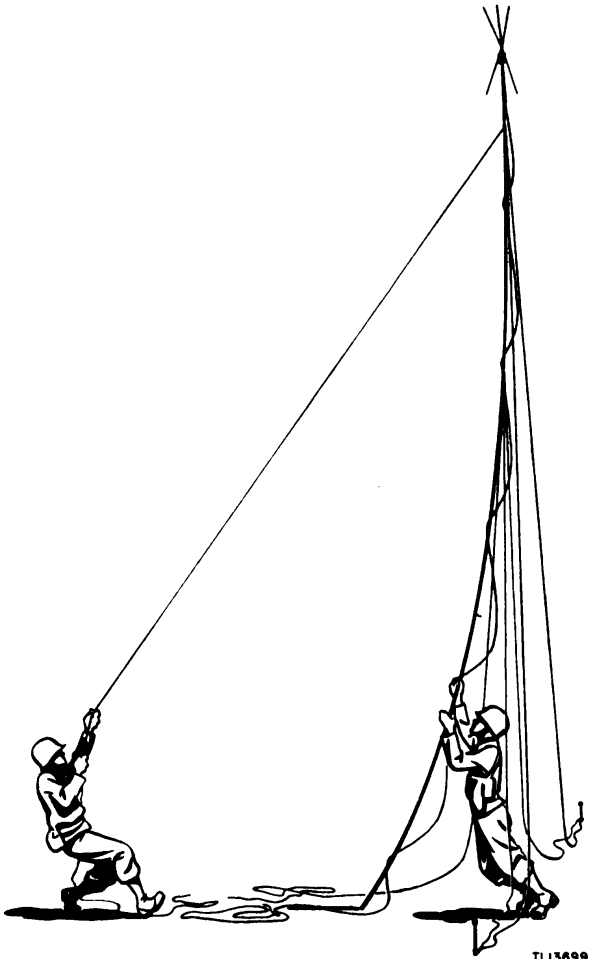


Figure 22. Antenna Assembly AS-110/TRC-7, erection by two men.

(b) Carefully thread the guys through the respective ground stake strap (one upper guy rope and one lower guy rope to each strap), then pass the two side sets through the corresponding openings on the base plate.

(c) Pull the two sets of side guys taut and tie them at the base plate.

d. Erection by Two Men.

(1) One man should stand at the end of the antenna mast which inserts into the swivel ground stake. From this position he will be able to control antenna movement during erection by pulling the guy ropes as the other man walks the antenna up (figs. 21 and 22).

(2) The second man should stand near the lower guy plate and raise the antenna as high as possible.

(3) While the man at the guy ropes raises the top of the antenna mast, the second man walks toward the antenna base, raising the mast as he goes.

(4) When the antenna mast is vertical, tie the third set of guy ropes to the base plate and readjust the other two sets.

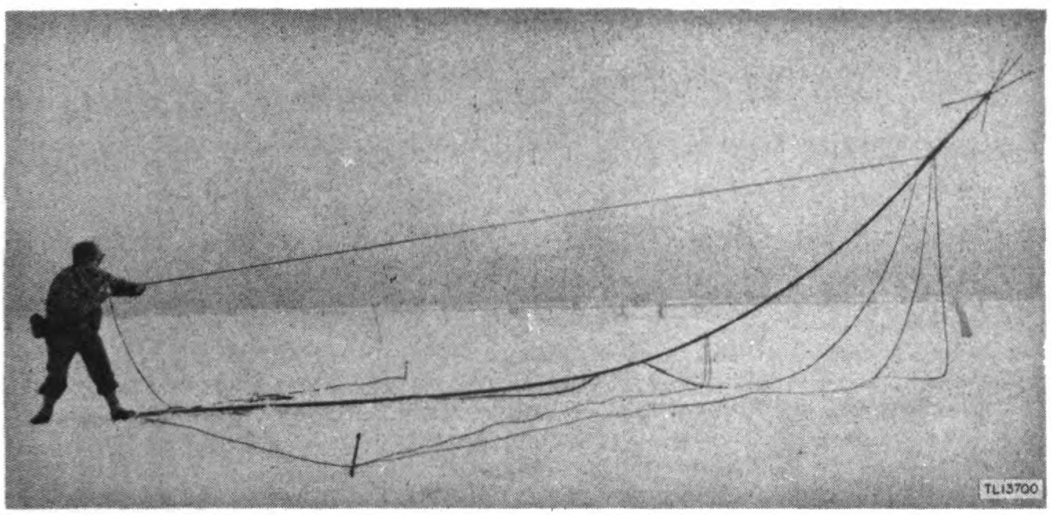


Figure 23. Antenna Assembly AS-110/TRC-7, erection by one man.

Figure 24. Antenna Assembly AS-110/TRC-7, erection by one man.

e. Erection by One Man.

(1) Hold the third set of guy ropes, which are through only the stake strap, in your left hand. With your right hand, grasp the upper guy. Slowly and steadily pull the antenna toward you until it snaps upward into a perpendicular position (figs. 23 and 24).

NOTE: Do not jerk the antenna into place. The slow, steady pull will straighten the deep bow into a vertical antenna assembly.

(2) Tie the third set of guy ropes to the base plate, and readjust the first two sets.

f. Operation. Connect the antenna to the radio set by plugging the connector into ANTENNA receptacle on front panel of the set.

g. Disassembly. Perform assembly in reverse order, but **walk** antenna mast down, rather than lowering it with the guy ropes.

20. ANTENNA AT-59/TRC-7.

Before installing Antenna AT-59/TRC-7, refer to paragraph 30b for the proper length of the antenna.

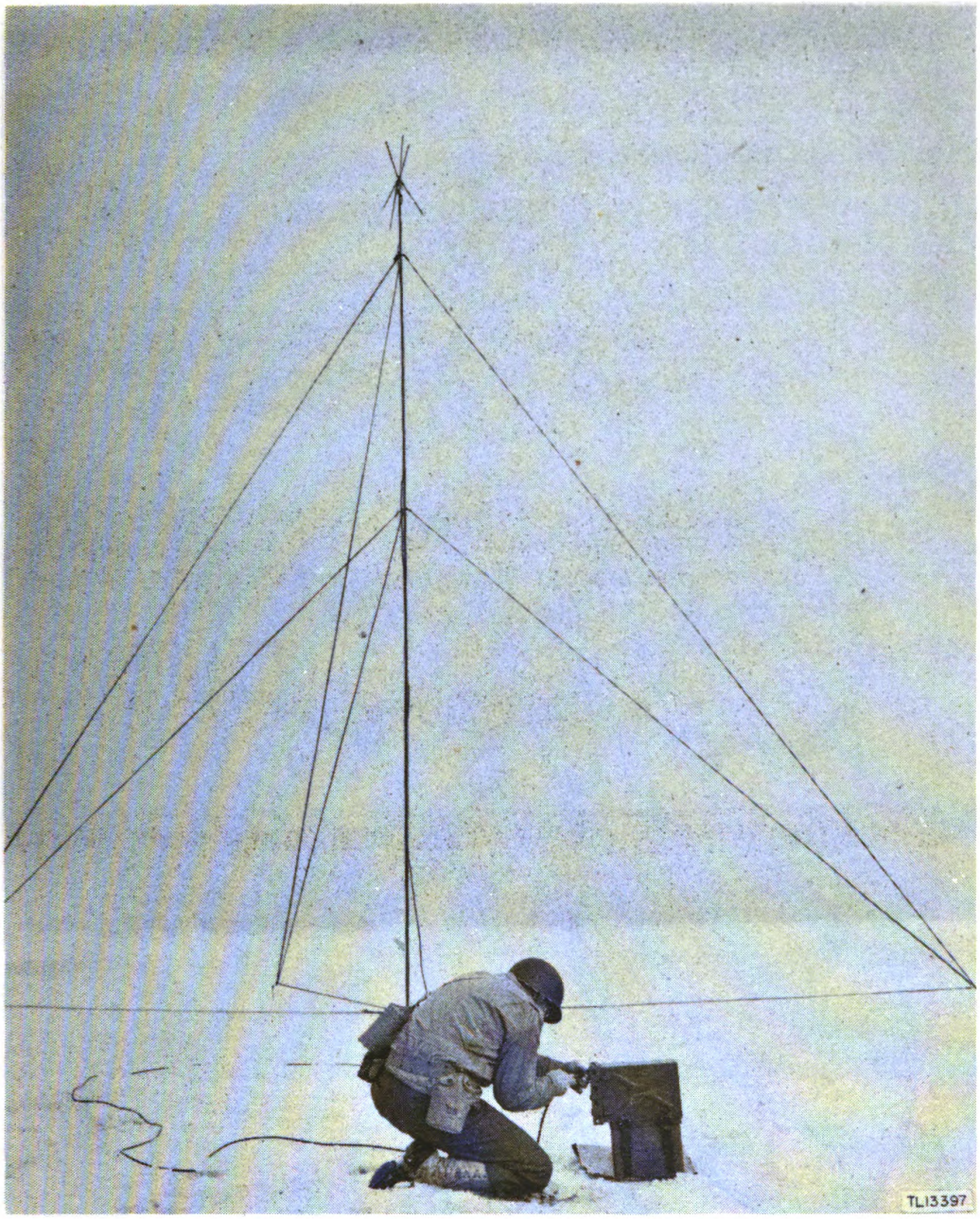


Figure 25. Antenna Assembly AS-110/TRC-7, installed.

a. Loosen the wingnut on Antenna Base AB-37/TRC-7 one or two turns. Slip the antenna base into the slot in the bracket on the receiver-transmitter case. The large washer beside the wingnut should remain on the outside of the bracket.

b. Tighten the large wingnut to hold the antenna base securely.

c. Pull the cable around the receiver-transmitter unit to the panel.

d. Remove the cap covering the receptacle marked ANTENNA in the upper right-hand corner of the panel. This cover will remain on the chain.

e. Insert the coaxial connector on the antenna base cable into the antenna receptacle. Tighten the plug securely.

f. Screw Antenna AT-59/TRC-7 to the threaded fitting on Antenna Base AB-37/TRC-7 and tighten securely.

21. HANDSET H-23( )/U, HEADSET HS-30-( ), AND MICROPHONE T-45.

The headset and microphone accessories used with this radio set may

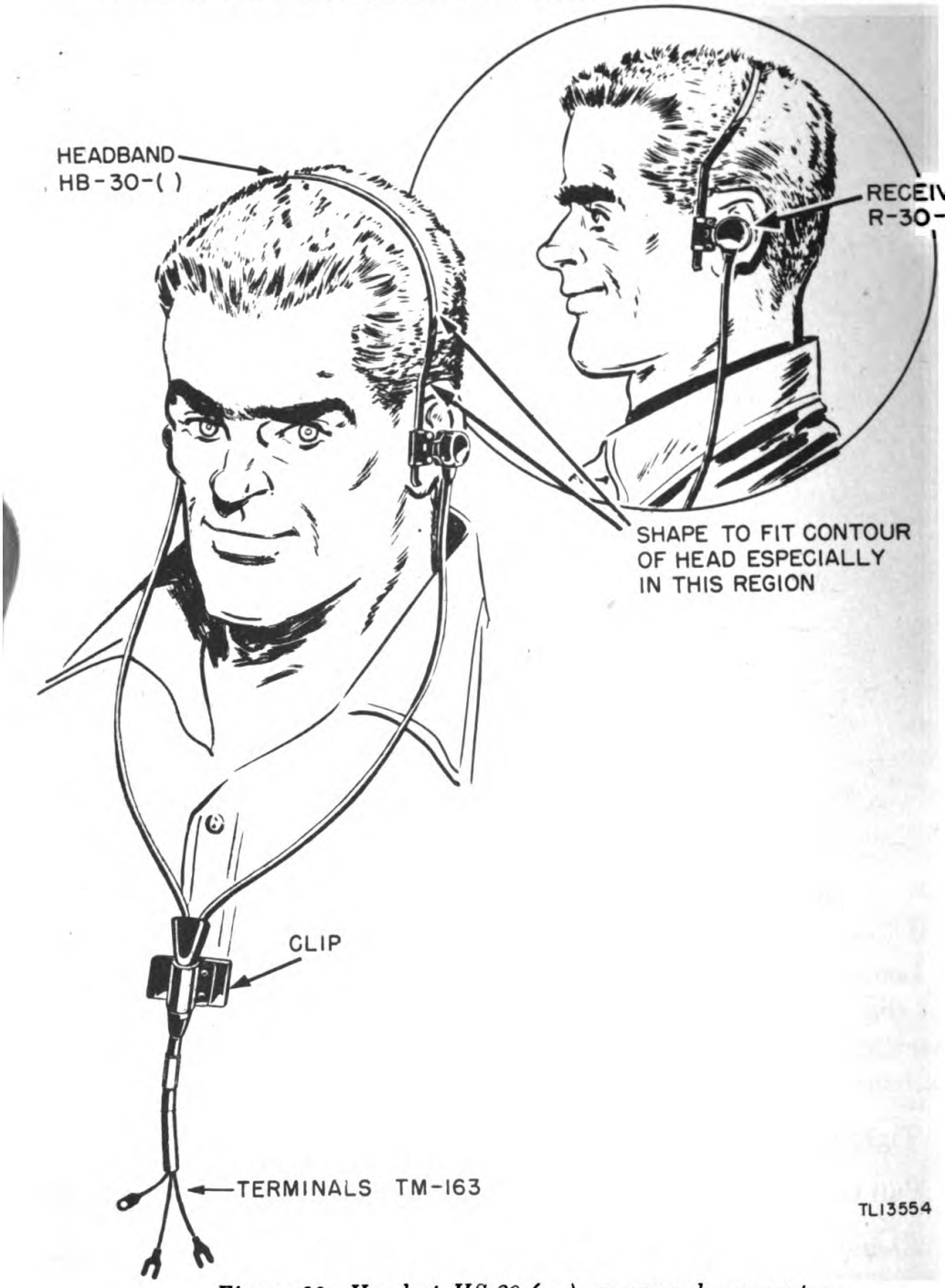


Figure 26. Headset HS-30-( ), as worn by operator.

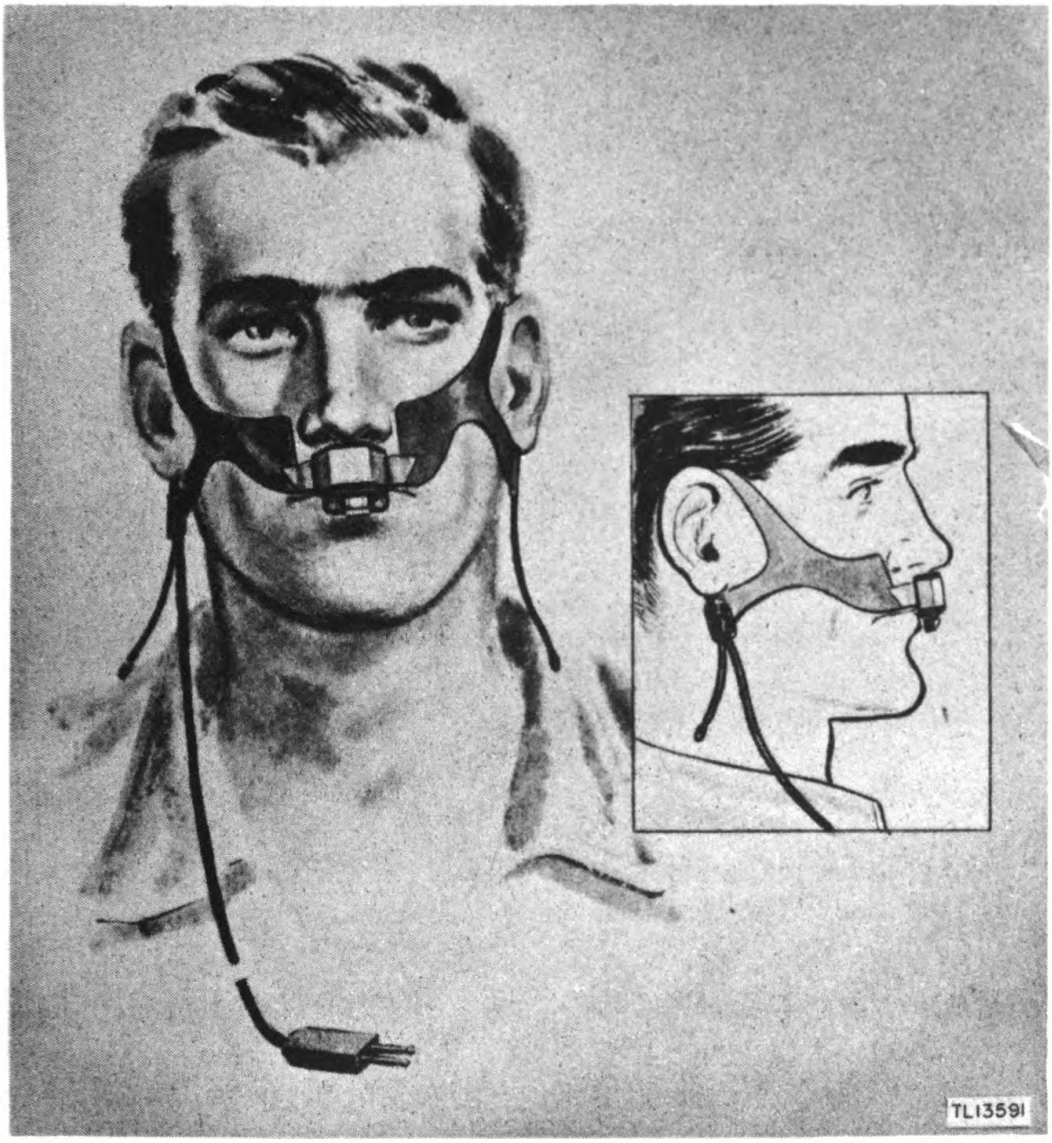


Figure 27. Microphone T-45, as worn by operator.

be either Handset H-23( )/U, or a combination of Headset HS-30-( ) and Microphone T-45.

a. Handset H-23( )/U is installed by inserting Plug PL-55 into the jack marked PHONES, and Plug PL-68 into the jack marked MIC.

b. Headset HS-30-( ) (fig. 26) is installed by inserting Plug PL-55 into the jack marked PHONES.

c. Microphone T-45 (fig. 27) when used with Radio Set AN/TRC-7, is worn in conjunction with Headset HS-30-( ). The correct procedure for assembling and wearing Microphone T-45 and Cord CD-318-A (fig. 28) follows:

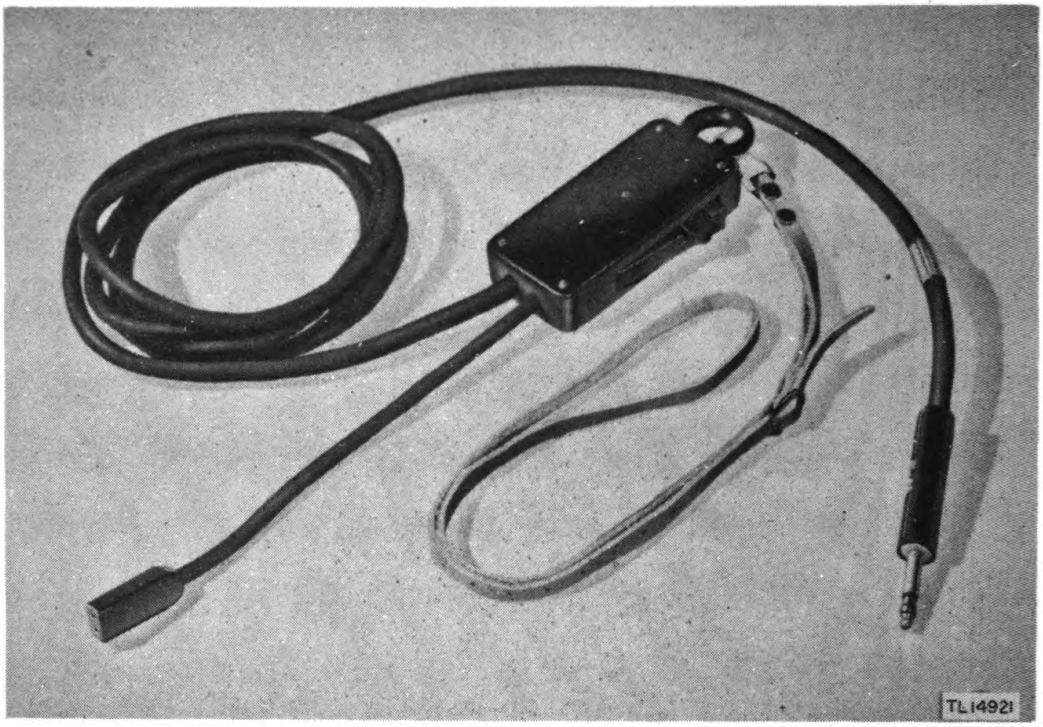


Figure 28. Cord CD-318-A.

(1) Place the assembly on the head and adjust Strap ST-50-A so that Microphone Unit MC-419 (fig. 14) rests on the upper lip.

(2) Adjust the two drawstrings to provide a comfortable and secure fit so that the microphone remains in place despite movement of the head. If the drawstrings do not move easily, moisten them slightly with water. Once correctly adjusted, Microphone T-45 can be removed and worn again without further adjustment.

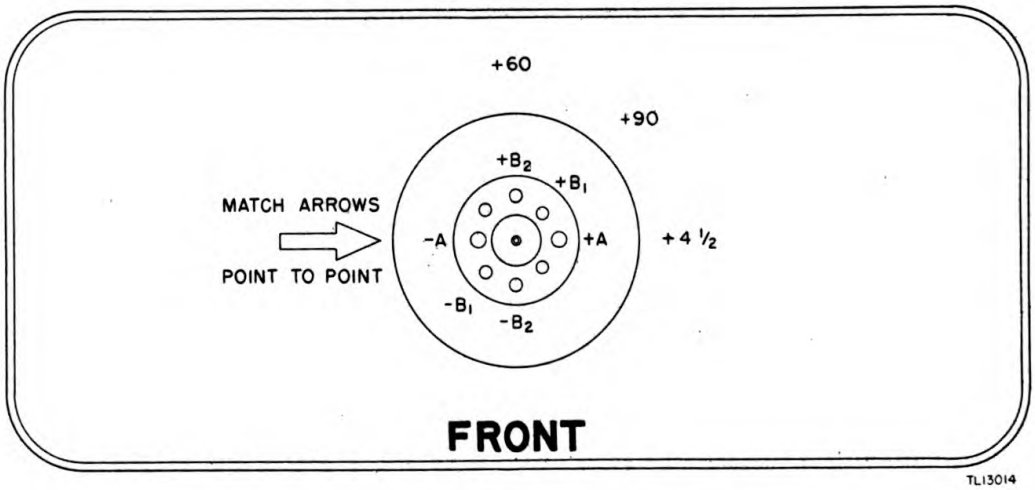


Figure 29. Battery BA-70, top view.

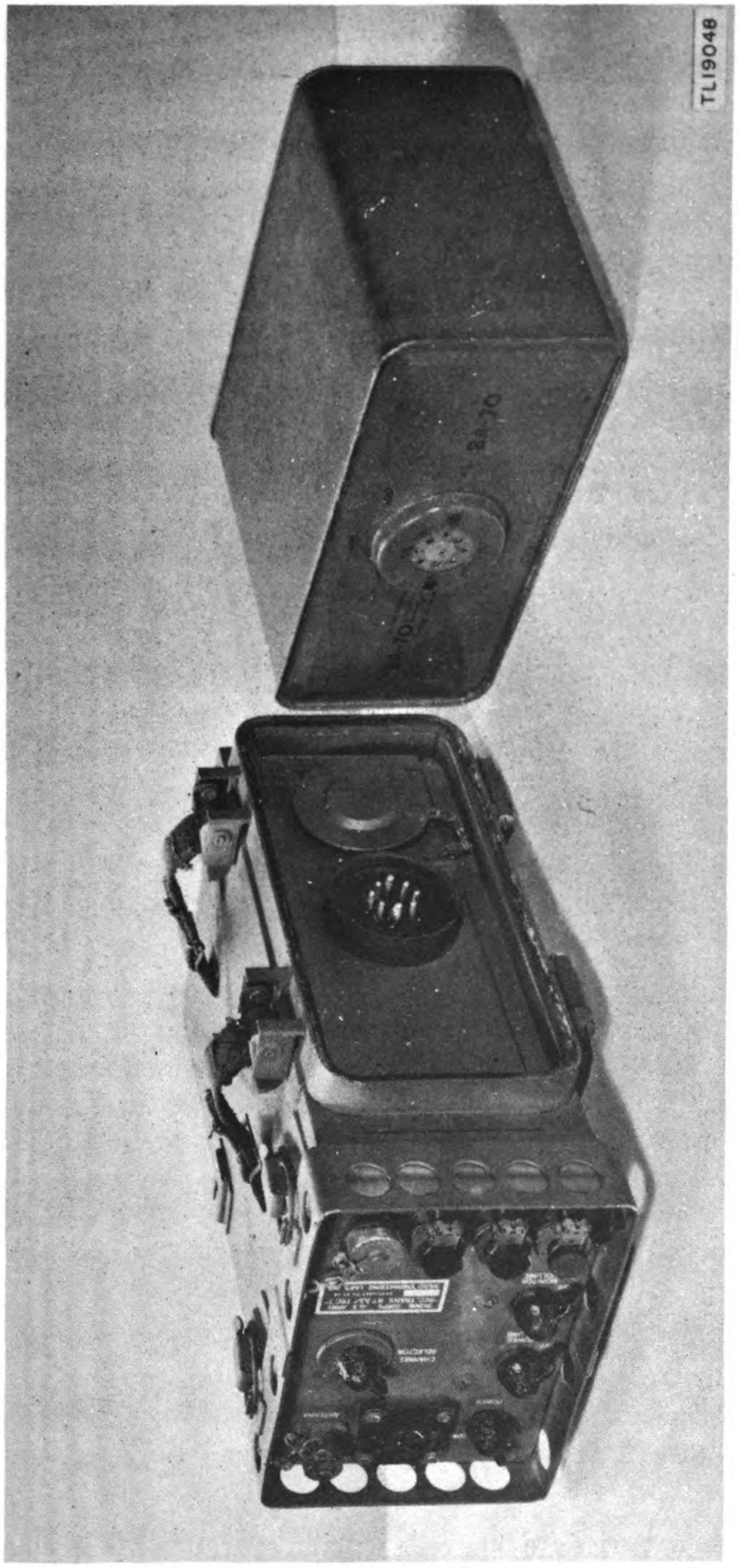


Figure 30. Radio Set AN/TRC-7, showing battery plug and receptacle.

(3) Center Microphone T-45 so that the breath shield is directly under the nose. The top of Microphone Unit MC-419 should touch the nose. Microphone T-45 is designed to work as close to the mouth as possible. If it does not remain within 3/16 inch of the mouth, bend the metal uprights of the microphone bracket inward (toward the face) until it is in the correct position.

(4) Insert Plug PL-68 into the MIC. jack on the front panel of Radio Set AN/TRC-7.

22. REMOTE CONTROL EQUIPMENT.

For installation of Control Unit RM-53 and Remote Control Unit RM-52, refer to TM 11-2632.

23. BATTERY BA-70.

a. Place the receiver-transmitter unit upside down on a smooth surface with the panel to the right and the side with the buckles attached facing the operator.

b. After removing Battery BA-70 from Bag CW-49/TRC-7 (which also contains the test cords and remote control equipment), place it upside down on the receiver-transmitter unit with the side bearing the label away from the operator. Note that the arrow next to the receptacle on the battery coincides with the arrow molded on the neoprene plug on the receiver-transmitter case. Push the battery gently onto the plug until the edge of the battery comes against the neoprene gasket on the receiver-transmitter case.

c. Open the clip-catches on the sides of the receiver-transmitter, then pass the straps over the battery from the far side and through the buckles on the side nearest the operator. Open the buckles on the web straps and pull the straps tight. Close the buckles and pull the straps outward, one after the other, steadying the battery with the other hand. This equalizes the tension on the two sides of the battery. Close the clip-catches to complete the battery installation. Place the assembled battery and receiver-transmitter unit right side up.

24. BIAS BATTERIES BA-58.

a. Remove receiver-transmitter from the case. Install five Batteries BA-58 as shown in figure 79. All positive ends of the cells face the front of the chassis. Make sure that the connector is inserted between the second and third cells from the rear.

b. These batteries are bias cells with an operating life of approximate shelf duration.

25. CRYSTAL UNITS CR-1/AR.

a. Channel No. 1. Install crystal units in sockets marked REC. CHAN. 1 and TRANS. CHAN. 1 on the panel of the receiver-transmitter. Tighten clamps securely by hand; use no tools.

b. Channel No. 2. Install crystal units in sockets marked REC. CHAN. 2 and TRANS. CHAN. 2 on the panel. Tighten clamps securely by hand; use no tools.

26. GENERATOR G-3/TRC-7 (fig. 16).

The hand generator and accessories are carried in Roll CW-50/TRC-7 (fig. 34), which is carried by Bag CW-48/TRC-7 (fig. 32). To mount the legs of the generator, proceed as follows:

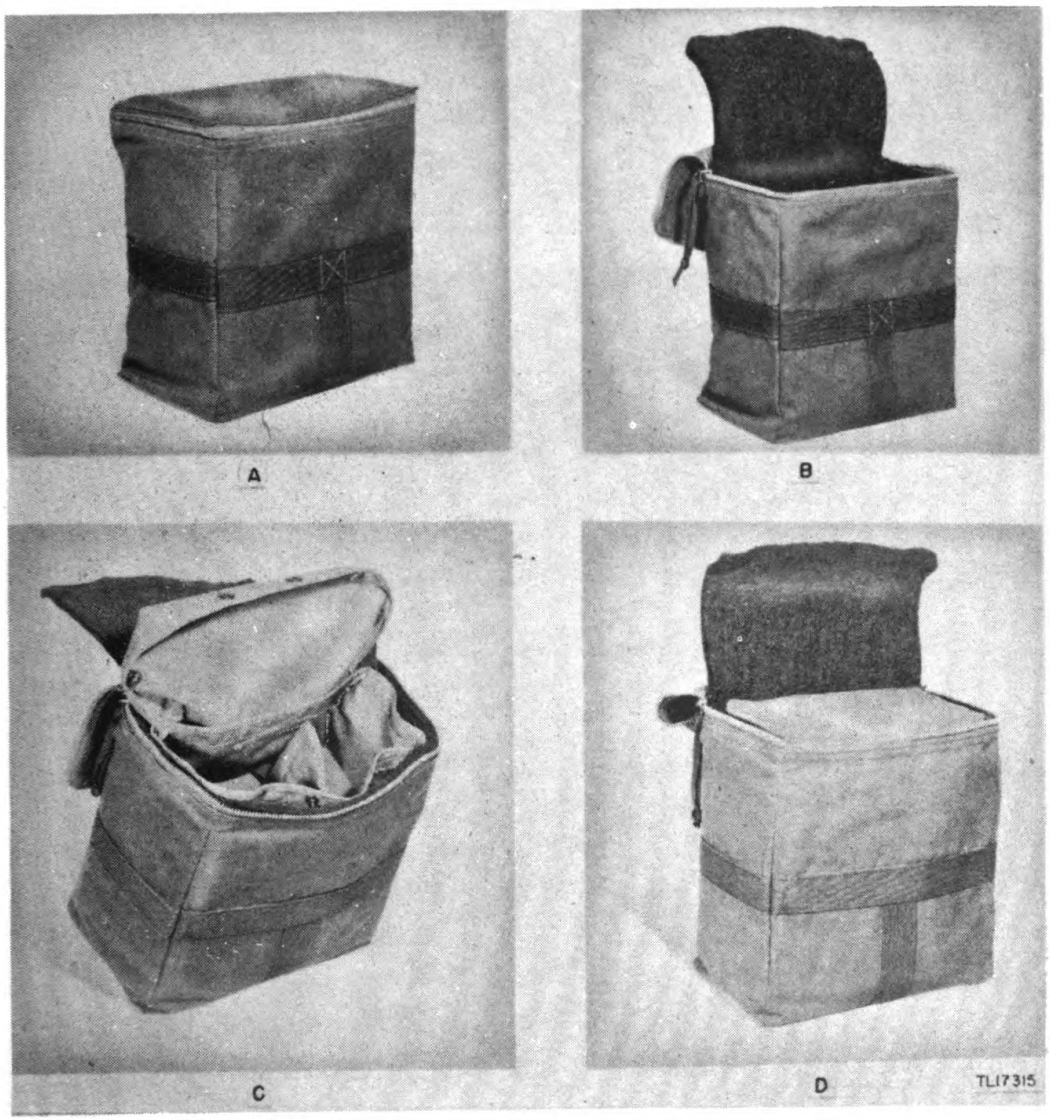


Figure 31. Bag CW-47/TRC-7.

a. Insert two Legs LG-3-B upward through the metal loops on the front of the generator and under the retaining springs.

b. Rest the generator on the two legs and slip the bottom of the attachment of Leg LG-2-B into its retainer. Drop the metal loop over the top of the attachment on the back of the generator. Lift up the seat until the lock catches to provide a secure rest.

c. Unscrew the waterseals, then insert two Cranks GC-7-( ) into the sockets on the sides of the generator. The long shafts of the cranks should be at an angle of 180° to each other.

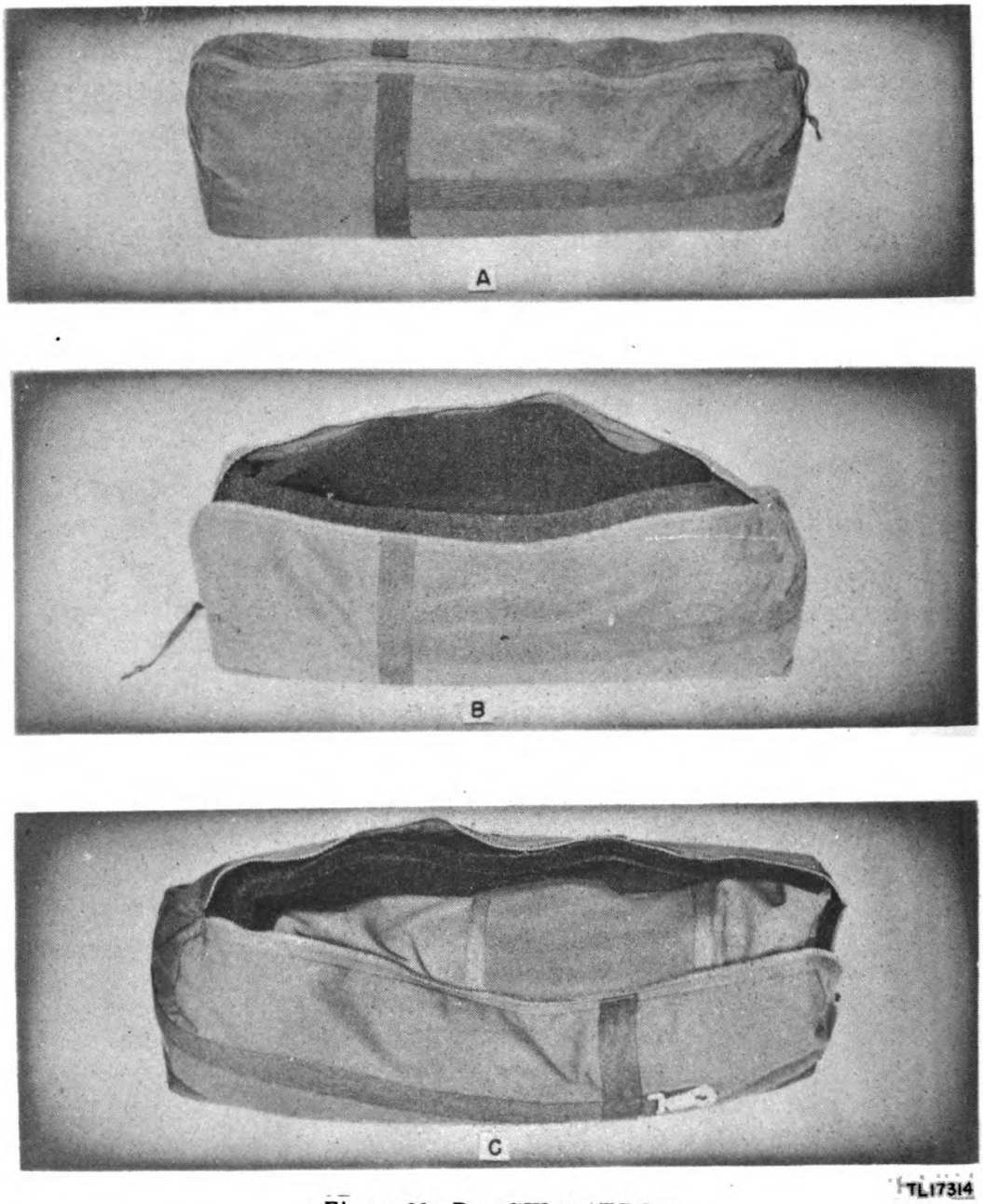


Figure 32. Bag CW-48/TRC-7.

Figure 33. Bag CW-49/TRC-7.

d. Unscrew the waterseal on the bottom of the generator; let it hang. Insert Cord CX-220/TRC-7.

e. Unscrew the waterseal, then insert the plug of Cord CX-220/TRC-7 into the GENERATOR receptacle on the receiver-transmitter panel. Generator G-3/TRC-7 is now ready for operation.

27. REPACKING INFORMATION.

When it is necessary to move the set, repack the components in the bags from which they were unpacked. The bags and their contents are listed below:

a. Bag CW-47/TRC-7. There are two Bags CW-47/TRC-7 (fig. 31-A and -B) with this equipment. Each carries Bag CW-49/TRC-7 and its contents (fig. 31-C and -D).

b. Bag CW-48/TRC-7. There are two Bags CW-48/TRC-7 (fig. 32-A and -B) with this equipment. Each carries Roll CW-50/TRC-7 and its contents (fig. 32-C).

c. Bag CW-49/TRC-7. Two of these bags (fig. 33) are used: one for the receiver-transmitter and accessories, the other for Battery BA-70 and the remote control equipment.

Bag 1	Bag 2
Receiver-Transmitter RT-53/TRC-7	Battery BA-70
Antenna AT-59-TRC-7	Control Unit RM-53
Microphone T-45	Remote Control Unit RM-52
Antenna Base AB-37/TRC-7	
Handset H-23( )/U	
Case CY-275/TRC-7	
Phantom Antenna TS-281/TRC-1	
Cord CD-318-A	
Cord CX-240/U	
Cord CD-604	
Headset HS-30-( )	
Cord CG-127/U	
Tube Puller TL-310/U	
Cord CD-307-A	

d. Roll CW-50/TRC-7 (fig. 35-A and -C). Two of these rolls are used: one for the antenna assembly, the other for the generator and accessories.

Roll 1 (fig. 35)	Roll 2 (fig. 34)
Antenna Assembly AS-110/TRC-7 (Check paragraph 5 for components.)	Generator G-3/TRC-7 Leg LG-2-B Leg LG-3-B Cord CX-220/TRC-7 Crank GC-7-( ) 1 set brushes (spare)

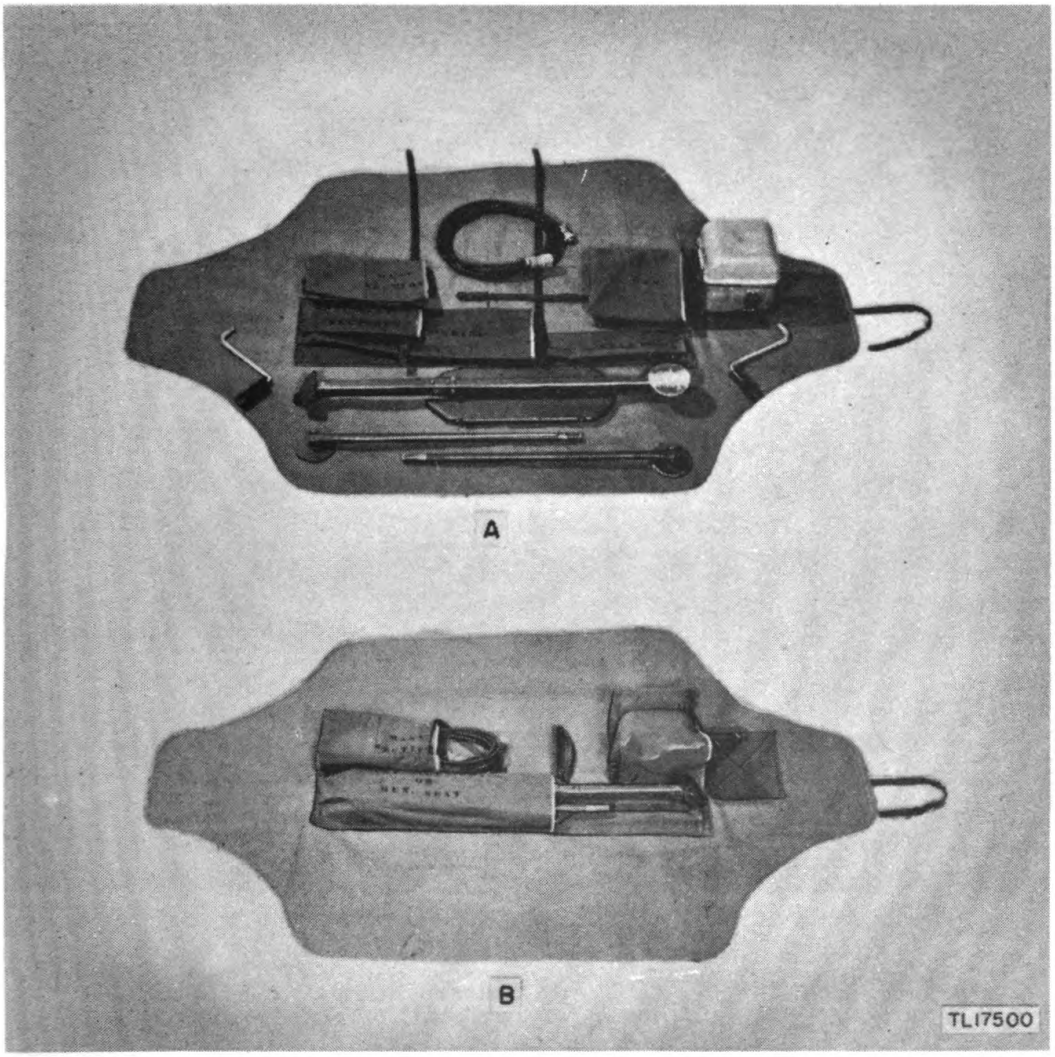


Figure 34. Roll CW-50/TRC-7, with Generator G-3/TRC-7 and accessories.

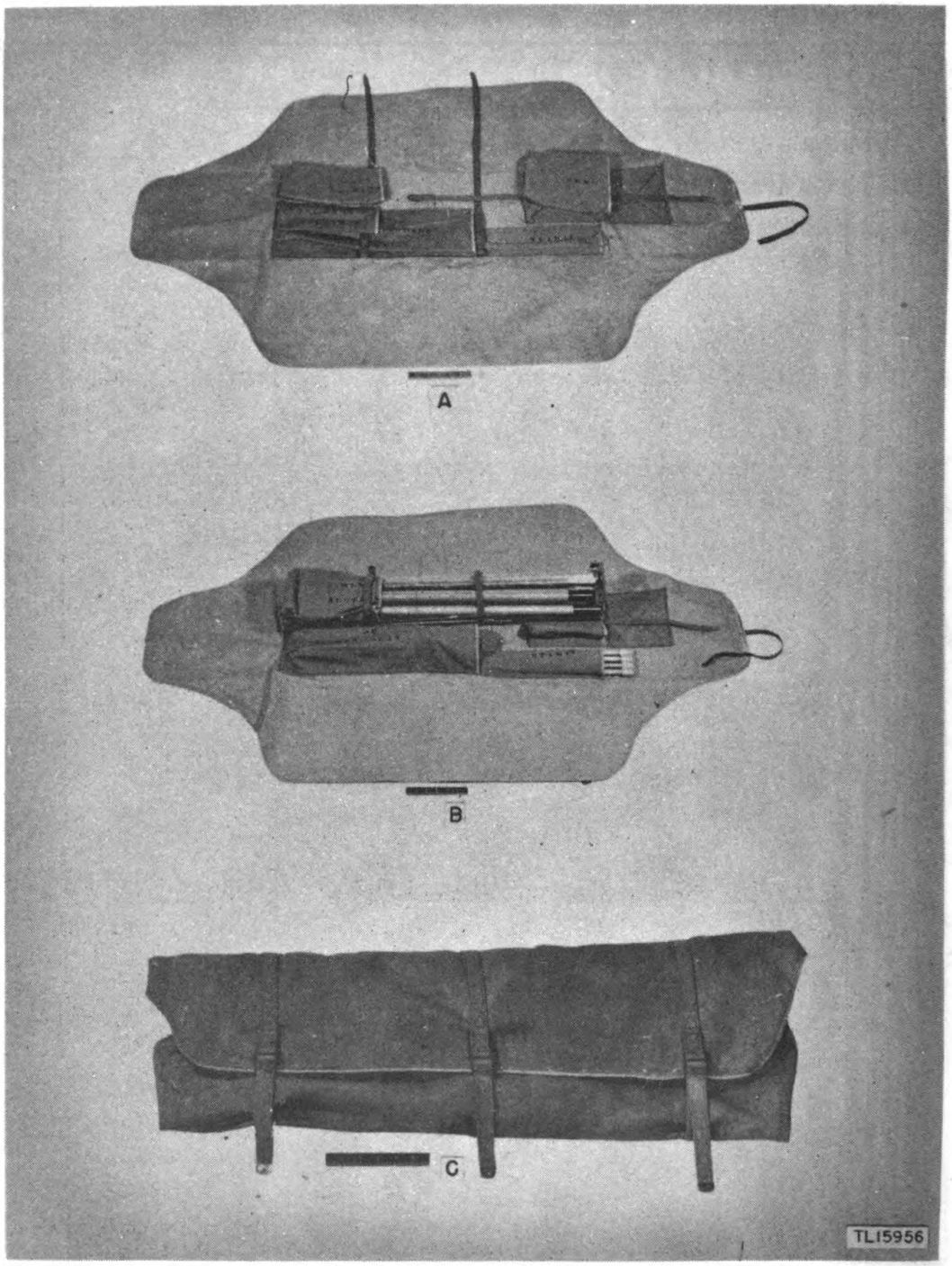


Figure 35. Roll CW-50/TRC-7, with Antenna Assembly AS-110/TRC-7.

PART TWO

OPERATING INSTRUCTIONS

NOTE: For information on destroying the equipment to prevent enemy use, refer to the destruction notice at the front of the manual.

SECTION III

CONTROLS AND THEIR USE

28. RECEIVER-TRANSMITTER PANEL CONTROLS.

The functions of the various controls, jacks, and terminals which are mounted on the front panel of Receiver-Transmitter RT-53/TRC-7 (fig. 36) are briefly described below.

a. POWER VOLUME Control (fig. 37). The POWER VOLUME control knob controls the main power switch and varies the volume of the receiver. The volume control circuit is so designed that this control has no effect on the transmitter after the switch is tripped.

b. POWER Switch (fig. 38). A selection of battery power, generator, or combination of battery and generator may be made with the POWER switch. With the switch at BAT. the battery supplies both the receiver and the transmitter. With the switch at GEN., the generator supplies both the receiver and the transmitter. With the switch at COMB., the battery supplies the receiver and the generator supplies the transmitter.

c. CHANNEL SELECTOR Switch (fig. 39). The CHANNEL SELECTOR switch has two positions, giving a selection of two preset channels in the 100- to 156-mc range.

d. MONITOR VOLUME Control (fig. 40). The MONITOR VOLUME control is used with Radio Sets AN/PPN-1 and AN/PPN-2.

e. MIC. Jack. The microphone or MIC. jack provides a connection to the microphone and to the receive-transmit switch.

f. PHONES Jack. The PHONES jack provides a connection for the headset or the receiver of the handset.

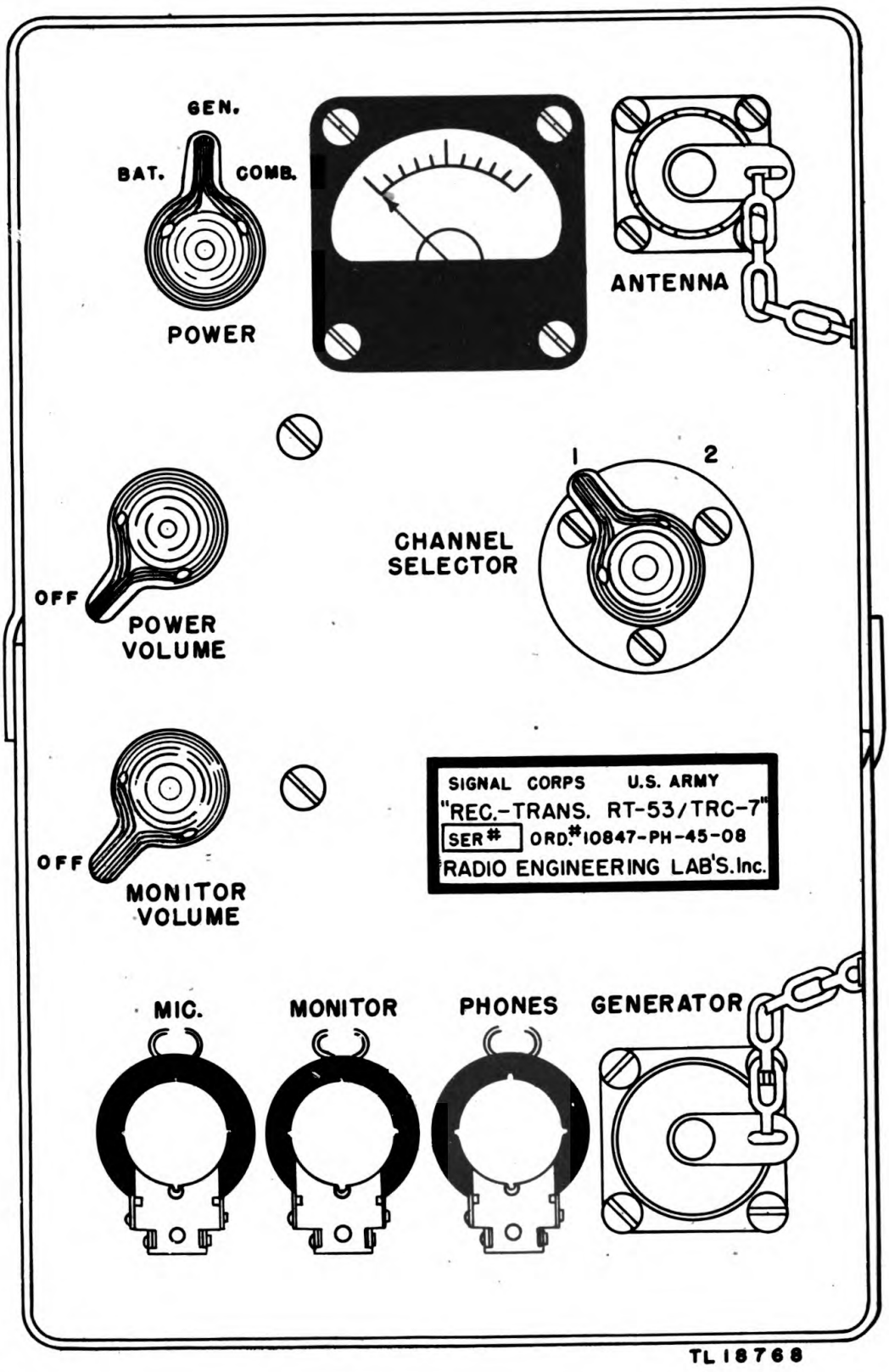


Figure 36. Radio Set AN/TRC-7, front panel.

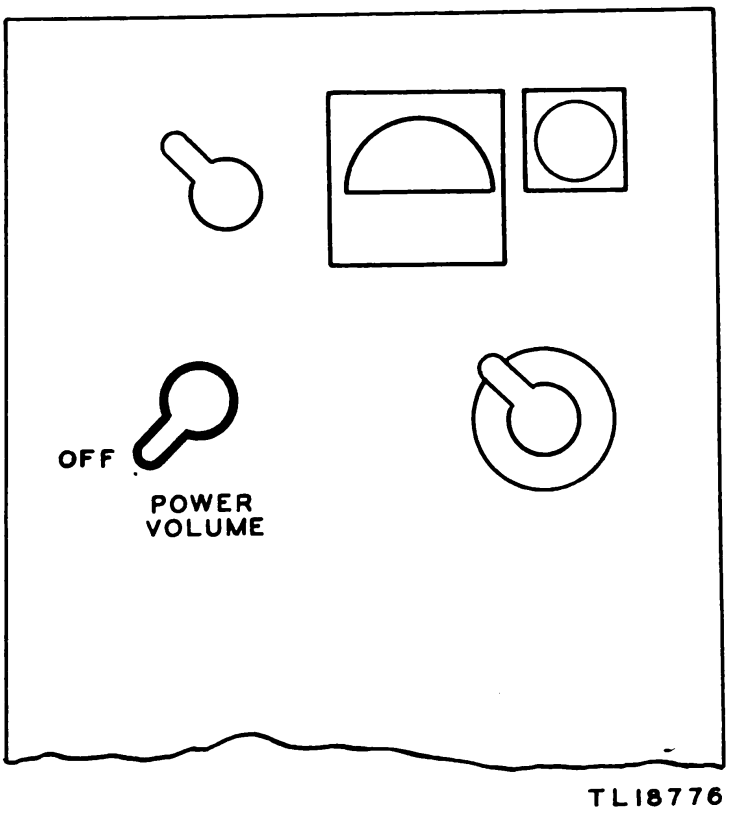


Figure 37. POWER VOLUME control.

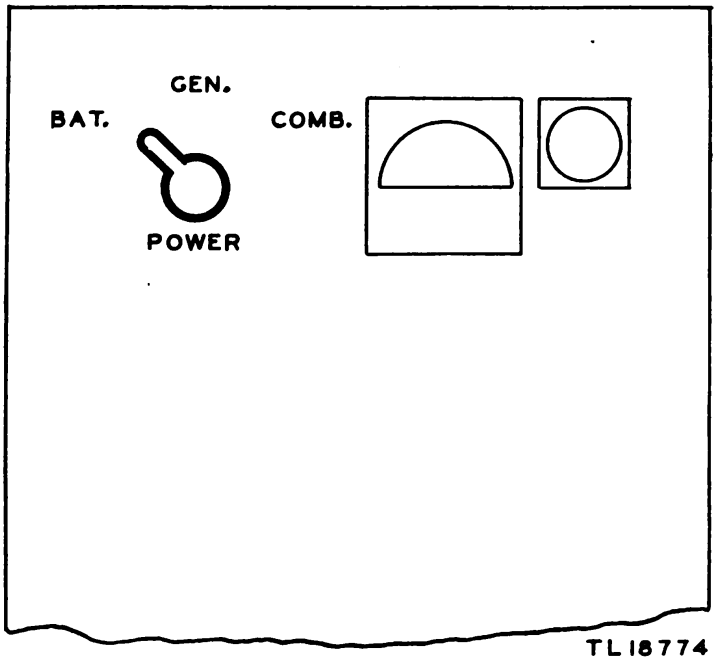


Figure 38. POWER switch.

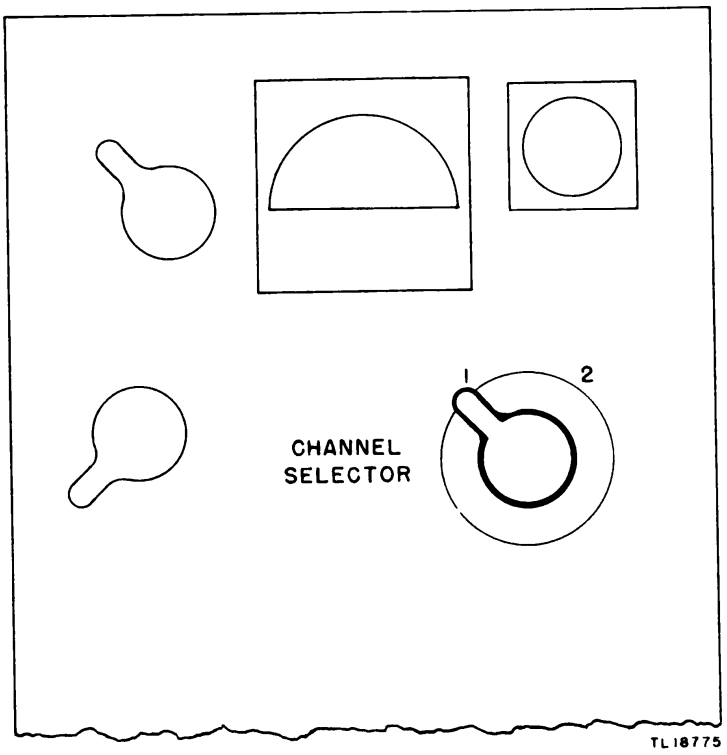


Figure 39. CHANNEL SELECTOR switch.

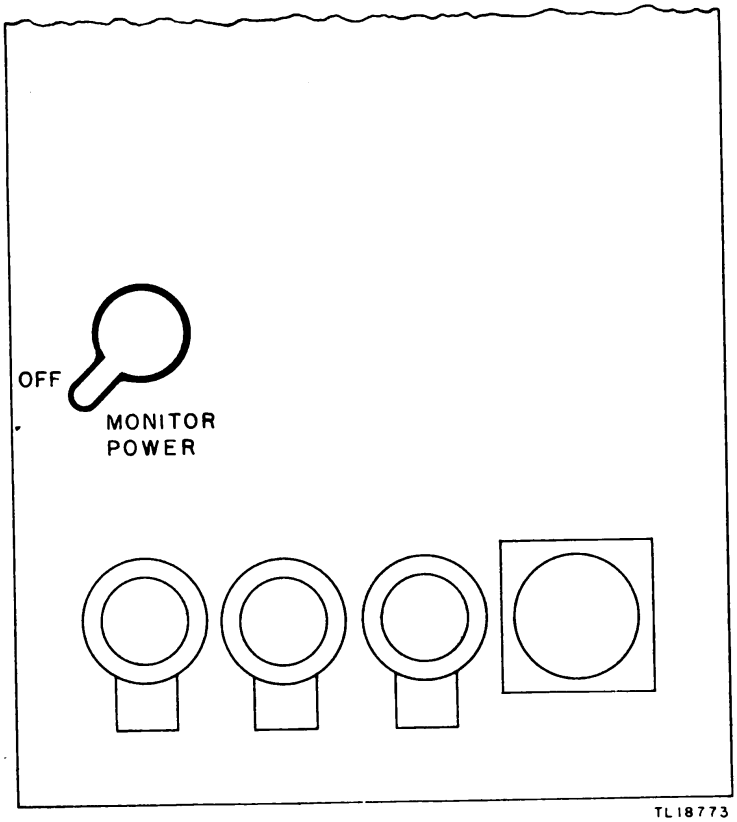


Figure 40. MONITOR VOLUME control.

g. MONITOR Jack. The MONITOR jack is used with Radio Sets AN/PPN-1 and AN/PPN-2.

h. GENERATOR Receptacle. Connection from hand generator cable Cord CX-220/TRC-7 is made here. The plug is screwed into the receptacle and tightened securely.

i. ANTENNA Receptacle. Connection is made from Antenna AT-59/TRC-7 or Antenna Assembly AS-110/TRC-7 by plugging the antenna coaxial connector into the receptacle (fig. 41) and turning the threaded portion of the connector until it is secure.

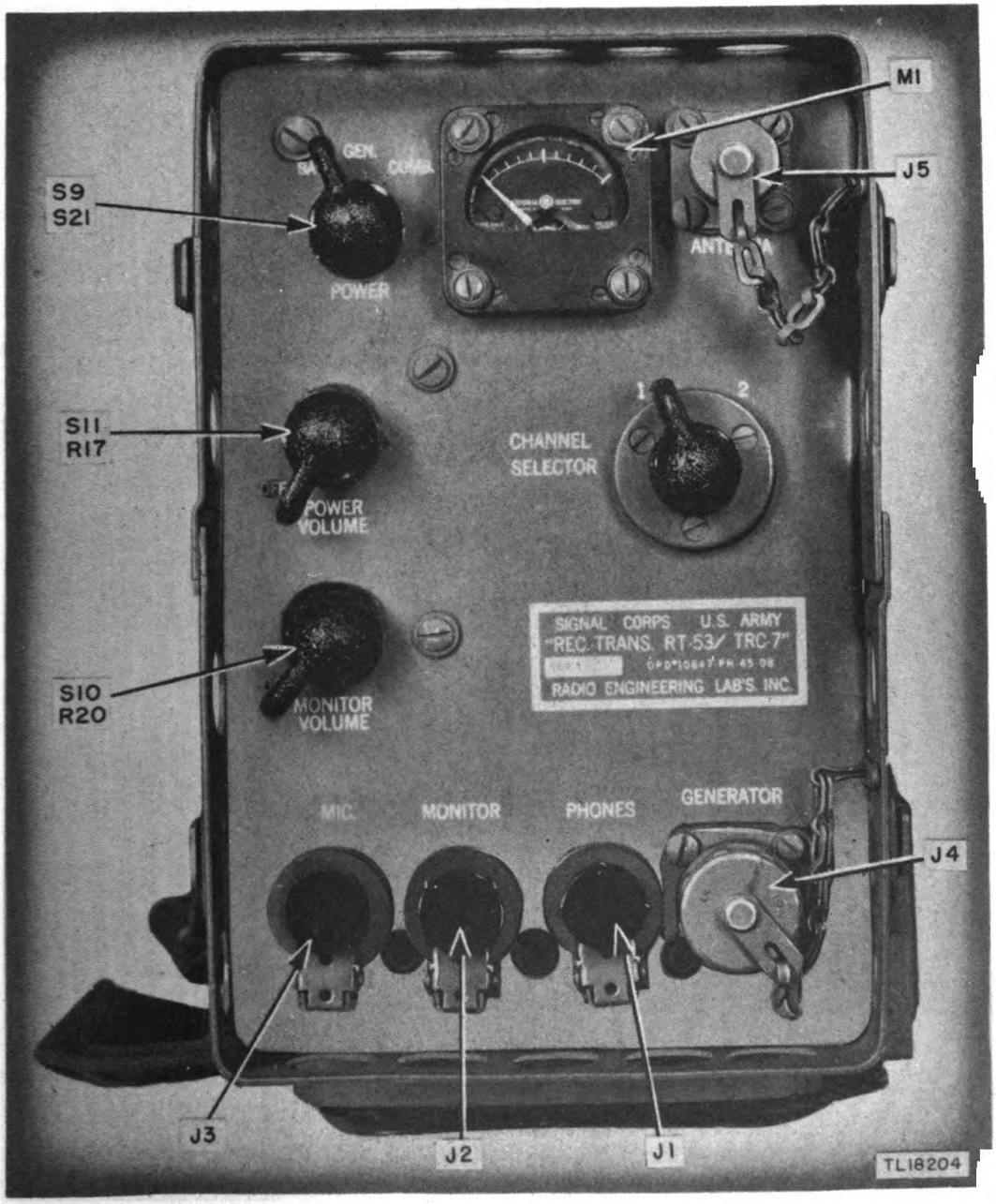


Figure 41. Receiver-Transmitter RT-53/TRC-7, front panel, showing reference symbols.

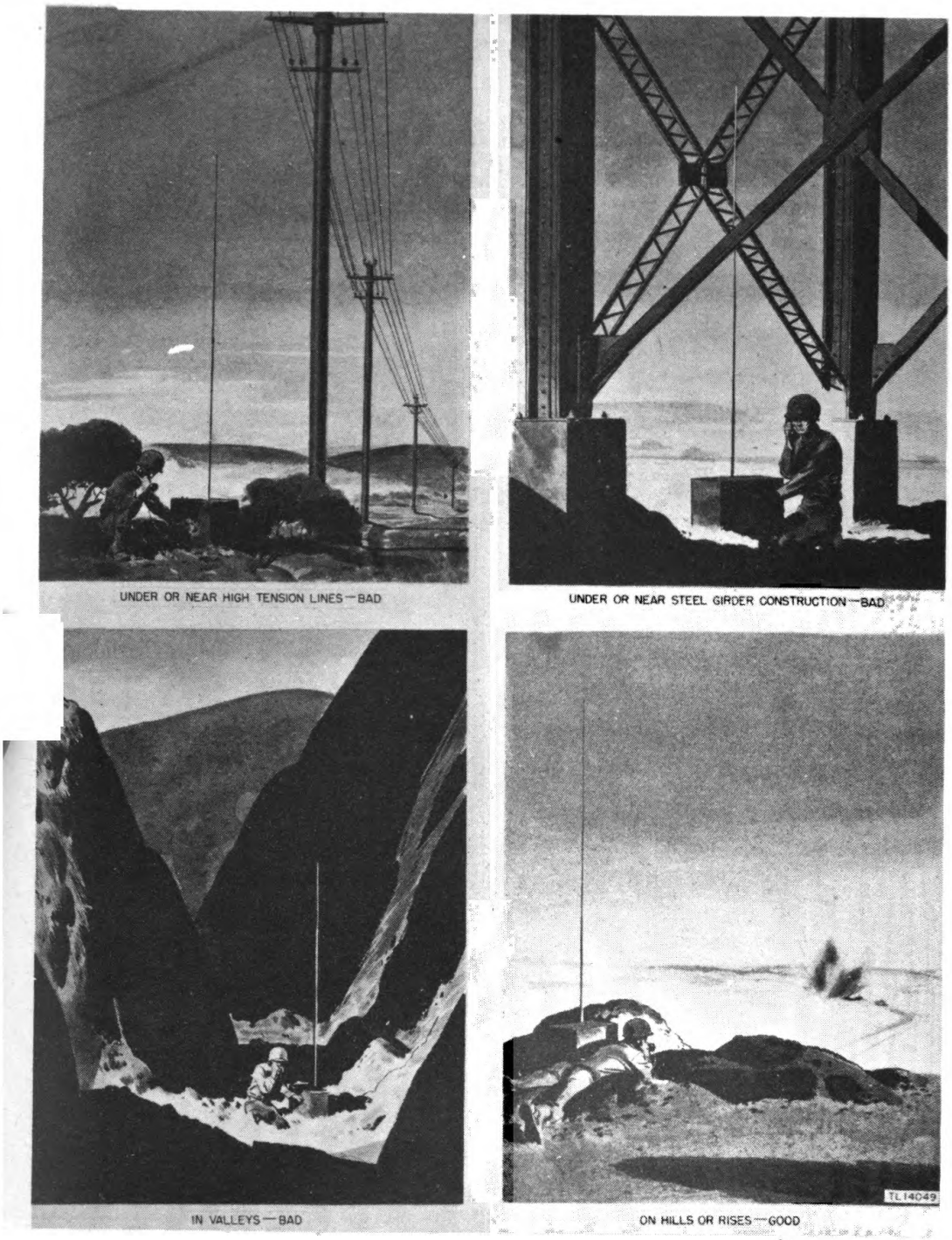


Figure 42. Siting.

SECTION IV

OPERATION

29. SITING.

Best communication results when Radio Set AN/TRC-7 is operated in a high open location with no hills or large structures to interfere with communication. When possible, avoid operation under bridges, in gulleys, and in dense woods. Be sure the antenna is always in a vertical position. Do not allow the antenna to touch branches or other objects when transmitting or receiving. Because this set operates on very high frequencies, moving the set a few inches may provide good communication where none existed before.

30. STARTING PROCEDURE.

a. Select desired channel by means of the CHANNEL SELECTOR knob on the front panel. See paragraphs 116 and 117 for presetting instructions.

b. To adjust Antenna AT-59/TRC-7, use the calibration chart on top of the cabinet (fig. 43). Loosen the antenna locknut one-quarter turn, place the locknut firmly against the front edge of the cabinet, and slide the movable rod in or out until it reads the desired frequency on the chart. When antenna is adjusted, hand-tighten the locknut securely.

Do not use any tools.

c. Set the POWER switch to BAT. position.

d. Turn on the set by rotating the POWER VOLUME control in a clockwise direction (fig. 37). A click indicates that the set has been turned on. A hissing sound is heard after a moment, usually indicating that the receiver is operating properly.

e. Allow the set to warm up for 30 seconds before proceeding.

31. PRECISE OPERATING INSTRUCTIONS.

a. Turn the POWER VOLUME knob in a clockwise direction until the desired output level is reached.

b. To transmit, press the push-to-talk switch of Microphone T-45. This turns on transmitter power and turns the receiver off. Wait about 1 second before beginning to talk into the microphone. Release the microphone switch as soon as the transmission is completed. This places the set in the receiving position again.

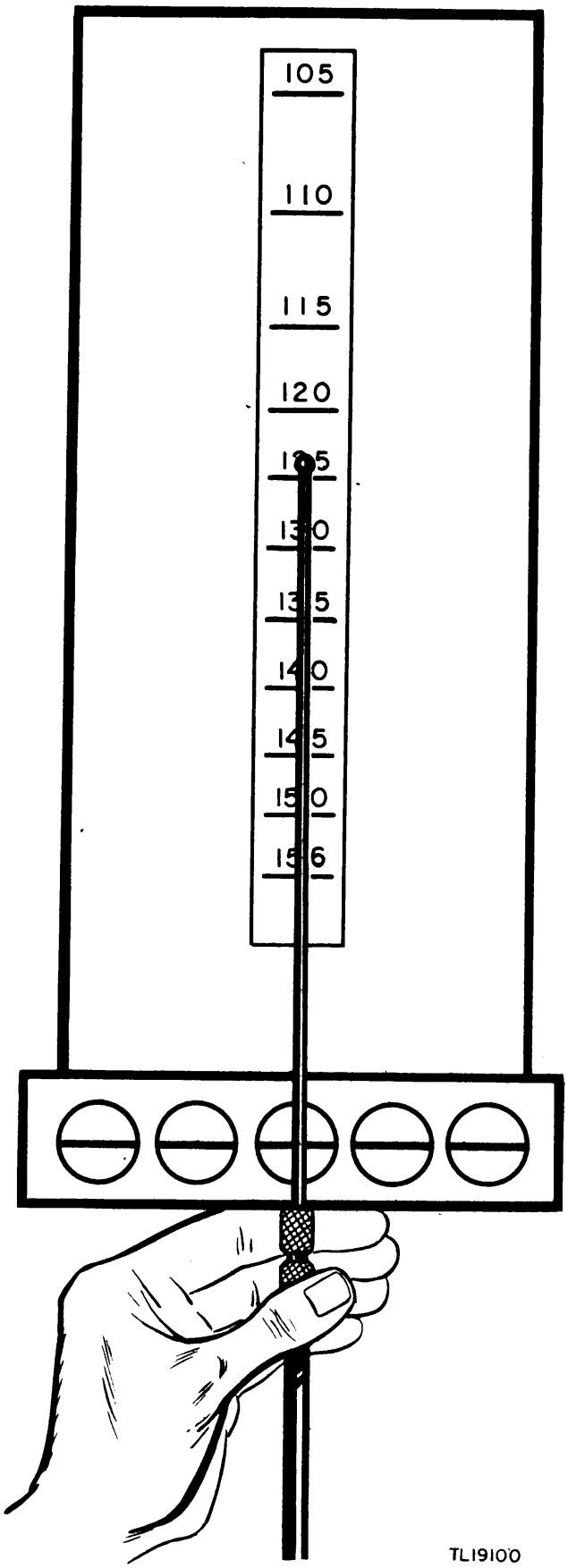


Figure 43. Antenna AT-59/TRC-7, adjustment for proper frequency.

c. For operation with the hand generator as the only power supply, the POWER switch knob is set to the GEN. position. In this case, the hand generator must be cranked during the entire period of transmission and reception.

d. In some cases it may be necessary to **stand by,** or listen for signals for long periods of time. To avoid turning the hand generator for these long periods, the combination power supply arrangement may be used by setting the POWER switch to COMB. In this position, the receiver obtains power from the battery, and the transmitter from the hand generator. It is necessary then to operate the hand generator only while transmitting. The hand generator should be started, however, shortly before the microphone switch is operated so that power will be available to the transmitter when it is needed. Never use the battery for transmitting when it can be avoided, as the power consumed by the transmitter is much greater than that required by the receiver.

e. Remote Control Unit RM-52 and Control Unit RM-53 with the necessary cordage are furnished to operate the equipment from a remote position. This equipment provides for operation of Radio Set AN/TRC7- on a preset frequency with a preset adjustment of the volume contro[1] for distances up to ½ mile. See TM 11-2632.

32. STOPPING PROCEDURE.

a. Transmitter. The receive-transmit switch located in the handle of Handset H-23-( )/U controls transmitting. Release of this switch takes the set off the air.

b. Receiver. To turn off the receiver, rotate the POWER VOLUME control counterclockwise to OFF.

SECTION V

EQUIPMENT PERFORMANCE CHECK LIST

33. PURPOSE AND USE OF CHECK LIST.

a. General. The equipment performance check list (par. 34) will help the operator to determine whether Radio Set AN/TRC-7 is operating properly. The check list gives the item to be checked, the condition under which the item is checked, the normal indications and tolerances of correct operation, and the corrective measures that the operator can take. Items 1 to 5 are checked before starting, items 6 and 7 when start-

ing, items 8 to 10 during operation, and item 11 when stopping. Items 6 to 10 on this list should be checked at least once during a normal operating period or at least four times a day during continuous operation.

b. Action or Condition. For some items the information given in the action or condition column consists of the settings of various switches and controls under which the item is to be checked. For other items it represents an action that must be taken to check the normal indication given in the normal indication column.

c. Normal Indications. The normal indications listed include the visible and audible signs the operator will perceive when he checks the items. In the case of meter readings, the allowable tolerances of readings are given. When a meter reads as specified, operation can be considered satisfactory. The fact that it does not, is a sign of impending trouble. If the indications are not normal, apply the recommended corrective measures.

d. Corrective Measures. The corrective measures listed are those that the operator can make without turning the equipment in for repairs. Reference to part five in the table indicates that the correction of the trouble cannot be effected during operation and that trouble shooting by an experienced repairman is called for. If the set is completely inoperative or if the recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that communication be maintained and if the set is not completely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

e. Items 1 to 7. Items 1 to 7 should be checked each time the equipment is put into operation.

f. Item 8. Item 8 shows the correct meter reading on the panel when the set is properly tuned and in operation.

g. Items 8 to 10. These items represent general operating characteristics of the set. The operator must become familiar with the characteristics of the set during normal operation; he must use that knowledge as a basis for recognizing changes in audible and visible indications when the set is not operating properly.

h. Item 11. Item 11 is checked whenever the station is taken out of operation. Any abnormal indications at this time are probably caused by trouble in the set and should be corrected before the next expected period of operation.

34. EQUIPMENT PERFORMANCE CHECK LIST. Radio Set AN/TRC-7.

	Item No.	*Item*	*Action or condition*	*Normal indications*	*Corrective measures*
PREPARATORY	1	Handset or headset and microphone.	Plugged into respective jacks.		
	2	CHANNEL SELECTOR switch.	Set to proper channel.		
	3	Antenna.	Desired antenna connected to set.		
	4	Generator G-3/TRC-7, Battery BA-70, or both.	Desired power source connected.		
	5	POWER control.	Set to proper power source.		
START	6	POWER VOLUME control.	Turn on.	Rushing noise heard in headset.	Preset channel. See par. 117, part five.
	7	Push-to-talk switch.	Press.	Rushing noise stops.	See par. 101, part five.
EQUIPMENT PERFORMANCE	8	Meter switch.	On position 1.	Reads one-half scale or more.	Replace Battery BA-70.
	9	Sidetone.	Talk into microphone.	Sidetone in headset.	Sidetone resistor R49 or capacitor C25 open; tube V11 defective; replace.
	10	CHANNEL switch.	Switch to other channel; release push-to-talk switch.	Noise in headset.	See par. 101, part five.
			Switch will not turn.	Switch turns.	Switch gears damaged. See par. 101, part five.

34. EQUIPMENT PERFORMANCE CHECK LIST (contd). Radio Set AN/TRC-7.

	Item No.	*Item*	*Action or condition*	*Normal indications*	*Corrective measures*
STOP	11	POWER VOLUME control.	Turn OFF.	No signal heard.	

PART THREE

PREVENTIVE MAINTENANCE

SECTION VI

PREVENTIVE MAINTENANCE TECHNIQUES

35. MEANING OF PREVENTIVE MAINTENANCE.

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major break-downs and unwanted interruptions in service, and to keep the equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to **prevent** break-downs and, therefore, the need for repair. On the other hand, the prime function of trouble shooting and repair is to locate and correct **existing** defects. The importance of preventive maintenance cannot be overemphasized. An entire system of radio communication depends upon each set's being **on the air** when it is needed and upon its **operating efficiently.** It is therefore vitally important that radio operators and repairmen maintain their radio sets properly. See TB SIG 123, Preventive Maintenance Practices for Ground Signal Equipment.

NOTE: The operation in sections VI and VII are first and second echelon (organization operators and repairmen) maintenance. Some operations in section VII are higher echelon maintenance.

36. DESCRIPTION OF PREVENTIVE MAINTENANCE TECHNIQUES.

a. General. Most of the electrical parts used in Radio Set AN/TRC-7 require routine preventive maintenance. Those requiring maintenance differ in the amount and kind required. Because hit-or-miss maintenance techniques cannot be applied, definite and specific instructions are needed. This section of the manual contains these specific instructions and serves as a guide for personnel assigned to perform the six basic maintenance operations namely: Feel, Inspect, Tighten, Clean,

Adjust, and Lubricate. Throughout this manual the lettering system for the six operations will be as follows:

F—Feel.
I—Inspect.
T—Tighten.
C—Clean.
A—Adjust.
L—Lubricate.

The first two operations establish the need for the other four. The selection of operations is based on a general knowledge of field needs. For example, the dust encountered on dirt roads during cross-country travel filters into the equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary performance of tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down when the equipment is most needed.

b. Feel. The feel operation is used most often to check rotating machinery, such as blower motors, drive motors, etc., and to determine if electrical connections, bushings, etc., are overheated. Feeling indicates the need for lubrication or the existence of similar types of defects requiring correction. The maintenance man must become familiar with the normal operating temperatures of motors, etc., in order to recognize signs of overheating.

> **NOTE:** It is important that the feel operation be performed as soon as possible after shut-down and always before any other maintenance is done.

c. Inspect. Inspection is the most important operation in the preventive maintenance program. A careless observer will overlook evidences of minor trouble. Although these defects may not interfere with performance of the equipment, valuable time and effort can be saved if they are corrected **before** they lead to major break-downs. Make every effort to become thoroughly familiar with indications of **normal** functioning, to be able to recognize the signs of a defective set. Inspection consists of carefully observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(1) Overheating, as indicated by discoloration, blistering, or bulging of the parts or surface of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

(2) Placement, by observing that all leads and cabling are in their original positions.

(3) Cleanliness, by carefully examining all recesses in the units for accumulation of dust, especially between connecting terminals. Parts, connections, and joints should be free of dust, corrosion, and other foreign matter. In tropical and high-humidity locations, look for fungus growth and mildew.

(4) Tightness, by testing any connection or mounting which appears to be loose.

d. Tighten, Clean, and Adjust. These operations are self-explanatory. Specific procedures to be followed in performing them are given wherever necessary throughout part three.

> **CAUTION:** Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

e. Lubricate. Lubrication refers to the application of grease or oil to the bearings of motors or other rotating shafts. It may also mean the application of a light oil to door hinges or other sliding surfaces on the equipment.

37. VACUUM TUBES.

a. Inspect (I).

(1) Inspect tube envelopes for accumulation of dirt and for corrosion.

(2) Inspect the firmness of tubes in their sockets. Make the inspection by pressing the tubes down in the sockets and testing them in that position, and **not** by partially withdrawing the tubes and jiggling them from side to side. Movement of a tube tends to weaken the pins in the base and unnecessarily spread the contacts in the socket. It is desirable to inspect the sockets of the tubes at the time the tubes are removed.

(3) When it is necessary to remove a tube from its socket, great care must be used. Never jar a warm tube. Use Tube Puller TL-310/U (par. 68).

b. Tighten (T). Tighten all loose connections to the tube sockets. If the connections are dirty or corroded, clean them before tightening.

c. Clean (C).

(1) Clean the tubes, but only if inspection shows cleaning to be necessary. Tubes operating at low voltage and not having exposed grid

caps and plate caps do not require frequent cleaning. However, do not permit dirt to accumulate on low-voltage tubes.

(2) Remove dust and dirt from the glass envelopes with a clean, lint-free, dry cloth.

(3) When tube sockets are cleaned and the contacts are accessible, fine sandpaper may be used to remove corrosion, oxidation, and dirt.

38. CAPACITORS.

a. Inspect (I).

(1) Inspect the terminals of large fixed capacitors for corrosion and loose connections. Carefully inspect the mountings to discover loose mounting screws, studs, or brackets. Examine the leads for poor insulation, for cracks, and for evidences of dry rot. Frayed strands on the insulation should be cut away. If the wire is exposed, wrap it with friction tape. The terminals of the capacitors should not be cracked or broken.

(2) Thoroughly inspect the case of each large fixed capacitor for leaks, bulges, and discoloration.

(3) Inspect the plates of variable capacitors for dirt, dust, or lint. Examine the movable set of plates for signs of damage or misalignment that would cause them to touch the fixed plates during tuning. Rotate the movable plates, using the tuning control, and thus check for proper operation of the capacitor.

b. Tighten (T). Tighten loose terminals, mountings, and connections on the capacitors, whenever they are observed. Do not break the bushing or damage the gasket.

c. Clean (C).

(1) Clean the case of fixed capacitors, the insulating bushings, and dirty or corroded connections. The capacitor cases and bushings can usually be cleaned with a dry cloth, but if the deposit of dirt is hard to remove, moisten the cloth in a dry-cleaning solvent.

(2) Clean the plates of variable capacitors with a small brush, removing all dust and lint.

d. Lubricate (L). The bearings of variable capacitors are usually of the ball-bearing type, lubricated and sealed at the factory. These bearings will **not** need relubrication during the life of the equipment.

39. RESISTORS.

a. General. Various types of resistors are used in Radio Set AN/

TRC-7. The connections to the various resistors are either of the pigtail or solder-lug type.

b. Inspect (I). Inspect the coating of the vitreous-enameled resistors for signs of cracks and chipping, especially at the ends. Examine the bodies of all types of resistors for blistering, discoloration, and other indications of overheating. Inspect leads and all other connections for corrosion, dirt, dust, looseness, and broken strands in the connecting wires. Check the security of all mountings. Do not attempt to move resistors with pigtail connections, because there is danger of breaking the connections at the point where they enter the body of the resistor. Such defects cannot be repaired.

c. Tighten (T). Tighten resistor connections and mountings whenever they are loose. If a resistor is allowed to remain loose, vibration may break the connection or damage the body.

d. Clean (C).

(1) Clean all carbon resistors with a small brush.

(2) The vitreous-enameled resistors must be kept clean to avoid leakage between the terminals. Ordinarily, they will be wiped with a dry cloth. However, if the dirt deposit is unusually hard to remove, use a dry-cleaning solvent.

(3) Resistors with discolored bodies cannot be cleaned. Discoloration indicates that there has been overloading and overheating at some time prior to the inspection. The discoloration is probably due to circuit trouble which requires analysis and correction. Trouble-shooting procedures are described in part five.

40. BUSHINGS AND INSULATORS.

a. Description.

(1) Insulated bushings are used in the high-voltage and r-f circuits. They are constructed of ceramic material with a glazed surface. An insulator is no better than its surface, so deposits of foreign substances on the surface will materially reduce the insulation value of the bushing. Therefore, it is very important that all bushings used in the high-voltage circuits be inspected frequently.

(2) Insulating bushings are used as supports for high-voltage terminals of capacitors and for tank coils. They are used as mountings for resistors in high-voltage circuits and as supports for panels which mount other parts. The condition of insulator bushings that are used solely as

panel supports is not too critical, but the condition of bushings used as high-voltage insulators is extremely important.

b. Inspect (I). Inspect the physical condition of the insulator bushings. They should be clean without cracks or chips. It is possible for a highly glazed insulator to develop fine-line surface cracks where moisture and dust will accumulate and eventually form a leakage for a high-voltage flash-over. Consequently, the surface of the bushings must be inspected to detect such cracks. As a rule, the bushings are held in position with nuts screwed onto the threaded conductors. These can be replaced very easily. If replacement is not possible because of a shortage of supplies, frequently clean the defective bushing thoroughly with dry-cleaning solvent. Sometimes it is difficult to see dust on a glazed surface. A satisfactory check can be made by sliding a clean finger across the bushing.

c. Tighten (T). The procedure to be used in tightening loose bushings is self-evident. However, one precaution must be observed. **Avoid forcing the nuts or screws down too tight.** If excessive pressure is exerted on the bushings, damage or breakage is almost certain. Sometimes the threads on bushing stud bolts may be found stripped so they cannot be tightened. The only solution is replacement of the entire bushing.

d. Clean (C). Insulating bushings are easily cleaned. Never use abrasive materials because the glazed finish will be destroyed, thus permitting moisture to be absorbed. A clean cloth is usually satisfactory. If deposits of grime or dirt on the surface of a bushing are hard to remove, use dry-cleaning solvent. After the surface has been cleaned with a solvent, it should be carefully polished with a dry cloth. Otherwise, a thin film of the solvent will be left which may impair the effectiveness of the bushing as a high-voltage insulator.

41. RELAY.

Relay K1 is considered normal if: the exterior is free from dirt or dust; the contacts are not burned, pitted, or corroded; the contacts are lined up and correctly spaced; the moving parts travel freely and function in a satisfactory manner; the connections to the relay are tight; the wire insulation is not frayed or torn; the relay assembly is securely mounted; the field coil shows no signs of overheating.

a. Inspect (I).

(1) Inspect the relay to detect defects. The contacts may be examined with the aid of a flashlight and mirror.

(2) The mechanical action of the relay should be checked to make certain that the moving and stationary contacts make positive contact and are directly in line with each other when they come together.

b. Tighten (T). Tighten all loose connections and mounting screws, but do not apply enough force to damage the screw or to break the parts it holds.

c. Clean (C).

(1) Relay Exterior. Brush the exterior of the relay with a soft brush. If it is very dirty, clean it with a brush dipped in dry-cleaning solvent. If loose connections are found, they should be inspected. If they are dirty or corroded, remove and clean them and replace carefully.

(2) Relay Contacts. Hard-alloy (palladium) contacts are cleaned by drawing a strip of thin clean cloth or paper between them while holding them together. In some cases, it may be necessary to moisten the cloth with dry-cleaning solvent. Use a dry cloth or paper strip for polishing. Corroded, burned, or pitted contacts must be cleaned with the point file or burnishing tool and crocus cloth.

42. SWITCHES.

a. Inspect (I).

(1) Inspect the mechanical action of each switch and, while so doing, look for signs of dirt or corrosion on all exposed elements. In some cases, it will be necessary to examine the elements of the switch visually; in others, check the action of the switch by flipping the control knob.

(2) Examine ganged switches S1, S2, S3, S4, S5, S6, S12, S13, S14, S15, S16, S17, S18, S19, and S22 to see if they are properly lubricated and if the contacts are clean. Inspection is visual. Do not pry the leaves of the switches apart. The rotary members should make good contact with the stationary members; and as the former slides into the latter, a spreading of the stationary contact leaves should be visible. Switch action should be free. Wiping action of contacts usually removes any dirt at the point of contact.

b. Clean (C). Clean the exterior surfaces of switches with a stiff brush moistened with dry-cleaning solvent.

c. Lubricate (L). If necessary, lubricate bearings or detent mechanism with Oil Lubricating, Preservative, Special, U. S. Army Spec. No. 2-120.

CAUTION: Apply **sparingly** with a pipe cleaner or small brush. Wipe off the excess with a cloth. Oil forms an insulating film; keep it off contacts.

43. COILS.

a. Inspect (I). Inspect coils L1 through L16 for cleanliness of the ceramic coil forms and mounting supports.

b. Tighten (T). Tighten any coil mounting or connection found loose by resoldering wires or tightening screws.

c. Clean (C). Clean the coil form and coil with a soft brush. The ceramic coil form is actually performing the function of a high-voltage insulator, therefore the same preventive maintenance will apply to the coil as to high-voltage insulators and bushings.

44. RHEOSTATS AND POTENTIOMETERS.

a. Inspect (I).

(1) Inspect the mechanical condition of rheostats R17 and R20. The arm should be keyed tightly to the shaft, and the shaft should turn easily in the bushing which supports it.

(2) Inspect the assembly and mounting screws, setscrews, and nuts.

(3) Examine the insulating body of the rheostats for dust, dirt, cracks, and chipped places.

(4) Examine all metallic parts for dust, dirt, and corrosion.

b. Tighten (T). Tighten loose assembly or mounting screws.

45. TERMINAL BLOCKS.

a. Inspect (I).

(1) Inspect terminal blocks for cracks, breakage, dirt, and loose connections or mounting screws.

(2) Carefully examine connections for mechanical defects, dirt, and corrosion.

b. Tighten (T). Tighten loose screws, lugs, and mounting bolts. When tightening screws, be sure to select a screwdriver of correct size; do not exert too much pressure. Remove loose connections and clean them when they are dirty or corroded.

c. Clean (C). Clean terminal blocks, when they require it, with a dry brush. When necessary, use a cloth moistened with a dry-cleaning solvent. If a solvent is used, the block must be thoroughly wiped with a cloth and then brushed to remove the lint.

46. MULTIPLE CONNECTORS.

a. Inspect (I). Inspect the female ends of the connectors for corrosion and dust. Inspect the mountings for cracks and loose connections. Inspect the male ends for loose and broken pins and for proper spring in the banana plugs.

b. Clean (C). Clean the male and female ends of the connectors with a brush moistened in dry-cleaning solvent. Remove corrosion with #0000 sandpaper, then wipe with a clean cloth.

47. CORDS AND CABLES.

The cables in Radio Set AN/TRC-7 are the life lines of the equipment. Condition of the cabling must be closely observed. Equipment operated in all kinds of weather and moved on all kinds of roads subjects cabling to a great deal of punishment.

a. Inspect (I). Inspect the cables for cracked or deteriorated insulation, frayed or cut insulation at the connecting and supporting points, and improper placement which places the cables or connections under strain. Also watch for kinks and improper supports.

b. Tighten (T). Tighten loose cable clamps, coupling rings, and cable connections.

c. Clean (C). Clean connections on cables when they are dirty or corroded. Clean corroded connectors with #0000 sandpaper. It is important that the entire surface of the connector be cleaned. No attempt should be made to remove individual prongs from cable plugs.

48. METER.

Meters are extremely delicate instruments and must be handled very carefully. They require very little maintenance. They are precision instruments and ordinarily cannot be repaired in the field.

a. Inspect (I). Inspect the leads and connections of the meter. Look for loose, dirty, and corroded connections. Look for cracked or broken cover glasses. Since the movement of a meter is extremely delicate, its accuracy will be seriously affected if the glass is broken and dirt and water filter through.

b. Tighten (T). Tighten all connections found loose. Any loose meter wires should be inspected for dirt or corrosion before they are tightened. The tightening of meter connections requires a special technique because careless handling can easily crack the meter case.

c. Clean (C). Meter cases can be cleaned with a dry cloth. If cleaning is difficult, the cloth should be dampened with a dry-cleaning solvent. Dirty connections may be cleaned with a small brush dipped in dry-cleaning solvent, or with a small piece of cloth dipped in the solvent.

49. JACKS AND PLUGS.

Jacks require very little attention, and then only at infrequent intervals. Occasionally it will be necessary to tighten the mounting nut, clean the contacts, or increase the spring tension. Remove dirt with a brush and dry-cleaning solvent; remove corrosion with a piece of crocus cloth followed by a clean cloth. Increase spring tension, when necessary. To do this it will be necessary to remove the jack so that the waterseal can be pulled back to make the contact accesible. Check the action of the jack after each adjustment. Be careful to keep all soldered connections intact. For cleaning telephone-type plugs use Polish, Metal, Paste, Signal Corps stock No. 6G1516. After cleaning, use a clean dry cloth to remove all traces of polish remaining on the plugs.

50. GENERATOR.

a. Generating Unit. Generating units are essentially the same type of mechanism as motors, and are inspected and lubricated in the same manner. The generating unit is located in the hand generator housing. The generating unit in Radio Set AN/TRC-7 operates with carbon brushes which mount in the motor frame and ride against a segmented commutator. The brushes and commutators require preventive maintenance as described below.

(1) Inspect (I).

(a) Inspect the brushes and the commutators at regular intervals. The brushes should be long enough to make firm contact with the commutator. The brush springs must have adequate tension and be in firm contact with the brushes. The brush caps must be tight. The commutators must be clean and smooth. The covers and straps must be in place.

(b) The maintenance of brushes and the cleaning of commutators are both important tasks. The operating life of the average brush is approximately 1,000 hours, but it will vary to some extent, depending upon climatic conditions.

(2) Clean (C).

(a) Remove the endplates or the brush-cover straps. Press a piece of canvas, folded to the exact width of the commutator, against the commutator and turn the armature by hand.

(b) If the commutator has been burned or pitted, hold a piece of No. 0000 sandpaper against the commutator and turn it by hand.

(c) If necessary, a cloth moistened in dry-cleaning solvent may be used to remove caked dirt and grease.

(d) Polish the commutator with crocus cloth and wipe with a clean dry cloth.

(3) Lubricate (L). The generator bearings are double-sealed. **Do not lubricate.**

b. Gears.

(1) Inspect (I). Inspect the teeth of the gears in the generator for dirt or corrosion.

(2) Clean (C). If the gears are dirty, clean them with a pipe cleaner or small brush dipped in dry-cleaning solvent.

(3) Lubricate (L).

(a) Coat the gear teeth liberally with Grease, Lubricating, Special Ordnance AXS-637. Do not leave any excess in the gear case.

(b) Apply Oil, Lubricating, Preservative, Special, U. S. Army Spec. No. 2-120 to the oil-permeated bearing surrounding the stud on the idler arm of the idler pulley assembly. Allow oil to penetrate, then wipe off excess.

(c) The idler-pulley bearing is double-sealed. **Do not lubricate.**

51. CABINETS, CHASSIS, AND MOUNTINGS.

The cabinets which house the various components of Radio Set AN/TRC-7 are constructed of sheet aluminum, coated with olive drab paint.

a. Inspect (I). Inspect the outside and inside of the case thoroughly, paying strict attention to every detail. Check the mountings and the panel screws. Inspect the panel for loose knobs, switches, and jacks.

b. Clean (C). Clean case, outside and in, with a clean dry cloth. Use dry compressed air to blow out all accumulated dirt and dust. Repaint any surface that is found scratched, rusted, or chipped.

c. Tighten (T). Tighten all panel screws, plugs, and control knobs found loose.

52. HANDSET, HEADSET, AND MICROPHONE.

These auxiliary items of equipment are essential to the operation of the radio set, therefore the operator must give them the same care as the radio itself.

a. Inspect (I). Inspect all external surfaces for dirt and corrosion. See that all cable connections are tight and that plugs and jacks fit together properly.

b. Clean (C). Clean all items of the equipment in accordance with the instructions outlined previously for relays, cords, jacks, cabinets, etc.

53. COUPLING SHAFTS AND CONTROL KNOBS.

The control of various switches and resistors found throughout the set is effected through coupling shafts that connect these items to control knobs located on the front panel. It is important that these shafts and control knobs be kept tight at all times. Use the Allen wrench furnished (par. 69) to tighten these items whenever they are found loose. Lubricate the bearings of these control shafts with Oil, Lubricating, Preservative, Special, U. S. Army Spec No. 2-120.

54. GEARS.

a. Inspect (I). Inspect the teeth of the gears on the gang switches and in the generator for dirt or corrosion.

b. Clean (C). If the gears are dirty, clean them with a pipe cleaner or small brush dipped in dry-cleaning solvent.

SECTION VII

ITEMIZED PREVENTIVE MAINTENANCE

55. INTRODUCTION.

For ease and efficiency of performance, preventive maintenance for Radio Set AN/TRC-7 will be broken down into operations that can be performed at different time intervals. In this section the preventive maintenance work to be performed on the radio set at specified time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in section VI. These general instructions are not repeated in this section. When performing preventive maintenance, refer to section VI if more information is required for the following items. Perform all work with the power removed from the equipment. After preventive maintenance has been performed on a given day, the equipment should be put in operation and checked for satisfactory performance. (See par. 34, Equipment Performance Check List.)

56. COMMON MATERIALS NEEDED.

The following materials are needed in performing preventive maintenance:

Common hand tools (TE-41 or equivalent).

Clean cloth.

#0000 sandpaper.

Crocus cloth.

Fine file or relay burnishing tool.

Solvent, Dry-cleaning, Federal Specification P-S-661a.

Polish, Metal, Paste, Sig. C stock No. 6G1516.

NOTE: Gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry-cleaning, Federal Specification P-S-661a is available as a cleaning fluid through established supply channels. Oil, Fuel, Diesel, U. S. Army Specification 2-102B, may be used for cleaning purposes when dry-cleaning solvent is not at hand. Carbon tetrachloride or fire-extinguishing liquid (carbon tetrachloride base) will be used, if necessary, *only on contact parts of electronic equipment.*

57. ITEM 1, EXTERIOR OF RADIO SET AN/TRC-7 (fig. 6).

OPERATIONS.

IC	Cabinet.
ITC	Jacks.
ITA	Control knobs.
IC	Meter.
IC	Straps.
ITC	Panel cover.
T	Loose screws, nuts, and bolts.
ICL	Metal accessories.
I	Waterseal gaskets.
I	Rivets.
IT	Nuts.

REMARKS. Check paint for scratches, chips, and blisters. Check for dents, cuts, or bends in the panel. Replace all knobs that are chipped

or broken. Remove all dirt, dust, rust, fungus, and other foreign matter. Use a dry-cleaning solvent on exposed metal parts. Use a damp cloth on painted parts. On web straps use soap and water.

58. ITEM 2, ANTENNAS.

a. Antenna AT-59/TRC-7 (fig. 11).

OPERATIONS.

IC	Insulator.
I	Mounting.

b. Antenna Assembly AS-110/TRC-7 (fig. 10).

OPERATIONS.

IC	Insulator.
I	Mounting.
ITC	Mast sections.

59. ITEM 3, BATTERY BA-70 (fig. 6).

PRELIMINARY STEPS. Remove Battery BA-70 from Receiver-Transmitter RT-53/TRC-7.

OPERATIONS.

IC	Battery receptacle.

60. ITEM 4, GENERATOR AND CABLE (fig. 16).

OPERATIONS.

IC	Generator receptacle.
IC	Cable and connections.
T	Nuts in receptacle.

61. ITEM 5, HANDSET (fig. 12).

OPERATIONS.

C	Handset.
I	Switch.
IC	Cabinets and external surfaces.
ITC	Cords and plugs.
IT	Mounting screws.
I	Covers of receiver and microphone.

62. ITEM 6, HEADSET (fig. 13).

OPERATIONS.

I	Rubber of ear plugs.
IC	Breast clamp.
IT	Loose sleeve on phone plugs.
IL	Metal part of headband.

REMARKS. Tighten any loose sleeve of a phone plug **by hand only.**

63. ITEM 7, MICROPHONE (fig. 14).

OPERATIONS.

IC	Cords.
IC	Jack.
IC	Switch.
ICA	Straps.
I	Microphone unit.
ITC	Plugs.
T	Screws on switch cover.

REMARKS. Tighten the sleeve of Plug PL-68 **by hand only.**

64. ITEM 8, RECEIVER-TRANSMITTER (fig. 18).

PRELIMINARY STEPS. Remove the receiver-transmitter from its case.

OPERATIONS.

I	Chassis.
I	Wiring and solder joints.
ITCA	Tubes and sockets.
I	Transformer shields.
ITC	Capacitors.
I	Crystal units.
ITC	Resistors.
I	Jack waterseals.
IT	Rheostats and potentiometers.
I	Power plug and test receptacle.

ITC	Bushings and insulators.
I	Chokes.
ICL	Switches.
I	Cables.
ITC	Relay.
ITL	Couplings.
T	Nuts and screws.
ITC	Coils.
ICL	Gears.
IC	Terminal blocks.

REMARKS. Do **not** touch adjusting screws on any transformer.

65. PREVENTIVE MAINTENANCE CHECK LIST.

The following check list is a summary of the preventive maintenance operations to be performed on Radio Set AN/TRC-7. The time intervals shown on the check list may be reduced at any time by the local commander. For the best performance of the equipment, perform the operations at least as frequently as called for in the check list. The echelon column indicates which operations are first echelon maintenance and which operations are second echelon maintenance. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITCA appear in the "Operations" column, the item to be treated must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

Item No	*Operations*	*Item*	*When performed*					
			Before operation	*After operation*	*Daily*	*Weekly*	*Monthly*	*Echelon*
1	ITCAL	Exterior of Radio Set AN/TRC-7.			X			1st
2	ITC	Antennas.	X	X	X			1st
3	IC	Battery BA-70.	X	X	X			1st
4	ITC	Generator cable.					X	2d
5	ITC	Handset.			X			1st
6	ITCL	Headset.			X			1st
7	ITCA	Microphone.			X			1st
8	ITCA	Receiver-transmitter.				X		2d

SECTION VIII

LUBRICATION

66. LUBRICATION.

No War Department Lubrication Order is prescribed for Radio Set AN/TRC-7, but lubrication instructions are given in the preventive maintenance sections of this manual.

SECTION IX

SPECIAL TOOLS

67. ALIGNMENT TOOL TL-314/U.

This plastic tool has a screwdriver on one end and an insert-type alignment tool on the other. Do not force the tool; it breaks easily. The alignment tool is packed with the receiver-transmitter unit (fig. 77).

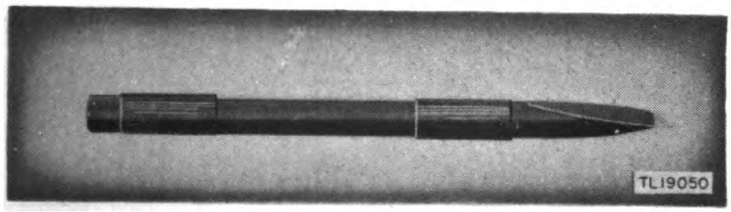


Figure 44. Alignment Tool TL-314/U.

68. TUBE PULLER TL-310/U.

One end of this double-ended tube puller is for the larger tubes of the set; the other end for the smaller. Push the tube puller down over the tube and pull straight up. The tube will come out easily. Do not force or exert any side thrust on the tubes.

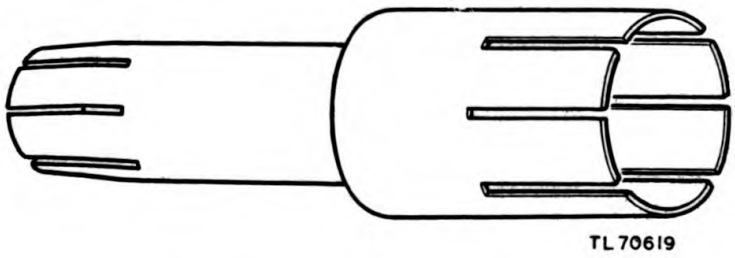


Figure 45. Tube Puller TL-310/U.

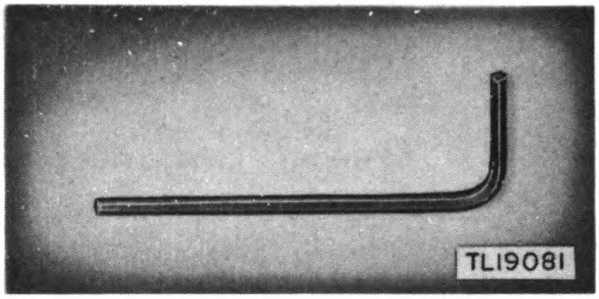


Figure 46. Allen wrench.

69. ALLEN WRENCH.

An $\frac{5}{32}$-inch Allen setscrew wrench is furnished with the equipment to facilitate removal of knobs and CHANNEL SELECTOR switch shafts. This wrench is located in the left rear corner of the tube side of the chassis. See figure 79 for location of the Allen wrench.

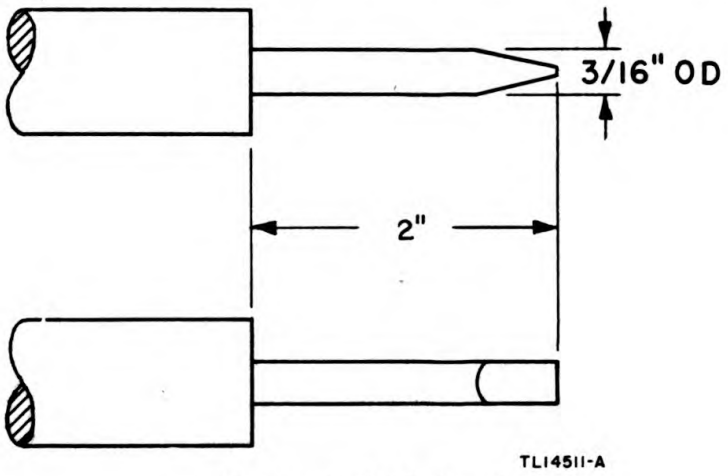


Figure 47. Soldering tip.

70. SOLDERING TIP.

For instructions on the preparation of this tool, see paragraph 104.

SECTION X

MOISTUREPROOFING AND FUNGIPROOFING

71. MOISTUREPROOFING AND FUNGIPROOFING RADIO SET AN/TRC-7.

Moistureproofing and fungiproofing is deleterious to Radio Set AN/TRC-7 and must not be attempted.

PART FOUR — AUXILIARY EQUIPMENT

NOT USED

PART FIVE

REPAIR INSTRUCTIONS

NOTE: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Services Forces will be reported on W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report); by Army Air Forces on Army Air Forces Form No. 54 (unsatisfactory report). If either form is not available, prepare the data according to the sample form reproduced in figure 73.

SECTION XI

THEORY OF EQUIPMENT

72. THEORY OF OPERATION.

Radio Set AN/TRC-7 is designed to give voice communication over a line-of-sight distance of approximately 35 miles. The transmitter is amplitude-modulated and transmits on either of two preset frequencies between 100 and 156 mc. The receiver is a superheterodyne operating over the same frequency range.

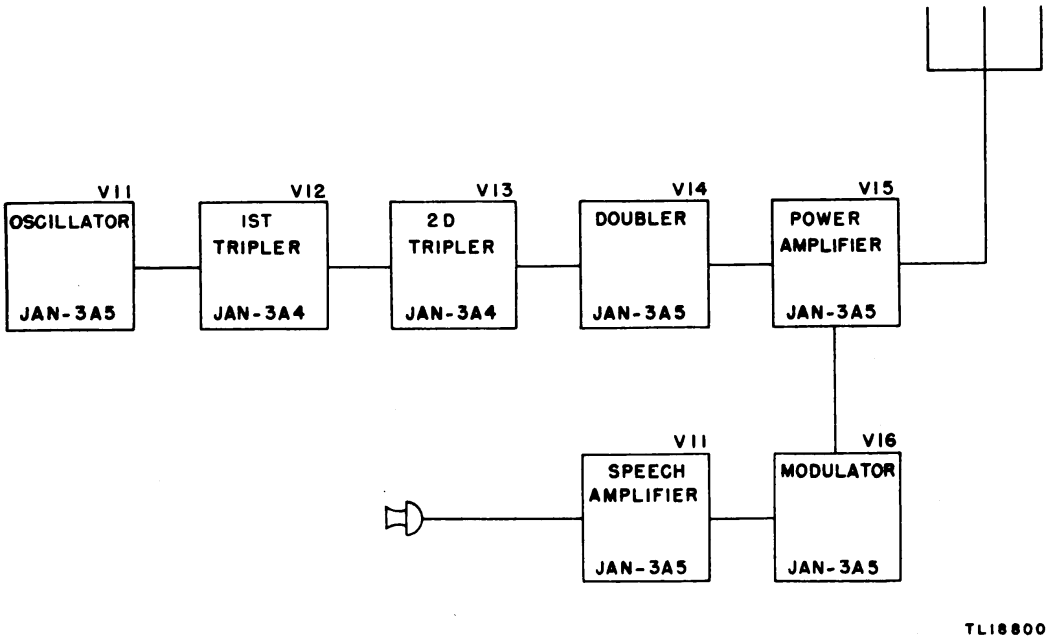


Figure 48. Transmitter, simplified block diagram.

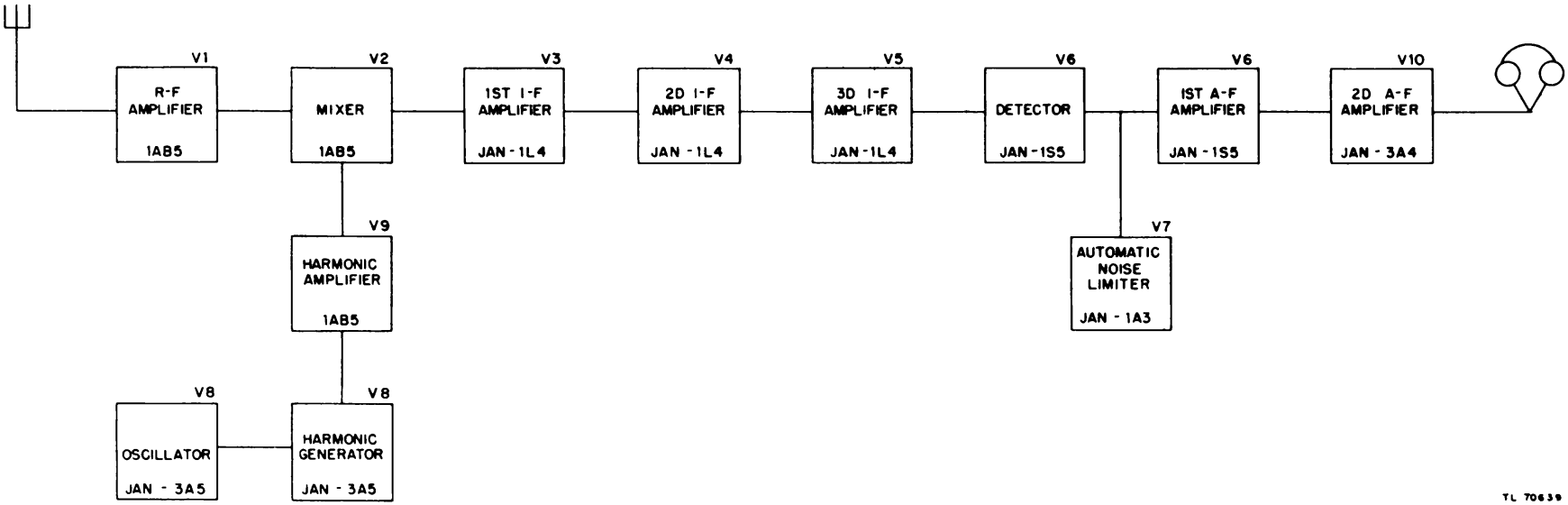


Figure 49. Receiver, simplified block diagram.

a. Figure 48 is a simplified block diagram of the transmitter. Oscillations generated in tube V11 are fed to the first tripler stage, V12. The output of tube V12 is applied to second tripler tube V13 then to the doubler-driver stage, tube V14. The doubler-driver output is fed to p-a (power-amplifier) stage tube V15. Modulator stage tube V16 modulates the power amplifier in the plate circuit and supplies sidetone to the headset. The modulator is driven by speech amplifier tube V11. The output of the p-a stage is applied to the antenna through a coaxial cable.

b. A simplified block diagram of the receiver section is illustrated in figure 49. The received signal is first amplified in r-f amplifier tube V1. The output of V1 is mixed with the output of harmonic amplifier tube V9 and applied to mixer tube V2. The i-f (intermediate-frequency) output of the mixer is amplified in the three i-f amplifier stages and applied to the diode detector tube V6. The audio output from the detector is amplified in two a-f (audio-frequency) amplifier stages, tubes V6 and V10, and applied to the headset. Noise limiter stage tube V7 aids in reducing noises caused by static, and other sudden noise pulses.

73. RECEIVER SECTION, FUNCTIONING OF PARTS.

A complete analysis of the operation of the receiver section of Receiver-Transmitter RT-53/TRC-7 is given in paragraphs 74 to 85 below. Each stage is discussed separately and a detailed description of the function of each circuit element is given.

74. RECEIVER RADIO-FREQUENCY AMPLIFIER STAGE.

a. The receiver r-f amplifier (fig. 50) increases the amplitude of the received signal before it is applied to the mixer. It also improves the selectivity of the receiver by providing an additional circuit which is tuned to the frequency of the desired signal. Unwanted signals are thus rejected to a large extent before reaching the mixer.

b. The incoming signal is applied through the contacts of antenna switching relay K1 and capacitor C54 to a tap on grid coil L1. The voltage applied to the grid of tube 1AB5 (V1) is developed across the parallel combination of coil L1 and the tuning capacitor. Either capacitor C1 or C2 may tune the circuit, depending on the setting of the CHANNEL SELECTOR switch. Capacitor C1 is used on channel 1, and capacitor C2 on channel 2 (odd-numbered circuit elements are always associated with channel 1 and even-numbered with channel 2). When the parallel combination of coil L1 and the tuning capacitor is tuned to resonance with the desired signal, it presents a higher impedance to this signal than to any other frequency; the voltage caused by the desired signal is greater than that due to any other frequency

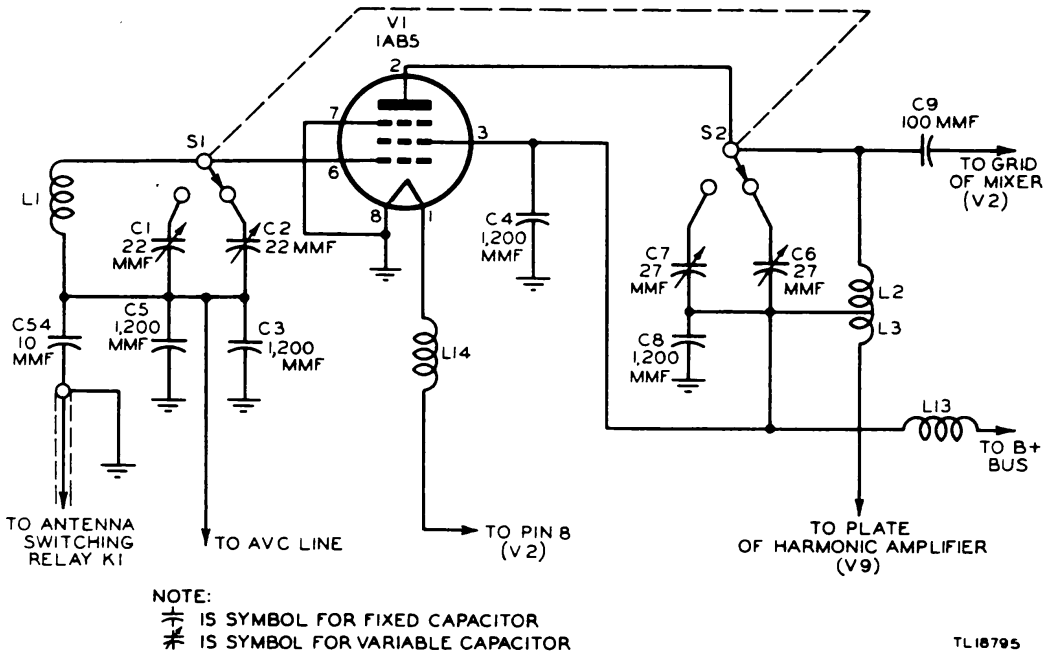


Figure 50. Receiver r-f amplifier.

that may be present in the circuit. This signal voltage is applied to the grid of V1 and is amplified in the plate circuit of the tube. The signal is returned to ground in the grid circuit through capacitors C5 and C3. The grid is returned to ground for direct current through the a-v-c (automatic-voltage-control) circuit which biases the grid to a value depending on the strength of the received signal.

c. The amplified signal is developed across the plate load impedance which consists of coil L2 and capacitor C6 or C7 in parallel. The setting of the CHANNEL SELECTOR switch determines which capacitor is used to tune the plate circuit. Coil L2 is part of a double coil, the other part is L3 (fig. 50) which is the plate load for the harmonic amplifier. Thus the signal from the harmonic amplifier is also present across coil L2. Plate voltage for tube V1 and harmonic amplifier tube V9, as well as screen voltage for tube V1, is applied through r-f choke L13 which isolates the plate supply from radio frequency in the plate circuits. Capacitor C8 bypasses radio frequency in the plate circuits and capacitor C4 is the screen bypass for tube V1. Filament current is supplied to tube V1 through choke L14 which prevents radio frequency from appearing in the filament supply.

75. RECEIVER MIXER STAGE.

a. The combined signals of the r-f amplifier and the harmonic amplifier are applied from coil L2 through coupling capacitor C9 to tube V2. Tube V2 is a pentode (1AB5) which mixes the two signals and converts

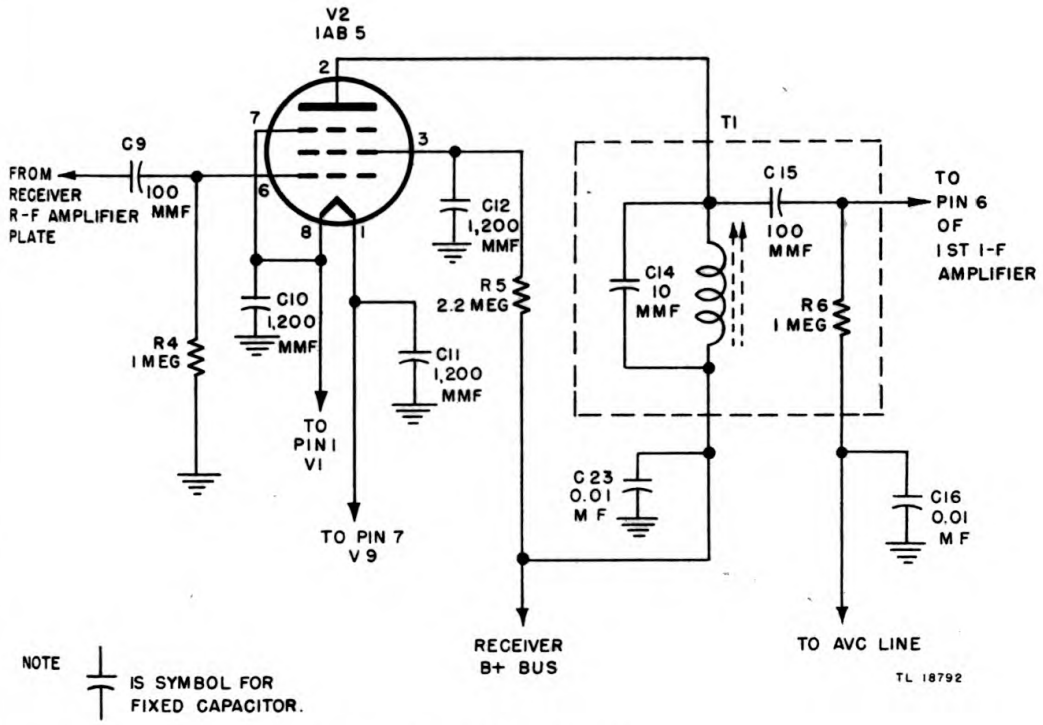


Figure 51. Receiver mixer.

them to the intermediate frequency (fig. 51). The voltage appearing between the grid and filament of tube V2 is developed across the grid resistor R4. The filament is held at r-f ground potential by capacitors C10 and C11.

b. The frequency of the signal in the plate circuit is the difference between the received signal and that of the harmonic amplifier. This difference is held at 12 mc, and the plate load impedance is tuned to this frequency by means of a powdered iron slug in the coil of T1. T1 in parallel with fixed capacitor C14 forms a single-tuned impedance coupling between the mixer and the first i-f stage. The intermediate frequency is bypassed to ground in the plate circuit by capacitor C23. Screen voltage is applied through voltage-dropping resistor R5 which, in conjunction with capacitor C12, makes up the decoupling circuit for the screen. The can containing coil T1 and capacitor C14 also incloses coupling capacitor C15 and grid resistor R6 for the first i-f amplifier stage.

76. RECEIVER FIRST INTERMEDIATE-FREQUENCY AMPLIFIER.

a. The modulated i-f signal is coupled from the mixer to first i-f amplifier Tube JAN-1L4, V3, through capacitor C15 (fig. 51). The voltage developed across grid resistor R6 (fig. 51) is applied between grid and filament of tube V3 (fig. 52). The d-c grid return is through the a-v-c

circuit while capacitor C16 bypasses the intermediate frequency to ground. The filament is bypassed by capacitor C17.

b. The amplified signal is developed across the plate load impedance which consists of fixed capacitor C34 and the variable inductance in T2. The inductance is tuned with a movable powdered iron slug to a resonant frequency of 12 mc. Capacitor C20 is the bypass capacitor for the plate circuit. Screen voltage is applied through voltage-dropping resistor R7. The screen supply is bypassed by capacitor C18. The output of the first i-f amplifier is coupled to the second i-f stage through capacitor C21.

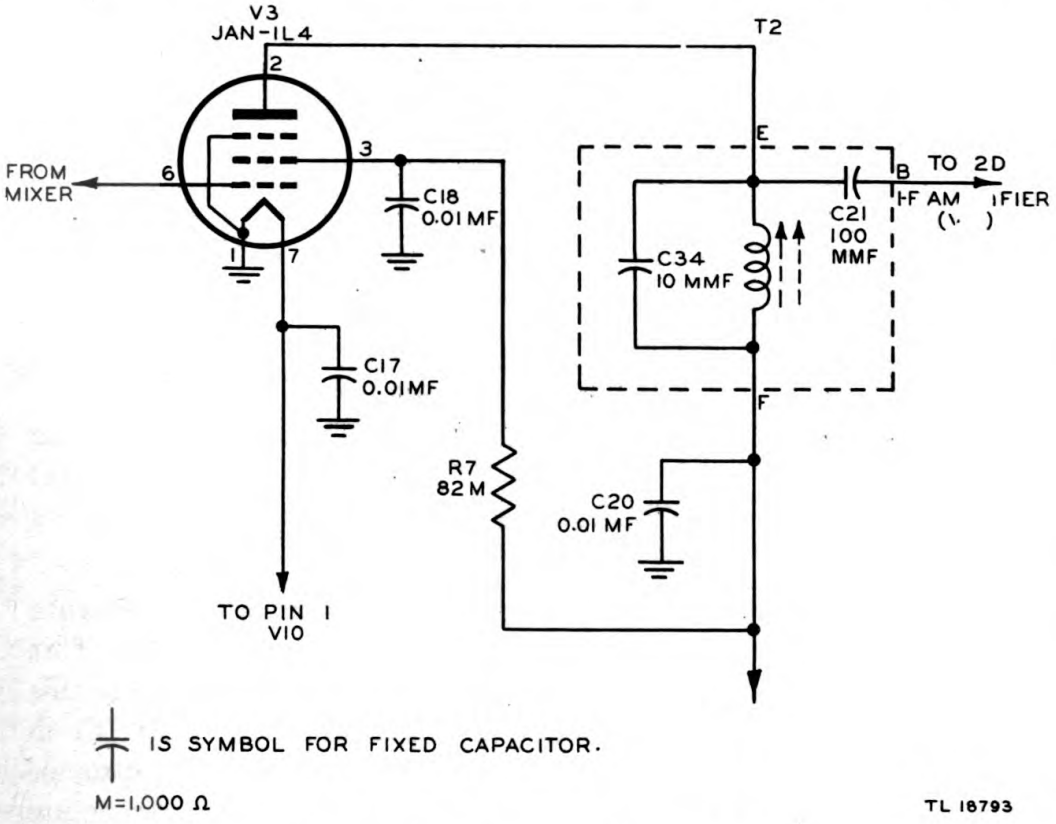


Figure 52. Receiver first i-f amplifier.

77. RECEIVER SECOND INTERMEDIATE-FREQUENCY AMPLIFIER.

The second i-f amplifier stage (fig. 53) is similar to the first. Tube V4 (JAN-1L4) is used exactly as in the first stage, the input signal voltage is developed across grid resistor R8 and appears between the grid and filament. The tube operates with zero bias instead of with a-v-c bias as in the case of the first stage, because the grid is returned directly to the filament through resistor R8. The filament is bypassed for the intermediate frequency by capacitor C22. The plate load impedance is tuned in the same manner as in the previous stage and consists of capacitor C36 in parallel with the tunable inductance in T3. The plate is by-

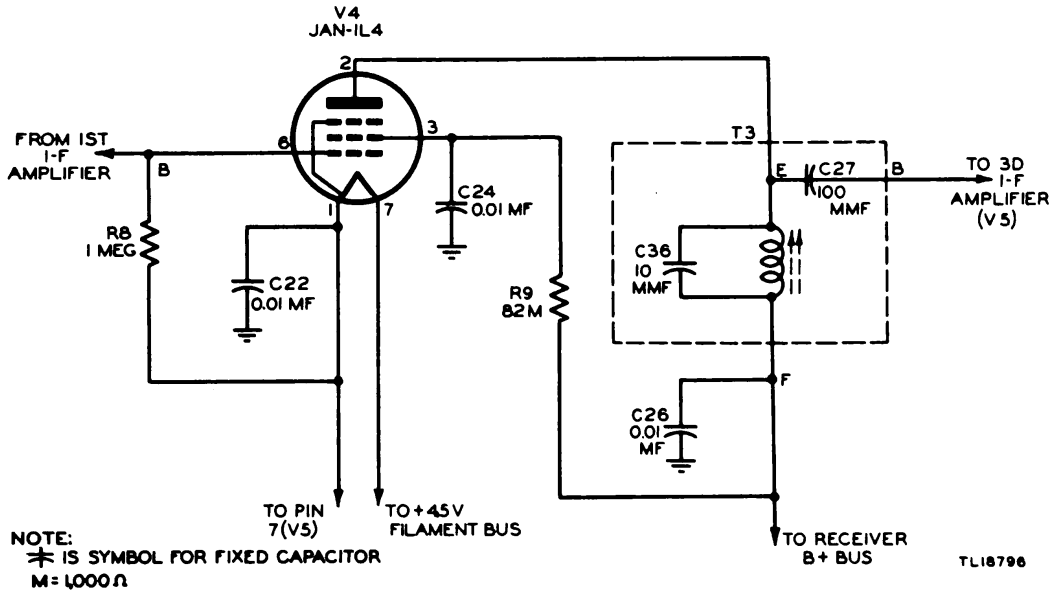


Figure 53. Receiver second i-f amplifier.

passed by capacitor C26, and the screen by capacitor C22. Resistor R9 is the screen voltage-dropping resistor. The output of the stage is coupled to the third i-f amplifier through capacitor C27.

78. RECEIVER THIRD INTERMEDIATE-FREQUENCY AMPLIFIER.

a. The output of the second i-f amplifier is applied to the grid of the third amplifier tube (fig. 54) through capacitor C27 (fig. 53). The grid

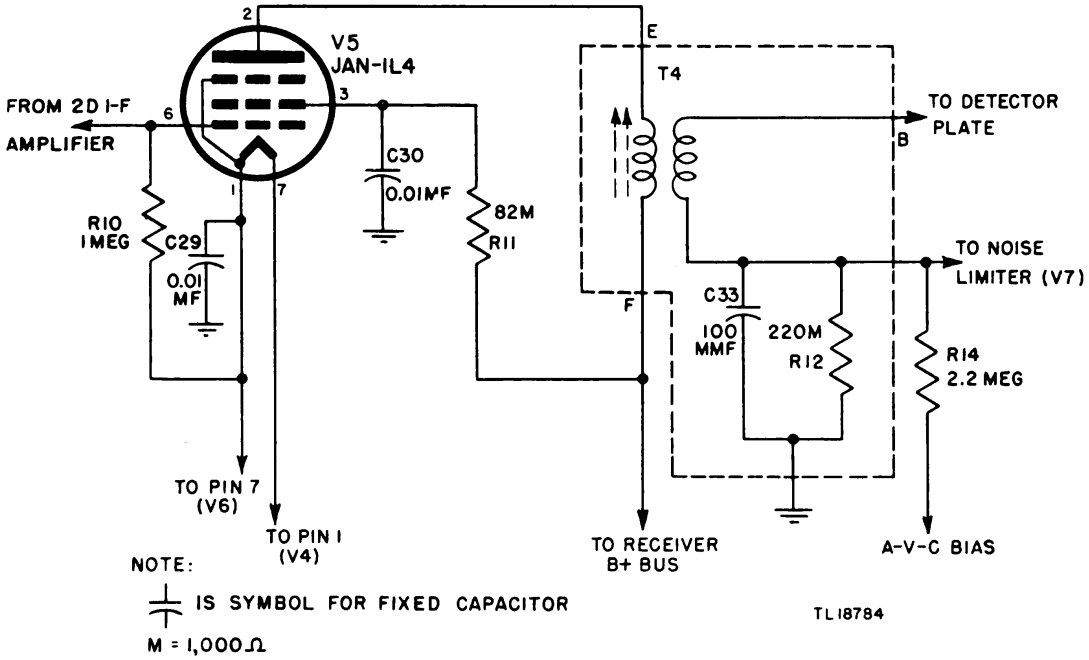


Figure 54. Receiver third i-f amplifier.

circuit of the second and third stages are identical. Resistor R10 is the grid resistor for the third stage and is connected directly to the filament. The filament is bypassed by capacitor C29. The screen voltage is applied through resistor R11 which is bypassed by capacitor C30.

b. The plate load is the primary of transformer T4. The primary is tuned to the intermediate frequency by a movable powdered iron slug. The output of this stage is taken from the secondary of the transformer and applied to the diode detector.

79. RECEIVER DIODE DETECTOR.

a. The diode detector (fig. 55) is the diode section of diode-pentode Tube JAN-1S5, V6. The voltage appearing across the secondary of transformer T4 is applied between the diode plate and filament. The diode circuit goes from ground at the filament, through the tube to the diode plate, through the secondary of transformer T4, through resistor R12 and capacitor C33 in parallel, and back to ground.

b. When the polarity of the signal voltage at the secondary of the transformer is such that the plate of the diode is positive with respect to the filament, the tube conducts. The direction of current flow is down through resistor R12 to ground. This causes a negative signal to appear at point C (fig. 55). Capacitor C33 bypasses the i-f component of the signal and only the audio component appears across resistor R12. This audio voltage is applied to the noise limiter circuit.

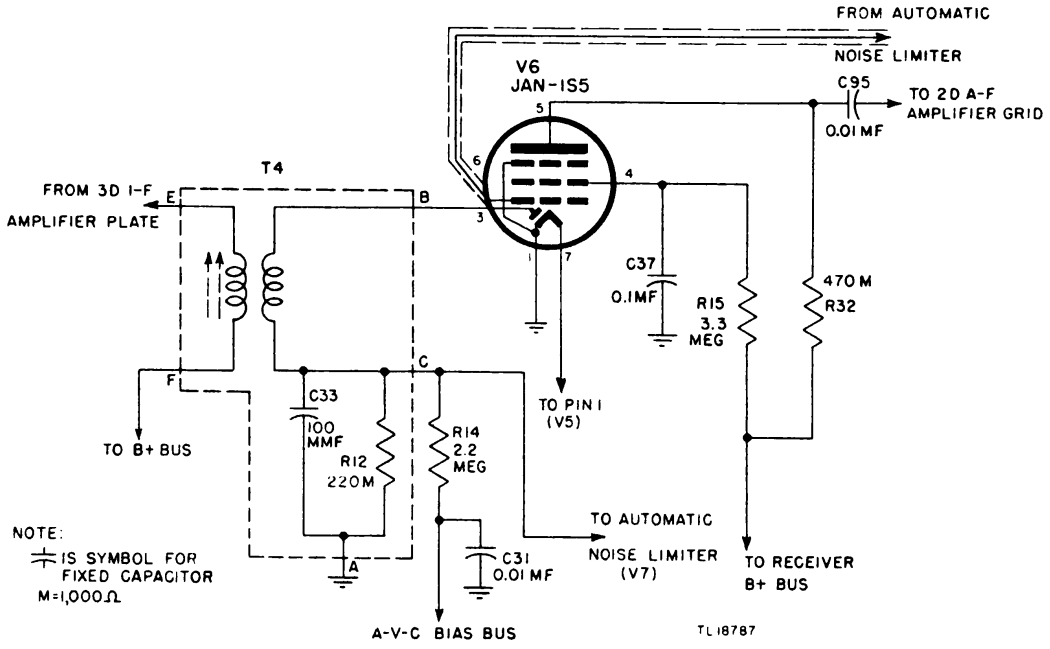


Figure 55. Receiver diode detector and first audio amplifier.

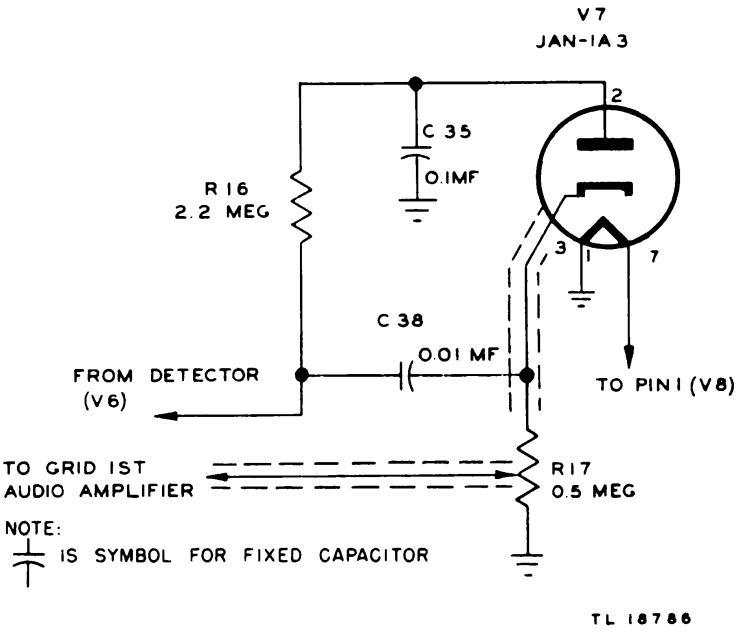


Figure 56. Receiver noise limiter.

c. The voltage developed at point C by the rectified signal is applied through the a-v-c circuit to the grids of r-f amplifier tube V1 and first i-f tube V3. The audio component of the signal is filtered out by the combination of resistor R14 and capacitor C31. The voltage applied to the grids of the tubes thus depends on the average signal strength and does not vary at an audio rate. Coil L15 is an r-f choke (fig. 89). The a-v-c voltage applied to V1 is obtained from the voltage divider made up of resistors R2 and R3. Any increase in signal strength causes an increase in the negative bias on the grids of tubes V1 and V3. The gain of these two stages is thus reduced, and the signal applied to the diode detector is reduced correspondingly.

80. RECEIVER NOISE LIMITER CIRCUIT.

a. The noise limiter circuit (fig. 56) is designed to cut down sudden increases in signal volume caused by noise impulses due to static or near-by electrical machinery. Under normal signal conditions the plate of diode Tube JAN-1A3, V7, is held at a negative potential by the charge on C35. This capacitor is charged to the average negative potential of the signal at point C (fig. 55) through resistor R16. The time constant of the RC combination of capacitor C35 and resistor R16 is long compared to audio frequencies, and the capacitor holds a charge which follows the average signal potential and not the audio variations. The cathode of the diode is at d-c ground potential because of the blocking action of capacitor C38. The diode cannot conduct under these con-

ditions, because the cathode is positive with respect to the plate. All of the signal voltage, therefore, appears across resistor R17.

b. When a sudden noise pulse is received, point C (fig. 55) is driven sharply negative. The negative pulse is coupled to the noise limiter tube through capacitor C38. The cathode of tube V7 goes more negative than the plate and the tube conducts. Resistor R17 is thus effectively shunted by a low-impedance path through the diode and capacitor C35 to ground for the duration of the noise pulse. The noise pulse voltage, therefore, is greatly reduced across resistor R17.

c. Noise pulses are usually of extremely short duration and end before capacitor C35 charges up to any great extent. At the end of the pulse, the diode can no longer conduct, and the capacitor loses any charge due to the pulse, through resistor R16.

81. RECEIVER FIRST AUDIO-FREQUENCY AMPLIFIER STAGE.

A portion of the audio signal across resistor R17 is applied to the control grid of the pentode section of Tube JAN-1S5, V6, through a shielded lead (fig. 55). This signal is amplified in the plate circuit and appears across plate load resistor R32. The plate is bypassed for radio frequency by capacitor C13 while capacitor C94 acts as a decoupling capacitor for the plate supply circuit. Screen voltage is applied through dropping resistor R15 which is bypassed for audio frequency by capacitor C37.

82. RECEIVER SECOND AUDIO-FREQUENCY AMPLIFIER STAGE.

a. The output of the first a-f amplifier is coupled from the plate of tube V6 to the second a-f amplifier stage through capacitor C95 (fig. 55). Grid voltage for second amplifier Tube JAN-3Q4, V10 (fig. 57),

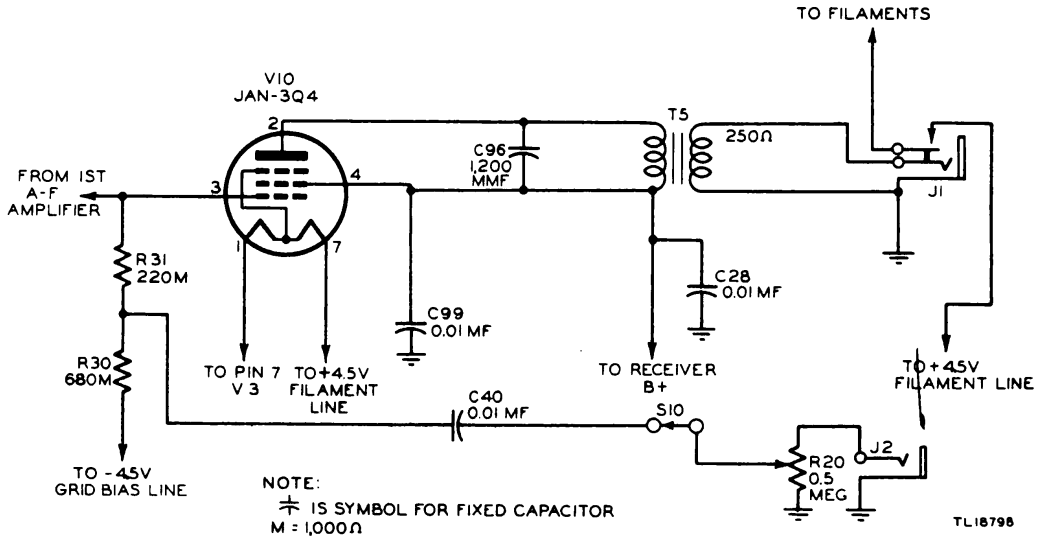


Figure 57. Receiver second a-f amplifier.

is developed across resistors R30 and R31 in series. The tube is biased to —4.5 volts from the fixed bias supply. This insures Class A operation and minimum distortion. The filament is bypassed for radio frequency by capacitors C97 and C98.

b. Plate voltage is applied through the primary of output transformer T5. Capacitor C28 bypasses the plate supply to ground. The primary of the output transformer is shunted by capacitor C96 which reduces the response of the amplifier at the higher audio frequencies. The turns ratio of transformer T5 is such that the impedance in the secondary circuit is reflected back into the primary so that the impedance of the primary matches that of the plate circuit of the tube. The secondary is designed for use with a 250-ohm headset. The screen voltage is supplied directly from the plate supply and is bypassed for af by capacitor C99.

c. The audio output from the secondary of transformer T5 is connected to the headset through PHONES jack J1 on the front panel of the set. An auxiliary contact in the jack opens the filament circuits of all tubes in the receiver when the headset plug is removed.

83. RECEIVER CRYSTAL OSCILLATOR.

a. The receiver crystal oscillator (fig. 58) uses one section of twin-triode Tube JAN-3A5, V8. The oscillator is the source of the local frequency which is mixed with the incoming signal to produce the intermediate frequency of 12 mc. The oscillator is connected in a tuned plate circuit with the crystal as the resonant circuit for the grid. The setting of the CHANNEL SELECTOR switch determines which crystal is in use, Y1 in channel 1 and Y2 in channel 2. A fixed bias of —4.5 volts is applied to the grid from the bias supply through resistor R21.

b. The plate circuit is tuned to the crystal frequency by means of capacitor C46 or C47 in parallel with coil L4. The coil is equipped with a powdered iron core which is adjusted at the factory and should need no attention under ordinary conditions. Coupling between the plate and grid circuits is accomplished through the grid-plate capacitance of the tube supplemented by capacitor C43. Plate voltage of 150 volts is applied through the meter circuit to coil L4. Plate current is indicated by meter M1 when the meter switch is set to position 2. The plate is bypassed by capacitor C48.

c. The filament circuit is bypassed by capacitors C39 and C41. A shunt resistor R23 is connected across the filaments to allow enough current for the heater of tube V7, as the filaments of the two tubes are in series. Resistor R22 is a cathode bypass for section 1-4 of the cathode as this section requires less current than the section of filament from 4 to 7.

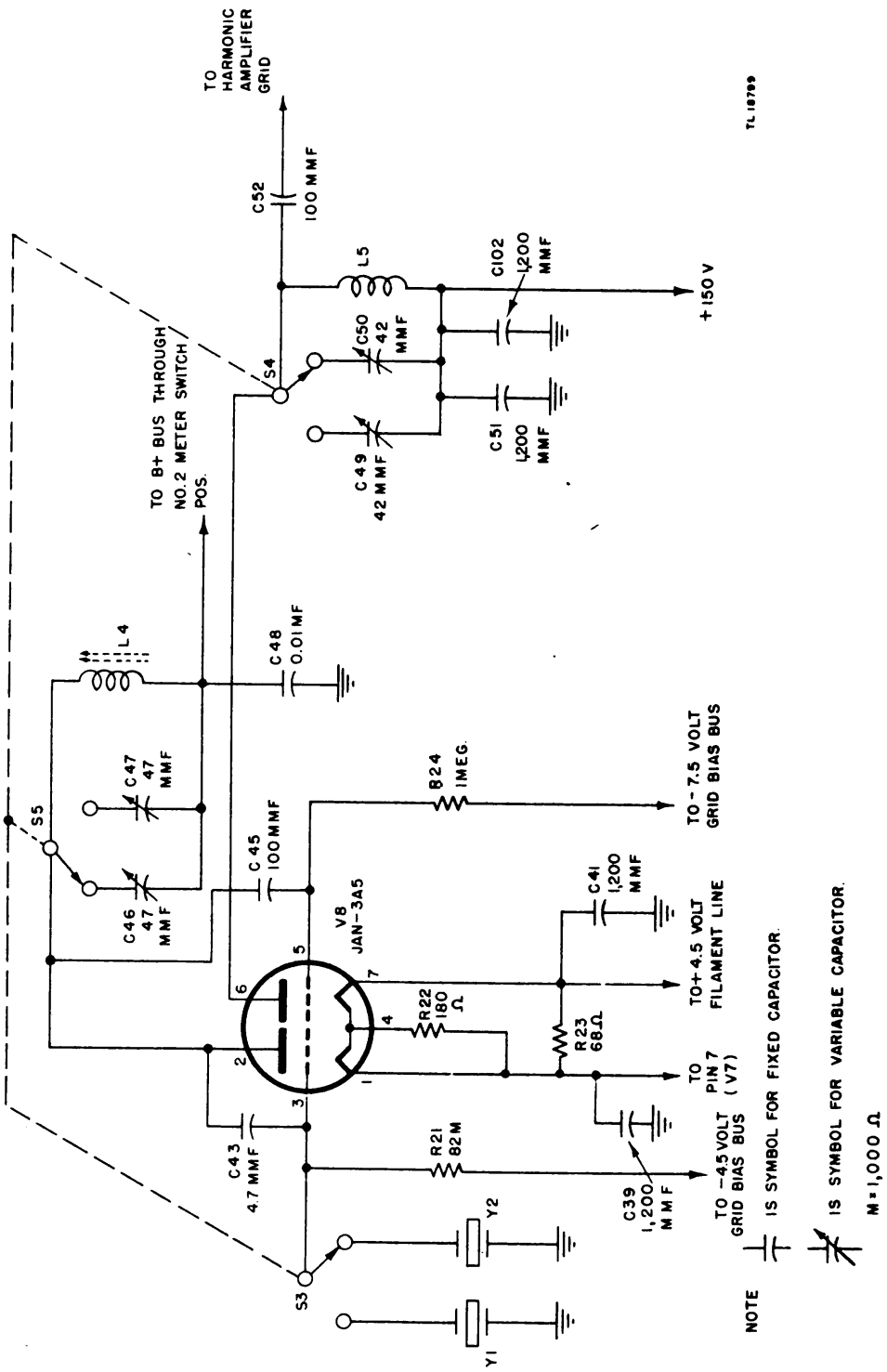


Figure 68. Receiver oscillator and harmonic generator.

84. RECEIVER HARMONIC GENERATOR.

a. The output from the plate of the crystal oscillator is applied to the grid of the harmonic generator tube, the second section of twin-triode Tube JAN-3A5, V8, through capacitor C45 (fig. 58). The grid is operated at a fixed protective bias of —7.5 volts. The grid leak resistor R24

is 1 megohm which allows a high negative bias to be developed. This causes the amplifier to operate Class C, insuring an output rich in harmonics.

b. The plate circuit is tuned to resonate with a harmonic of the frequency applied to the grid. This may be from the eleventh to the seventeenth harmonic, depending on the crystal in use and the channel selected. Tuning is accomplished by means of capacitor C49 or C50 in parallel with plate-tank coil L5. Plate voltage of 150 volts is applied directly to the coil from the plate supply. The plate is bypassed by capacitors C51 and C102.

85. RECEIVER HARMONIC AMPLIFIER.

a. The amplified harmonic of the crystal oscillator is applied from the plate circuit of the harmonic generator to harmonic amplifier tube

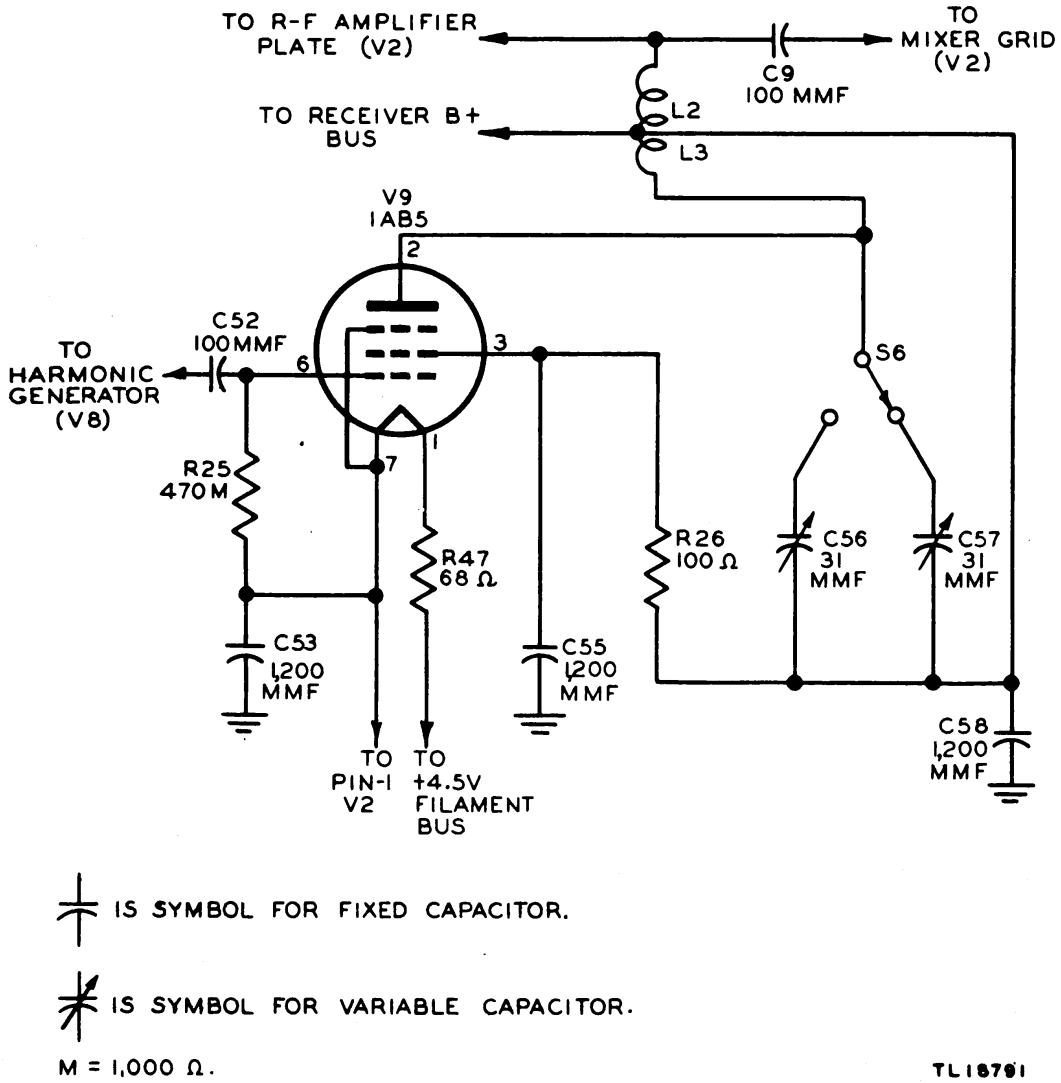


Figure 59. Receiver harmonic amplifier.

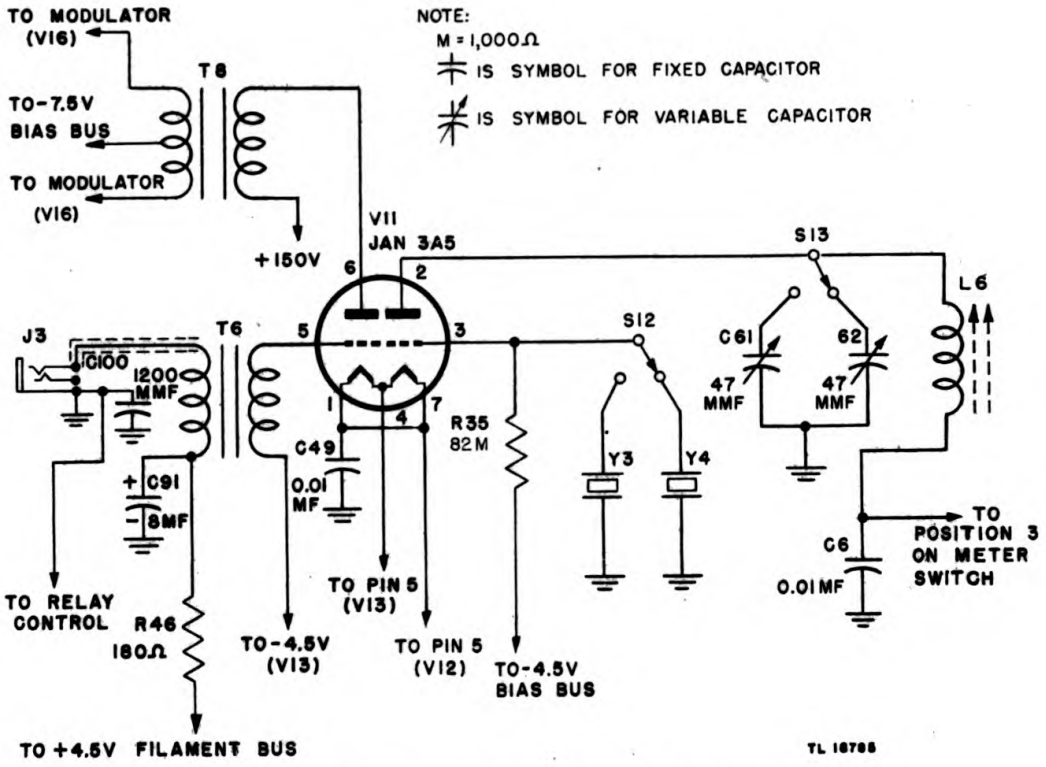


Figure 60. Transmitter oscillator and speech amplifier.

V9 (1AB5) through capacitor C52 (fig. 59). This tube is a pentode operating Class A. The input voltage is developed across resistor R25 and is applied directly between grid and filament. The filament is bypassed by capacitor C53. Resistor R47 is placed in series with the filament as a voltage-dropping resistor for tubes V1, V2, and V9 which require only 1.2 volts each while the filament supply is 4.5 volts.

b. The plate load is coil L3 and is tuned to resonance by means of capacitor C56 or C57. Plate voltage is applied through r-f choke L13. Capacitor C58 is the plate bypass capacitor. The output of the stage is coupled inductively to coil L2, the plate coil of the r-f amplifier stage of the receiver. Screen voltage is applied through voltage-dropping resistor R26, which is bypassed by capacitor C55.

86. TRANSMITTER OSCILLATOR.

a. The transmitter oscillator (fig. 60) consists of half of Tube JAN-3A5, V11, a twin diode, connected in a crystal-controlled, tuned plate circuit. The crystals form the resonant circuit for the grid, Y3 for channel 1 and Y4 for channel 2. The grid is biased to —6 volts, —4.5 volts from the fixed bias supply and +1.5 on the filament which is obtained from the voltage drop in the filament of tube V13. Resistor R35 is the grid-leak resistor.

b. Plate voltage of +150 volts is applied through coil L6. The plate circuit is tuned to the crystal frequency by either capacitor C61 or C62, one of which is in parallel with coil L6. The coil is provided with a powdered iron core, proper adjustment of which enables the tuning capacitors to cover the frequency range of the crystals. This adjustment is made at the factory and requires no attention under ordinary conditions. The plate supply is bypassed to ground by capacitor C64 and the filament by capacitor C92. Plate current is read on meter M1 when the meter switch is in position 3.

87. TRANSMITTER FIRST TRIPLER.

a. The output from the transmitter oscillator is applied to the grid of Tube JAN-3A4, V12, through capacitor C63 (fig. 61). The grid is biased to —7.5 volts from the bias supply battery. An additional 1.5 volts is obtained from the voltage drop in the filament of tube V13. This bias prevents damage to the tube in case the excitation fails. The total fixed bias of —9 volts and the additional bias developed across grid resistor R36 causes the output of the tube to be greatly distorted, and therefore rich in harmonics.

b. The plate circuit is tuned to the third harmonic of the input frequency by means of capacitor C65 or C66 in parallel with coil L7. The output signal across the plate load coil L7 is therefore three times the frequency of the oscillator. Plate voltage of 150 volts is applied directly

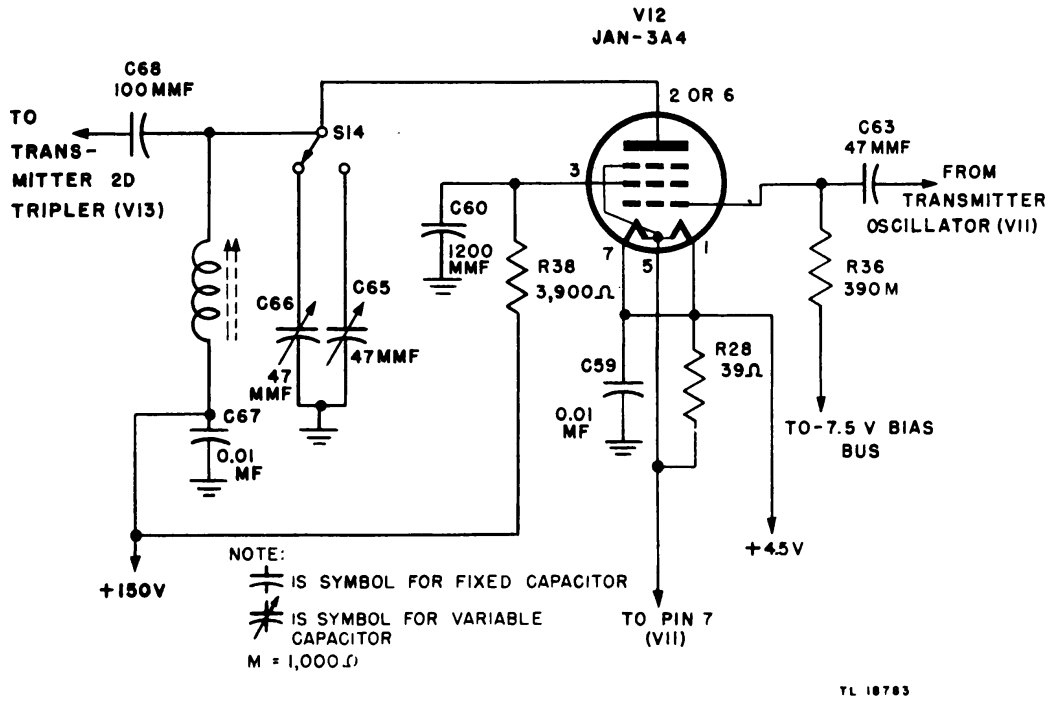


Figure 61. Transmitter first tripler.

to coil L6 from the plate supply which is bypassed by capacitor C67. Screen voltage is applied through resistor R38 which together with capacitor C60 acts as a decoupling circuit for the screen. The filament is bypassed by capacitor C59. Resistor R28 acts as a shunt for the filament as tube V12 requires less current than tube V11 which is in series with it.

88. TRANSMITTER SECOND TRIPLER.

a. The output from the first tripler stage is applied to the second tripler through capacitor C68. Pentode Tube JAN-3A4 (fig. 62) is used and is connected in a circuit similar to the first tripler. A fixed protective bias of —7.5 volts is applied through grid leak resistor R39. The signal from the plate of tube V12 is developed across resistor R39 and applied to the grid of tube V13. The tube operates at a high negative bias which insures an output rich in harmonics. The grid is bypassed to ground by capacitor C42.

b. The plate load consists of coil L8 in parallel with capacitor C70 or C71. The plate circuit is tuned to resonance with the third harmonic of the input signal. The frequency is, therefore, three times that of the

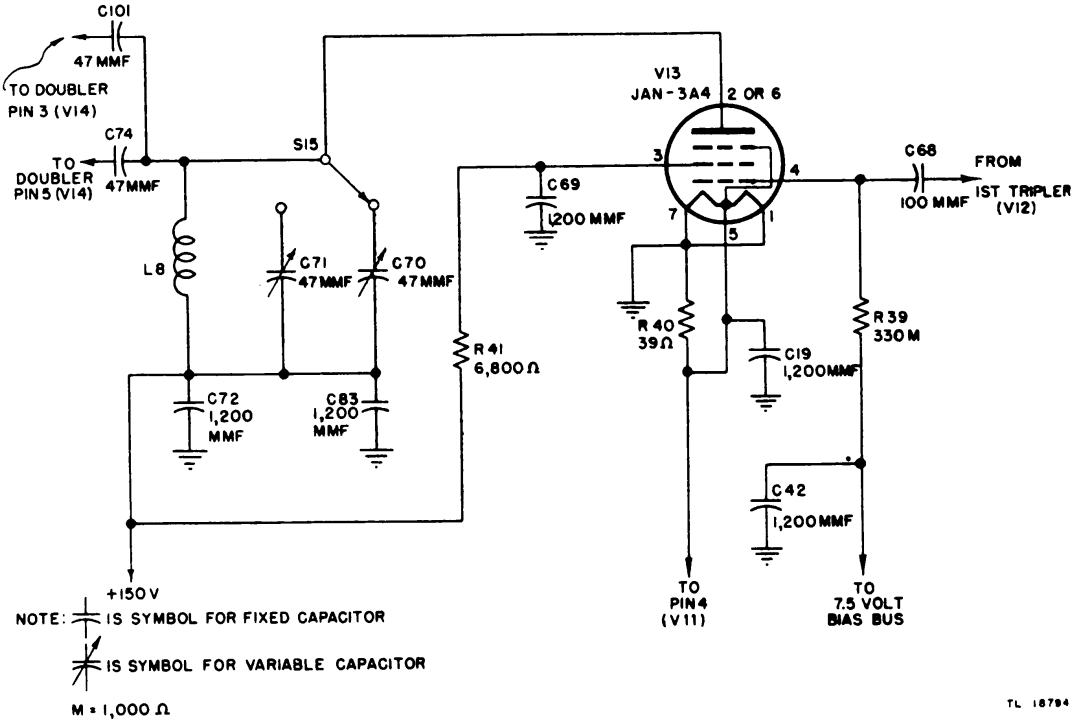


Figure 62. Transmitter second tripler.

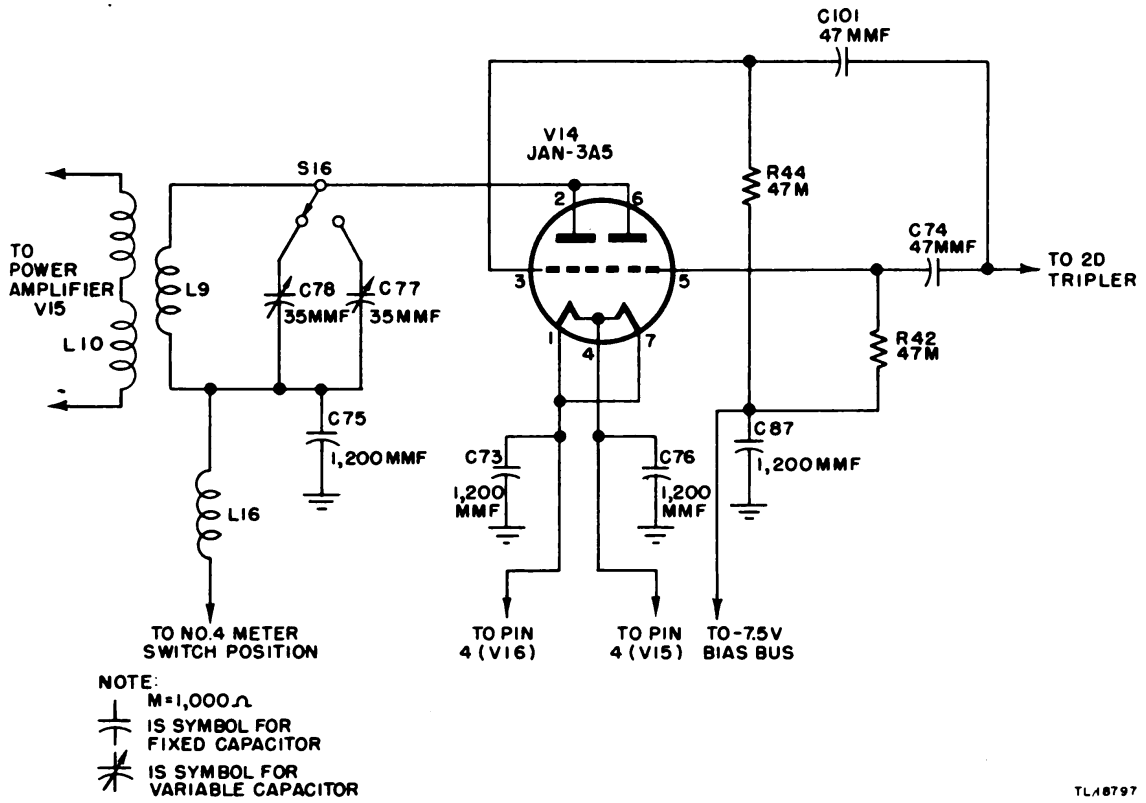


Figure 63. Transmitter doubler.

first tripler, or nine times that of the crystal oscillator. The plate supply is bypassed by capacitors C72 and C83. Screen voltage is applied through voltage-dropping resistor R41 bypassed by capacitor C69. The filament is bypassed by capacitor C19 and is shunted by resistor R40. Resistor R40 performs the same function as resistor R38 in the first tripler.

89. TRANSMITTER DOUBLER-DRIVER STAGE.

a. The doubler-driver stage (fig. 63) consists of a twin-triode Tube JAN-3A5, V14, both sections of which are used connected in parallel. The output of the second tripler is applied to one grid through capacitor C74 and across resistor R42, and to the other through capacitor C101 and across R44. Separate grid resistors are used because the characteristics of the two triodes are not identical and the same bias voltage is not suitable. By using separate grid resistors, each tube operates at its most efficient bias and is not affected by the other. A protective bias of —7.5 volts is applied from the bias supply battery and 1.5 volts is obtained from the drop in the filament circuit of tube V15, making a total fixed bias of —9 volts. The grid supply is bypassed by capacitor C87 and the filament by capacitors C73 and C76.

b. The plate circuit is tuned to resonate with the second harmonic of the input signal. Thus, the output frequency to the power amplifier is twice that of the second tripler and eighteen times that of the crystal oscillator. Plate voltage of 150 volts is applied through the meter circuit and r-f choke L16. Plate current is indicated on meter M1 when the meter switch is set to position 4. The plate supply is bypassed for radio frequency by capacitor C75. The plate load consists of coil L9 in parallel with tuning capacitor C77 or C78.

90. TRANSMITTER POWER AMPLIFIER.

a. The output of the doubler-driver is inductively coupled to p-a Tube JAN-3A5, V15 (fig. 64). Tube V15 is a twin-triode connected in a push-pull neutralized circuit. The grid circuits are tuned by means of split-stator capacitor C79 or C80 in parallel with coupling coil L10. The coil is coupled to the plate coil of the doubler-driver. A protective bias of —4.5 volts is applied through the meter circuit and resistor R43. The rotors of the tuning capacitors are grounded, thus fixing the electrical center of the grid circuit at the center of coil L10. This insures the proper out-of-phase condition for the two grids necessary for push-pull operation. The grid supply is bypassed for radio frequency by capacitor C44, and the filaments by capacitor C86.

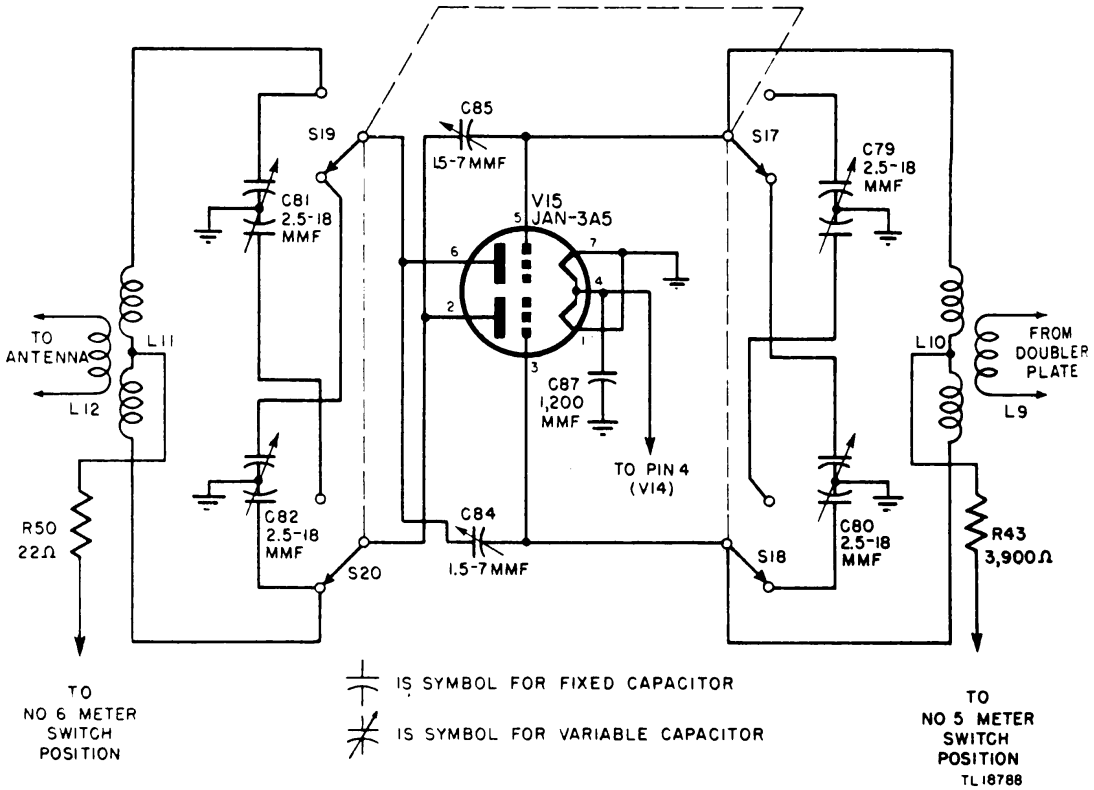


Figure 64. Transmitter power amplifier.

b. The plate circuit is tuned by plate tuning capacitor C81 or C82. These are split-stator capacitors in parallel with plate load coil L11. The rotors of the capacitors are grounded. Plate voltage is applied through the secondary of modulation transformer T8, resistor R50, and the metering circuit. The plate supply is bypassed by capacitor C88. Plate current is indicated on the meter when the meter switch is set to position 6. Resistor R50 is a plate filter resistor which aids in isolating the plate supply from radio frequency. The amplifier is neutralized by feeding back through capacitors C84 and C85 sufficient out-of-phase voltage to cancel that which is coupled through the grid-plate capacitance of the triodes. Proper adjustment of these neutralizing capacitors insures that no self-oscillation will take place in the amplifier.

c. The plate is modulated by the audio variation in the voltage applied to the center point of coil L11 through the secondary of modulation transformer T8.

91. ANTENNA SYSTEM.

a. The output of p-a tube V15 is applied to the antenna system through coil L12 (fig. 89), a three-turn coil closely coupled to plate-tank coil L11. The antenna circuit is completed through capacitor C89 or C90 and the contacts of antenna switching relay K1 to antenna jack J5 on the front panel. When relay K1 is operated by means of the press-to-talk switch on the microphone, the antenna is connected to the transmitter. Capacitor C89 or C90 is used to tune the antenna to resonance with the output frequency of the power amplifier. By proper adjustment of these capacitors and the tank tuning capacitor C81 or C82, a resistive load can be presented to the plate circuit of the amplifier and maximum antenna current can be obtained. The adjustment of these capacitors is not critical and is preset at the factory.

b. Power is fed to the antenna jack through a coaxial cable whose impedance is 50 ohms. This is the impedance also of the coaxial cable in Antenna Base AB-37/TRC-7 which connects quarter-wave Antenna AT-59/TRC-7 to the antenna jack, and of Antenna Assembly AS-112/TRC-7. The input impedance of the antenna is 50 ohms, therefore the system is matched and maximum power is applied to the antenna. The antenna is adjusted to the proper length by using the rule on the top of the case of the radio set.

92. TRANSMITTER SPEECH AMPLIFIER.

a. The speech amplifier uses one section of Tube JAN-3A5, V11, a twin triode (fig. 60). The tube is biased to —6 volts by means of —4.5 volts from the bias battery and 1.5 volts on the filament from the drop

in the filament of tube V13. The input is the voltage in the secondary of the microphone transformer T6. Microphone current is obtained from the filament supply of the radio set through the winding of relay K1 and the primary of transformer T6. Thus the transmitter is connected to the antenna by operating the press-to-talk switch on the carbon microphone. Resistor R46 is a current limiting resistor for the microphone. The A voltage supply is bypassed for audio frequencies by capacitor C91, and the microphone is bypassed for radio frequency by capacitor C100.

b. The signal from the secondary of transformer T6 is amplified in the plate circuit and appears across the primary of transformer T7 through which the plate voltage of 150 volts is applied.

93. TRANSMITTER MODULATOR.

a. The modulator stage uses Tube JAN-3A5, V16, a twin triode, in a push-pull circuit operating Class B (fig. 65). A fixed bias of —7.5 volts is applied to the grids through a connection to the center point of the secondary of coupling transformer T7. An additional 3 volts is obtained from the voltage drop across the filaments of tubes V14 and V15. The input signal to the grids of tube V16 is the voltage induced in the secondary of transformer T7 by the audio signal, developed in the plate circuit of the speech amplifier, flowing through the primary. Since the center point of the secondary is grounded through the bias supply, the 180° out-of-phase relationship of the two grids, necessary for push-pull operation, is obtained.

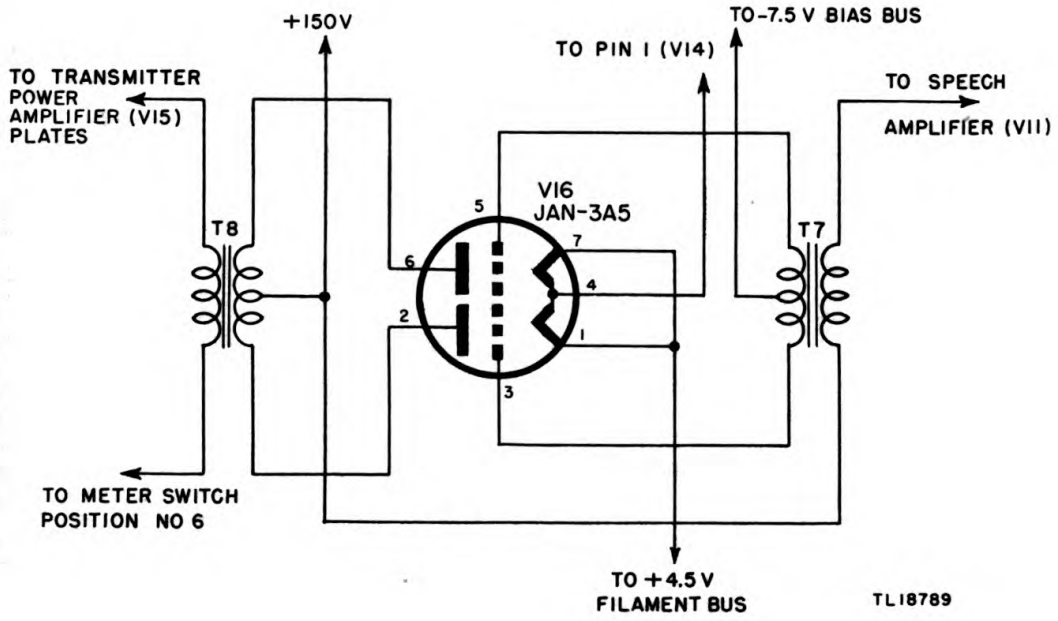


Figure 65. Transmitter modulator.

b. The primary of the modulation transformer T8 forms the plate load for the modulator. Plate voltage is applied to the center tap from the 150-volt plate supply. The turns ratio of the primary to secondary of transformer is 3/2, the proper ratio to reflect the impedance of the secondary into the primary circuit to match the output impedance of the tube. This match is necessary for maximum power transfer to the plate of p-a tube V15. Plate voltage to tube V15 is applied through the secondary of modulation transformer T8. The audio signal induced in the secondary of the transformer adds to or subtracts from the plate voltage of the power amplifier, thus modulating the output of the amplifier at the audio rate.

c. A portion of the audio signal is applied through capacitor C25 and resistor R49 to the primary of transformer T5 to provide sidetone to the headset.

94. POWER SUPPLY CIRCUITS.

a. Power required by Receiver-Transmitter RT-53/TRC-7 is furnished by Battery BA-70 or Generator G-3/TRC-7 or a combination of the two, depending on the setting of the POWER switch on the front panel. With the switch set to BAT., the battery furnishes all power for the radio set. The 150-volt plate supply is connected to contact 9 on the rear of switch S9 and through contacts 10 and 11 to the plate circuits of both the receiver and transmitter (fig. 66). The 4.5-volt source is connected to contact 5 on the front section of the switch, S21, through contact 6 to the filament circuits and contact 8 to antenna switching relay K1 and the microphone.

b. When the POWER switch is set to GEN., contacts 10, 11, and 12 on the rear switch, S9, are connected and the generator supplies plate voltage to both transmitter and receiver. Contacts 6, 7, and 8 are connected on the front section of the switch which connects the generator to all the 4.5-volt circuits.

c. The POWER switch, when in the COMB. position, connects contact 9 to 10, and contact 11 to 12 on the rear section of the switch. In this position, the generator supplies plate power to the transmitter, and the battery to the receiver. The front section of the switch connects contact 7 to 8, and the generator supplies current for the transmitter filament circuits, while the battery through contacts 5 and 6 supplies all receiver filaments.

d. Antenna switching relay K1 is controlled by the press-to-talk switch on the microphone. When the microphone switch is operated, a circuit is completed from the 4.5-volt supply through switch S9, the winding of relay K1, and the press-to-talk switch to ground. Relay K1 then

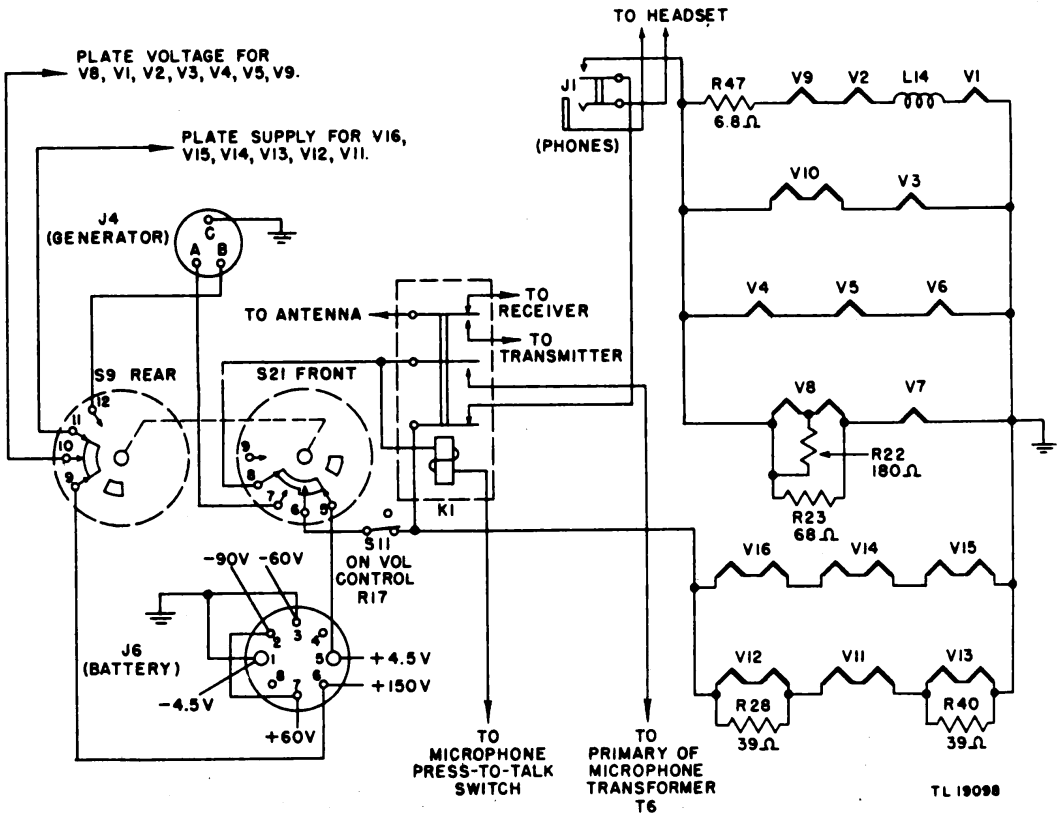


Figure 66. Control and power supply circuits.

operates, completing the 4.5-volt circuit to the primary of the microphone transformer, opening the filament supply to the receiver, and connecting the antenna to the transmitter. When the microphone press-to-talk switch is released, filament voltage is applied to the receiver through the contacts in PHONES jack J1. These contacts are closed when the headset plug is inserted in the jack. The release of relay K1 also opens the voltage supply to the microphone transformer and connects the antenna to the receiver.

95. METER CIRCUIT.

Meter M1 is connected through switch S7-8 in a circuit that enables the meter to be used to indicate the current in five separate circuits as well as the voltage of another (fig. 89). The various circuits in which the meter may be used are as follows:

a. With switch S7-8 in position 1, the meter is connected between ground and the 150-volt supply in series with 220,000-ohm resistor R37. In this position the meter indicates the voltage of the B supply.

b. In position 2 of the meter switch, the meter indicates the voltage drop across meter shunt resistor R29, and thus the plate current of receiver oscillator tube V8.

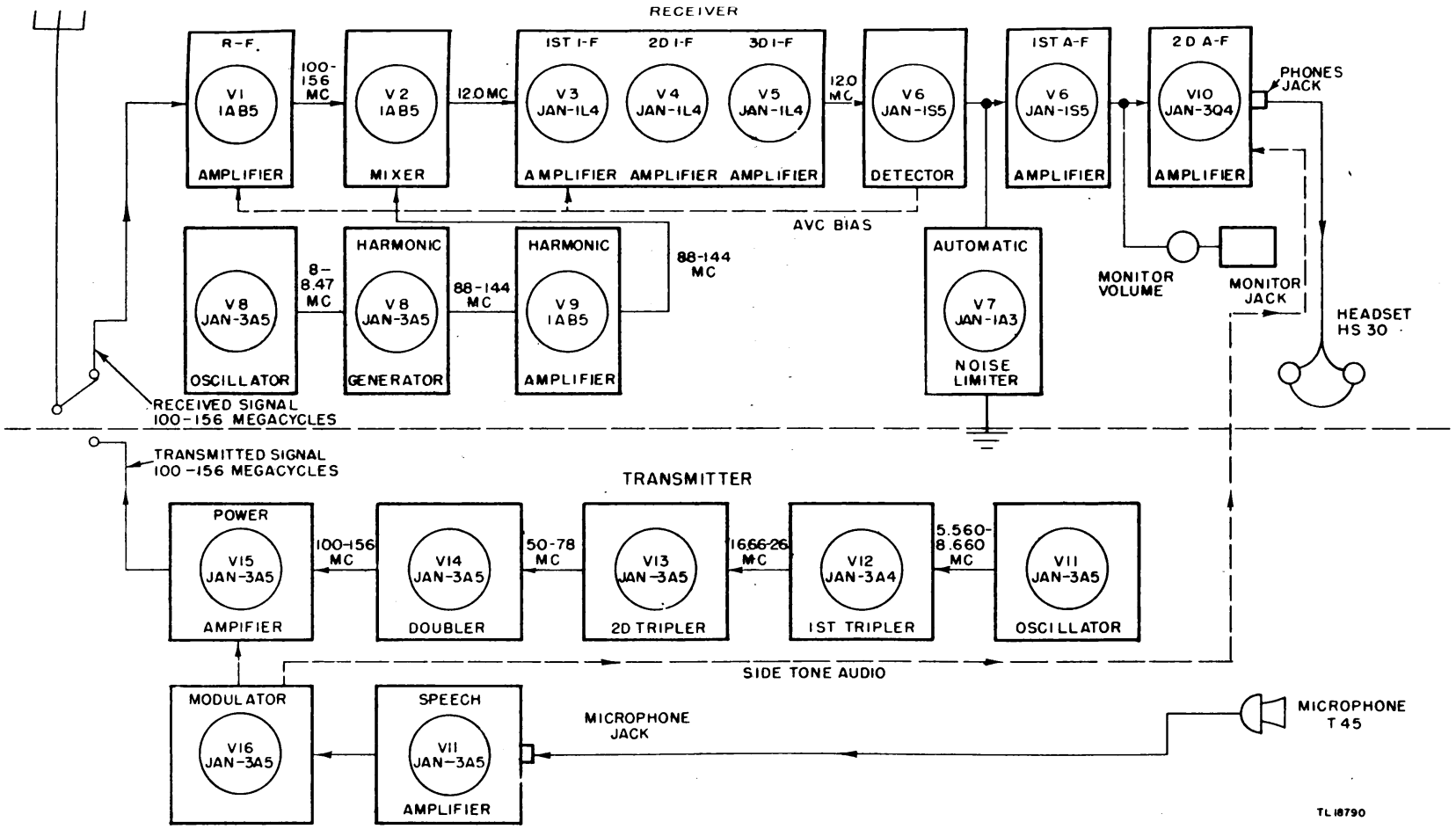


Figure 67. Radio Set AN/TRC-7, complete block diagram.

c. With switch S7-8 set to position 3, meter shunt resistor R34 is across the meter and the current in the plate of transmitter oscillator tube V11 is indicated.

d. Position 4 of the meter switch connects shunt resistor R33 in the plate supply lead of transmitter doubler tube V14. The meter then indicates the plate current of tube V14.

e. Meter M1 indicates the transmitter final amplifier grid current when the meter switch is set to position 5. Resistor R48 is the meter shunt in this position.

f. Final amplifier plate current is indicated when the meter switch is in position 6. The meter is shunted by resistor R45 through which the plate current to tube V15 flows.

96. OVER-ALL SYSTEM FUNCTIONING.

a. Complete Block Diagram. A complete block diagram of Receiver-Transmitter RT-53/TRC-7 is shown in figure 67. Each major component is shown with the interconnections to other components. The arrow on the connecting lines indicate the direction of the signal through the set.

b. Receiver Functioning. The received signal from the antenna is applied through a coaxial line and the contacts of the antenna switching relay to the r-f amplifier. The amplified signal is applied, together with the output of the harmonic amplifier, to the grid circuit of mixer tube V2. The output of the mixer is the intermediate frequency of 12 mc and is amplified in three stages of i-f amplification, tubes V3, V4, and V5. From the third i-f amplifier stage, the signal is fed into the diode detector which is part of tube V6. Noise limiter tube V7 is a diode which shunts sudden noise impulses, caused by static or ignition noise, to ground. The audio signal from the diode detector is then applied to the amplifier section of tube V6 where it is still further amplified. Tube V10 is the final audio stage and after passing through this stage, the signal is coupled to the headset. Oscillator tube V8 is crystal-controlled and furnishes the input to the harmonic generator which uses the other part of the same tube. The harmonic generator is operated with a high negative bias and the output contains many harmonics. The plate circuit of the harmonic generator is tuned to a harmonic 11 to 17 times the frequency of the oscillator. The output of the harmonic generator is amplified in harmonic amplifier stage tube V9 and applied to the grid of the mixer tube V2 where it combines with the received signal to form the intermediate frequency.

c. Transmitter Functioning. The frequency of the transmitted signal is controlled by the oscillator stage which uses one section of tube

V11. The tube is connected in a crystal-controlled tuned plate circuit. The signal from the oscillator is applied to first tripler tube V12 where the frequency is increased to three times the crystal frequency. Second tripler stage tube V13 again multiplies the input frequency by three. The output of the second tripler is fed to the doubler stage which consists of both sections of twin-triode tube V14 operating in parallel. The frequency of the output signal from the second tripler is doubled in this circuit. The output signal of the doubler is therefore 18 times that of the oscillator. The doubler output drives the p-a stage. This stage consists of tube V15, a twin-triode operating in a push-pull circuit. The amplified signal from the power amplifier is fed to the antenna through the contacts of the antenna switching relay when the push-to-talk switch on the microphone is operated. The transmitter is modulated by Microphone T-45. Audio voltage developed in the microphone is amplified in tube V11, the speech amplifier stage. The output of the speech amplifier is applied to modulator stage tube V16 operating push-pull. Voltage developed in the plate circuit is applied to the plate of tube V15, the power amplifier, and thus modulates the r-f signal to the antenna. A portion of the signal from the modulator is fed to the headset to furnish sidetone for the operator.

SECTION XII

TROUBLE SHOOTING

97. GENERAL TROUBLE-SHOOTING INFORMATION.

No matter how well equipment is designed and manufactured, faults occur in service. When such faults occur, the repairman must locate and correct them as rapidly as possible. This section contains general information to aid personnel engaged in the important duty of trouble shooting.

a. Trouble-shooting Data. Take advantage of the material supplied in this manual to help in the rapid location of faults. Consult the following trouble-shooting data when necessary:

(1) Block diagram of Radio Set AN/TRC-7 (fig. 67).

(2) Complete schematic diagram (fig. 89).

(3) Simplified and partial schematic diagrams. These diagrams are particularly useful in trouble shooting, because the repairman can follow the electrical functioning of the circuits more easily than on the regular schematics, thus speeding trouble location.

(4) Voltage and resistance data for all socket connections.

(5) Illustrations of components. Front, top, and bottom views which aid in locating and identifying parts.

(6) Pin connections. Pin connections on sockets, plugs, and receptacles are numbered or lettered on the various diagrams.

(a) Seen from the bottom, pin connections are numbered in a clockwise direction around the sockets. On octal sockets the first pin clockwise from the keyway is pin No. 1.

(b) Plugs and receptacles are numbered on the side to which the associated connector is attached. To avoid confusion, some individual pins are identified by letters which appear directly on the connector.

b. Trouble-shooting Steps. The first step in servicing a defective radio set is to sectionalize the fault. Sectionalization means tracing the fault to the component or circuit responsible for the abnormal operation of the set. The second step is to localize the fault. Localization means tracing the fault to the defective part responsible for the abnormal condition. Some faults such as burned-out resistors, r-f arcing, and shorted transformers can be located by sight, smell, and hearing. The majority of faults, however, must be located by checking voltage and resistance.

c. Localization. The method of localizing faults within the individual components is described below. These paragraphs are accompanied by trouble-shooting charts which list abnormal symptoms and their probable causes. The charts also give the procedure for determining which of the probable locations of the fault is the exact one. In addition, there are a number of drawings which show the resistance and voltage at every socket pin connection.

d. Voltage Measurements. Voltage measurements are an almost indispensable aid to the repairman, because most troubles either result from abnormal voltages or produce abnormal voltages. Voltage measurements are taken easily, because they are always made between two points in a circuit and the circuit need not be interrupted.

(1) Unless otherwise specified, the voltages listed on the voltage charts are measured between the indicated points and ground.

(2) Always begin by setting the voltmeter on the highest range so that the voltmeter will not be overloaded. Then, if it is necessary to obtain increased accuracy, set the voltmeter to a lower range.

(3) In checking cathode voltage, remember that a reading can be obtained when the cathode resistor is actually open. The resistance of the meter may act as a cathode resistor. Thus, the cathode voltage may be approximately normal only as long as the voltmeter is connected

between cathode and ground. Before the cathode voltage is measured, make a resistance check with a cold circuit to determine whether the cathode resistor is normal.

e. Precautions Against High Voltage. Certain precautions must be followed when measuring voltages above a few hundred volts. High voltages are dangerous and can be fatal. When it is necessary to measure high voltages, observe the following rules:

(1) Connect the ground lead to the voltmeter.

(2) Place one hand in your pocket. This will eliminate the possibility of making accidental contact with either ground or another part of the circuit thus causing the electricity to travel from one hand to the other.

(3) With voltages less than 300 volts, connect the test lead to the hot terminal (which may be either positive or negative with respect to ground).

f. Voltmeter Loading. It is essential that the voltmeter resistance be at least 10 times as large as the resistance of the circuit across which the voltage is measured. If the voltmeter resistance is comparable to the circuit resistance, the voltmeter will indicate a voltage lower than the actual voltage present when the voltmeter is removed from the circuit.

(1) The resistance of the voltmeter on any range can always be calculated by the following simple rule: Resistance of the voltmeter equals the ohms per volt multiplied by the full-scale range in volts. For example: The resistance of a 1,000-ohm-per-volt meter on the 300-volt range is 300,000 ohms (R = 1,000 ohms per volt times 300 volts = 300,000 ohms).

(2) To minimize the voltmeter loading in high-resistance circuits, use the highest voltmeter range. Although only a small deflection will be obtained (possibly only 5 divisions on a 100-division scale), the accuracy of the voltage measurement will be increased. The decreased loading of the voltmeter will more than compensate for the inaccuracy which results from reading only a small deflection on the scale of the voltmeter.

(3) When a voltmeter is loading a circuit, the effect can always be noted by comparing the voltage reading on two successive ranges. If the voltage readings on the two ranges do not agree, voltmeter loading is excessive. The reading (not the deflection) on the highest range will be greater than that on the lowest range. If the voltmeter is loading the circuit heavily, the deflection of the pointer will remain nearly the same when the voltmeter is shifted from one range to another.

(4) The ohm-per-volt sensitivity of the voltmeter used to obtain the readings recorded on the voltage and resistance charts in this manual is printed on each chart. Use a meter having the same ohm-per-volt sensitivity; otherwise it will be necessary to consider the effect of loading.

98. TEST EQUIPMENT.

The following test equipment is used to repair Radio Set AN/TRC-7.

a. Maintenance Equipment.

(1) Phantom Antenna TS-281/TRC-7.

(2) Tube Puller TL-310/U.

(3) Spintite wrenches.

(4) Screwdriver, small tip.

(5) Alignment Tool TL-314/U.

(6) Battery cable assembly Cord CX-240/U.

(7) One Case CY-275/TRC-7, spare tubes.

(8) One 8-32 Allen wrench.

(9) Signal generator test Cord CG-127/U.

(10) Signal generator.

b. Repair Equipment and Miscellaneous Tools.

(1) Signal generator having a 12.0-mc output such as Signal Generator I-72-G. Signal generator having 100 to 156-mc output, such as in Test Set IE-19-( ).

(2) Combination d-c voltmeter and ohmmeter, range 0 to 150 volts, resistances up to 5 megohms.

(3) Electronic voltmeter, up to 150 volts.

(4) Soldering iron with small tip.

(5) Long-nose pliers, one pair.

(6) Diagonal pliers, one pair.

99. TROUBLE-SHOOTING PROCEDURES.

a. When Radio Set AN/TRC-7 becomes defective or inoperative, the trouble can quickly be isolated to either the control circuits or to Receiver-Transmitter RT-53/TRC-7. To test for trouble in the control circuit, remove Plugs PL-55 and PL-68 from PHONES and MIC. jacks

on the front panel of Receiver-Transmitter RT-53/TRC-7. Plug the microphone and headset or handset directly into these jacks. If the receiver and transmitter operate properly, the trouble is in one of the control circuits or in the connecting cord. If trouble still is apparent, the following trouble-shooting procedure should be adopted:

(1) Be certain that the volume control is turned on.

(2) Be certain that Plug PL-55 is plugged all the way into the PHONES jack and that Plug PL-68 is plugged all the way into the MIC. jack.

(3) If the headset and microphone are used, replace with the handset or vice versa, since the particular unit used may be defective.

(4) Be certain that the battery plug contacts are clean and plugged in as far as they can go.

(5) With the ear close to the unit push the push-to-talk switch on the microphone or handset. If the relay is operating properly, a click will be heard when the switch is closed, and again when it is open.

(6) The set may be inoperative because of a run-down battery, therefore, as a check, replace with a fresh unit. If the meter selector switch on the chassis is left in position 1 when the set is sealed in the case, the meter on the front panel gives an indication of battery voltage. When the meter reads less than one-half scale, the battery voltage is down and the Battery BA-70 should be replaced.

b. Attempt to localize the trouble by examining the equipment carefully, noting abnormal effects. To analyze and inspect without test equipment, proceed as follows:

(1) Remove the chassis from the case and examine the wiring for poorly soldered connections, damaged wiring, parts shorting against each other or against the chassis case, and bad sockets or socket connections. Make certain tubes are not cracked or broken, and that they are plugged all the way into their **proper** sockets. Any tube exhibiting a milky color on the inside of the glass envelope can be assumed to be bad, either cracked or gassy, even if the crack is not visible. Such a tube should be replaced.

(2) Examine the component parts for those which appear abnormal, such as bloated capacitors, charred or broken resistors, broken sockets, tubes, controls, etc.

(3) If no tube checker or continuity tester is available replace the tubes one at a time with a substitute tube known to be in good condition.

(4) Connect Battery BA-70 to the set by means of Cord CX-240/U. This enables the set to be operated while out of its case.

(5) Feel the various components for signs of excessive heating.

(6) Shorted parts, or any part through which excessive current is passing usually give off a strong odor. Examine for the presence of unusual odors. Sometimes a shorted resistor will show heat by a blistering of the finish.

(7) With the antenna in position and the set turned on, listen for excessive hum, distortion, fading, etc.

(8) Make sure that the location is ideal for correct operation of this equipment. That is, with correct antenna position, no high tension wires in the immediate vicinity, etc.

c. If the above methods fail to localize the trouble, test equipment must be used.

100. INSTRUMENT TEST METHODS.

a. Preliminary Precautions.

(1) Do not check filament continuity with an ohmmeter unless the highest scale is used.

(2) Do not remove tubes unless there is an indication that one or more is defective.

(3) When using a test prod to take voltage measurements cover most of the prod with tape so that only the point is exposed. This prevents short circuits.

(4) Before connecting the Battery BA-70 always check for shorts between A positive and the high-voltage prongs on the power input plug. There should be a high resistance of at least 500,000 ohms.

(5) Before repairing a set, get the operator's report on the trouble, but do not depend entirely on this report.

(6) Always check the alignment of set before removing circuit elements.

(7) Never replace any tube or circuit element until the cause for failure of the damaged element has been determined and corrected. Failure to observe this precaution may result in almost immediate failure of the new part.

b. General. After the trouble has been localized to one section of the set, use test instruments to find the exact part causing the trouble. To

assist in testing the set, tables of normal values of resistances and voltages are provided in figures 68 and 69 respectively. Resistance tables indicating the resistance between socket contacts and ground and between terminals and ground are furnished. Voltage test tables are supplied also, which indicate voltages from all sockets to ground, and all terminals to ground.

c. Signal Tracing and Substitution. Signal tracing and signal substitution may be used to localize trouble that cannot be found by voltage and resistance checks. For further information and instructions in the use of test instruments involved in resistance and voltage measurements and for signal generators and other instruments used in signal tracing and signal substitution, refer to the technical manuals supplied with these instruments.

d. Panel Meter. Radio Set AN/TRC-7 is equipped with a meter on the front panel, which may be inserted into any one of six circuits in the set by means of a six-position selector switch mounted on the chassis. These positions connect the meter as follows:

Position	Indicates
1	Battery voltage
2	Receiver oscillator plate current
3	Transmitter oscillator place current
4	Doubler plate current
5	R-f p-a grid current
6	R-f p-a plate current

Standard readings of this meter for the various positions are as follows:

Position	Reading
1	Above half-scale (BA-70 should be replaced when meter in this position reads less than half scale)
2	Three divisions
3	Three divisions
4	One-half to three-quarters full scale
5	Half-scale
6	Full-scale (normal if slightly off scale)

101. TROUBLE-SHOOTING CHARTS.

The accompanying trouble-shooting charts, if properly used, simplify trouble shooting. The charts are arranged in two groups. The first group of charts localizes the trouble to the various components and circuit elements, thus saving time that otherwise might be lost in checking components that are free of trouble. The second group of charts (figs. 68, 69 and 70) shows the resistance and voltage at various easily reached points in the circuit. This enables the repairman to rapidly check various circuits and circuit elements.

Symptoms	*Probable Trouble*	*Corrections*
1. Receiver dead.	1. Power switch off.	1. Turn VOLUME control to right.
	Plug PL-55 not in phone jack.	Plug headset into PHONES jack.
	Relay stuck.	Attempt to free with probe. If this fails replace relay.
	Set always transmitting.	Replace push-to-talk switch if defective, or relay if defective.
	Defective handset or headset.	Replace.
	Dead or low Battery BA-70.	Replace battery.
	Hand generator not operating.	Replace hand generator.
	Defective crystal.	Replace crystal.
	Antenna insulator shorted by water or dirt.	Clean.
	Antenna touching wet foliage or overhead wire.	Move antenna.
	Defective or burned-out tube.	Replace.
2. Weak receiver.	2. Receiver misaligned.	2. Realign.
	Receiver not preset.	Preset.
	Weak Battery BA-70.	Replace battery.
	High resistance short across antenna insulator caused by water or dirt.	Wipe off insulator.
	Defective antenna.	Replace antenna.
	Antenna touching overhead wires or wet foliage.	Move antenna.

101. TROUBLE-SHOOTING CHARTS (contd).

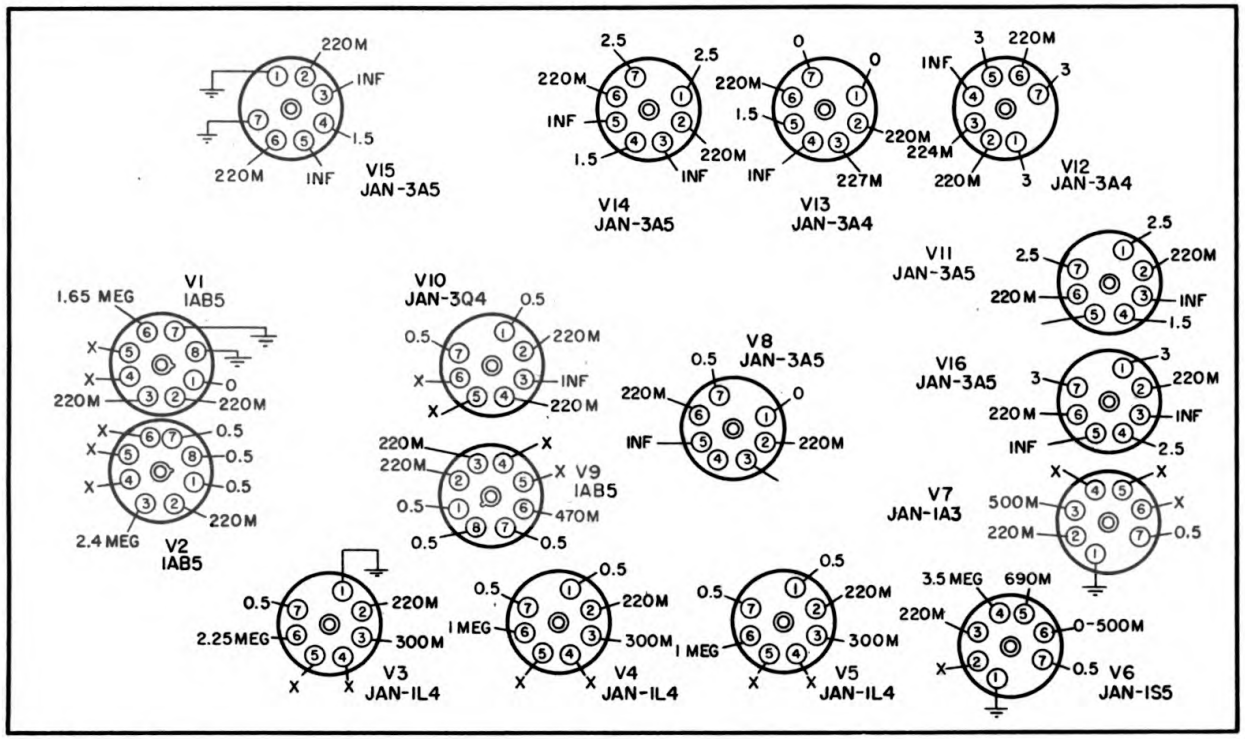
Symptoms	*Probable Trouble*	*Corrections*
	Receiver out of range of transmitter.	Move closer to transmitter.
	Defective Handset H-23-( )/U or Headset HS-30-( ).	Replace.
	Poor location.	Change location.
	Defective or burned-out tube.	Replace tube.
3. Receiver noise.	3. Insufficient input signal.	3. Move closer to transmitting station.
	Antenna shorted.	Replace antenna.
	Defective tubes.	Check unit; replace tubes.
	Nearby electrical interference.	Change location.
4. Intermittent reception.	4. Loose antenna connection.	4. Tighten antenna connections.
	Plugs not completely inserted in jacks.	Push plugs in all the way.
	Poor contact on CHANNEL SELECTOR switch.	Replace CHANNEL SELECTOR switch.
	Loose connections.	Check and resolder any loose connections.
5. Transmitter dead.	5. No Plug PL-68 in MIC. jack.	5. Insert Plug PL-68 in MIC. jack.
	Defective push-to-talk switch on handset.	Replace handset.
	Defective microphone.	Replace microphone.
	Defective crystal in crystal oscillator.	Replace crystal.
	Transmitter not preset.	Preset.
	Defective or burned-out tubes.	Replace necessary tubes.
	Antenna touching overhead wires or wet foliage.	Move antenna.
	Dead or low Battery BA-70.	Replace Battery BA-70.
	Shorted bypass capacitor, or open resistor.	Replace.

101. TROUBLE-SHOOTING CHARTS (contd).

Symptoms	*Probable Trouble*	*Corrections*
6. Transmitter weak.	6. Weak Battery BA-70.	6. Replace Battery BA-70
	Weak tube.	Replace tube.
	Defective or broken antenna.	Replace.
	Link coupling for antenna bent out of place.	Put in proper position.
7. Distortion.	7. Not neutralized.	7. Neutralize.
	Defective audio tube, receiver or transmitter.	Replace defective tube.
	Weak bias battery.	Replace bias cells.
	Defective microphone, driver, or modulation transformer (T6, T7, or T8).	Check and replace if defective.
8. Intermittent transmission.	8. Loose connections.	8. Tighten connections.
	Defective push-to-talk switch.	Replace push-to-talk switch or entire microphone.
	Defective antenna (intermittent ground).	Replace antenna.
9. No sidetone.	9. Resistor R49 or coupling capacitor C25 open. Speech amplifier tube V11 defective.	9. Replace defective unit.
10. CHANNEL SELECTOR switch stuck.	10. Gear teeth on dial mechanism broken, worn, or extremely dirty.	10. Replace or clean.
	Bearing badly worn; side thrust prevents operation.	Replace defective bearing.
11. No headset noise in one or both channel positions.	11. Switch contacts on wafers broken.	11. Replace contacts.
	Switch contacts on wafers dirty.	Clean contacts.
	Broken lead.	Resolder lead.
	Shaft coupling loose and wafers do not turn as knob is rotated.	Tighten couplings.

101. TROUBLE-SHOOTING CHARTS (contd).

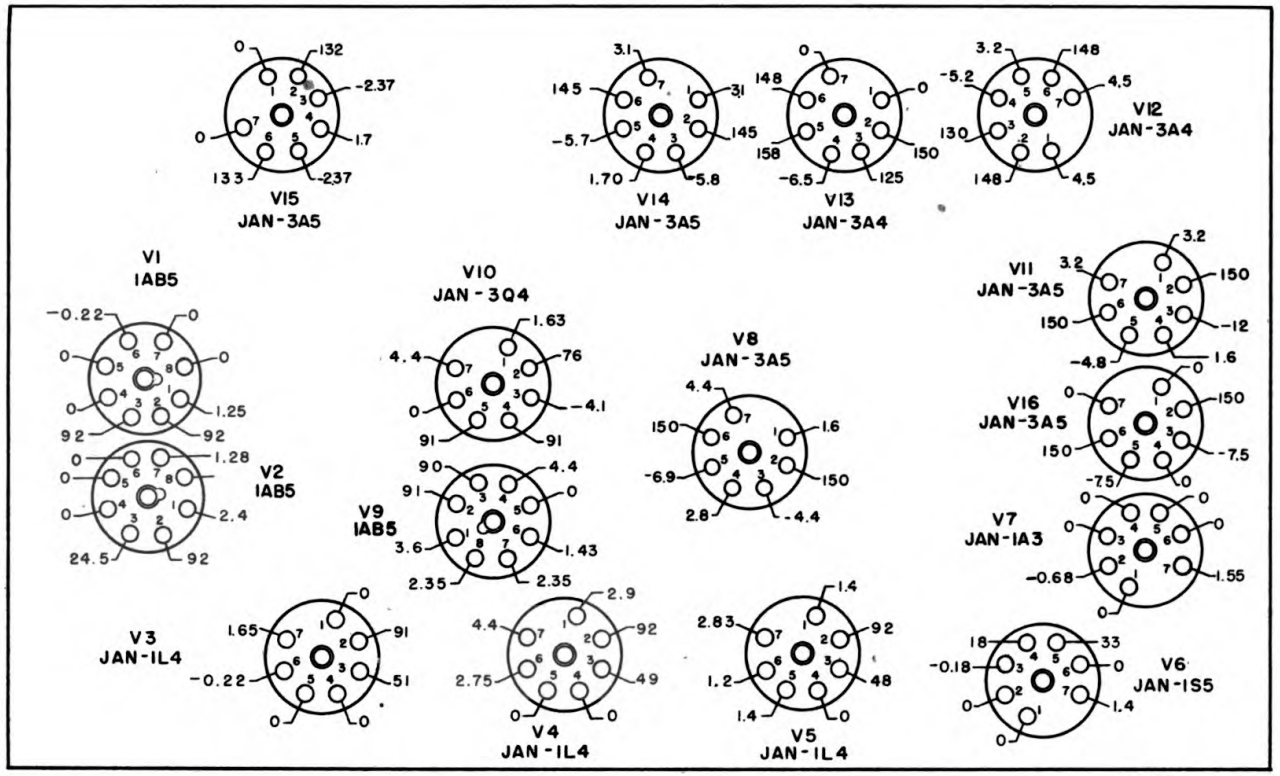
Symptoms	*Probable Trouble*	*Corrections*
12. Phanton Antenna TS-281/TRC-7 does not light when push-to-talk switch depressed on either channel.	12. Defective transmitter tube.	12. Check and replace tubes if necessary.
	Both channels detuned.	Preset.
	Oscillator not oscillating.	Check oscillator tube.
		Check oscillator circuit elements including Resistor R-22.
13. Phantom Antenna TS-281/TRC-7 lights on one channel, but not on other.	13. One channel detuned.	13. Preset.
	Defective or dirty contact on transmitter wafer section.	Replace or clean.
	Dirt in one or more tuning capacitors for the defective channel.	Clean.
14. Phantom Antenna TS-281/TRC-7 does not brighten when speaking into microphone.	14. Defective driver tube V14 or modulator tube V16.	14. Check and replace tubes if necessary.
	Microphone transformer T6, driver transformer T7, or modulation transformer T8 defective.	Replace defective unit.
	Defective microphone.	Replace.



NOTES:
ALL RESISTANCE READINGS TAKEN WITH:
ALL TUBES AND CRYSTALS IN SOCKETS
METER SWITCH ON POSITION 1
POWER SWITCH ON BAT.
HEADSET HS-30-( ) IN PHONES JACK
MICROPHONE T-45 IN MIC. JACK
ALL READINGS IN OHMS
BATTERY-GENERATOR NOT CONNECTED
X = NO CONNECTION
M = 1,000

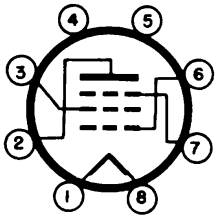
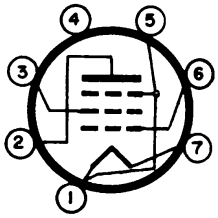
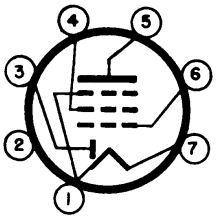
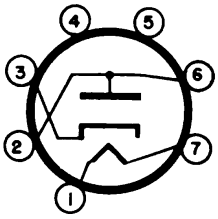
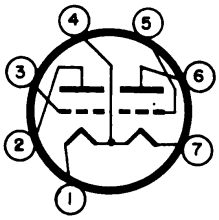
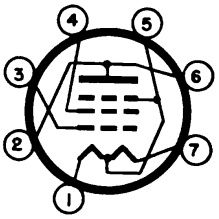
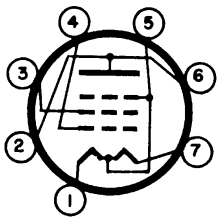
TL 19099

Figure 68. Resistance chart.



NOTE: ALL READINGS TAKEN WITH VACUUM TUBE VOLTMETER,
METER SWITCH IN POSITION 1.
POWER VOLUME CONTROL ON
POWER SWITCH ON BAT.
MICROPHONE T45 IN MIC. JACK
HEADSET HS-30-( ) IN PHONES JACK
BATTERY BA-70 CONNECTED TO SET
BIAS BATTERIES INSTALLED
ALL READINGS IN VOLTS

Figure 69. Voltage chart.

TUBES		TUBES	
1AB5 V1, V2 V9 TUBE BASE		JAN-1L4 V3, V4 V5 TUBE BASE 6AR	 INTERNAL SHIELD
TUBE		TUBE	
JAN-1S5 V6 TUBE BASE 6AU		JAN-1A3 V7 TUBE BASE 5AP	
TUBES		TUBE	
JAN-3A5 V8, V11 V14, V15 V16 TUBE BASE 7BC		JAN-3Q4 V10 TUBE BASE 7BA	
TUBES		TYPE	DESIGN
JAN-3A4 V12, V13 TUBE BASE 7B8		1AB5 JAN-1L4 JAN-1S5 JAN-1A3 JAN-3A5 JAN-3Q4 JAN-3A4	PENTODE PENTODE DIODE - PENTODE DIODE TWIN TRIODE BEAM POWER BEAM POWER

TL 18772

Figure 70. Tube base connections.

SECTION XIII

REPAIRS

102. GENERAL.

a. Only competent personnel supplied with adequate tools and instruments are authorized to service and repair this equipment. An inexperienced operator attempting to make repairs which should be made by a competent repairman may damage the equipment to such an extent that it has to be sent to a higher echelon for repair.

b. The removal and replacement of defective parts or circuit elements in this radio set is very difficult; great care must be taken to avoid further damage to the set or to the new part being installed. Before attempting repairs, make every effort to obtain the proper tools for the job.

c. Often it may be necessary to remove other circuit elements to gain access to the defective part. A record should be made of the connection to each element removed and its position in a set. Tag each wire that has been removed so that the wire can be returned to its original position.

d. Clip all leads as short as possible and avoid using more solder than is necessary to make a good secure connection. The slightest amount of solder accidentally dropped inside the set can cause a short circuit. Exercise extreme care when soldering. Do not heat lugs or connections more than is absolutely necessary. Excessive heat damages nearby chokes, capacitors, coil forms, and wiring. When connecting a wire to a tube socket, use a wire long enough to prevent pull on the socket. Before removing a part that appears to be defective, make a thorough electrical check.

CAUTION: Never change the location of parts or wiring leads; undesirable feed back and oscillations may result.

e. Use extreme care in disassembling and reassembling mechanical units. Secure bolts snugly, but do not overtighten them.

103. HANDLING OF TOOLS.

a. Careful handling of tools is essential in the maintenance of signal equipment. Grasp tools firmly. Do not drop or jar them against breakable parts of the set. A tool dropped on the chassis of Receiver-Transmitter RT-53/TRC-7 may damage tubes, resistors, or other delicate components. Do not strain wires, cables, connections, or couplings unnecessarily. Do not provide space for working on a part by carelessly pushing aside other parts which are in the way.

b. Work can be performed rapidly and efficiently with well-kept tools. When a job has been completed, wipe the tools with a cloth slightly dampened with oil. Occasionally oil the hinge rivets of pliers and similar tools to keep them working freely. Inspect the handles of driving tools to see that they are tight and free from chips and splinters. When tools are to be stored for a long time, cover the surfaces with heavy grease (type GL) as a preservative. Do not use thin oil because its tendency to break down may permit moisture to corrode or rust the metal.

104. CONSTRUCTION OF SOLDERING TIP.

The mechanical compactness of Receiver-Transmitter RT-53/TRC-7 makes it difficult to solder and unsolder certain parts. To perform soldering operations at ease with close quarters, reshape a standard size soldering iron tip to a chiselpoint (fig. 47).

105. TUBE CHECKING AND REPLACEMENT.

a. Loosen Receiver-Transmitter RT-53/TRC-7 in the chassis case by unfastening the two clip catches on either side of the front panel. Remove chassis from case.

b. While the set is out of the case, supply power by plugging Cord CX-240/U into the battery and connecting to the set. Set may then be operated while out of the case.

c. If a tube checker is not available, check tubes by replacing them one at a time with another tube known to be in good working condition. Only replace defective tubes. If the trouble is not caused by a burned-out or broken tube, do not attempt further analysis unless complete test equipment is available. When checking tubes by this method, always be certain that an exact replacement for the tube in question is used. Check this by reading the type number of the tube removed from the socket, and also by comparing the new tube with the type number stamped on the chassis. The tube layout is shown in figure 80. To remove a tube shield, press down on the shield, twist it slightly to the left, and lift it off. To replace tube shield, place the shield over the tube, line up the slots, press the tube shield down, and twist it to the right to lock it in place. The tube shield must be replaced because it prevents interaction between circuits and helps to hold the tubes in their sockets.

106. TESTING TUBES WITH TEST SET 1-56-( ).

When using Test Set 1-56-( ), consult the following technical manuals for tube testing information:

Test Sets I-56, -C, -D, -H, and -J ..... TM 11-303
Test Set I-56-E ..... TM 11-321
Test Set I-56-K ..... TM 11-2627

107. BATTERY CHECKING AND REPLACEMENT.

The battery is checked by putting the meter selector switch in position 1. If the meter reads less than half-scale (five divisions), the battery has exceeded its useful life and must be replaced. Battery BA-70 is replaced by loosening the two straps that hold it in place, lifting the chassis case off the battery, and replacing it with a new one.

108. REPLACEMENT OF CHANNEL SELECTOR SWITCH WAFERS.

Remove chassis from case and place it bottom side up. Using the Allen wrench furnished, loosen hexagonal screws in shaft coupling of shaft passing through wafer to be replaced. Slide shaft out through wafers and hole in chassis near crystal sockets. Unsolder wires from wafer, remove bolts holding wafer, and remove wafer. To replace, follow above instructions in reverse.

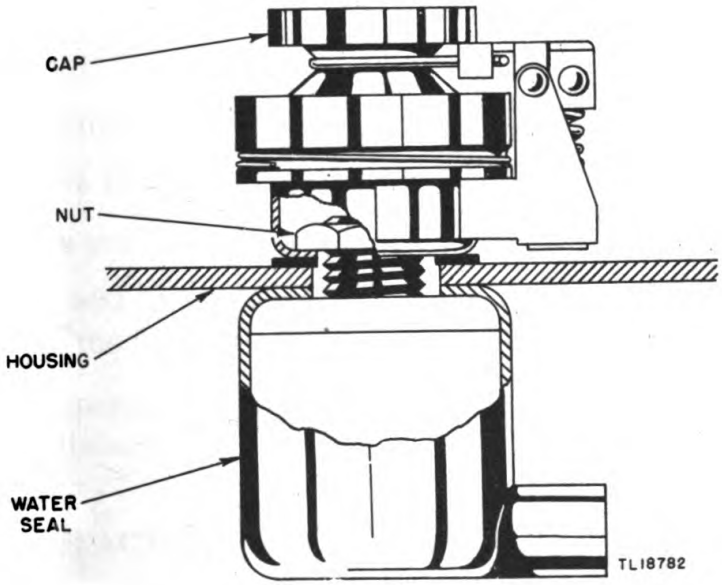


Figure 71. Waterseal jack assembly.

109. REPLACEMENT OF JACKS.

Remove chassis from case. Open jack plug and remove wire ring holding the neoprene gasket. Remove the gasket, then the nut holding the jack is accessible. Remove nut and jack is free. To replace follow procedure in reverse taking care to make all surfaces tight and waterproof (fig. 71).

110. REPLACEMENT OF OTHER PARTS.

All other parts are readily accessible. Before removing some parts it will be necessary to remove the gang switch shaft and some of the wafer switches.

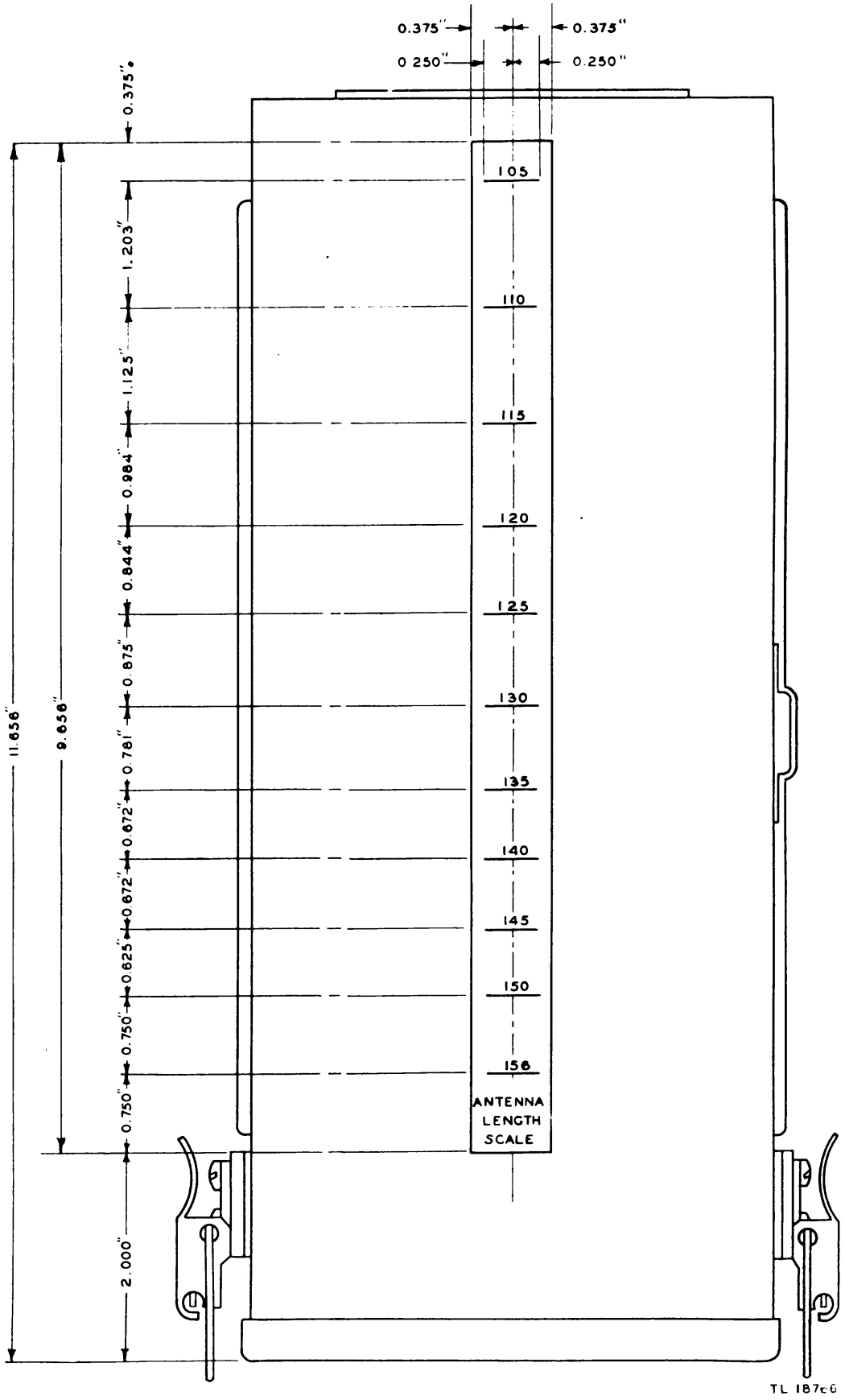


Figure 72. Antenna scale.

111. ANTENNA SCALE.

If the antenna scale on the top of the cabinet becomes obliterated, it can be replaced by referring to figure 72.

112. RUSTPROOFING AND REPAINTING.

a. If the finish on the case is badly scarred or damaged, the repairman should touch up the exposed surfaces to prevent rust and corrosion. Using #00 or #000 sandpaper, clean the surface down to the bare metal until the finish is bright and smooth. Apply paint with a small brush

> **CAUTION:** The use of steel wool is not recommended. Although it removes rust rapidly, the small particles of metal which often fall into the case cause internal electrical shorting or grounding of circuits.

b. If a complete repainting job is necessary, proceed as follows:

(1) Remove the chassis from the case.

(2) Loosen rust and corrosion with dry-cleaning solvent.

(3) Using #00 or #000 sandpaper, clean the surface down to the bare metal until the finish is bright and smooth.

(4) Spray-paint the entire case using a paint which is authorized by existing regulations.

113. UNSATISFACTORY EQUIPMENT REPORT.

a. When trouble in equipment used by Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, War Department Unsatisfactory Report, W.D., A.G.O. Form No. 468 should be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D.C.

b. When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form No. 54 should be filled out and forwarded through channels.

c. If either form is not available, Form No. 468 (fig. 73) may be reproduced, filled out, and forwarded through channels. When Army Air Forces Form No. 54 is required but unavailable, reproduce Form No. 468 and forward it through channels in accordance with directions on Form No. 468.

WAR DEPARTMENT

UNSATISFACTORY EQUIPMENT REPORT

FOR (Technical service) Signal Corps FROM (Organization) 351 Sig Repair Co MATÉRIEL (Station) APO 285 San Francisco, Cal. DATE 15 Nov 44

TO (Next superior headquarters) Signal Officer, Second Army (Station) (Technical service)

COMPLETE MAJOR ITEM

NOMENCLATURE: Receiver & Transmitter BC-1000-A TYPE: Vehicular

MODEL: A MANUFACTURER: Philco Corp

U. S. A. REG. NO.: Order No. 26925-Phila-44-01 SERIAL NO.: 243 DATE RECEIVED: 5 Nov 44

EQUIPMENT WITH WHICH USED (IF APPLICABLE): AN/VRC-3

NOMENCLATURE OF DEFECTIVE COMPONENT

PART NO.: Stock No. 2Z3543-4300 TYPE: Crystal Unit FT-243 4,300 kc Transmitting

MANUFACTURER: Philco Corp DATE INSTALLED: 7 Nov 44

LENGTH OF SERVICE

DATE OF INITIAL TROUBLE: 14 Nov 44

TOTAL TIME INSTALLED: YEARS —, MONTHS —, DAYS 7

TOTAL PERIOD OF OPERATION BEFORE FAILURE (FILL IN WHERE APPLICABLE): YEARS —, MONTHS —, DAYS —, HOURS 60 operating time, MILES, ROUNDS

DESCRIPTION OF TROUBLE AND PROBABLE CAUSE

GIVE TYPE OF FAILURE, MECHANICAL, ELECTRICAL, WORKMANSHIP, MATERIAL, DESIGN

Electrical; output of crystal low when received at repair shop

UNUSUAL SERVICE CONDITIONS

GIVE BRIEF DESCRIPTION

high temperature and humidity

TRAINING OR SKILL OF USING PERSONNEL (CHECK ONE): POOR FAIR ✓ GOOD

DESCRIPTION OF ANY REMEDIAL ACTION TAKEN

Crystal replaced

RECOMMENDATIONS

More complete check be made on crystal activity at time of manufacture

1ST IND. OFFICE STATION DATE

TO CHIEF (Technical service) Signal Officer, Washington 25, D.C.

NAME STATION RANK

ORIGINATING OFFICER

SIGNATURE: R D VanMetre

NAME: R.D. VAN METRE

RANK AND TITLE: Capt Sig C

ORGANIZATION: 351 Sig Repair Co.

INSTRUCTIONS

1. It is imperative that the Chief of Technical Service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.

2. This form will be used for reporting manufacturing, design or operational defects in matériel with a view to improving and correcting such defects, and for use in recommending modifications of matériel.

3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair, or the issue of parts and equipment. It does not replace currently authorized operational or performance records.

4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (Change No. 3).

5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches or other illustrative material are highly desirable.

6. When cases arise where it is necessary to communicate with a chief of service in order to secure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.

7. This form will be made out by using or service organizations and forwarded in duplicate through command channels to the chief of technical service. The office of the chief of technical service receiving the report will forward an information copy to the Commanding General, Army Ground Forces or Army Air Forces, whichever is applicable, and to the Commanding General, Army Service Forces.

8. Necessity for using this form will be determined by the using or service troops.

W. D., A. G. O. Form No. 468
1 December 1942

16—67786-1

TL13596

Figure 73. Unsatisfactory Equipment Report.

SECTION XIV

ALIGNMENT AND ADJUSTMENT

114. ALIGNMENT OF RECEIVER SECTION OF RECEIVER-TRANSMITTER RT-53/TRC-7.

a. General. The only alignment procedure required on the receiver is that of the i-f stages. All other adjustments are given in paragraph 117 under presetting. The following equipment is necessary to align the i-f stages: A signal generator capable of providing a 12-mc signal modulated at an audio frequency, an output meter, and Alignment Tool TL-314/U. Headset HS-30-( ) may be used if no output meter is available. Cord CX-240/U is used to connect the chassis to the battery when the chassis is removed from the case.

b. Alignment Procedure.

(1) Remove the chassis from the case by releasing the four clamps on the sides.

(2) Connect the GENERATOR receptacle on the chassis to the battery with Cord CX-240/U.

(3) Connect the output meter to the PHONES jack or plug in the headset if no meter is available.

(4) Set the signal generator to 12 mc modulated by a 400-cps (cycles per second) audio frequency, and connect the output by means of a 50-mmf (micromicrofarad) capacitor to the plate of tube V4 (pin 2). Connect the ground lead of the signal generator to the chassis of the set.

(5) Turn on the set by rotating the POWER VOLUME control fully clockwise to maximum volume.

(6) Adjust the output of the signal generator until the tone in the headset is barely audible or until the reading of the output meter is very low. If no output is obtained, adjust the signal generator for maximum output.

(7) With the alignment tool turn the screw protruding from the bottom of transformer T4 (fig. 77) until the output at the PHONES jack is maximum. As the output signal increases in volume, the output of the signal generator should be decreased, keeping the output volume of the set at a low value.

(8) Couple the signal generator to pin 2 of tube V3 and repeat the procedure outlined in (6) and (7) above, tuning the coupling impedance coil T3 for maximum output.

(9) Repeat the same procedure with the signal generator connected to the plate of tube V2 (pin 2), and tune coil T2 for maximum output.

(10) Connect the signal generator to the plate of tube V1 (pin 2), and tune coil T1 for maximum output. Now, with the signal still connected to tube V1, retune transformer T4, coil T3, coil T2, and coil T1 until maximum output is obtained. The i-f stages are now aligned.

115. NEUTRALIZATION OF TRANSMITTER POWER AMPLIFIER.

a. General. Neutralizing capacitors C84 and C85 are adjusted at the factory and should need no attention in the field. If it is known that the neutralization is out of adjustment, the following procedure may be followed in an emergency.

b. Neutralization Procedure.

(1) Align the transmitter using a crystal corresponding to a frequency lower than 130 mc. Follow the method outlined in paragraph 116 on presetting. Detune the plate circuit of the power amplifier by changing the adjustment of plate tuning capacitor C81 or C82 from the setting given minimum reading on the meter when the meter switch is set to position 6. Then set the meter switch to position 5. The meter now reads grid current of the final amplifier.

(2) Adjust the final amplifier plate tuning control capacitor C81 or C82 for minimum meter deflection.

(3) With the insulated blade of the Tuning Tool TL-314/U, adjust capacitors C84 and C85 for maximum meter deflection.

(4) Recheck the adjustments of (2) and (3) above.

(5) Recheck the presetting of the transmitter by following the procedure given in paragraph 116 on presetting.

SECTION XV

PRESETTING

116. TRANSMITTER PRESETTING.

a. Preliminary Procedure.

(1) Remove the chassis of Receiver-Transmitter RT-53/TRC-7 by opening the four clamps and carefully sliding the unit out of the case.

(2) Check all tubes for emission and shorts on a tube tester.

(3) Connect Receiver-Transmitter RT-53/TRC-7 to Battery BA-70 by plugging one end of test Cord CX-240/U into Battery BA-70 and the other end into the generator receptacle on the front panel of the set.

(4) Plug Handset H-23( )/U (or Microphone T-45 and Headset HS-30-( )) into the MIC. and PHONES jacks on the front panel.

(5) Turn on the set by turning the POWER switch to BAT. and turning the POWER VOLUME switch clockwise from the OFF position.

(6) Remove the cap from the ANTENNA socket and plug in phantom Antenna TS-281/TRC-7.

b. Presetting Transmitter Stages.

(1) Transmitter Crystal Oscillator.

(a) To align either channel, insert a crystal into TRANS. CHAN. 1 or TRANS. CHAN. 2 in the rear of the chassis (fig. 77) and turn the CHANNEL SELECTOR switch on the front panel to the channel in which the crystal has been inserted.

(b) Set the meter selector switch (found at the rear top of chassis, fig. 75) to position 3 (transmitter crystal oscillator current) with a screwdriver.

(c) Depress the press-to-talk switch on Handset H-23( )/U (or Microphone T-45), and rotate either capacitor C61 or C62 (upper rear corner of the left side, fig. 79) until a slight rise in oscillator plate current is noted on the panel meter.

(2) First Tripler, Second Tripler, and Doubler Stages.

(a) If presetting channel 1, adjust trimmer capacitors C65, C71, C77, C79, and C81 to the approximate frequency as calibrated on each capacitor. If presetting channel 2, adjust trimmer capacitors C66, C70, C78, C80, and C82 to approximate frequency. These capacitors are located on the upper left side of the chassis (fig. 79).

(b) Set the meter selector switch to position 4 (doubler plate current).

(c) If the adjustment of second tripler tuning capacitor C70 or C71 is approximately correct, the doubler plate current may be peaked by adjusting first tripler plate tuning capacitor C65 or C66 for maximum deflection of the meter.

(d) Adjust second tripler plate tuning capacitor C70 or C71 for maximum current as indicated by the meter.

(e) Adjust doubler plate tuning capacitor C77 or C78 for minimum current as indicated by the meter.

(3) Radio-frequency Power-amplifier Stage.

(a) Set meter selector switch to position 5 (r-f p-a grid current).

(b) Adjust p-a grid tuning capacitor C79 or C80 for maximum meter reading.

(c) Leaving the meter switch in position 5, readjust capacitors C65, C71, C77, C79, and C81, or capacitors C66, C70, C78, C80, and C82 for maximum reading.

(d) Set the meter selector switch to postion 6 (p-a plate current).

(e) Adjust the p-a plate tuning capacitor C81 or C82 for minimum plate current as indicated on the panel meter.

(f) Readjust all tuning capacitors previously adjusted for maximum brilliance of phantom Antenna TS-281/TRC-7.

c. Antenna Tuning. Adjustment of antenna tuning capacitors C89 or C90 is done at the factory and should not be disturbed.

117. RECEIVER PRESETTING.

a. Preliminary Procedure.

(1) Remove the chassis from the case by opening the four clamps and carefully sliding the unit out of the case.

(2) Plug one end of Cord CX-240/U into the battery and the other end to the GENERATOR receptacle on the front panel of the set.

(3) Insert the proper crystal, into either the REC. CHAN. 1 or REC. CHAN. 2 socket, depending upon which channel is to be preset. The proper frequency for the crystal is determined from the following equation:

$$F_r = \frac{1000\ (F_c - 12)}{H}$$

Where: F_r = crystal frequency in kilocycles
F_c = carrier frequency to be received in megacycles and H (harmonic) is taken from the following table:

F_c	H
100—107.99	11
108—115.99	12
116—123.99	13
124—131.99	14
132—139.99	15
140—147.99	16
148—155.99	17

(4) Set the CHANNEL SELECTOR switch to the channel in which the crystal has been inserted.

(5) Set oscillator tuning capacitor C46 or C47 for maximum capacity (plates fully meshed). Use alignment Tool TL-314/U for this and all other tuning adjustments.

(6) Adjust the remaining receiver tuning capacitors C1, C7, C49, and C57, or C2, C6, C50, and C56 approximately to the desired frequency as indicated by the calibration marked on each capacitor. The odd-numbered controls tune channel 1 and the even-numbered controls tune channel 2.

(7) Connect Handset H-23( )/U or Headset HS-30( ).

b. Presetting Procedure.

(1) Set the meter switch to position 2. Turn receiver on. The meter now indicates receiver oscillator plate current. Turn C46 or C47, depending on which channel is being preset, slowly until a point is reached where the meter reading suddenly increases. At this point the oscillator starts oscillating. Do not turn the tuning adjustment beyond the point at which the meter indicates about two-thirds full scale. Turning the adjustment too far will cause the meter indication to reach a peak and then decrease again. Always maintain the adjustment on the high-capacity side of this peak.

(2) Couple the output of Signal Generator I-130-A (part of Test Equipment IE-19-( )) to the antenna receptacle by means of Cord CG-127/U. Set the generator to the modulated position, turn on, and let warm up for approximately 15 minutes. Set the generator to the desired frequency and maximum output.

(3) Set the POWER VOLUME control to the minimum position giving an audible headset signal.

(4) Adjust harmonic generator plate tuning capacitor C49 or C50 until maximum signal is heard in the headphones.

(5) Adjust harmonic amplifier plate tuning capacitor C56 or C57 until maximum signal is heard in the headphones.

(6) Reduce the output of the signal generator so that the output of the headphones is barely audible at all times.

(7) Adjust r-f amplifier plate tuning capacitor C6 or C7 for maximum headset signal.

(8) Adjust r-f amplifier grid tuning capacitor C1 or C2 for maximum headset signal.

(9) Disconnect signal generator from set and replace chassis in case.

APPENDIX

SECTION XVI

MAINTENANCE PARTS

118. MAINTENANCE PARTS FOR RADIO SET AN/TRC-7.

The following information was compiled on 23 February 1945. The appropriate sections of the ASF Signal Supply Catalog for Radio Set AN/TRC-7 are:

SIG 7-AN/TRC-7	Radio Set AN/TRC-7	Organizational Spare Parts, when published
SIG 7-HS-30	Headset HS-30	Organizational Spare Parts
SIG 8-AN/TRC-7	Radio Set AN/TRC-7	Higher Echelon Spare Parts, when published
SIG 8-AS-110/TRC-7	Antenna System AS-110/TRC-7	Higher Echelon Spare Parts, when published
SIG 8-G-3/TRC-7	Generator G-3/TRC-7	Higher Echelon Spare Parts, when published
SIG 8-HS-30	Headset HS-30	Higher Echelon Spare Parts
SIG 8-RT-53/TRC-7	Radio Transmitter RT-53/TRC-7	Higher Echelon Spare Parts, when published
SIG 8-H-23/U	Handset H-23/U	Higher Echelon Spare Parts, when published

a. Maintenance Parts for Radio Set AN/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	6Q341-314	ALIGNMENT TOOL TL-314/U: black bakelite; 4¾" lg x 5/16" diam; ¼" wd; insulated screwdriver on one end; standard Insuline screwdriver pin No. 1004 on other end; Sig C spec No. 271-3103.
	2A264-110	ANTENNA AS-110/TRC-7, sectionalized; 30' high; with 3 radiating and 3 ground elements.
	2A203-59	ANTENNA AT-59/TRC-7: whip; tubular steel; telescopic; 27-11/16" extended, 15⅞" collapsed, 0.145" OD; Sig C dwg No. SC-D-16847, spec No. 271-3103.
	2A282-37	ANTENNA BASE AB-37/TRC-7: olive drab finish; Sig C dwg No. SC-D-16846, spec No. 271-3103; (with Socket SO-239 for connection of Plug PL-259, and 12" coaxial terminating in Plug PL-259).

a. Maintenance Parts for Radio Set AN/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	2A203A-281	ANTENNA, phantom: Army-Navy Phantom Antenna TS-281/TRC-7; Sig C spec No. 271-3103; (Plug PL-259 one end with miniature screw-type socket across term; socket holds 6-v, 150-ma pilot lamp).
	3H160-47	BAG CW-47/TRC-7: canvas, olive drab finish; 14⅛" lg x 8⅝" thk x 16" h; felt padding 1" thk; Sig C spec No. 271-3103; (for receiver-transmitter and accessories).
CW-48	2Z553-48	BAG CW-48/TRC-7: canvas; olive drab finish; 37" lg x 14" wd x 10" thk; Sig C spec No. 271-3103; (for antenna roll and contents).
	3B295-49	BAG CW-49/TRC-7: canvas; olive drab finish; 12⅝" wd x 6⅝" thk x 14" h; Sig C spec No. 271-3103; (for receiver-transmitter and accessories).
	3A30	BATTERY BA-30: dry; portable; metal can; 1.5-v; 2-13/32" h x 1-11/32" diam; (for Remote Control Units RM-52 and RM-53).
	3A58	BATTERY BA-58: dry; 1½-v; C battery bias; Penlight cell type No. T1AA.
	3A70	BATTERY BA-70: dry; A unit 4.5-v, B unit No. 160 v, B unit No. 2 90 v; rectangular; 7⅝" h x 10" wd x 4½" d.
	1F430-127	CABLE ASSEMBLY, RF: Sig C Cord CG-127/U; rubber jacketed; 48" lg; RF Cable RG-5/U; Sig C dwg No. SC-D-14126; (width Plug PL-259 one end, socket No. 46-P6 other end).
	3E6000-220	CABLE ASSEMBLY, power: Sig C Cord CX-220/TRC-7; rubber jacketed; 15 ft lg; 3-cond; shielded; Sig C dwg No. SC-D-16852; (with AN-3106-14S-7S connector on one end; AN-3106-16S-5P connector on other end); (connects generator to receiver transmitter).
	3E6000-240	CABLE ASSEMBLY, power: Sig C Cord CX-240/U; rubber jacketed; 48" lg; Sig C dwg No. SC-D-14127; (4-prong male connector one end, female plug on other end); (for test).
	2Z1891-175	CASE CY-275/TRC-7: aluminum; empty; for spare tubes; 12½" lg x 4¼" wd x 2⅝" h; Sig C dwg No. SC-D-16849.
	3E1307A	CORD CD-307-A: headset; RC; ¼" diam x 65" lg; two No. 20 stranded copper cond; Sig C dwg No. SC-D-2019; spec No. 71-1105; (with Plug PL-55 one end; Jack JK-26 other end).
	3E1318	CORD CD-318: microphone; RC; Sig C spec No. 71-971; (7 ft Cordage CO-145 with Plug PL-68 on one end; 8 ft Cordage CO-119-B with Jack JK-55 on one end); (for Microphone T-45).
	3E1604	CORD CD-604: headset; RC; round: 0.270" diam; 6 ft lg; 2-cond; Sig C spec No. 71-1525; (with transformer C410 on one end, and Plug PL-54 on other end); (used with Headset HS-30).

a. Maintenance Parts for Radio Set AN/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	3H1407	CRANK GC-7: generator; 7" throw; (for Generator G-3/TRC-7).
	2X4-8007.69	CRYSTAL UNIT CR-1A/AR: quartz; single-wafer; freq 8007.69 kc; (receiving crystal).
	2X4-8155.71	CRYSTAL UNIT CR-1A/AR: quartz; single-wafer; freq 8155.71 kc; (receiving crystal).
	2X4-6450	CRYSTAL UNIT CR-1A/AR: quartz; single-wafer; freq 6450 kc; (transmitter).
	2X4-7010	CRYSTAL UNIT CR-1A/AR: quartz; single-wafer; freq 7010 kc; (transmitter).
G-3	3H2320-3	GENERATOR G-3/TRC-7: hand operated; 23-w; 4.7-v dc 2-wire lv side; 145 v dc, 2-wire hv side; closed frame; equipped with gear chain; 4½" lg x 3" wd x 3" h; Sig C spec No. 71-3169; (inclosed in watertight housing 7¾" lg x 6¾" wd x 7¼" h).
	4B1115	HANDSET TS-15: telephone; transmitter impedance 50 ohms; receiver impedance 250 ohms; black phenolic; 9-1/16" lg x 2¾" wd x 3-15/16" d; per SC-D-6307; (with 60" lg Cord CD-494 and Plugs PL-55 and PL-68).
	2B620-23	HANDSET H-23/U: telephone; transmitter impedance approx 100 ohms; receiver impedance 250 ohms; black phenolic; 9-1/16" lg x 2¾" wd x 3-15/16" diam; Sig C spec No. 71-3157, dwg No. SC-D-14651; (with cord and two plugs).
	2B830	HANDSET HS-30-U: radio; magnetic; approx 250 ohms; 2 receivers 0.895" diam x 0.68" h; headband 6⅛" max; with cord and 2 Insert M-300; Sig C spec No. 71-1518-B.
LG-2	2Z6102B	LEG LG-2-B: aluminum tube; with aluminum plate 3½" diam on bottom; wooden seat 16" lg x 6" wd, attached 10¾" from top of tube; 31⅞" lg over-all x 1⅜" to ¾" taper; Sig C spec No. 71-512; (used with generator G-3/TRC-7).
LG-3	2Z6103B	LEG LG-3-B: aluminum tube; with aluminum plate 3½" diam at bottom; top of tube tapered; 22-11/32" lg x ¾" diam; Sig C spec No. 71-513; (used with generator G-3/TRC-7).
	2B1645	MICROPHONE T-45: carbon; lip type; mounts by ear straps; Sig C spec No. 71-1603.
	2Z7157	PLUG PL-57: telephone; male; one prong; bakelite; 1-11/16" lg x ⅞" wd; Sig C dwg No. SC-D-4213; (with special large bakelite shell, includes two Eby type binding posts).
	2C680-52	REMOTE CONTROL UNIT RM-52: receiver-transmitter; remote; 5-11/16" lg x 4-7/16" h x 2-13/16" wd; Sig C dwg No. SC-D-7849, spec No. 271-3043.
	2C680-53	REMOTE CONTROL UNIT RM-53: transmitter-receiver; remote; 7½" lg x 3½" wd x 4-3/16" h; Sig C dwg No. SC-D-7841.

a. Maintenance Parts for Radio Set AN/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	2A312-50	ROLL CW-50/TRC-7: canvas; olive drab finish; for antenna; 35" lg x 12" wd x 8" h; with shoulder strap; Sig C spec No. 271-3103.
	2B1589/1	SHIELD, breath: microphone; steel; black enamel finish; approx ⅜" wd x 9/32" h x 13/32" d; Sig C dwg No. SC-D-9974 item 3; (for Microphone T-45).
	6R7442-310	TUBE PULLER TL-310/U: steel; olive drab enamel; 3-13/16" lg x 1⅛" diam; Rad Eng Lab dwg No. PB-176.
	6R57400	WRENCH: setscrew; 2" lg x 1/16" diam; L shaped; bottom of L ¾" lg; Sig C spec No. 271-3103.
b. Receiver-Transmitter RT-53/TRC-7.		
	2Z9401.93	BOARD, terminal: one turret lug; laminated phenolic; 11/16" lg x 5/16" wd x 1/16" thk; Insuline No. SK-13-30.
	2Z9402.273	BOARD, terminal: 2 turret lugs; laminated phenolic; 11/16" sq x 1/16" thk; Insuline No. SK-13-33.
	2Z9402.272	BOARD, terminal: 2 turret lugs; laminated phenolic; 1/16" lg x 5/16" wd x 1/16" thk; Insuline No. SK-13-30.
	2Z9403.176	BOARD, terminal: 3 turret lugs; laminated phenolic; 1-7/16" lg x 5/16" wd x 1/16" thk; Insuline No SK/13-30.
	2Z9408.141	BOARD, terminal: 8 turret lugs; laminated phenolic 1¾" lg x 1" wd x 1/16" thk; Insuline No. SK-13-34
	2Z9409.47	BOARD, terminal: 9 turret lugs; laminated phenolic; 2⅛" lg x 1-25/32" wd x 1/16" thk; Insuline No. SK-13-44.
	2Z1409-59	BUSHING, spacer: steel; 1.793" lg x 0.250" diam; tapped No. 10-32 each end; Rad Eng Lab dwg No. SK13-2.
	3F4325-125/C2	CAP, antenna: aluminum; 13/16" diam x 9/16" h, with chain; Amphenol type No. 9760-10; Rad Eng Lab part No. 5000-A5.
	2Z1607-26	CAP: battery socket; aluminum; olive drab finish; 2¾" OD x 29/32" h; Rad Eng Lab dwg No. SK-13-3.
	2Z1612 26	CAP, connector: aluminum; 1-1/6" diam x 9/16" h, with chain; Amphenol type No. 9760-14; Rad Eng Lab part No. 5001-A5; (generator).
C43	3D9005-54	CAPACITOR, fixed: ceramic; 5.0-mmf ±2%; zero temp coef; 500 vdcw; max dimen 0.562" lg x 0.250" diam; CC21CH050G.
C54	3D9010-84	CAPACITOR, fixed: ceramic: 10-mmf ±10%; zero temp coef: 500 vdcw; max dimen 0.562" lg x 0.250" diam; CC21CH100F.
C63, C74, C101	3D9047-16	CAPACITOR, fixed: ceramic; 47-mmf ±10%; neg temp coef 750 mmf/mmf/°C; 500 vdcw; max dimen 0.562" lg x 0.250" diam; CC21UJ470K.

b. Receiver-Transmitter RT-53/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
C9, C45, C52, C68	3D9100-185	CAPACITOR, fixed: ceramic; 100-mmf ±10%; neg temp coef 750 mmf/mmf/°C; 500 vdcw; max dimen 0.690" lg x 0.240" diam; CC25UJ101K.
C3, C4, C5, C8, C10, C11, C12, C19, C39, C41, C42, C44, C51, C53, C55, C58, C60, C69, C72, C73, C75, C76, C83, C86, C87, C93, C96, C100, C102	3DA1.200-8	CAPACITOR, fixed: ceramic; 1,200-mmf ±20%; temp coef −40 +50 mmf/mmf/°C; 300 vdcw; 0.625" lg x 0.121" diam; Muter type BK1200; Rad Eng Lab part C-5000-M5.
C91, C94	3DB8-163	CAPACITOR, fixed: electrolytic; 8-mf; 200 vdcw; 1-3/16" lg x ¾" diam; Sprague No. D11220DEAA-1W; Rad Eng Lab part No. C-5018-S7.
C13	3K2022111	CAPACITOR, fixed: mica; 220-mmf ±10%; 500 vdcw; max dimen 51/64" lg x 15/32" wd x 7/32" thk; CM20A221K.
C88	3K3010214	CAPACITOR, fixed: mica; 1,000-mmf ±20%; 500 vdcw; max dimen 51/64" lg x 15/32" wd x 7/32" thk; CM30A102M.
C16, C17, C18, C22, C23, C24, C25, C26, C29, C30, C31, C32, C40, C48, C59, C64, C67, C92, C95, C97, C98	3DA10-323	CAPACITOR, fixed: paper; 10,000-mmf ±20%; 300 vdcw; 1⅛" lg x 5/16" diam; Aerovox type 338; Rad Eng Lab part No. C-5020-A1.
C28, C38, C99	3DA10-322	CAPACITOR, fixed: paper: 10,000-mmf +60% −20%; 300 vdcw; max dimen 53/64" lg x 53/64" wd x 9/32" thk; CN36A103.
C 35, C37	3DA100-466	CAPACITOR, fixed: oil-filled; 100,000-mmf ±20%; 400 vdcw: max dimen 1½" lg x 11/16" diam; CP25A-2EF104MM.
C1, C2	3D9022V-2	CAPACITOR, variable: air; 2- to 22-mmf; 0.016" air gap; 6 plates; body 1⅞" lg x 15/16" wd x 1-7/32" h, shaft ⅜" lg x 13/64" diam; Rad Eng Lab part No. C-5024-S5.
C6, C7	3D9027V-4	CAPACITOR, variable: air; 2.1- to 27-mmf; 0.016" air gap; 8 plates; body 1⅞" lg x 12/16" wd x 1-7/32" h, shaft ⅜" lg x 13/64" diam; Rad Eng Lab part No. C-5025-S5.

b. Receiver-Transmitter RT-53/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
C56, C57	3D9031V-4	CAPACITOR, variable; air; 2.8-mmf to 31-mmf; 0.016" air gap; 8 plates; body 1-7/16" lg x 15/16" wd x 1-7/32" h, shaft ⅜" lg x 13/64" diam; Sickles part No. C-5028-S5.
C77, C78	3D9035V-39	CAPACITOR, variable: air; 2.8-mmf to 35-mmf; 0.016" air gap; 9 plates; body 1-7/16" lg x 15/16" wd x 1-7/32" h, shaft ⅜" lg x 13/64" diam; Sickles part No. C-5029-S5.
C49, C50	3D9042V-2	CAPACITOR, variable: air; 3.2-mmf to 42-mmf; air gap 0.016"; 11 plates; body 1⅞" lg x 15/16" wd x 1-7/32" h, shaft ⅜" lg x 13/64" diam; Sickles part No. C-5027-S5.
C46, C47, C65, C66	3D9047V-2	CAPACITOR, variable: air; 3.5-mmf to 47-mmf; 0.012" air gap; 11 plates; body 1-7/16" lg x 15/16" wd x 1-7/32" h, shaft ⅜" lg x 13/64" diam; Sickles part No. C-5030-S5.
C70, C71	3D9047V-1	CAPACITOR, variable: air; 3.5-mmf to 47-mmf; 0.016" air gap; 11 plates; body 1⅞" lg x 15/16" wd x 1-7/32" h, shaft ⅜" lg x 13/64" diam; Sickles No. C-5026-S5.
C84, C85	3D9007V-9	CAPACITOR, variable: ceramic; 1.5-mmf to 7-mmf; zero temp coef; 500 vdcw; 54/64" lg x 41/64" wd x ⅜" thk; Erie Type TS2A-NPO; Rad Eng Lab part No. C-5010-E5.
C79, C80, C81, C82	3D9034V	CAPACITOR, variable: air; 2-sect, each 5-mmf to 34-mmf; 0.012" air gap; 8 plates per sect; body 1⅞" lg x 15/16" wd x 1-3/16" h, shaft 7/32" lg x 13/64" diam; Hammerlund No. M-430304-2; Rad Eng Lab part No. C-5021-H2; (rotor connection to left side).
C89, C90	3D9045V-1	CAPACITOR, variable: ceramic; 7-mmf to 45-mmf; 500 vdcw; 57/64" lg x 41/64" wd x ⅜" thk; Erie type TS-2A-N500; Rad Eng Lab part C-5011-E5.
L1	3C370-68	COIL, RF: antenna; single-winding; air wound; unshielded; 3½ turns 0.0508" diam wire; ⅞" lg x ¼" ID; Rad Eng Lab dwg No. 13-91.
L13, L14, L15, L16	3C307-64	COIL, RF: choke; single-layer wound; unshielded; 1 turn 0.0508" diam wire; 3/16" OD x ¾" lg; Sickles No. SK12-160-4.
L3	3C323-69D	COIL, RF: harmonic amplifier, single-winding; unshielded, 3 turns 0.0508" diam wire; 1⅛" lg x ¼" ID; Rad Eng Lab dwg No. SK13-90.
L5	3C370-70	COIL, RF: harmonic generator; single-winding; air wound; unshielded; 3 turns 0.0320" diam wire; 25/32" lg x ½" h x 0.187" ID; Rad Eng Lab dwg No. 13-91.
L4	3C323-69F	COIL, RF: oscillator; single-winding; unshielded; 1⅝" lg x 5/16" OD; Rad Eng Lab part No. L5000-S5; dwg No. SK12-160.
L6	3C323-69C	COIL, RF: oscillator; single-winding; unshielded: 34 turns; permeability tuning; 2¼" lg x 5/16" OD; Sickles No. SK-12-160-2.

b. Receiver-Transmitter RT-53/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
L12	3C370-71	COIL, RF: transmitter; antenna coupling; single-winding, close wound; unshielded; 1½" turns 0.0508" diam; copper tinned wire; ⅞" lg x 5/16" h x 5/16" ID; Rad Eng Lab dwg No. 13-84.
L10, L11	3C370-72	COIL, RF: transmitter; final grid and plate; single split winding, 2 sect of 2 turns; 0.0508" diam wire; unshielded; 1¼" lg x 1-5/16" h x ⅜" ID; Rad Eng Lab dwg No. 13-86.
L7	3C323-69B	COIL, RF: transmitter; first tripler; single-winding; unshielded; 13 turns No. 36 E copper wire; 1¾" lg x 5/16" OD; Sickles No. SK12-160.
L8	3C323-69G	COIL, RF: transmitter; second tripler; single-winding; air wound; unshielded; 4½ turns; ½" lg x ⅞" h x 7/16" wd; Rad Eng Lab dwg No. 13-87.
L9	3C323-69E	COIL, RF: transmitter; doubler plate; air wound; unshielded; 1 turn wire ⅜" ID; Rad Eng Lab dwg No. 13-82.
L2	3C370-69	COIL, RF: tuning; single-wound; unshielded; 4 turns 0.0508" diam wire; 1-9/16" lg x ¼" ID; Rad Eng Lab dwg No. SK13-90.
	2Z8799-239	CONNECTOR, female contact: Socket SO-239; single-cont; straight; ¾" lg x 1" sq; Amphenol No. SO-239; Rad Eng Lab part J-5001A-5.
	2Z3023-5	CONNECTOR, female contact: 3-cont; straight; 1-1/16" lg x 1-3/16" sq; Amphenol AN-3102-14S-7P; Rad Eng Lab J-5001-A5.
	2Z6820 58	CONNECTOR, female contact: 3 GR banana jacks; 2¼" lg x 1⅜" wd x ⅛" thk; Rad Eng Lab dwg No. SK-13-46.
	2Z6820 57	CONNECTOR, male contact: 3 GR banana plugs; 2¼" lg x 1⅜" wd x ⅛" thk; Rad Eng Lab dwg No. SK-13-31.
	2Z3028-24	CONNECTOR, male contact: 8-pin cont; straight; 2⅝" diam x 1-1/16" thk; Rad Eng Lab dwg No. SK-13-1.
	6Z6918-6	FASTENER, latch: cabinet; steel, lusterless finish; 2-1/16" lg x 9/16" wd x 7/16" thk; Corbin No. 15840-1; Rad Eng Lab dwg No. SK13-35.
	6Z6012 5	FASTENER, latch: cabinet; steel, lusterless finish; 2-1/16" lg x 9/16" wd x 7/16" thk; Corbin No. 15840-2; Rad Eng Lab dwg No. SK13-35.
	6Z3810-50	FASTENER, slide: strap; aluminum; 1¾" lg x 1" wd x ⅝" thk; Rad Eng Lab dwg No. BP-168.
	2Z4867.219	GASKET: neoprene; 10.437" lg x 4.656" wd x 0.234" thk; Rad Eng Lab dwg No. SK13-17.
	2Z4872-66	GEAR ASSEMBLY: tuning; brass; nickel pl; 1.353" lg x 0.875" wd x ½" thk; Rad Eng Lab dwg No. BP-164.
	2Z1239.47	HOLDER, battery socket cover: aluminum; 2" lg x ⅝" wd x 0.434" thk; Rad Eng Lab dwg No. SK13-7; (holds cover when battery is in use).

b. Receiver-Transmitter RT-53/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
J2	4C4312-16	JACK, telephone: for 2 cond; 0.25" diam plug; 2" lg x 1" wd x 1-7/16" h; Galvin part No. 1X1853; Rad Eng Lab No. J-5005-G-5; (single ckt).
J1	4C4312-17	JACK, telephone: for 2 cond; 0.25" diam plug; 2" lg x 1" wd x 1-7/16" h; Galvin part No. 1X1852; Rad Eng Lab part No. J-5004-G-5; (two ckts, one open, one closed).
J3	4C4312-16	JACK, telephone: for 3 cond; 0.210" diam plug; 2" lg x 1" wd x 1-7/16" h; Galvin part No. 1X41864; Rad Eng Lab J-5006-G-5; (microphone).
	2Z5824.70	KNOB, round: aluminum; black wrinkle finish; for ¼" diam shaft; two No. 8-32 Allen setscrews; ¾" diam x ⅝" h with bar extending ⅜" on one side; Otis Elevator Corp No. SK12-211; Rad Eng Lab dwg No. SK12-211.
M1	3F891-60	METER, milliammeter: dc; 0-1 ma; flush mtg case w/1½" sq face; GE type DN1 Model ABB4; Rad Eng Lab M-5000-G2.
K1	2Z7591-36	RELAY, general purpose: 2-sect; one SPDT, other SPST; one normally open, one normally closed; 1-7/16" lg x 1-9/16" h x 1" wd; Allied Cont type TK; Rad Eng Lab part No. K-5000-A2.
R50	3RC20BE220K	RESISTOR, fixed: composition; 22-ohm ±10%; ½-w; max dimen 0.468" lg x 0.249" diam; RC20BF220K.
R28, R40, R48	3RC10BF390J	RESISTOR, fixed: composition; 39-ohm ±5%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF390J.
R23	3RC10BF680K	RESISTOR, fixed: composition; 68-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF680K.
R22, R46	3RC10BF181K	RESISTOR, fixed: composition; 180-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF181K.
R26	3RC10BF102K	RESISTOR, fixed: composition; 1,000-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF102K.
R38	3RC10BF392K	RESISTOR, fixed: composition; 3,900-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF-392K.
R43	3RC20BF392K	RESISTOR, fixed: composition; 3,900-ohm ±10%; ½-w; max dimen 0.468" lg x 0.249" diam; RC20BF392K.
R13, R27	3RC40BF622J	RESISTOR, fixed: composition; 6,200-ohm ±5%; 2-w; max dimen 1.41" lg x 0.405" diam; RC40BF622J.
R41	3RC10BF682K	RESISTOR, fixed: composition; 6,800-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF682K.
R42, R44	3RC10BF473K	RESISTOR, fixed: composition; 47,000-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF-473K.
R30	3RC10BF683K	RESISTOR, fixed: composition; 68,000-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF-683K.
R7, R9, R11	3RC10BF823K	RESISTOR, fixed: composition; 82,000-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF-823K.

b. Receiver-Transmitter RT-53/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
R21, R35	3RC20BF823K	RESISTOR, fixed: composition; 82,000-ohm ±10%; ½-w; max dimen 0.468" lg x 0.249" diam; RC20BF-823K.
R31, R37	3RC10BF224K	RESISTOR, fixed: composition; 220,000-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF-224K.
R39	3RC10BF334K	RESISTOR, fixed: composition; 330,000-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF-334K.
R36	3RC10BF394K	RESISTOR, fixed: composition; 390,000-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF-394K.
R25, R32	3RC10BF474K	RESISTOR, fixed: composition; 470,000-ohm ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF-474K.
R49	3RC20BF474K	RESISTOR, fixed: composition; 470,000-ohm ±10%; ½-w; max dimen 0.468" lg x 0.249" diam; RC20BF-474K.
R4, R8, R10, R24	3RC10BF105K	RESISTOR, fixed: composition; 1-meg ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF105K.
R2, R5, R14, R16	3RC10BF225K	RESISTOR, fixed: composition; 2.2-meg ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF225K.
R15	3RC10BF335K	RESISTOR, fixed; composition; 3.3-meg. ±10%; ¼-w; max dimen 0.406" lg x 0.170 diam; RC10BF335K.
R3	3RC10BF395K	RESISTOR, fixed: composition; 3.9-meg ±10%; ¼-w; max dimen 0.406" lg x 0.170" diam; RC10BF395K.
R33, R45	3Z5992-43	RESISTOR, fixed: wire-wound; 2.7-ohm ±5%; ½-w; ⅝" lg x 3/16" diam; IRC type BW1/2; Rad Eng Lab R5013-12.
R29, R34	3Z5995F6-2	RESISTOR, fixed: wire-wound; 5.6-ohm ±5%; ½-w; ⅝" lg x 3/16" diam; IRC type BW1/2; Rad Eng Lab R5011-12.
R47	3Z5996H8-4	RESISTOR, fixed: wire-wound; 6.8-ohm ±5%; ½-w; ⅝" lg x 3/16" diam; IRC No. BW 1/2; Rad Eng Lab A5019-12.
R20, S10, R17, S11	3Z7498-50 16	RESISTOR, variable, (potentiometer): composition; 500,000-ohm; 1-w; 3-term; body 1" diam x 11/16" d, shaft ¼" diam x ⅜" lg; CTS part No. GC-45; Rad Eng Lab R-5024-C5.
	2Z8761-40	SOCKET, crystal: for 4 crystals; laminated phenolic; 4⅜" lg x 1-11/16" wd x ⅛" thk; Rad Eng Lab part No. X-5003-C4.
	2Z8677.75	SOCKET, tube: 7-prong; miniature; ceramic; 1¼" lg x 1⅛" wd x 13/16" thk; Eby type 102M; Rad Eng Lab part No. X-5000-E1.
	2Z8678.115	SOCKET, tube: loctal; ceramic; 1-15/16" lg x 1¼" wd x ⅝" thk; Ucinite type No. 115054; Rad Eng Lab part No. X-5001-U5.
	6Z8448-6	STRAP, battery: olive drab cotton webbing; 4" lg x 1" wd x ⅛" thk; with adjustable fastener; Rad Eng Lab dwg No. BP-170.

b. Receiver-Transmitter RT-53/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	6Z8448-7	STRAP, battery: olive drab cotton webbing; 20⅜" lg x 1" wd x ⅛" thk; Rad Eng Lab No. BP-170.
S7, S8	3Z9825-55.76	SWITCH, rotary: 2-pole; 6-position; single-sect; metal body, ⅜" lg x 1¼" diam, shaft ¼" diam x 5/32" lg; Mallory No. B117294; Rad Eng Lab part No. S-5000-M1.
S1	3Z9903E-3.15	SWITCH SECTION, rotary: SPDT; isolantite construction; 1¾" x ⅝"; Oak No. 28599-HC-1; Rad Eng Lab No. S-5001-02-RW1; (wax impregnated; conts 9 & 10 normal make).
S2	3Z9903E-3.16	SWITCH SECTION, rotary: SPDT; single-sect; isolantite construction; 1¾" lg x 1⅞" wd x ⅝" thk; Oak No. 28599-HC-2; Rad Eng Lab No. S-5001-02-RW2; (wax impregnated; cont 8 & 9 normal make).
S6	3Z9903E-3.23	SWITCH SECTION, rotary: SPDT; single-sect; isolantite construction; 1¾" lg x 1⅞" wd x ⅝" thk; Oak No. 28599-HC-3; Rad Eng Lab part No. S-5001-02-RW3.
S22	3Z9903E-3.17	SWITCH SECTION, rotary: SPDT; single-sect; isolantite construction; 1¾" lg x 1⅞" diam x ⅝" thk: Oak No. 28601-HC-1; Rad Eng Lab No. S-5002-02 TW1.
S19, S20	3Z9903E-3.18	SWITCH SECTION, rotary: SPDT; single-sect; iso lantite construction; 1¾" lg x 1⅞" diam x ⅝" thk, Oak No. 28601-HC-2; Rad Eng Lab No. S-5002-02-TWA2.
S17, S18	3Z9903E-3.19	SWITCH SECTION, rotary: SPDT; single-sect; isolantite construction; 1¾" lg x 1⅞" diam x ⅝" thk; Oak No. 28601-HC-3; Rad Eng Lab No. S-5002-02-TW3.
S16	3Z9903E-3.20	SWITCH SECTION, rotary: SPDT; single-sect; isolantite construction; 1¾" lg x 1⅞" diam x ⅝" thk; Oak No. 28601-HC-4; Rad Eng Lab part No. S-5002-02-TW4.
S12, S13, S14, S15	3Z9903E-3.21	SWITCH SECTION, rotary: SPDT; single-sect; isolantite construction; 1¾" lg x 1⅞" diam x ⅝" thk; Oak No. 28601-HC-5; Rad Eng Lab S-5002-02-TW5.
S3, S4, S5	3Z9903E-3.24	SWITCH SECTION, rotary: SPDT; single-sect; isolantite construction; 1¾" lg x 1⅞" wd x ⅝" thk; Oak No. 28599-HC-4; Rad Eng Lab 5001-02-RW4; (wax impregnated).
S9, S21	3Z9903E-3 22	SWITCH SECTION, rotary: 1-pole 4-position; phenolic wafer; 1¾" lg x 1⅞" diam x ⅞" thk; Oak No 28669-H1; Rad Eng Lab No. S-5004-02.
T6	2Z9631.268	TRANSFORMER, AF: microphone; pri 233-ohm; sec 900-ohm impedance; shielded; 1½" lg x 1-7/16" wd x 1-1/16" d; Rad Eng Lab T-5001-U2.
T7	2Z9634 96	TRANSFORMER, AF: modulation; pri 10,000-ohm; sec 25,000-ohm impedance; shielded; 1½" lg x 1-7/16" wd x 1-1/16" d; Rad Eng Lab T-5002-U2.

b. Receiver-Transmitter RT-53/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
T8	2Z9634.95	TRANSFORMER, AF: modulation; pri 13,200-ohm; sec 5,500-ohm impedance; turns ratio of pri to sec 3:2; shielded; 1-9/16" diam x 2¼" h; Rad Eng part No. T-5003-U2.
T5	2Z9632.374	TRANSFORMER, AF: output; pri 12,000-ohm; sec 4,000-ohm; shielded; 1½" lg x 1-7/16" wd x 1-1/16" d; Rad Eng Lab part No. T-5000-U2.
T1	2Z9643.186	TRANSFORMER, IF: 12-mc; input; shielded; 1-5/32" sq x 2-3/16" h; Sickles No. Z-5000-S5.
T2	2Z9643.187	TRANSFORMER, IF: 12-mc; 2d interstage; shielded; 1-5/32" sq x 2-3/16" h; Sickles No. Z-5001-S5.
T3	2Z9643.187	TRANSFORMER, IF: 12-mc; 3d interstage; shielded; 1-5/32" sq x 2-3/16" h; Sickles No. Z-5002-S5.
T4	2Z9643.188	TRANSFORMER, IF: 12-mc; output; shielded; 1-5/32" sq x 2-3/16" h; Sickles No. Z-5003-S5.
V7	2J1A3	TUBE, electron: JAN-1A3.
V1, V2, V9	2J1AB5	TUBE, electron: JAN-1AB5.
V3, V4, V5	2J1L4	TUBE, electron: JAN-1L4.
V6	2J1S5	TUBE, electron: JAN-1S5.
V12, V13	2J3A4	TUBE, electron: JAN-3A4.
V8, V11, V14, V15, V16	2J3A5	TUBE, electron: JAN-3A5.
V10	2J3Q4	TUBE, electron: JAN-3Q4.

c. Antenna Assembly AS-110/TRC-7.

	2A264-110	ANTENNA ASSEMBLY AS-110/TRC-7: sectionalized; 30 ft h; with 3 radiating and 3 ground elements.
	2A264-112	ANTENNA ASSEMBLY AS-112/TRC-7: 3 radiating and 3 ground elements; ea 5/32" phosphor bronze wire 21½" lg attached to base; with Socket SO-239.
	IF430-102	CABLE ASSEMBLY, RF: Army-Navy CORD CG-102/TRC-7; coaxial; flexible; characteristic impedance 50 ohms; 37 ft 6" lg; single No. 16AWG solid copper conductor; Grade A polyethylene dielectric; Sig C dwg No. SC-D-16851.
	2Z7226-258	CONNECTOR, female contact: Plug PL-258; single cont; fits Plug PL-259; Sig C dwg SC-D-5887-B.
	2A1344-5	GUY: braided nylon rope; 55 ft lg x ⅛" diam; olive drab finish; Sig C dwg SC-D-16844; (fitted with swivel snap North & Judd No. 4586).
	6R375-185	MALLET MX-185/TRC-7: phenolic head; bound with ⅛" steel band; 18" wooden handle; Sig C spec No. 271-3103.
	2A2081-77	MAST BASE AB-77/TRC-7: aluminum; olive drab finish; 3-3/16" OD x 2" ID x ⅝" thk; Sig C dwg SC-D-16856.

c. Antenna Assembly AS-110/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	2A2450-34	MAST SECTION AB-34/TRC-7: light wt metal tubing; olive drab finish; 36″ lg x 1¼″ OD x 0.065″ thk; Sig C dwg SC-D-16841; spec No. 271-3103.
	2A2450-35	MAST SECTION AB-35/TRC-7: aluminum; olive drab finish; 33″ lg x 1½″ diam x 0.065″ thk; Sig C dwg SC-D-16842.
	2A2450-36	MAST SECTION AB-36/TRC-7: light wt metal tubing; 33″ lg x 1″ OD x 0.065″ thk; Sig C dwg SC-D-16843; spec No. 271-3103.
	2A2450-78	MAST SECTION AB-78/TRC-7: chrome molybdenum; tube; 21-5/16″ lg x 0.246″ diam; tapered to 0.130″; Sig C dwg SC-D-16862.
	2A2819-4	PLATE, base: aluminum; olive drab finish; antenna assembly; 5¾″ lg x 1-3/16″ h x 3/16″ thk; Sig C dwg SC-D-16845.
	2A2819-3	PLATE, guy: lower; aluminum; olive drab finish; 2⅞″ OD x ⅛″ thk; Sig C dwg SC-D-16845.
	2A2819-2	PLATE, guy: upper; aluminum; olive drab finish; 2¼″ OD x ⅛″ thk; Sig C dwg SC-D-16845.
RL28	2A3128	REEL RL-28: guy; aluminum plate; 6½″ lg x 2¾″ wd x 0.0747″ thk; Sig C dwg SC-D-1064; (cond No. 14 USS Gauge).
	2A3330-2	STAKE, ground: aluminum; olive drab finish; 18⅛″ lg x ⅝″ diam; Sig C dwg SC-D-16853.
	2A3330-3	STAKE, ground: swivel; aluminum alloy; 12″ lg x 0.625″ diam; Sig C dwg SC-D-16854.

d. Generator G-3/TRC-7.

01	6Z879-13	BELT, V type: synthetic rubber; outside circumference 15¾″; ¼″ wd x 0.135″ thk; Gates Rub No. 3Y-46; GE part dwg No. K-2263432; (generator drive belt).
E701	2Z9405.114	BOARD, terminal: 5 brass screw term; textolite board; 2-3/16″ lg x 1-3/16″ wd x ¾″ h, over-all; GE part dwg No. K-2263497.
	2Z760-2	BOOT, synthetic rubber: watertight closure for crankshaft opening; 1¼″ diam x 1-7/32″ lg; GE part dwg No. K-2263419.
E601	3H525-95	BRUSH, electrical contact: carbon, hv side; ¼″ x 3/32″ x ½″ lg; brush with pigtail and spring; GE part dwg No. K-5893583AD-2.
E602	3H525-96	BRUSH, electrical contact: carbon, lv side; 5/16″ x 5/32″ x ½″ lg; brush with pigtail and spring; GE part dwg No. K-8100699AC-2.
H101	2Z1612.22	CAP, connector: aluminum; 1⅛″ diam x 7/16″ thk; Amphenol No. 9760-16; GE part dwg No. K-2263418; (with chain and gasket).
0601	3H2358/C1	CAP, contact brush: brass with bakelite compound covering; 9/16″ diam x 5/16″ thk over-all; GE part dwg No. K-8100698AB1.

d. Generator G-3/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
C601	3DA1-181	CAPACITOR, fixed: mica; 1,000-mmf; 400-v; ⅞" lg x ½" wd x ¼" thk; Electro Motive Mfg Co type 102M; GE part dwg No. K-2263431.
C703	3DB50-45	CAPACITOR, fixed: electrolytic; 50-mf +75% −20%; 250 vdcw; 1" diam x 2¾" lg; Solar type DFM; GE part dwg No. K-2263430 Pt 1.
C701	3DA1-183	CAPACITOR, fixed: electrolytic; 1,000-mf +75% −10%; 6 vdcw; 1" diam x 3¼" lg; Solar type DFM; GE part dwg No. K-2263428 Pt 2.
C702	3DA1-182	CAPACITOR, fixed: electrolytic; 1,000-mf +75% −10%; 12 vdcw; 1" diam x 3¼" lg; Solar type DFM; GE part dwg No. K-2263429 Pt 1.
L701	3C324-109	COIL, AF: filter; single-winding; 50-mh, 60-c, as with 0.55 amp dc flowing through it; 0.49 ohms dc resistance; 3" wd x 1½" thk x 1⅞" h; GE part dwg No. M-2266406; (filter assembly).
L101	3C307-63	COIL, RF: choke; single-winding; unshielded; 45 turns No. 30 E copper wire; 5/16" OD x ⅞" lg overall; Sickles FW, part dwg REL SK-12-160, GE part dwg No. K-2263426.
J101	2Z8673 33	CONNECTOR, female contact: 3 round polarized cont; straight; 1-9/32" sq x 29/32" lg less cont; Amphenol part No. AN 3102-16S-5S; GE part dwg No. K-2263417.
	3H1380.3	COVER: shaft; aluminum; zinc chromate and olive drab finish; 2½" lg x 1½" wd x ¾" thk; Warwick part dwg No. 2134, No. 83350 & No. 56173; GE part dwg No. K-2263424; (with rubber seal and thumb screw).
H102	6Z3810-26	FASTENER, latch: cover; steel, bonderized, olive drab; body closed 1-15/16" lg x 9/32" wd x 31/64" h, ring 1-3/16" lg x 1-5/16" wd; Amer Cabt Hdwe No. WX-6889; GE part dwg No. K-2263452.
Z1	3H5357	FILTER ASSEMBLY: dc power; 3 capacitors and iron core coil, mtd on aluminum panel; 0.55 amp at 4.4 v dc and 0.130 amp at 145 v dc; 5" lg x 3½" wd x 6½" h over-all; GE part dwg No. T-2266903; (equipped with socket for voltage regulator).
	2Z4867.216	GASKET: paper; thrust bearing plate; ⅞" OD x ¼" ID x 0.006" thk; GE part dwg No. K-2263467; (gear case).
	3H2358/G11	GASKET: rubber; 1-1/16" OD x ⅞" ID x 9/16" thk, 3/64" webb thk; Warwick part dwg No. US-83350; GE part dwg No. K-2263477; (shaft cover seal).
	2Z4867.215	GASKET: rubber; 6-11/16" lg x 5¾" wd x 3/16" thk; GE part dwg No. M-2266401; (cover seal).
	2Z4867.217	GASKET: rubber asbestos; 5½" lg x 4" wd x 0.015" thk; GE part dwg No. K-2263403; (grease seal).
	2Z4867.218	GASKET: synthetic rubber; connector; 1.281" sq x 1/32" thk; GE part dwg No. K-2263433; (generator housing).

d. Generator G-3/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
02	2Z4871-81	GEAR ASSEMBLY: steel pinions and testolite gears, with magnesium castings, barrier coat; speed changing unit; case 6" lg x 4" wd over-all, with 5½" lg cranking shaft through thickness; cranking shaft for 0.385" sq crank arm; GE part dwg No. P-2266809.
G1	3H2403-3	GENERATOR, DC: 23-w; 4.7-v dc, 2-wire, lv side, 145-v dc, 2-wire, hv side; closed frame; 4½" lg x 3" wd x 3" h, excluding shaft; 0.1562" diam x 11/16" lg shaft ext; GE part dwg No. K-2268400.
	6G673.7	GREASE: 8-oz tube; Ordnance spec AXS-637; (gearcase).
E702	3G1795-8	INSULATOR, bushing; round; synthetic rubber; 1⅛" diam x 25/64" thk over-all; GE part dwg No. K-2268411; (insulator cup for Capacitor C-703).
E101	3G1837-24.14	INSULATOR, stand-off: cylindrical; textolite; ¼" OD x ¾" lg; GE part dwg No. K-2223423; (No. 4-40 tap through center).
0301	6L996-2-1C	KEY, machine: Woodruff; steel, cadmium plate; 0.156" arc depth on 0.171" radius, 0.0948" thk; GE part dwg No. K-2263465; (gearcase pulley).
	6D16791	LABEL, circuit: 50 lb white book paper; 4¼" lg x 3½" wd; GE part dwg No. S-4178218.
H302	6L3612-24.3	NUT, hexagon: steel, cadmium pl; No. 12-24; ⅛" thk; 7/16" across flats; GE part dwg No. K-2268408; (gearcase mounting).
	3H4280.1	PLATE, thrust: steel; ⅞" diam x 1/16" thk; GE part dwg No. K-2263458; (gearcase).
H301	6LK3610-32.6	NUT, lock: aluminum, No. 10-32; 11/64" thk; ⅜" across hex flats; Esna No. 69TM02; (gearcase mounting).
H1	6L974-3-16	PIN, cotter: steel; 3/64" diam x ¼" lg shank; GE part dwg No. K-2263483.
	3H2358/P10	PIN, straight: steel; cadmium pl; 0.084" diam x 1-5/32" lg; Warwick part dwg No. 7260; GE part dwg No. K-2263481.
	3H4600P1	PULLEY: grooved; magnesium; 1.230" x ⅜" thk over-all; bore 0.1562" diam x ⅜" lg; single-groove, 0.240" wd x 3/16" d; pulley fixed with No. 5-40 Allen recessed head setscrew; GE part dwg No. K-2263436; (generator drive).
	3H4600P2	PULLEY: magnesium; 1" diam x ⅜" wd flat face; pulley fixed with retaining ring; GE part dwg No. K-2268421; (idler pulley).
	3H4600P3	PULLEY ASSEMBLY: idler; includes magnesium pulley, 2¼" x 1" x 1¾" over-all, pulley arm, studs, bearings; GE part dwg No. K-2268428.
	3H4993-1	REGULATOR, voltage: aluminum case; olive drab finish; 4.7-v dc, 0.4-amp, 1.88-w; 2¼" lg x 1¾" wd x 1⅝" h over-all; WL part dwg SO 4447395 ED 40221; GE part dwg No. K-2263427.

d. Generator G-3/TRC-7.

Ref symbol	*Signal Corps stock No.*	*Name of part and description*
	3H5041.2-2	RING, retainer: steel; for fixing pulley to shaft; 0.173" ID; sect 0.025" sq; GE part dwg No. K-2263482.
H303	6L6832-8.3AL	SCREW, machine: fil H; aluminum; anodized; No. 8-32 x ½" lg; (gearcase).
H304	6L6832-16.3AL	SCREW, machine: fil H; aluminum; anodized; No. 8-32 x 1" lg; (gearcase).
H305	6L6256-3-1AL	SCREW, machine: flat H; aluminum; anodized; No. 2-56 x 7/32" lg; (gearcase).
H306	6L6832-8AL	SCREW, machine: flat H; aluminum; anodized; No. 8-32 x ½" lg; (gearcase).
H2	6L6832-8.81CS	SCREW, machine: hex hd; steel, cadmium pl; No. 8-32; ⅝" lg w/13/64" lg thd; head ⅜" across flats, ⅛" thk; GE part dwg No. K-2263445; (hinge bolt for generating unit).
H601	6L6632-3-1.49S	SCREW, machine: RH; steel, zinc pl; No. 6-32 x 7/32" lg; GE part dwg No. K-2268418; (special head 0.231" diam x 0.071" thk, slotted); (capacitor mounting).
H3	6L18505-5 41	SCREW, set: headless; hex socket type, self locking; steel; cadmium pl; No. 5-40; 5/16" lg over-all; GE part dwg No. K-2268422; (for grooved pulley).
X701	2ZK8666-15	SOCKET, tube: octal; molded bakelite or steatite; body, 1¼" diam x ½" h; Vicinite No. 115015-2, Amphenol No. SS8M on S-STM; GE part dwg No. K-2263421; (voltage regulator mounting).
	3H2358/S15	SPRING: helical; 0.025" OD music wire; 8 turns close wound with ⅜" projection of wire at ends of spring; 0.206" ID x 0.225" lg; Warwick part dwg No. US-70135; GE part dwg No. K-2263480.
	3H5280.3	SPRING: helical; phosphor bronze; ¼" OD x 1½" lg with 0.5-lb pull and 1⅝" lg with 0.7-lb pull; GE part dwg No. K-2263498; (tension for idler pulley assembly).
	6L58022-12C	WASHER, flat: steel, cadmium pl; 0.159" ID x 9/32" OD x 0.031" thk; GE part dwg No. K-2263499; (idler pulley).
	6L58023C	WASHER, flat: steel, cadmium pl; 0.187" ID x 11/32" OD x 0.031" thk; GE part dwg No. K-2263484-1; (idler pulley).
H307	3G1838-8.19	WASHER, flat: textolite; ½" OD x 0.257" ID x 0.062" thk; GE part dwg No. K-2263455-1; (thrust plate).
H308	3G1838-8 20	WASHER, flat: textolite; ½" OD x 0.257" ID x 0.031" thk; GE part dwg No. K-2263455-2; (thrust plate).
H309	3G1838-14 9	WASHER, flat: textolite; ⅞" OD x 0.630" ID x 0.062" thk; GE part dwg No. K-2263456; (thrust plate).
H310	6L70008C-4	WASHER, lock: steel, cadmium pl; No. 8-3/64" x 3/64" sect; (gearcase housing).
H4	6L73612-4C	WASHER, spring: phosphor bronze, zinc pl; 11/64" ID x 15/32" OD, 0.016" thk; Hubbard Spring No. EW-244; GE part dwg No. K-2263488.

SECTION XVII

REFERENCES

119. ARMY REGULATIONS.

AR 380-5 Safeguarding Military Information.

120. MAINTENANCE PARTS.

SIG 1 Introduction to ASF Signal Supply Catalogue.

SIG 2 Complete Index to ASF Signal Supply Catalogue.

SIG 3 List of Items for Troop Issue.

SIG 4-1 Allowances of Expendable Supplies.

SIG 4-2 Allowances of Expendable Supplies for Schools, Training Centers, and Boards.

SIG 5 Stock List of All Items.

SIG 7 Organizational Spare Parts.

SIG 8 Higher Echelon Spare Parts.

SB 11-6 Dry Battery Supply Data.

SB 11-8 Chests for Running Spares.

121. TECHNICAL MANUALS ON AUXILIARY EQUIPMENT AND TEST EQUIPMENT.

TM 11-303 ..... Test Sets I-56-C, I-56-D, I-56-H, and I-56-J.

TM 11-321 ..... Test Set I-56-E.

TM 11-472 ..... Repair and Calibration of Electrical Measuring Instruments.

TM 11-2613 ..... Voltohmmeter I-166.

TM 11-2626 ..... Test Unit I-176.

TM 11-2627 ..... Tube Tester I-177.

122. PAINTING, PRESERVING, AND LUBRICATING.

TB SIG 6..... A Method of Prolonging the Life of Dry Batteries.

123. SHIPPING INSTRUCTIONS.

U. S. Army Spec No. 100-14A . . Army-Navy General Specification for Packaging and Packing for Overseas Shipment.

124. DECONTAMINATION.

TM 3-220 . . . . . Decontamination.

125. DEMOLITION.

FM 5-25 . . . . . Explosives and Demolitions.

126. CAMOUFLAGE.

FM 5-20 . . . . . Camouflage, Basic Principles.

127. OTHER TECHNICAL PUBLICATIONS.

FM 21-6 . . . . . List of Publication for Training.

FM 21-7 . . . . . List of Training Films, Film Strips, and Film Bulletins.

FM 21-8 . . . . . Military Training Aids.

FM 21-40 . . . . . Defense Against Chemical Attacks.

FM 24-6 . . . . . Radio Operator's Manual, Army Ground Forces.

FM 24-11 . . . . . Combined Operating Signals.

FM 24-18 . . . . . Radio Communication.

TB SIG 5 . . . . . Defense Against Radio Jamming.

TB SIG 25 . . . . . Preventive Maintenance of Power Cords.

TB SIG 66 . . . . . Winter Maintenance of Ground Signal Equipment.

TB SIG 69 . . . . . Lubrication of Ground Signal Equipment.

TB SIG 72 . . . . . Tropical Maintenance of Ground Signal Equipment.

TB SIG 75 . . . . . Desert Maintenance of Ground Signal Equipment.

TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.
TM 1-455	Electrical Fundamentals.
TM 11-227	Signal Communication Equipment Directory, Radio Communication Equipment.
TM 11-310	Schematic Diagrams for Maintenance of Ground Radio Communications Sets.
TM 11-314	Antennas and Antenna Systems.
TM 11-453	Shop Work.
TM 11-454	The Radio Operator.
TM 11-455	Radio Fundamentals.
TM 11-462	Reference Data.
TM 11-483	Suppression of Radio Noises.
TM 11-496	Training Text and Laboratory Exercise for Amplitude-modulated Radio Sets.
TM 11-499	Radio Propagation.
TM 38-250	Basic Maintenance Manual.

128. ABBREVIATIONS.

a-f	audio-frequency
a-m	amplitude-modulated
a-v-c	automatic-volume-control
cps	cycles per second
d-c	direct-current
i-f	intermediate-frequency
ma	milliampere
mc	megacycle
mmf	micromicrofarad
r-f	radio-frequency

129. GLOSSARY.

Refer to the glossary in TM 11-455.

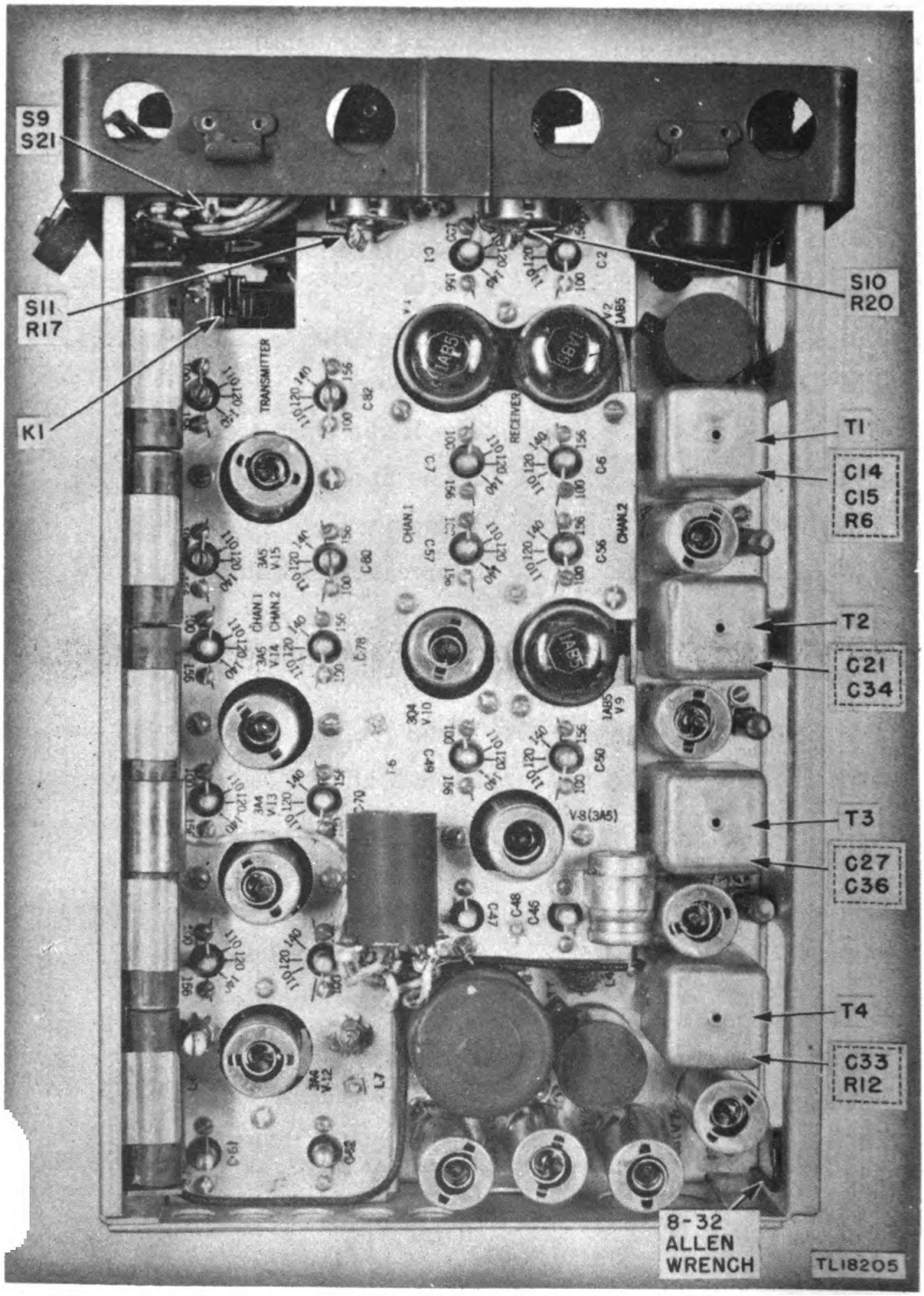


Figure 74. Radio Set AN/TRC-7, right side.

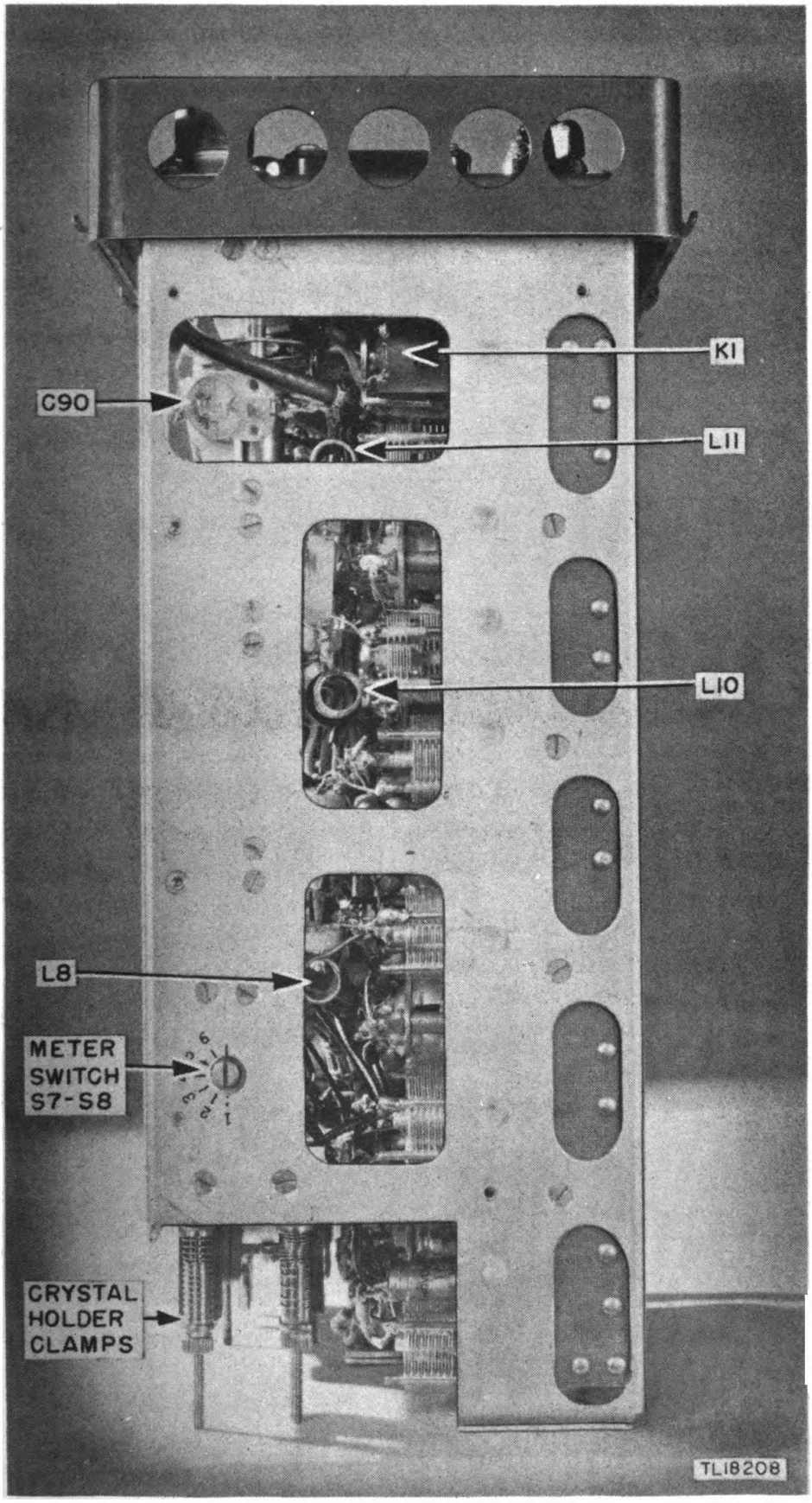


Figure 75. Radio Set AN/TRC-7, chassis top.

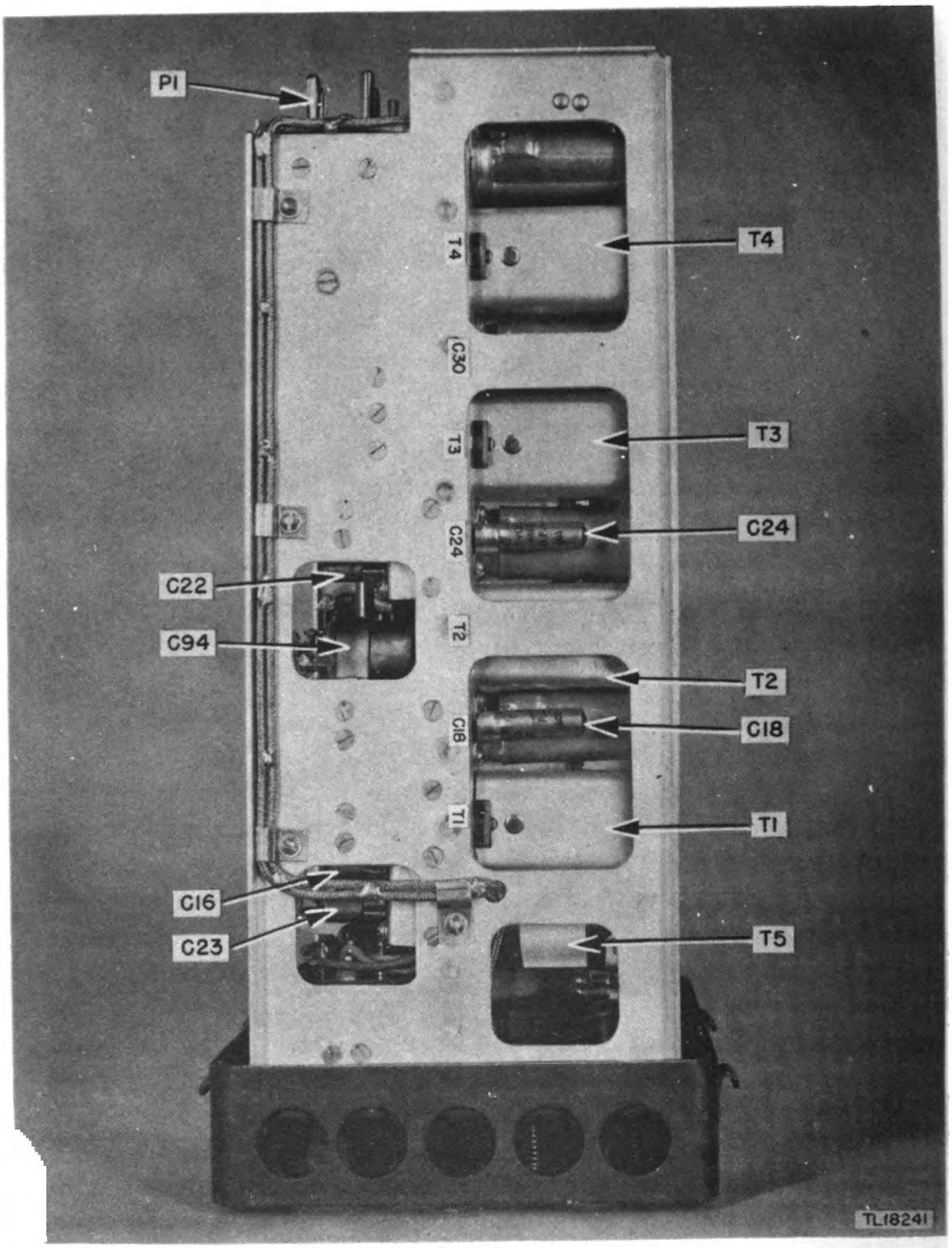


Figure 76. Radio Set AN/TRC-7, chassis bottom.

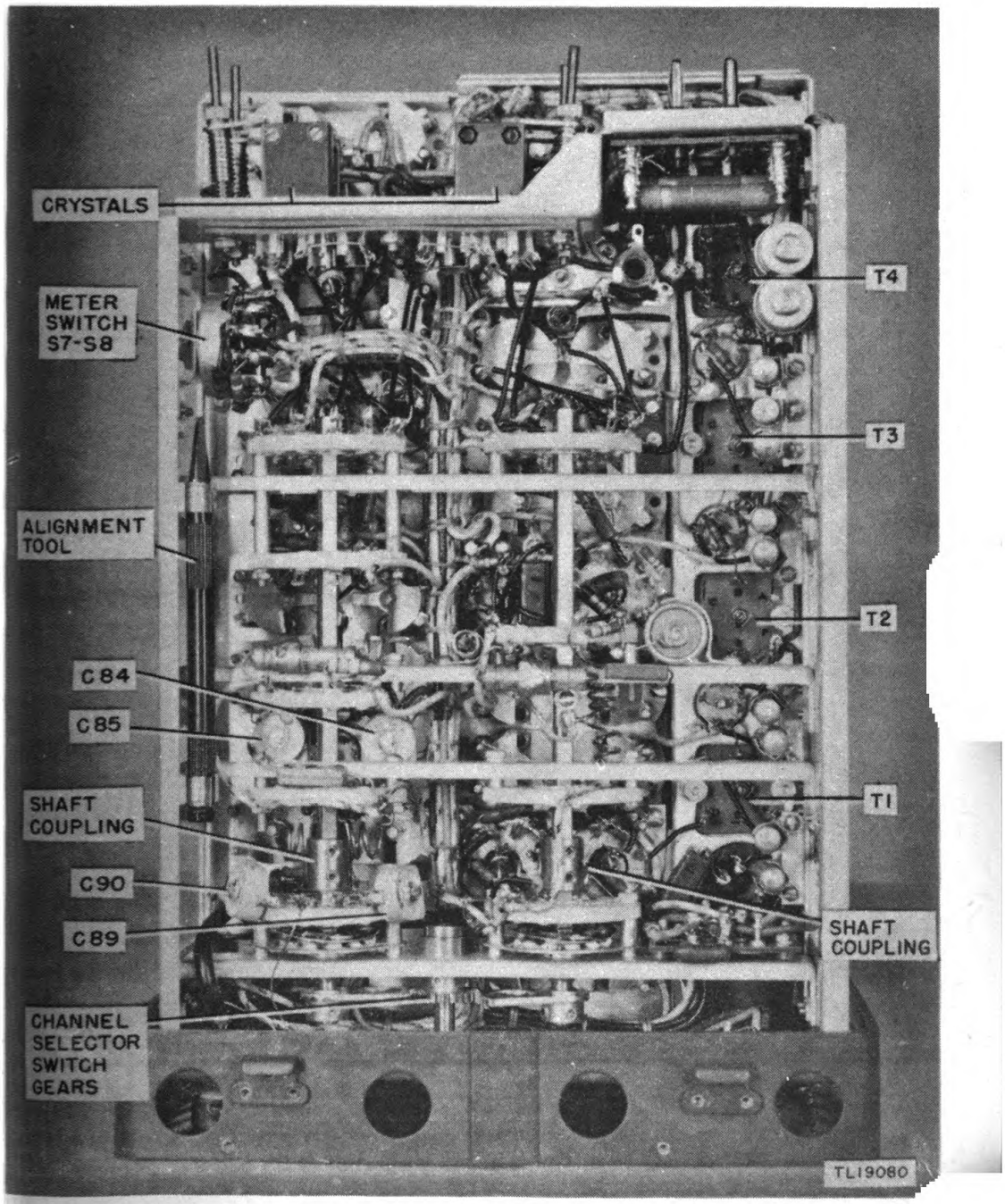


Figure 77. Radio Set AN/TRC-7, chassis right side.

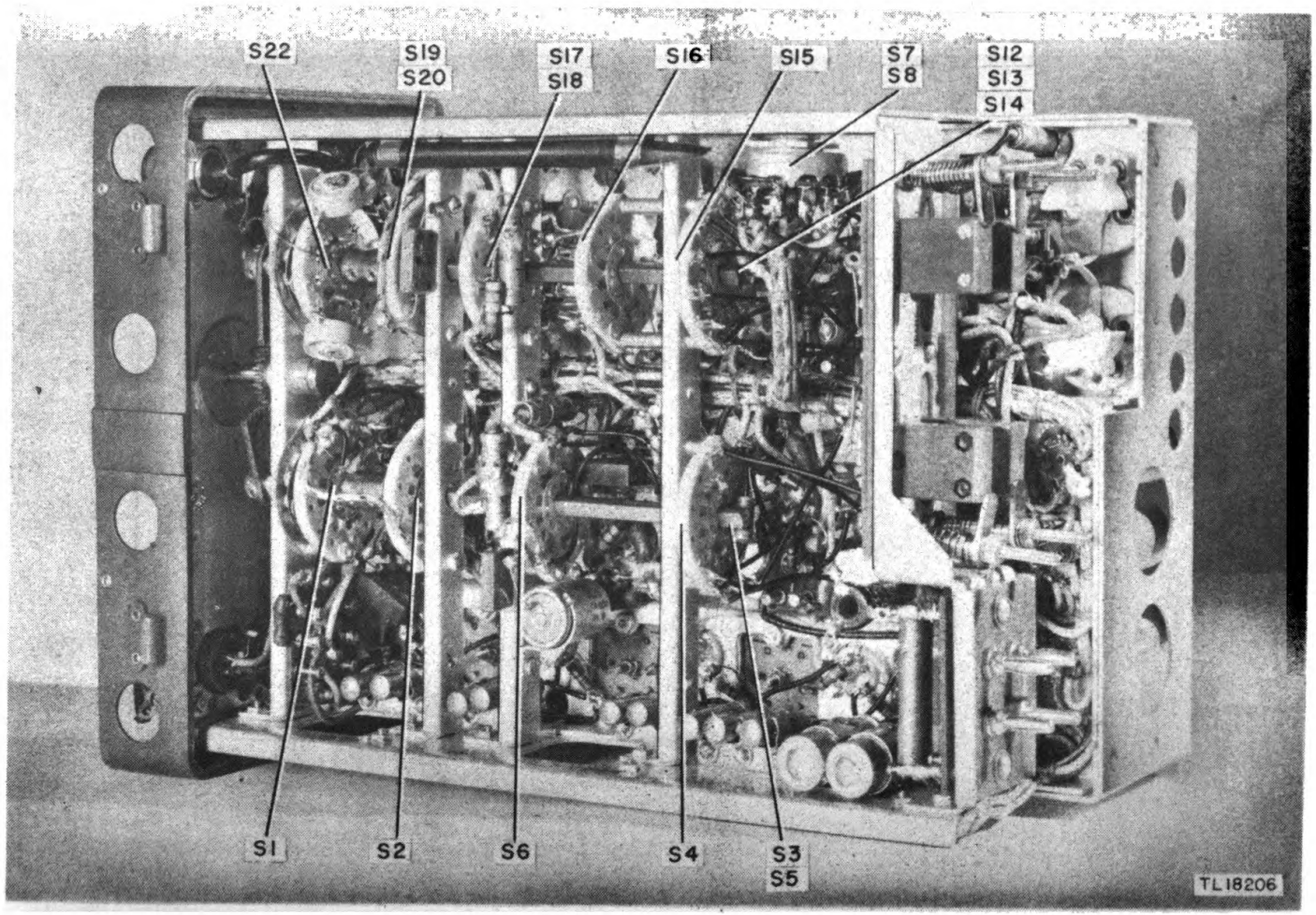


Figure 78. Radio Set AN/TRC-7, chassis oblique right side view.

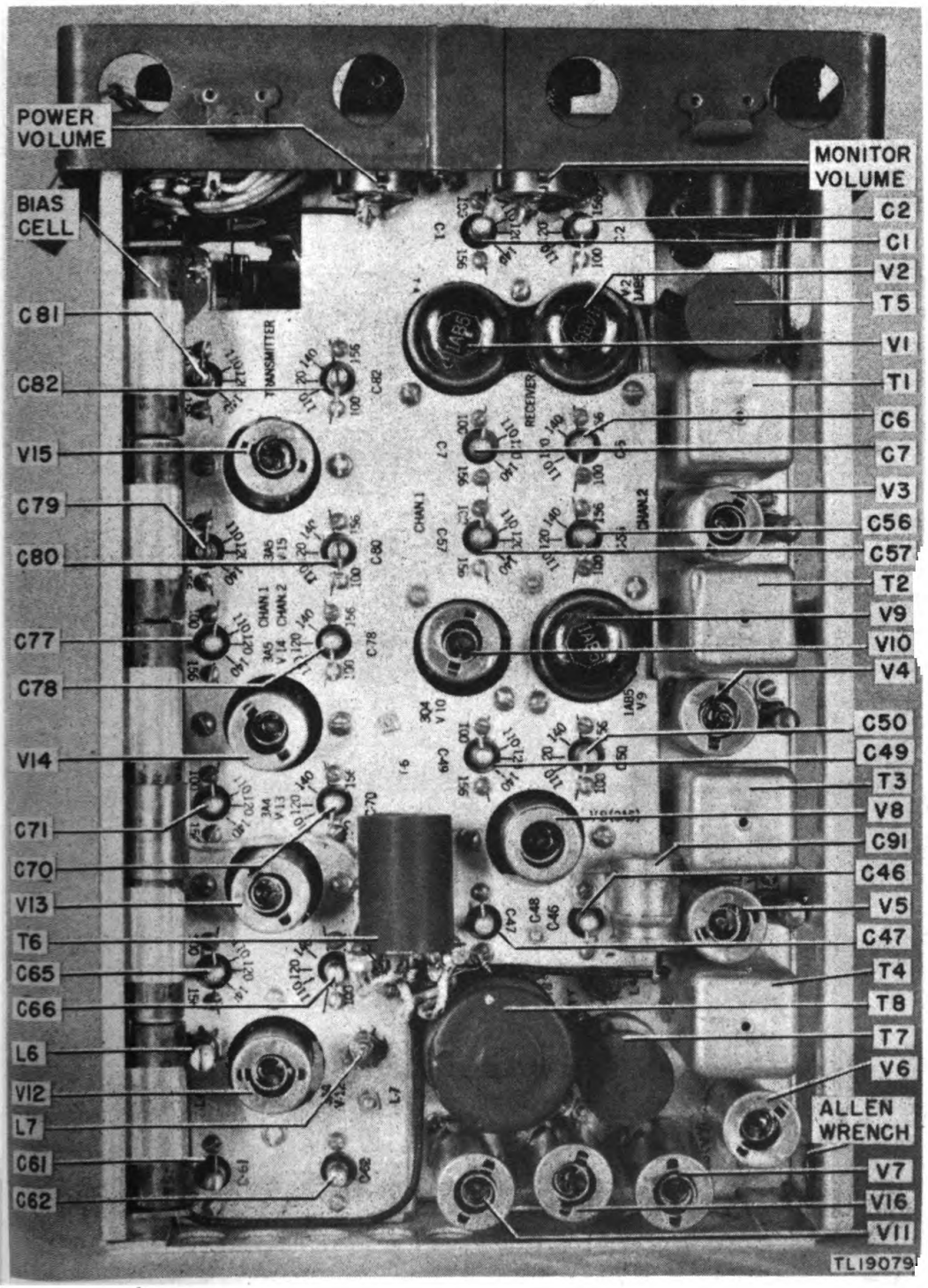


Figure 79. Radio Set AN/TRC-7, chassis left side.

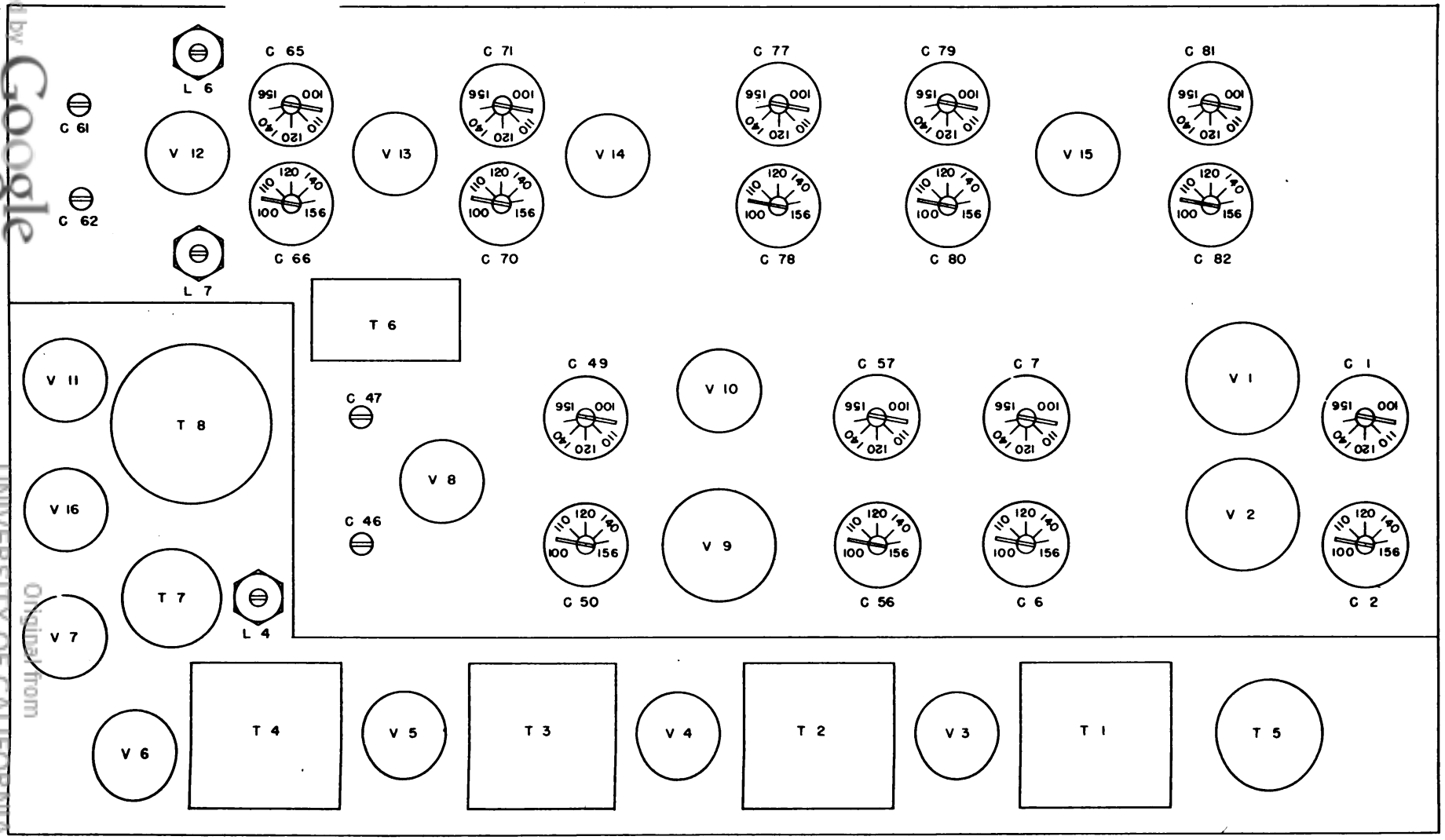


Figure 80. Radio Set AN/TRC-7, chassis tuning controls

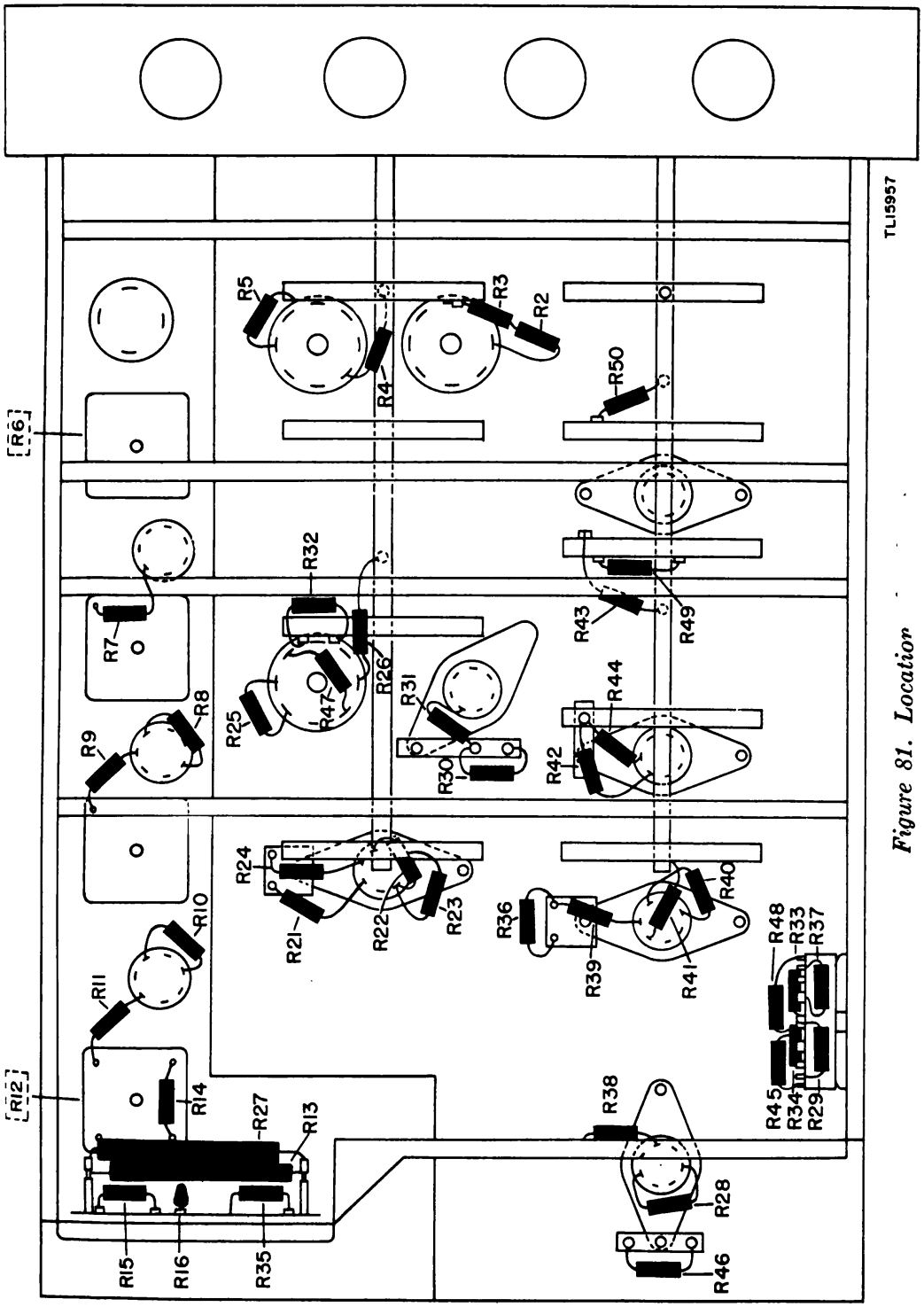


Figure 81. Location

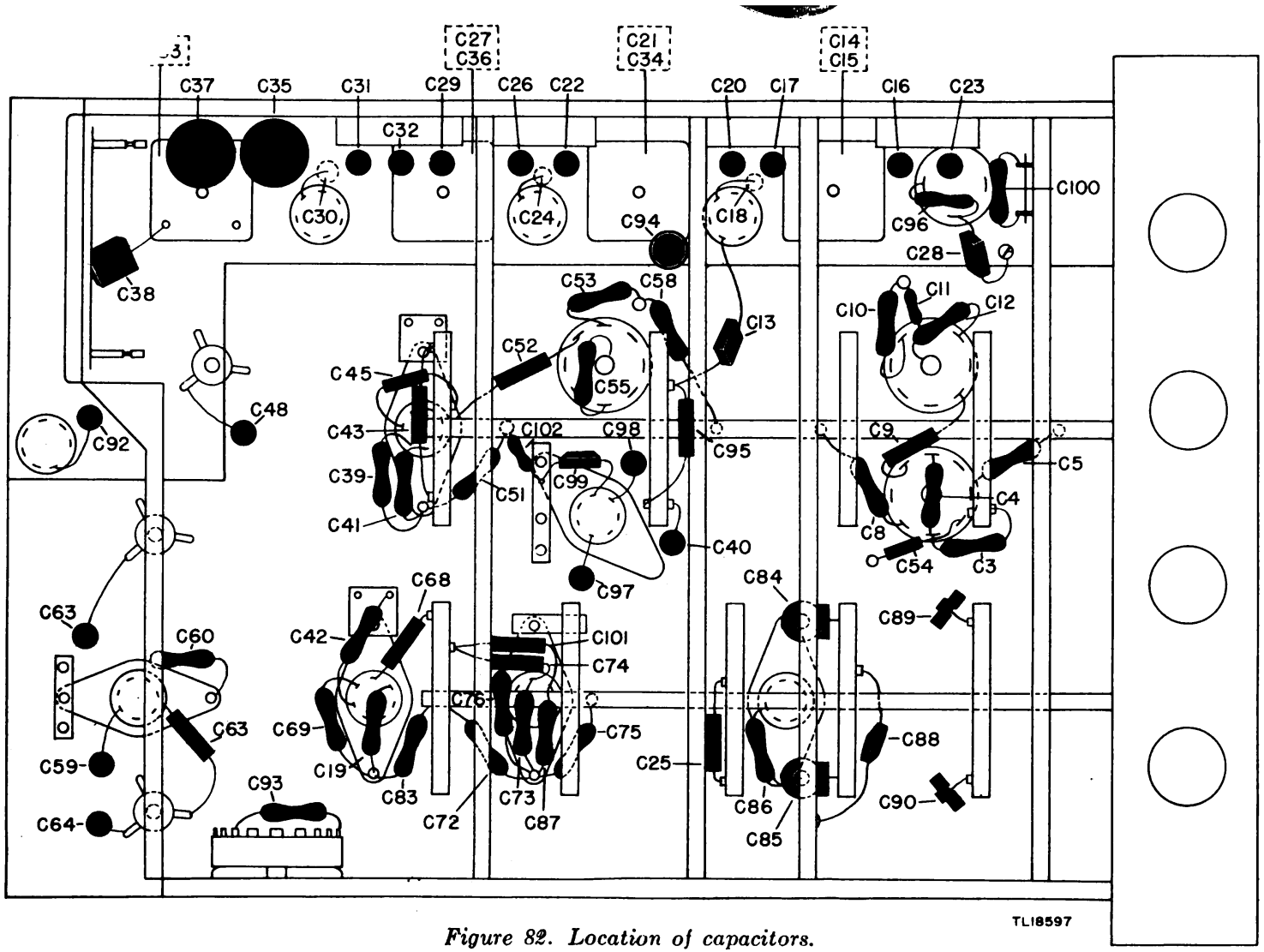


Figure 82. Location of capacitors.

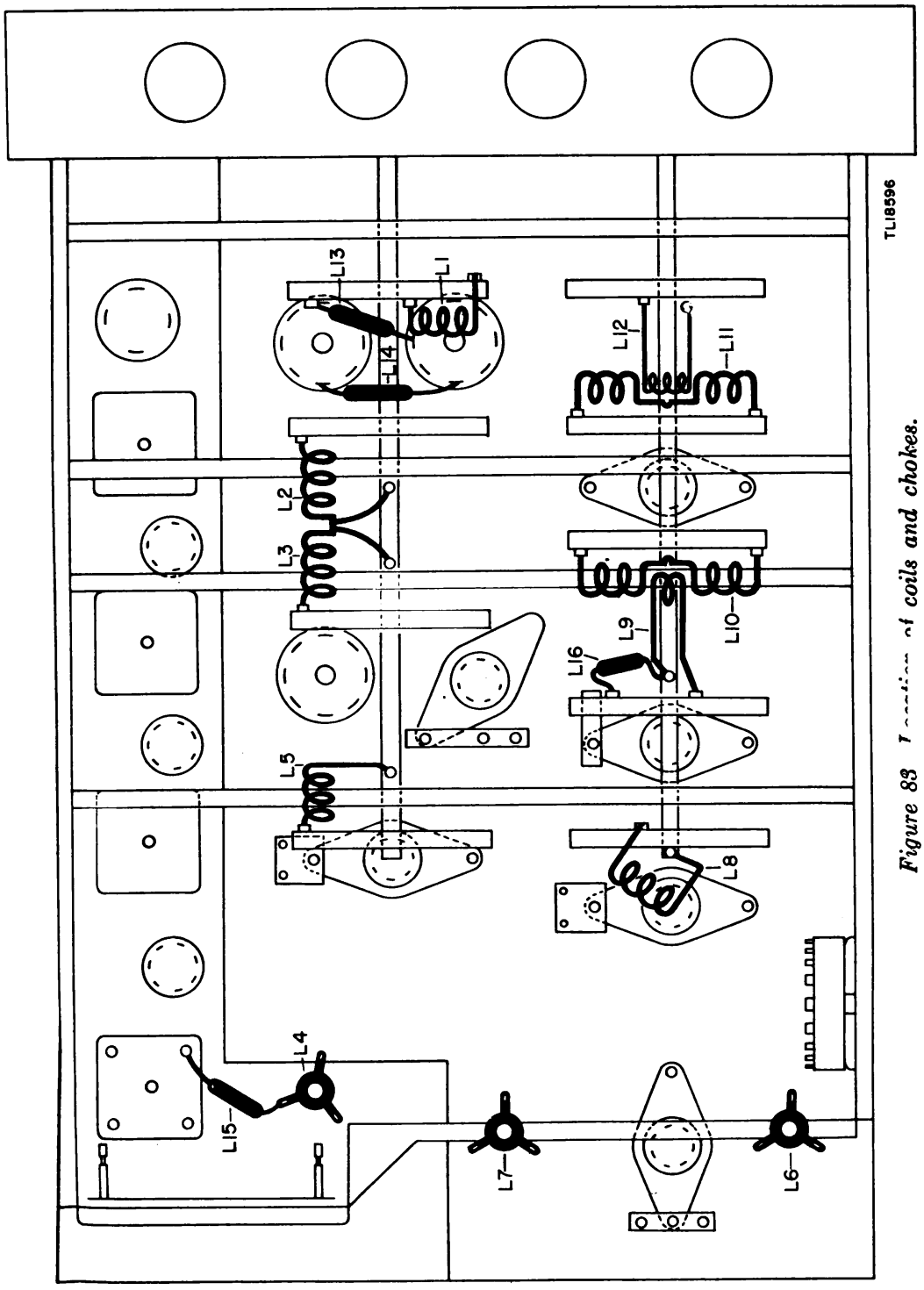
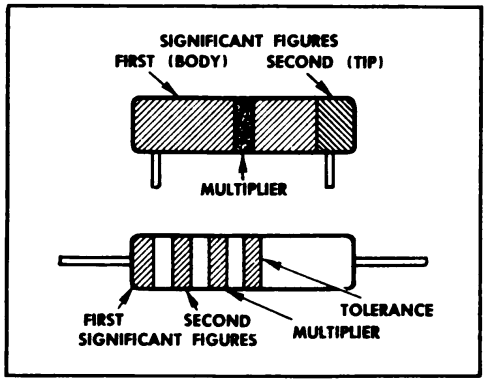


Figure 83 Location of coils and chokes.

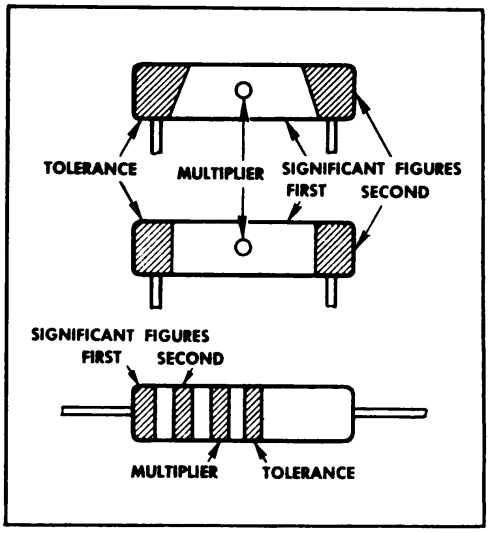
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS



Insulated fixed composition resistors with axial leads are designated by a natural tan background color. Non-insulated fixed composition resistors with axial leads are designated by a black background color.

AWS COLOR CODE FOR FIXED COMPOSITION RESISTORS



The exterior body color of insulated resistors may be any color except black. The usual color is natural tan. The exterior body color of uninsulated resistors with axial leads may be either black or white. The exterior body color of uninsulated resistors with radial leads may be black or it may be the color of the first significant figure of the resistance value.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	
RED	2	100	
ORANGE	3	1000	
YELLOW	4	10,000	
GREEN	5	100,000	
BLUE	6	1,000,000	
VIOLET	7	10,000,000	
GRAY	8	100,000,000	
WHITE	9	1,000,000,000	
GOLD		0.1	5
'ILVER		0.01	10
) COLOR			20

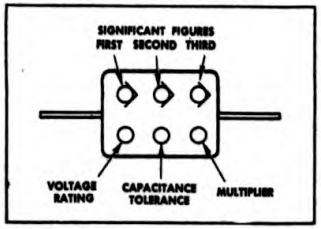
RMA: *Radio Manufacturers Association*
AWS: *American War Standard (American Standards Association)*

TL 13418

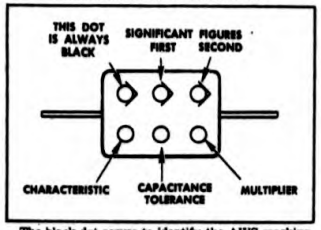
Figure 84. Resistor color codes.

CAPACITOR COLOR CODES

RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

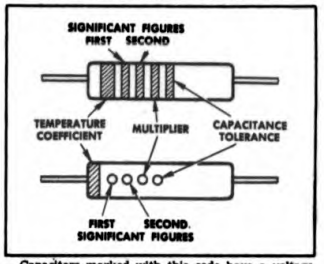


AWS 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



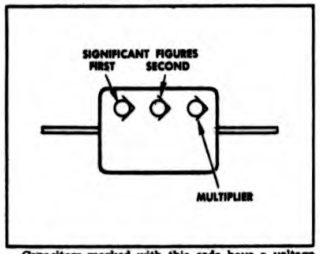
The black dot serves to identify the AWS marking. Capacitors marked with this code are rated at 500 volts, except the following. AWS type CM35 capacitors with capacitances of 6,800, 7,500, and 8,200 micromicrofarads, and AWS type CM40 capacitors with capacitances of 9,100 and 10,000 micromicrofarads are rated at 300 volts.

AWS COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS



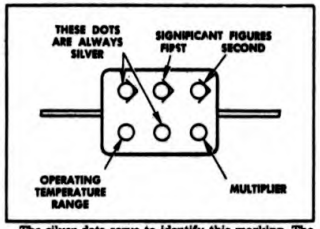
Capacitors marked with this code have a voltage rating of 500 volts.

RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



Capacitors marked with this code have a voltage rating of 500 volts.

AWS 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS

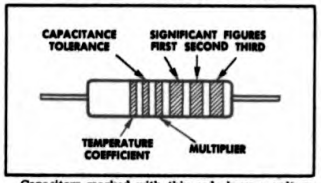


The silver dots serve to identify this marking. The sixth dot shows whether the capacitor has a maximum operating temperature of 167°F (black) or 185°F (brown).

RMA: *Radio Manufacturers Association*
AWS: *American War Standard (American Standards Association)*

NOTE: These color codes give all capacitances in *micromicrofarads*.

RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS



Capacitors marked with this code have a voltage rating of 500 volts.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER: RMA MICA- AND CERAMIC-DIELECTRIC AWS MICA- AND PAPER-DIELECTRIC	MULTIPLIER: AWS CERAMIC-DIELECTRIC	VOLTAGE RATING (VOLTS)	CHARACTERISTIC (AWS MICA-DIELECTRIC)
BLACK	0	1	1		A
BROWN	1	10	10	100	B
RED	2	100	100	200	C
ORANGE	3	1000	1000	300	D
YELLOW	4	10,000		400	E
GREEN	5	100,000		500	F
BLUE	6	1,000,000		600	G
VIOLET	7	10,000,000		700	
GRAY	8	100,000,000	0.01	800	
WHITE	9	1,000,000,000	0.1	900	
GOLD		0.1		1000	
SILVER		0.01		2000	
NO COLOR				500	

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CAPACITANCE TOLERANCE: RMA & AWS MICA- AND PAPER-DIELECTRIC (PERCENT)	CAPACITANCE TOLERANCE: RMA CERAMIC-DIELECTRIC (PERCENT)	CAPACITANCE TOLERANCE: AWS CERAMIC-DIELECTRIC GREATER THAN 10 MMF (PERCENT)	CAPACITANCE TOLERANCE: AWS CERAMIC-DIELECTRIC LESS THAN 10 MMF (MMF)	TEMPERATURE COEFFICIENT OF CAPACITANCE $\times 10^{-6}$ MMF/MMF/°C
20	20	20	2.0	0
1	1	1		− 30
2	2	2		− 80
3	3	2.5	0.25	−150
4	4			−220
5	5	5	0.5	−330
6	6			−470
7	7			−750
8	2.5			+ 30
9	10	10	1.0	Not specified
.5				
10				
20				

TL 13417-1

Figure 85. Capacitor color codes.

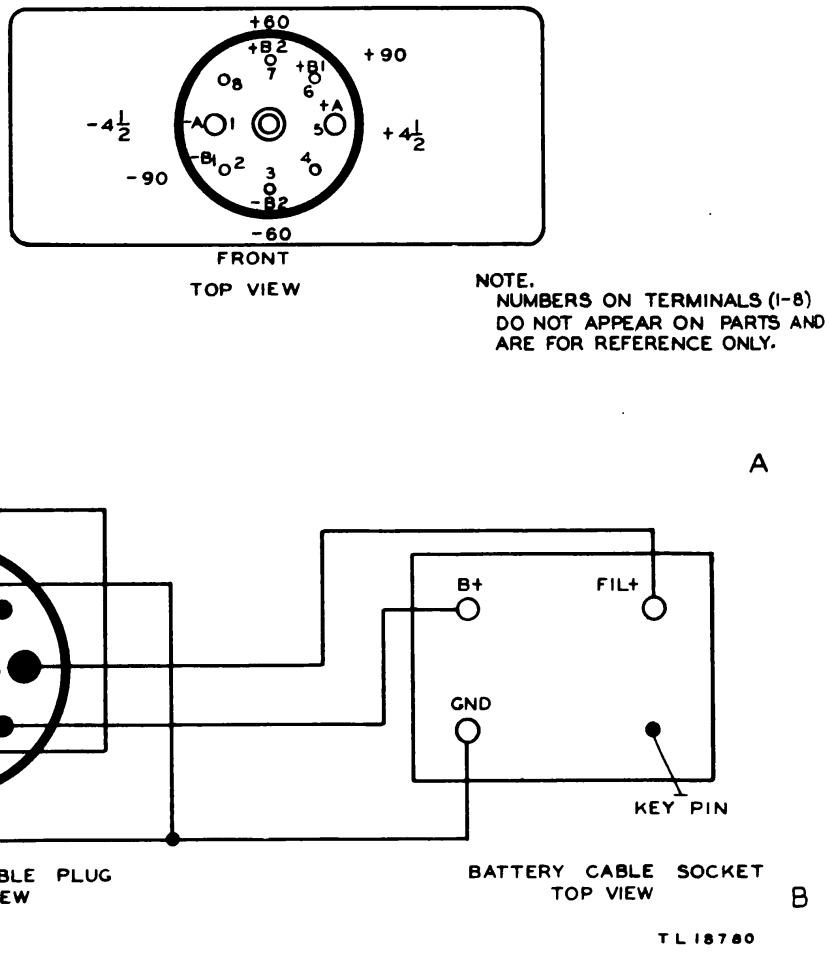


Figure 86. Battery cable plug.

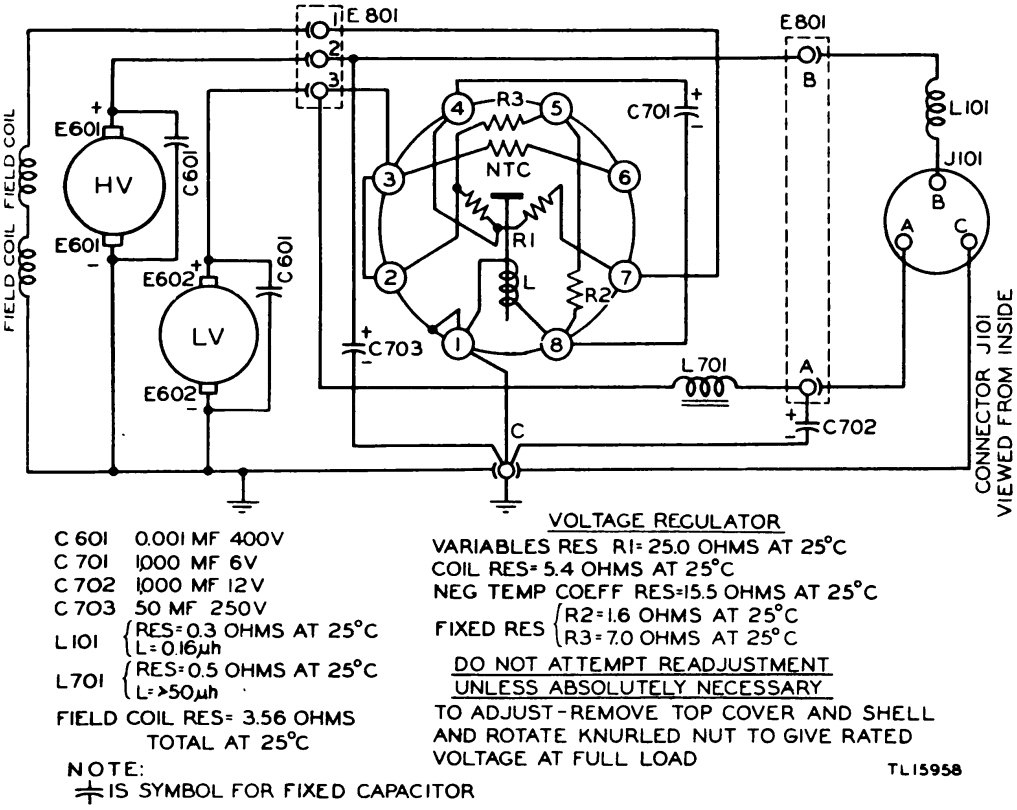


Figure 87. Generator G-3/TRC-7, wiring diagram.

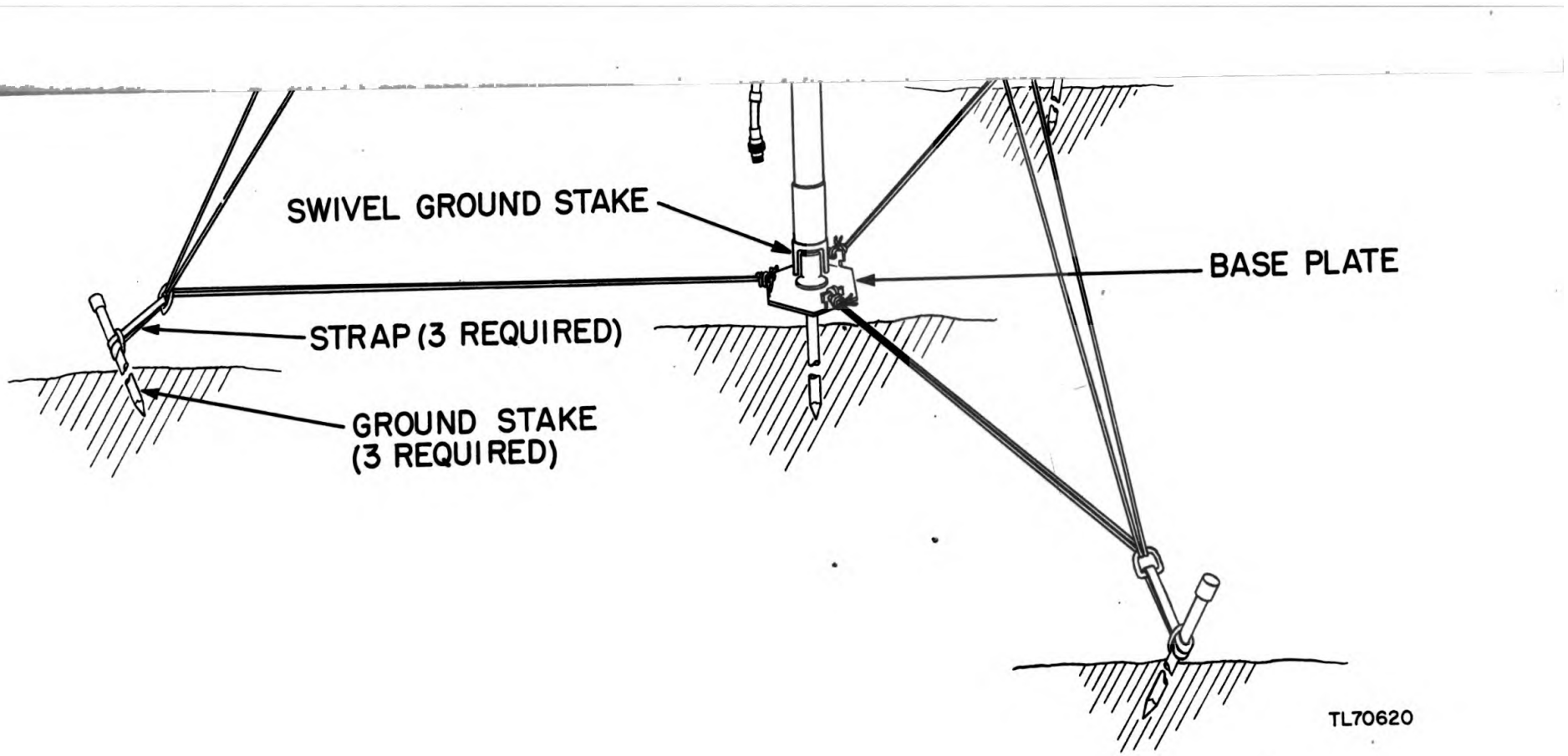


Figure 88. Antenna Assembly AS-110/TRC-7, assembly of components.

THIS SUPPLEMENT WILL REMAIN IN EFFECT ONLY UNTIL THE INFORMATION IS PUBLISHED IN AN OFFICIAL WAR DEPARTMENT PUBLICATION.

SUPPLEMENT

21 JULY 1945

SUPPLEMENT TO

TM 11-617

RADIO SET AN/TRC-7

The following information, published on Order No. 29016-Phila-45-08, supplements TM 11-617, 22 February 1945. The serial numbers of the equipment covered in this supplement are:

NAME	SERIAL NO.
Radio Set AN/TRC-7A	1 to 3144 incl

Personnel using the equipment and having custody of this technical manual will enter suitable notations beside each affected paragraph and figure in the technical manual to indicate the presence of this supplementary information.

Make the following changes in nomenclature throughout the manual:

Change "AN/TRC-7" to read: AN/TRC-7A.

Change "RT-53/TRC-7" to read: RT-53A/TRC-7.

Change "AS-110/TRC-7" to read: AS-110A/TRC-7.

Page 3. Par. 3. In line 13, change "0.5 to 1.5 watts" to read: 0.4 to 1.5 watts.

Page 5. Figs. 5 and 6. Add the following note under the captions of figures 5 and 6:

NOTE: Cord CD-604 which should be included in this illustration appears in figure 6.1.

Page 5. Fig. 6. Add figure 6.1 after figure 6.

Figure 6.1. Cord CD-604; for use with Headset HS-30-( ).

Page 6. Par. 5. In lines 27 and 28, change "Control Unit RM-52 and Remote Control Unit RM-53" to read: Control Unit RM-53 and Remote Control Unit RM-52.

Page 7. Par. 5. In the last line, delete "1 Tube Puller TL-310/U" and insert the following material therefor:

2 tube pullers No. 11-16.
2 tube pullers No. 1-125.

Page 21. Par. 17. In the last line of subparagraph a, change "plug P1" to read: connector J6.

'age 36. Par. 27. In subparagraph c, under components listed in Bag 1, delete "Tube Puller TL-310/U" and insert:

2 tube pullers No. 11-16
2 tube pullers No. 1-125

Page 39. Par. 28. Delete subparagraph a and substitute the following therefor:

a. POWER VOLUME Control (fig. 37). The POWER VOLUME control knob actuates the receiver filament switch S11, and controls the volume of the receiver with variable resistor R17. This knob has no effect on the transmitter.

ıge 40. Fig. 36. Delete figure 36 and substitute new figure 36 located in back of supplement.

Page 43. Fig. 41. Delete figure 41 and substitute new figure 41 located in back of supplement.

Page 53. Par. 37. In subparagraph a(3), delete "Use Tube Puller TL-310/U (par. 68)." and substitute the following therefor:

Use tube puller No. 11-16, or tube puller No. 1-125 (pars. 68 and 68.1).

Page 67. Par. 68. Delete paragraph 68 and substitute the following therefor:

68. TUBE PULLER NO. 11-16.

This tube puller (fig. 45) is used for removing the miniature type tubes from the receiver-transmitter unit. Push the round woven end of the tube puller over the tube. TAKE CARE NOT TO STRIKE THE SEAL-OFF TIP WITH YOUR FINGER. Pull straight up on handle of puller. Do not wiggle puller from side to side.

68.1. TUBE PULLER NO. 1-125.

This tube puller (fig. 45) is used for removing the larger tubes (lock-in type) from the receiver-transmitter unit. Push the round woven end of the tube puller over the tube. Pull straight up on handle of puller. Do not wiggle puller from side to side.

Page 67. Fig. 45. Delete figure 45 and substitute new figure 45 located in back of supplement.

Page 70. Fig. 49. In the V10 section of the block diagram, change "JAN-3A4" to read: JAN-3Q4.

Page 72. Fig. 50. Delete figure 50 and substitute new figure 50 located in back of supplement.

Page 72. Par. 74. In the next to last line of subparagraph b, chang "(automatic - voltage - control)" to read: (automatic - volume control).

Page 73. Fig. 51. Delete figure 51 and substitute new figure 51 located in back of supplement.

Page 74. Fig. 52. Delete figure 52 and substitute new figure 52 located in back of supplement.

Page 75. Fig. 53. Delete figure 53 and substitute new figure 53 located in back of supplement.

Page 75. Par. 77. In the first line on page 75, change "C22" to read: C2

Page 75. Fig. 54. Delete figure 54 and substitute new figure 54 locate in back of supplement.

Page 76. Par. 78. Add the following material at the end of the first sentence in subparagraph b:

in parallel with fixed capacitor C103.

Page 76. Fig. 55. Delete figure 55 and substitute new figure 55 located in back of supplement.

Page 78. Fig. 57. Delete figure 57 and substitute new figure 57 located in back of supplement.

Page 79. Par. 82. In subparagraph b, change "The secondary is designed for use with a 250-ohm headset." to read:

The secondary is designed for use with either a 250-ohm headset or a 4,000-ohm headset.

Page 79. Par. 82. Delete subparagraph c and substitute the following therefor:

c. The audio output from either the 250-ohm or the 4,000-ohm secondary of transformer T5 is connected to the headset through PHONES jack J1 on the front panel of the set. A small reversible nameplate on the PHONES jack cover is marked 250 OHMS on one side and 4000 OHMS on the other. The nameplate indicates which secondary is connected. If it becomes necessary to change the connection to the tap on the secondary of transformer T5, the nameplate should be reversed accordingly. An auxiliary contact in the jack opens the filament circuits of all tubes in the receiver when the headset plug is removed.

Page 79. Par. 83. In subparagraph a, change the second sentence to read:

The oscillator is the source of the harmonic used as the local frequency which is mixed with the incoming signal to produce the intermediate frequency of 12 mc.

Page 79. Par. 83. In subparagraph b, change the last sentence to read:

The plate supply is bypassed by capacitor C48.

Page 81. Par. 84. In subparagraph b, change the last sentence to read:

The plate supply is bypassed by capacitors C51 and C102.

Page 81. Fig. 59. Delete figure 59 and substitute new figure 59 located in back of supplement.

Page 82. Fig. 60. Delete figure 60 and substitute new figure 60 located in back of supplement.

Page 82. Par. 85. In line 3 of subparagraph b, change "Capacitor C58 is the plate bypass capacitor", to read:

Capacitor C58 is the plate supply bypass capacitor.

Page 83. Fig. 61. Add the reference symbol L7 to the variable inductance.

Page 84. Par. 87. In the top line, change "L6" to read: L7.

Page 84. Par. 88. In subparagraph a, change the last sentence to read:

The grid supply is bypassed to ground by capacitor C42.

Page 84. Fig. 62. Change "TO 7.5 VOLT BIAS BUS" to read:

TO —7.5 VOLT BIAS BUS.

Page 86. Fig. 64. Delete figure 64 and substitute new figure 64 located in back of supplement.

Page 87. Par. 91. In the last sentence of subparagraph a, delete the word "not".

Page 90. Fig. 66. Delete figure 66 and substitute new figure 66 located in back of supplement.

Page 91. Fig. 67. In the V13 section of the block diagram, change "JAN-3A5" to read: JAN-3A4.

Page 96. Par. 98. Delete subparagraph a(2) and substitute the following therefor:

(2) Two tube pullers No. 11-16, for miniature tubes.

Page 96. Par. 98. Add the following to subparagraph a:

(11) Two tube pullers No. 1-125, for lock-in type tubes.

Page 97. Par. 99. In the last sentence of subparagraph a(5), change "open" to read: opened.

Page 104. Fig. 68. Delete figure 68 and substitute new figure 68 located in back of supplement.

Page 105. Fig. 69. Delete figure 69 and substitute new figure 69 located in back of supplement.

Page 110. Fig. 72. Change the dimension in the lower left-hand corn from 2.000″ to 1.750″; change the over-all dimension from 11.65(to 11.406″.

Page 114. Par. 115. Delete paragraph 115 and substitute the follov ing therefor:

115. NEUTRALIZATION OF TRANSMITTER POWER AMPLIFIER.

a. General. Neutralizing capacitors C84 and C85 are adjusted at tl factory and should need no attention in the field. However, if tube V1 is replaced it may upset the neutralization. When the neutralization out of adjustment the power-amplifier stage will go into oscillation. Th condition can be recognized if the brightness of phantom Antenn TS-281/TRC-7 does not change as capacitor C61 (or C62) is adjuste If it is certain that the neutralization is out of adjustment, the followin procedure may be followed.

b. Neutralization Procedure.

(1) Align the transmitter using a crystal corresponding to a fr quency lower than 130 mc. Follow the method outlined in paragraph 11 up to and including the adjustment of capacitor C79 (or C80) describe in subparagraph b(3)(c). Remove the plate supply voltage of tube V1 by opening the connection between terminal 4 of transformer T8 ar capacitor C88. This is most easily done by unsoldering the green lea from the main wiring cable at terminal clip 5 on switch wafer B. S capacitor C81 (or C82) at 100 mc. Set the meter switch to position The meter now reads grid current of the final amplifier.

(2) Set neutralizing capacitors C84 and C85 at half maximu capacitance.

(3) Retune the grid circuit of tube V15 by adjusting capacitor C7 (or C80) for maximum meter deflection.

(4) Tune slowly through resonance of tube V15 plate circuit b adjusting capacitor C81 (or C82). The meter deflection dips when passin through plate circuit resonance. Observe the amount of dip produce Reset capacitor C81 (or C82) to 100 mc.

(5) Increase the capacitance of capacitors C84 and C85, each by small amount, by using the insulated blade of Alignment Tool TL-314/U

(6) Repeat steps (3) and (4) above. If the meter dip has decrease continue to increase the capacitance of capacitors C84 and C85 in smal equal amounts, each time repeating steps (3) and (4). If the meter di

has increased, decrease the capacitance of capacitors C84 and C85 in small, equal amounts, each time repeating steps (3) and (4).

(7) Complete neutralization is indicated by a very slight dip when tuning the plate circuit through resonance by means of capacitor C81 (or C82).

(8) Reconnect the plate supply voltage removed in step (1) above.

(9) Recheck the presetting of the transmitter by following the procedure given in paragraph 116.

Page 115. Par. 116. In the third line of subparagraph b(1)(c) change "fig. 79" to read: figs. 79 and 80.

Page 115. Par. 116. In the last line of subparagraph b(2)(a) change "fig. 79" to read: figs. 79 and 80.

Page 136. Fig. 74. Delete figure 74 and substitute new figure 74 located in back of supplement.

Page 137. Fig. 75. Delete caption for figure 75 and substitute the following therefor:

Figure 75. Receiver-Transmitter RT-53A/TRC-7, chassis top.

Page 138. Fig. 76. Change "P1" to read: J6.

Page 138. Fig. 76. Delete caption for figure 76 and substitute the following therefor:

Figure 76. Receiver-Transmitter RT-53A/TRC-7, chassis bottom.

Page 139. Fig. 77. Delete figure 77 and substitute new figure 77 located in back of supplement.

Page 140. Fig. 78. Delete caption for figure 78 and substitute the following therefor:

Figure 78. Receiver-Transmitter RT-53A/TRC-7, chassis oblique right side view.

Page 141. Fig. 79. Delete figure 79 and substitute new figure 79 located in back of supplement.

Page 142. Fig. 80. Delete figure 80 and substitute new figure 80 located in back of supplement.

Page 143. Fig. 81. Delete figure 81 and substitute new figure 81 locate in back of supplement.

Page 144. Fig. 82. Delete figure 82 and substitute new figure 82 locate in back of supplement.

Page 148. Fig. 86. Delete figure 86 and substitute new figure 86 loca ted in back of supplement.

Page 153. Fig. 89. Delete figure 89 and substitute new figure 89 locate in back of supplement.

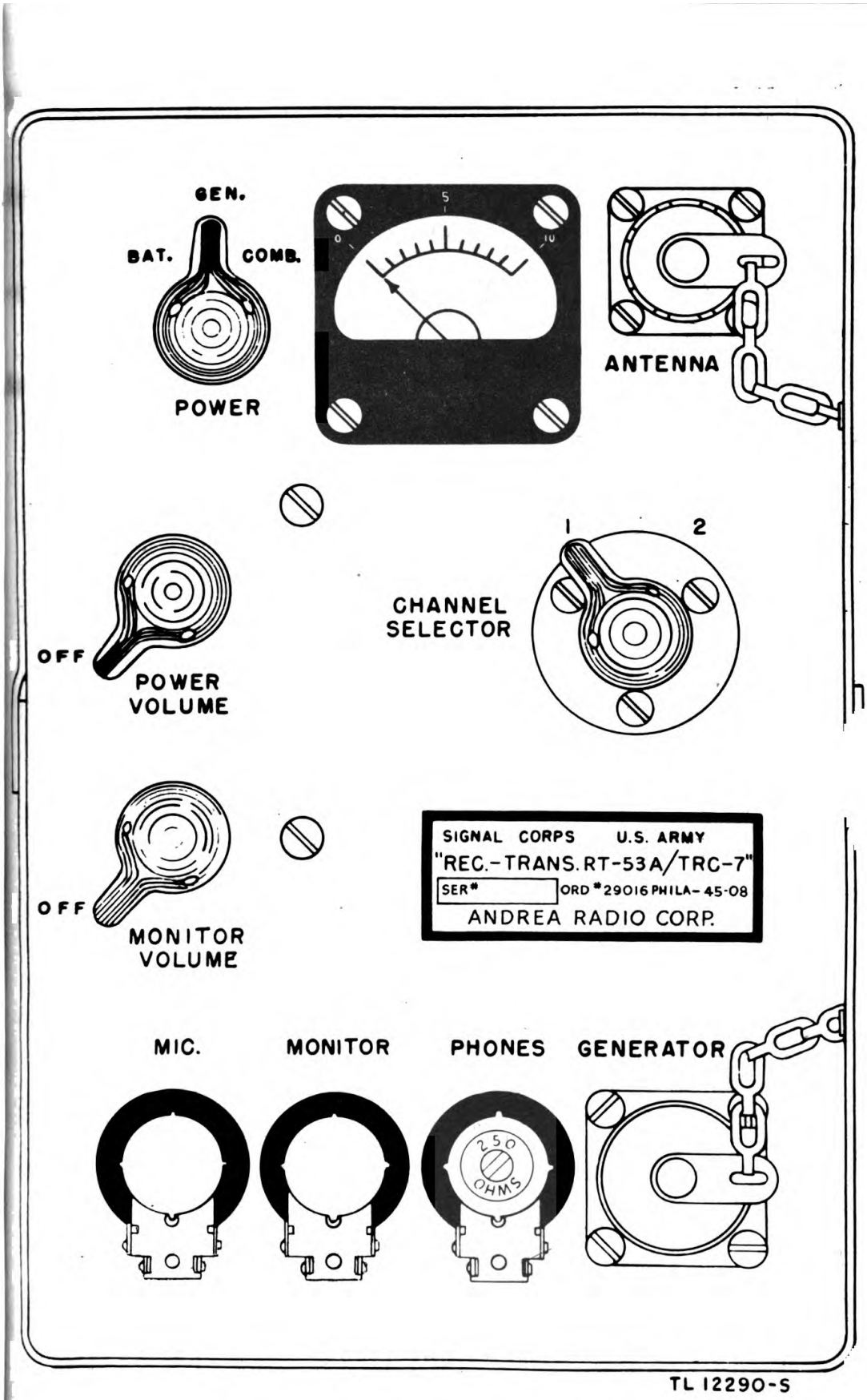


Figure 36. Radio Set AN/TRC-7A, front panel.

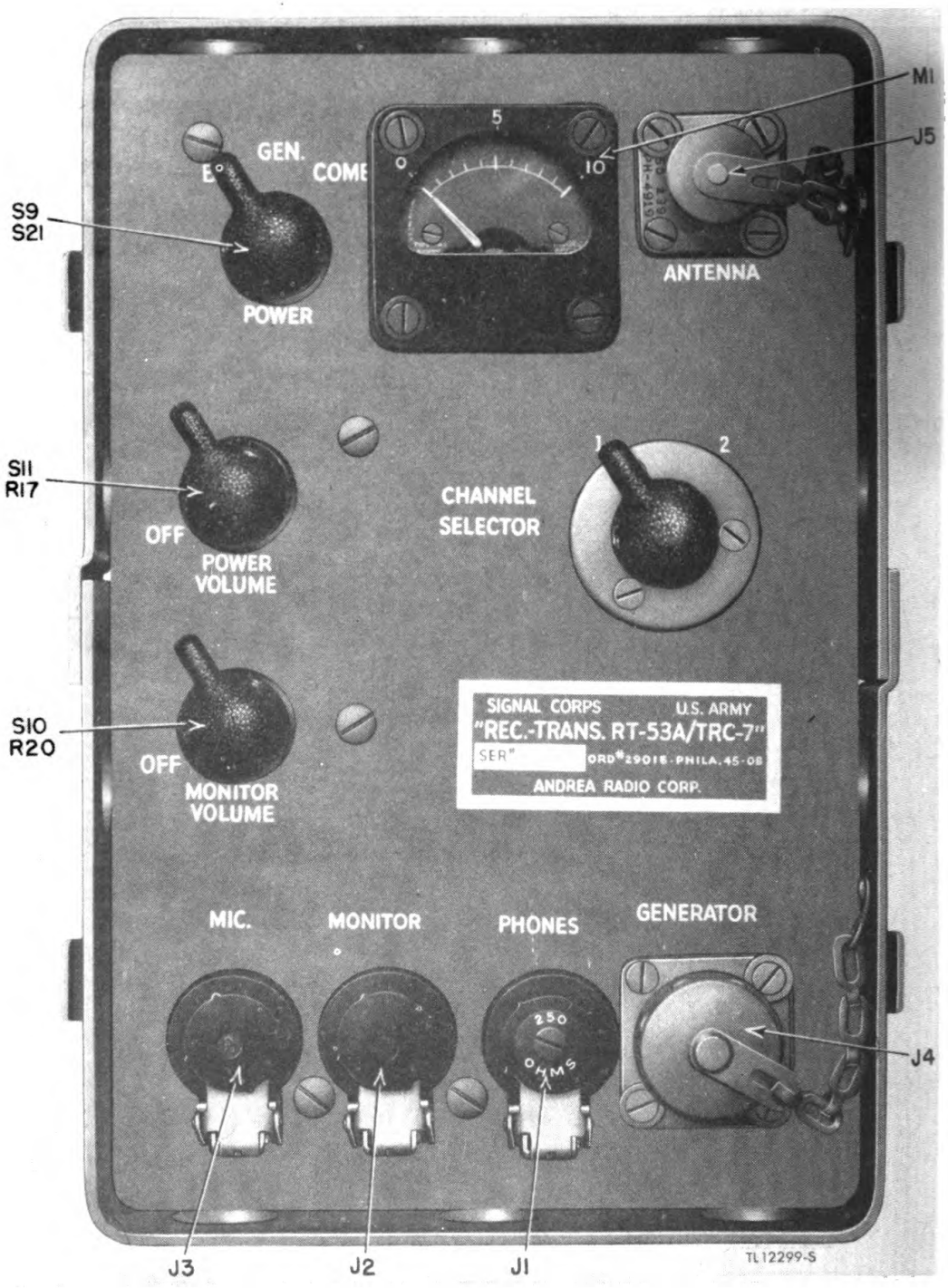


Figure 41. Receiver-Transmitter RT-53A/TRC-7, front panel, showing reference symbols.

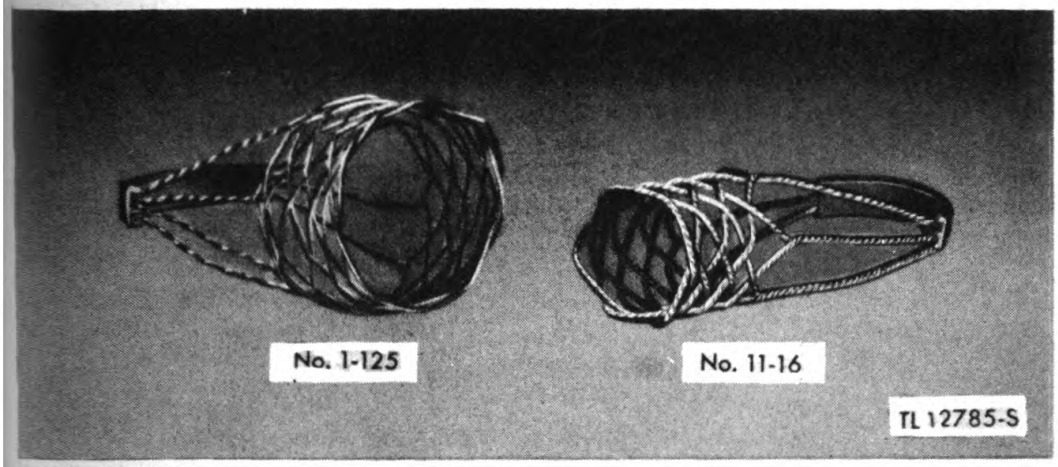


Figure 45. Tube puller No. 1-125 and tube puller No. 11-16.

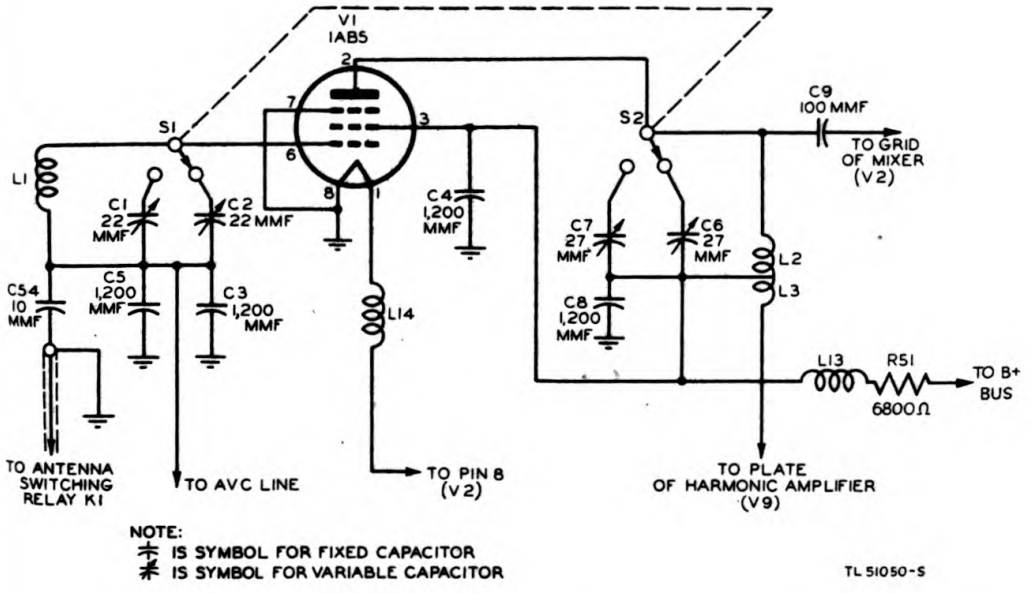


Figure 50. Receiver r-f amplifier.

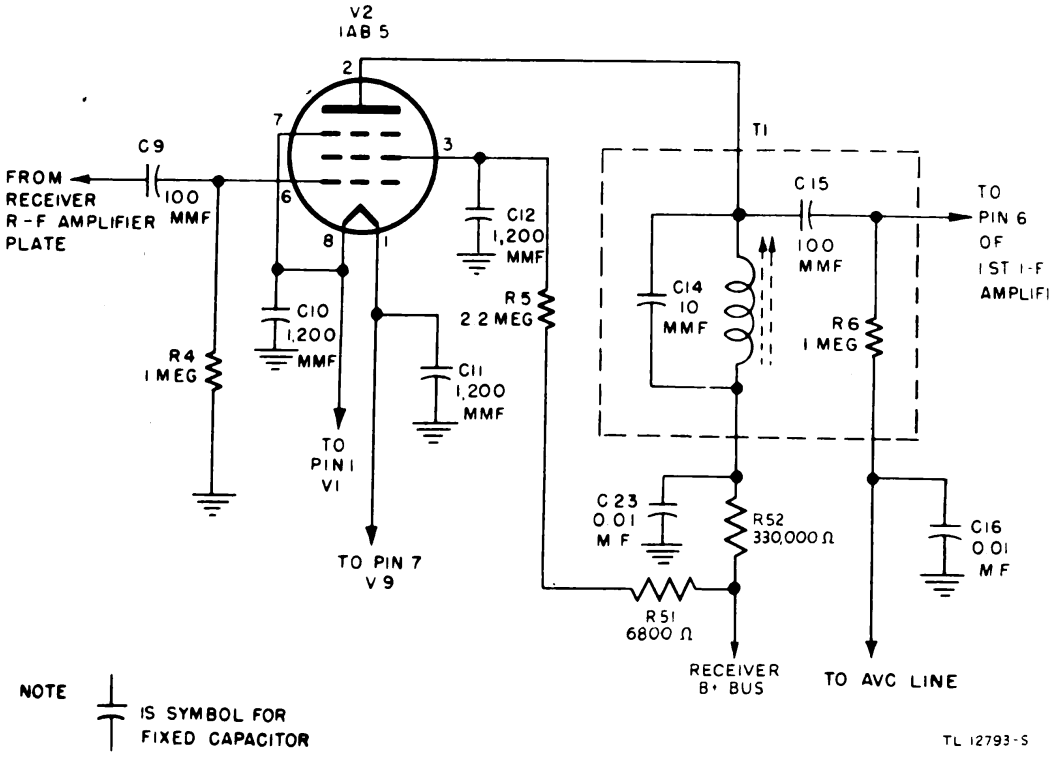


Figure 51. Receiver mixer.

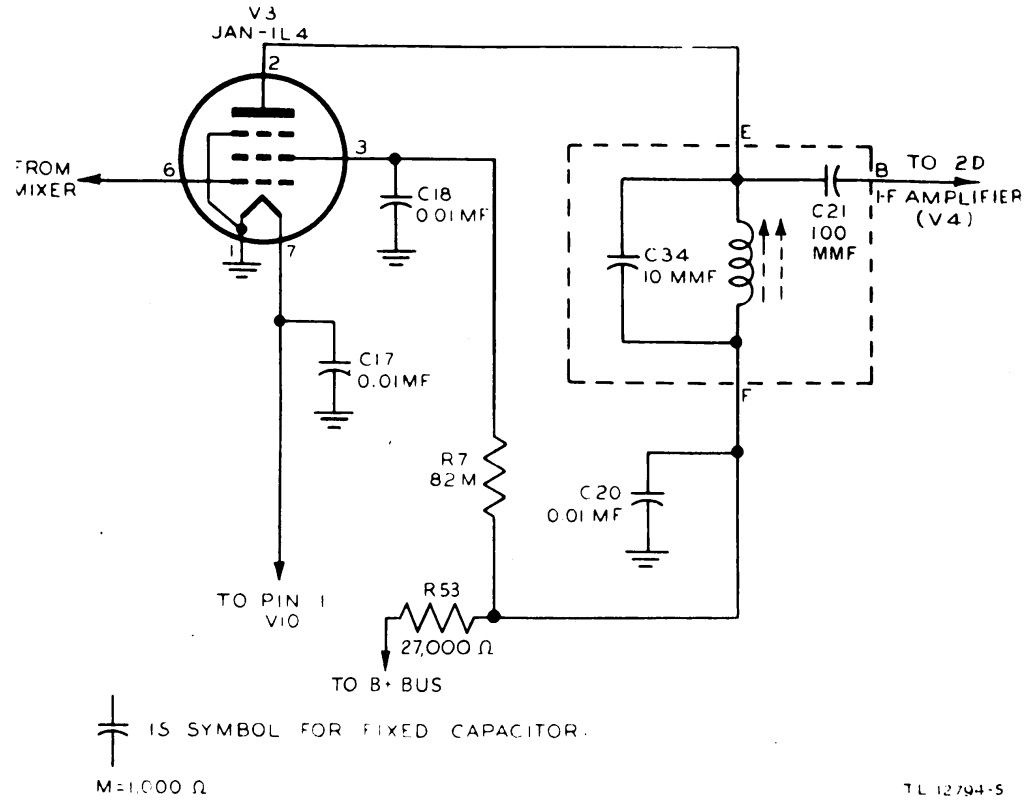


Figure 52. Receiver mixer.

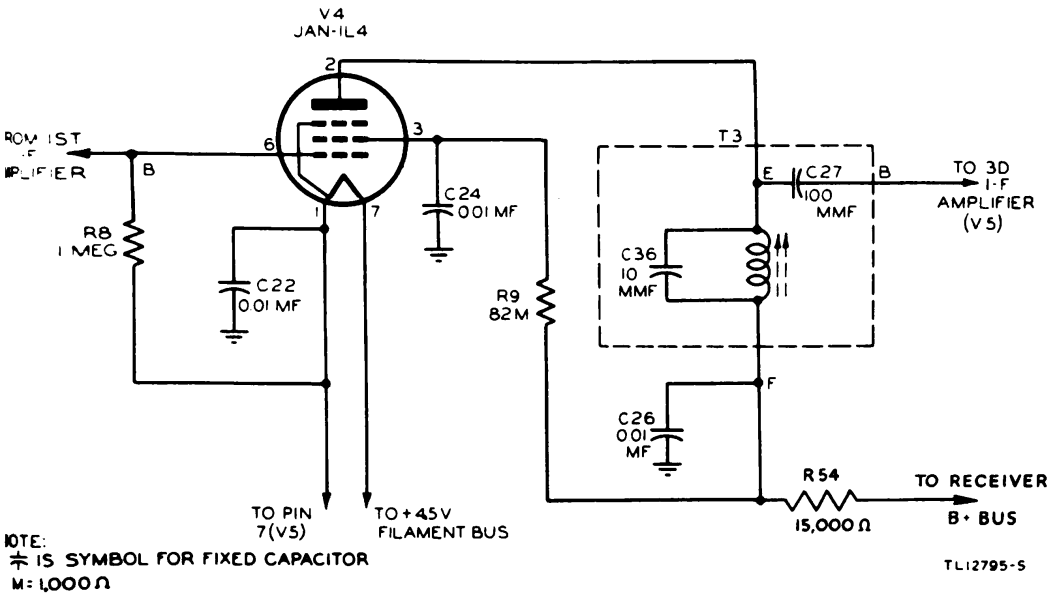


Figure 53. Receiver second i-f amplifier.

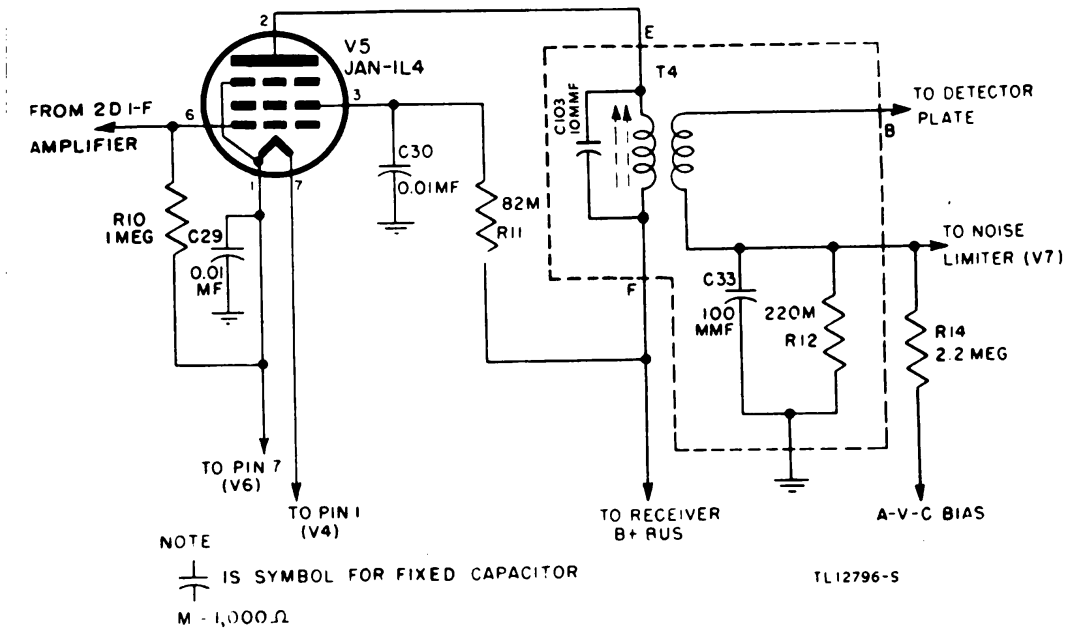


Figure 54. Receiver third i-f amplifier.

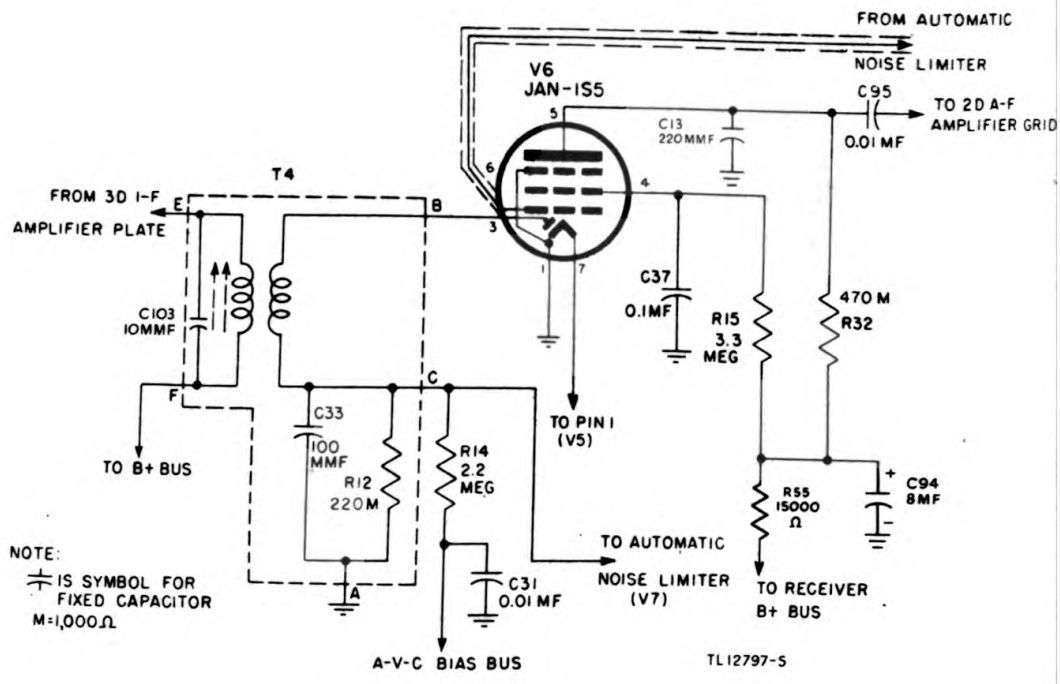


Figure 55. Receiver diode detector and first audio amplifier.

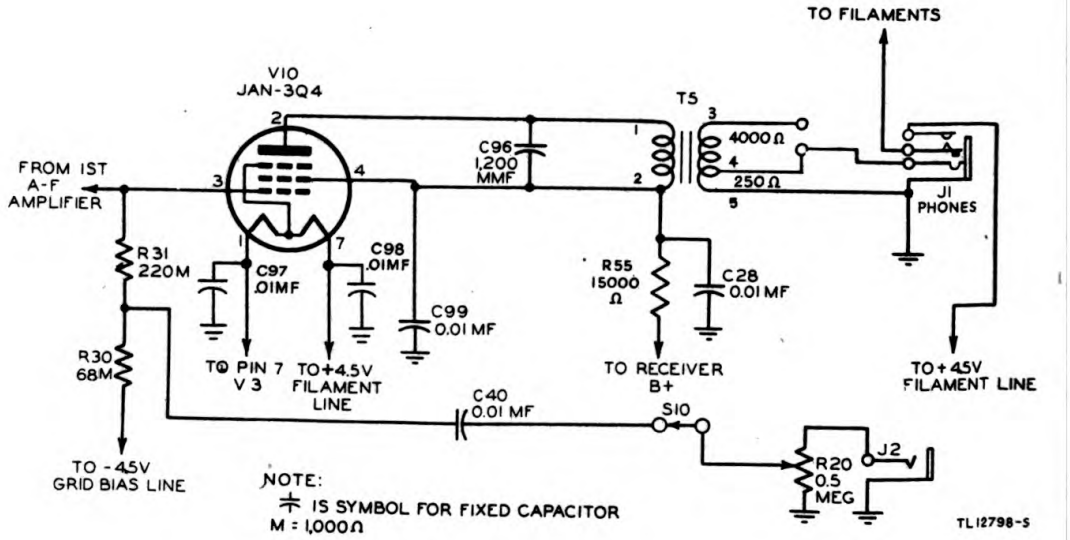


Figure 57. Receiver second a-f amplifier.

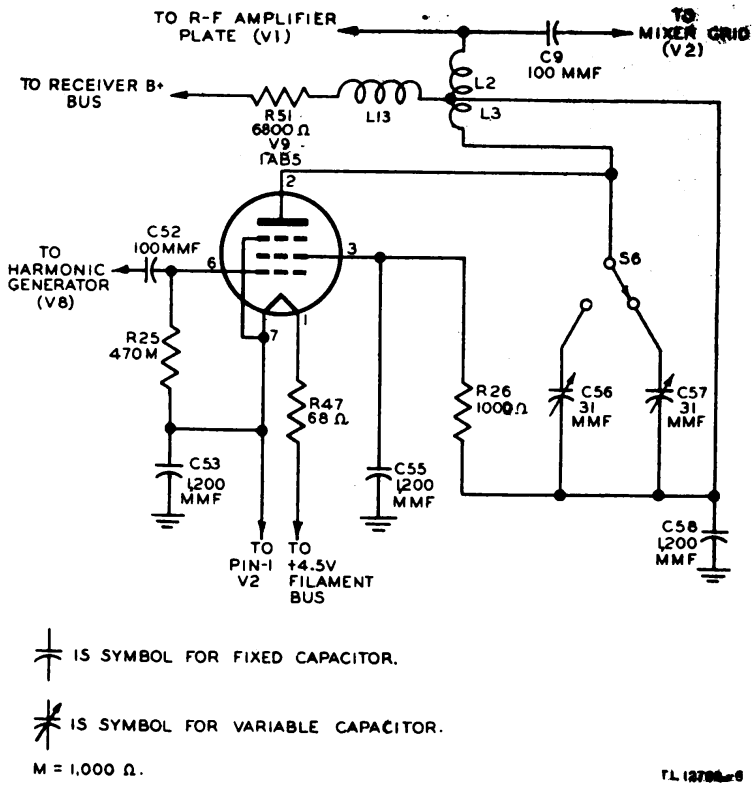


Figure 59. Receiver harmonic amplifier.

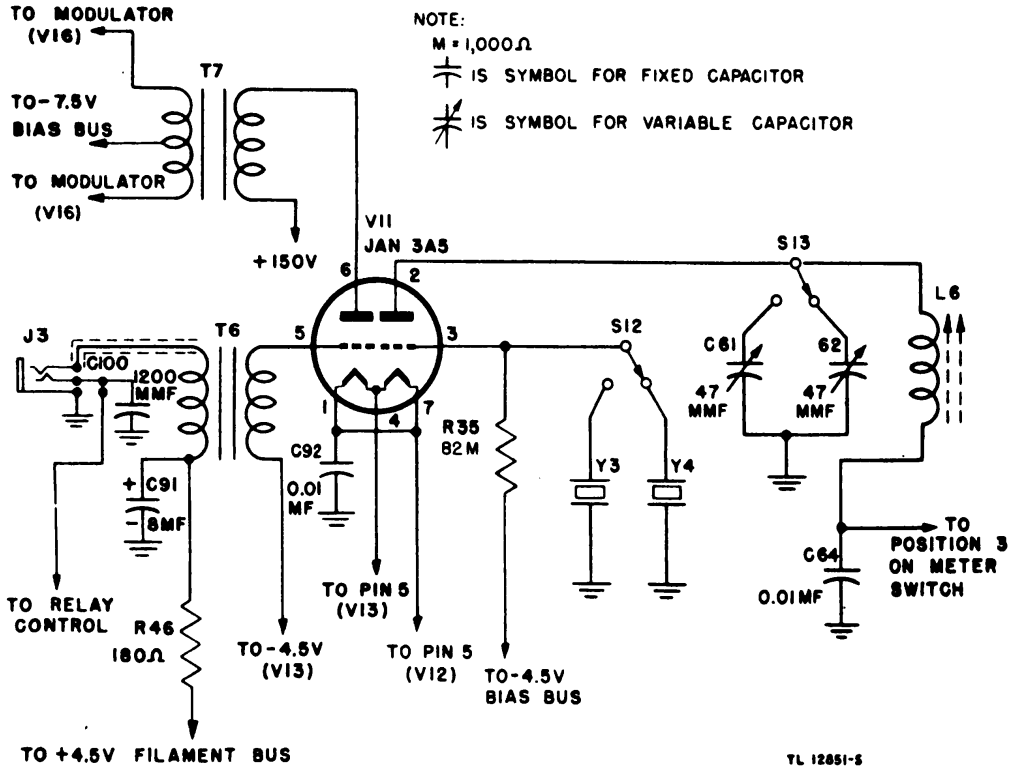


Figure 60. Transmitter oscillator and speech amplifier.

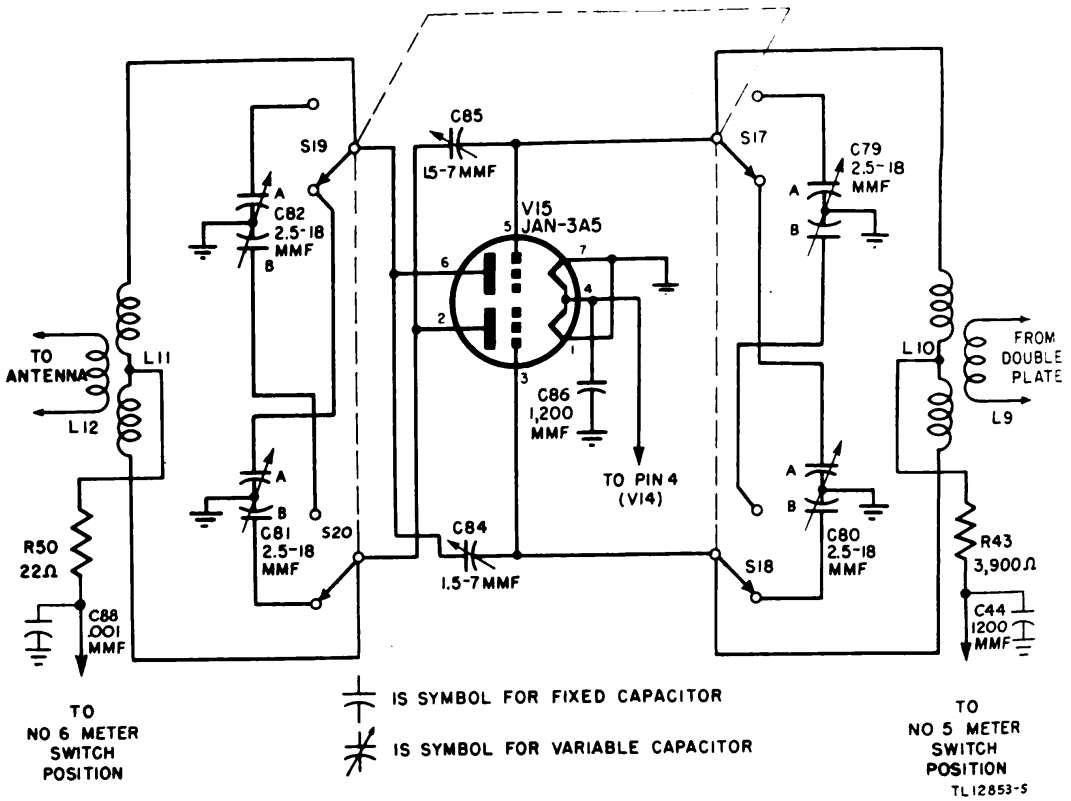


Figure 64. Transmitter power amplifier.

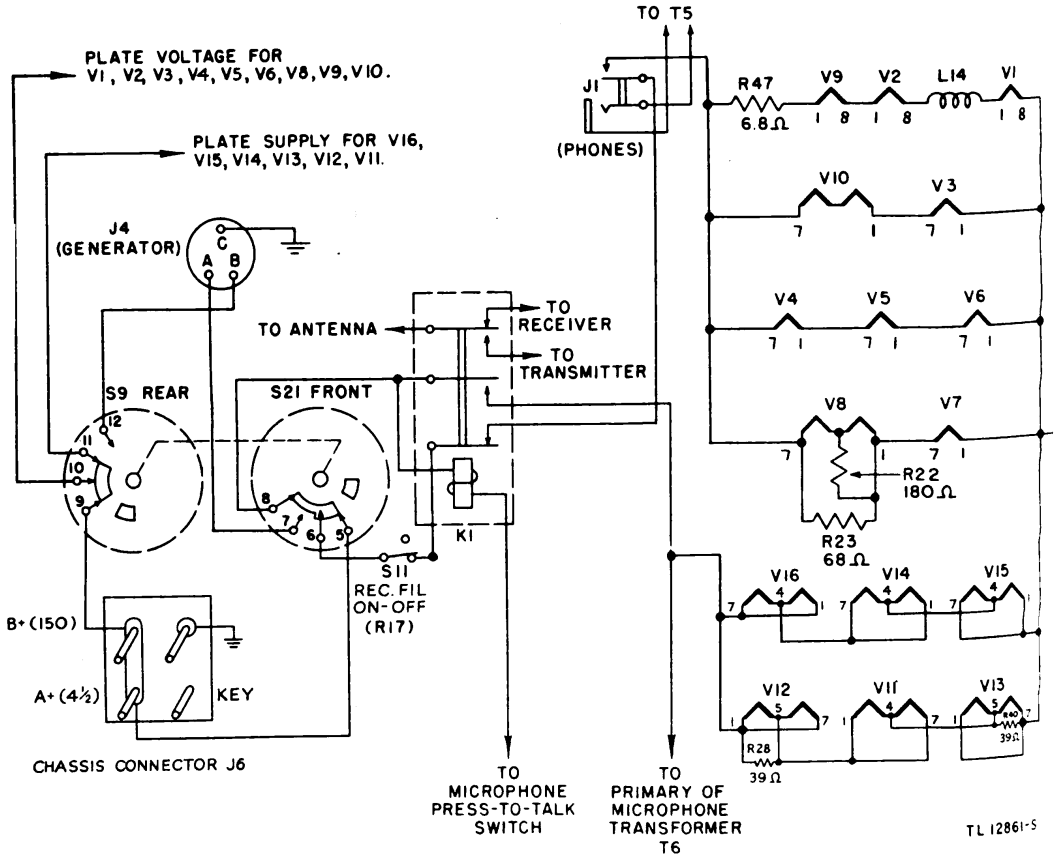
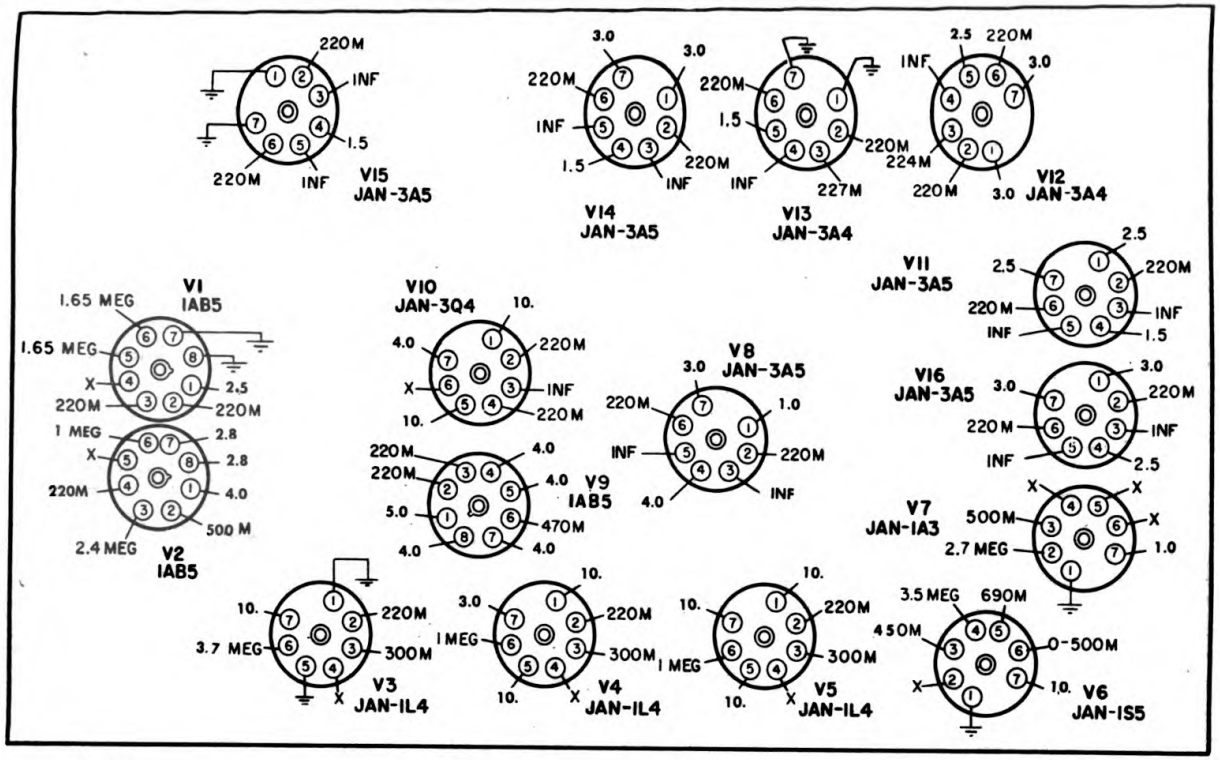


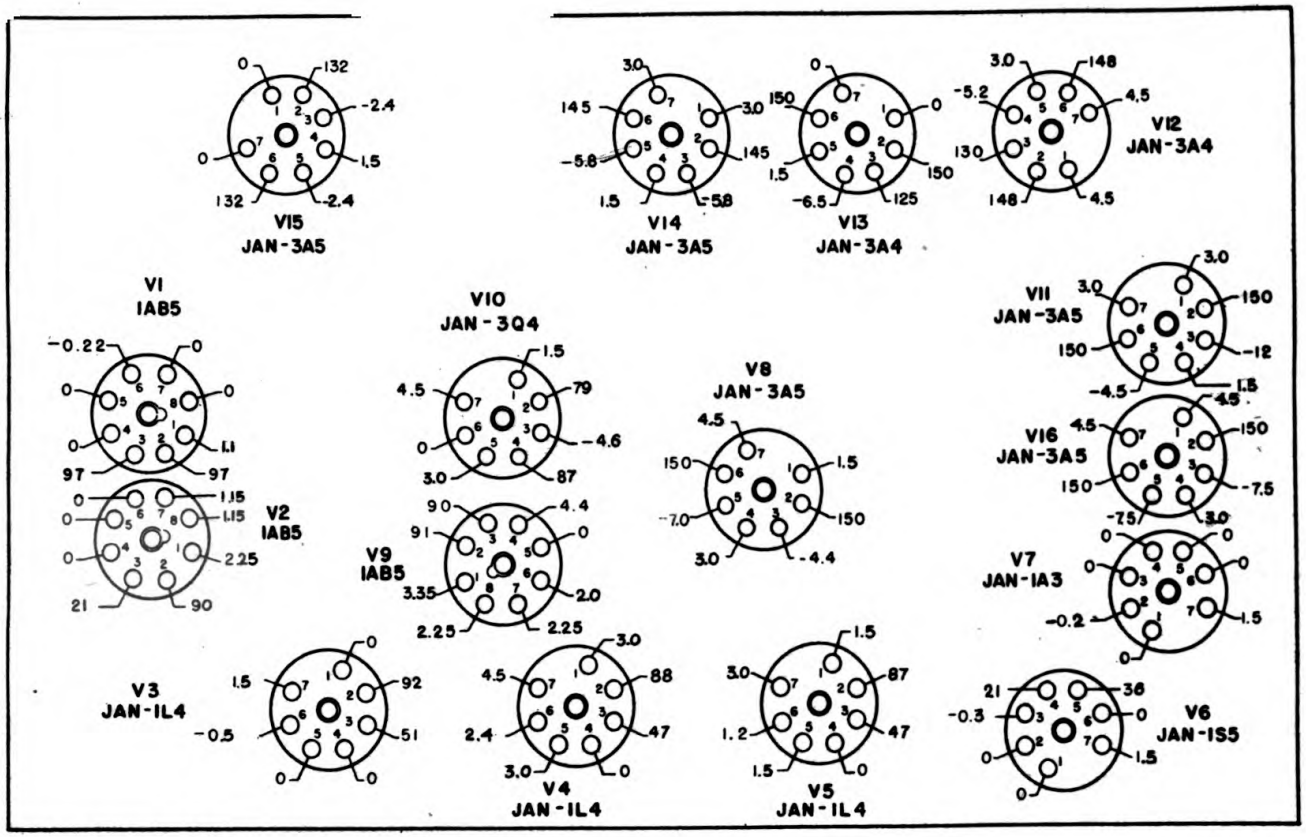
Figure 66. Control and power supply circuits.



NOTES:
ALL RESISTANCE READINGS TAKEN WITH:
ALL TUBES AND CRYSTALS IN SOCKETS
METER SWITCH ON POSITION I
POWER SWITCH ON BAT.
HEADSET HS-30-( ) IN PHONES JACK
MICROPHONE T-45 IN MIC. JACK
ALL READINGS IN OHMS
BATTERY-GENERATOR NOT CONNECTED
X = NO CONNECTION
M = 1,000
BIAS BATTERIES REMOVED

TL 12862-S

Figure 68. Resistance chart.



NOTE: ALL READINGS TAKEN WITH VACUUM TUBE VOLTMETER,
METER SWITCH IN POSITION 1.
POWER VOLUME CONTROL ON
POWER SWITCH ON BAT.
MICROPHONE T45 IN MIC. JACK
HEADSET HS-30-( ) IN PHONES JACK
BATTERY BA-70 CONNECTED TO SET
BIAS BATTERIES INSTALLED
ALL READINGS IN VOLTS RELATIVE TO CHASSIS

TR 12900-5

Figure 69. Voltage chart.

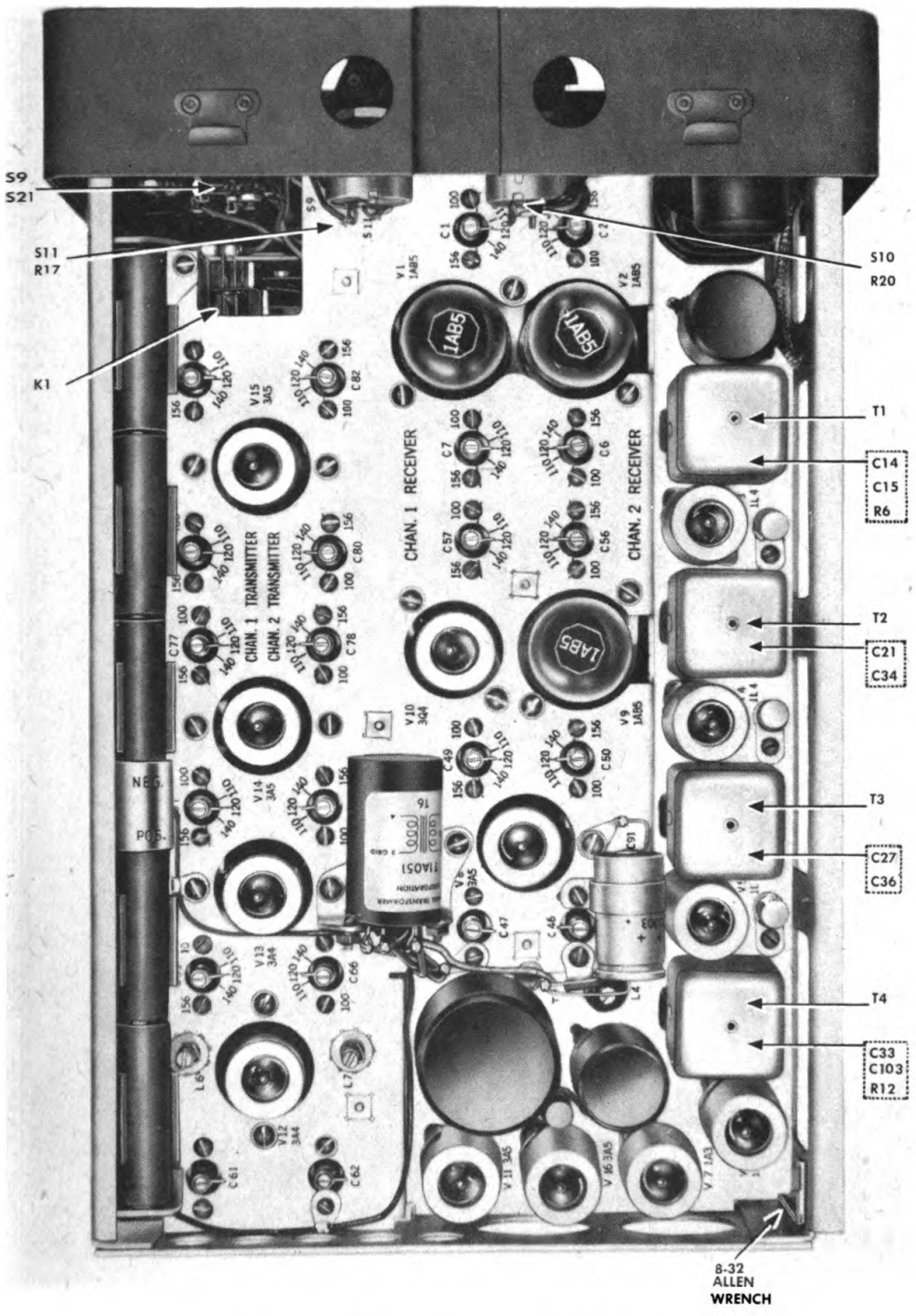


Figure 74. Receiver-Transmitter RT-53A/TRC-7, left side.

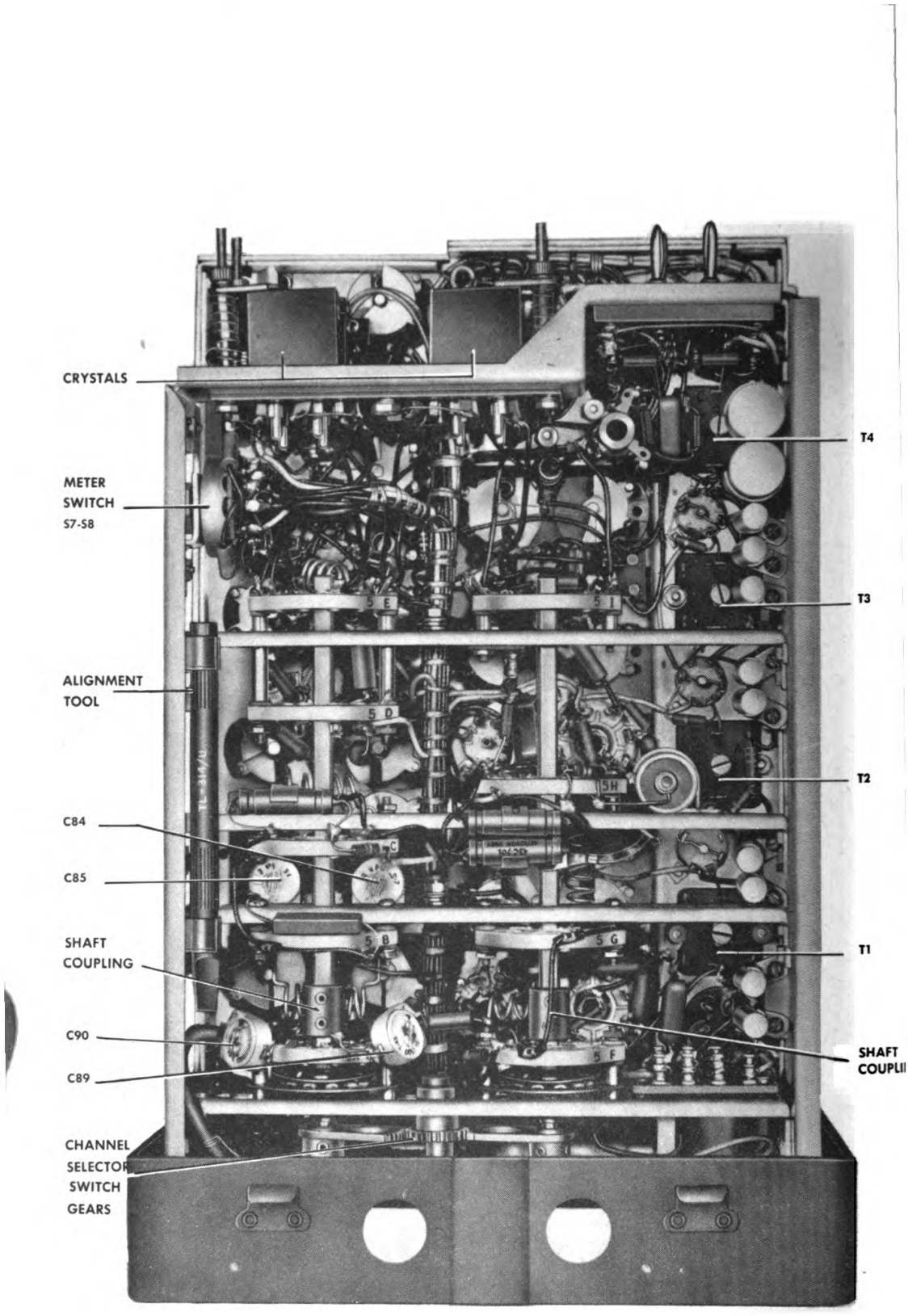


Figure 77. Receiver-Transmitter RT-53A/TRC-7, chassis right side.

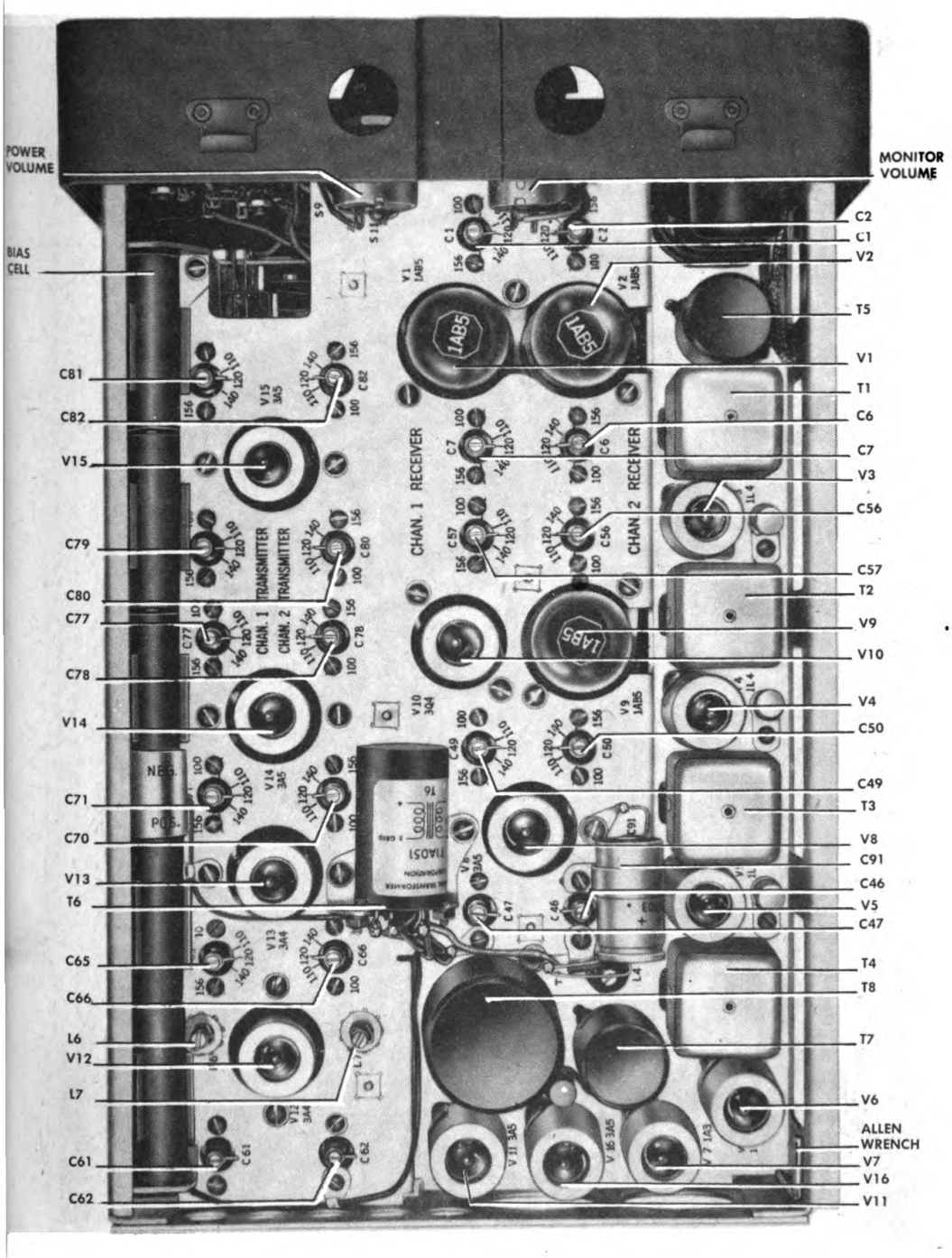
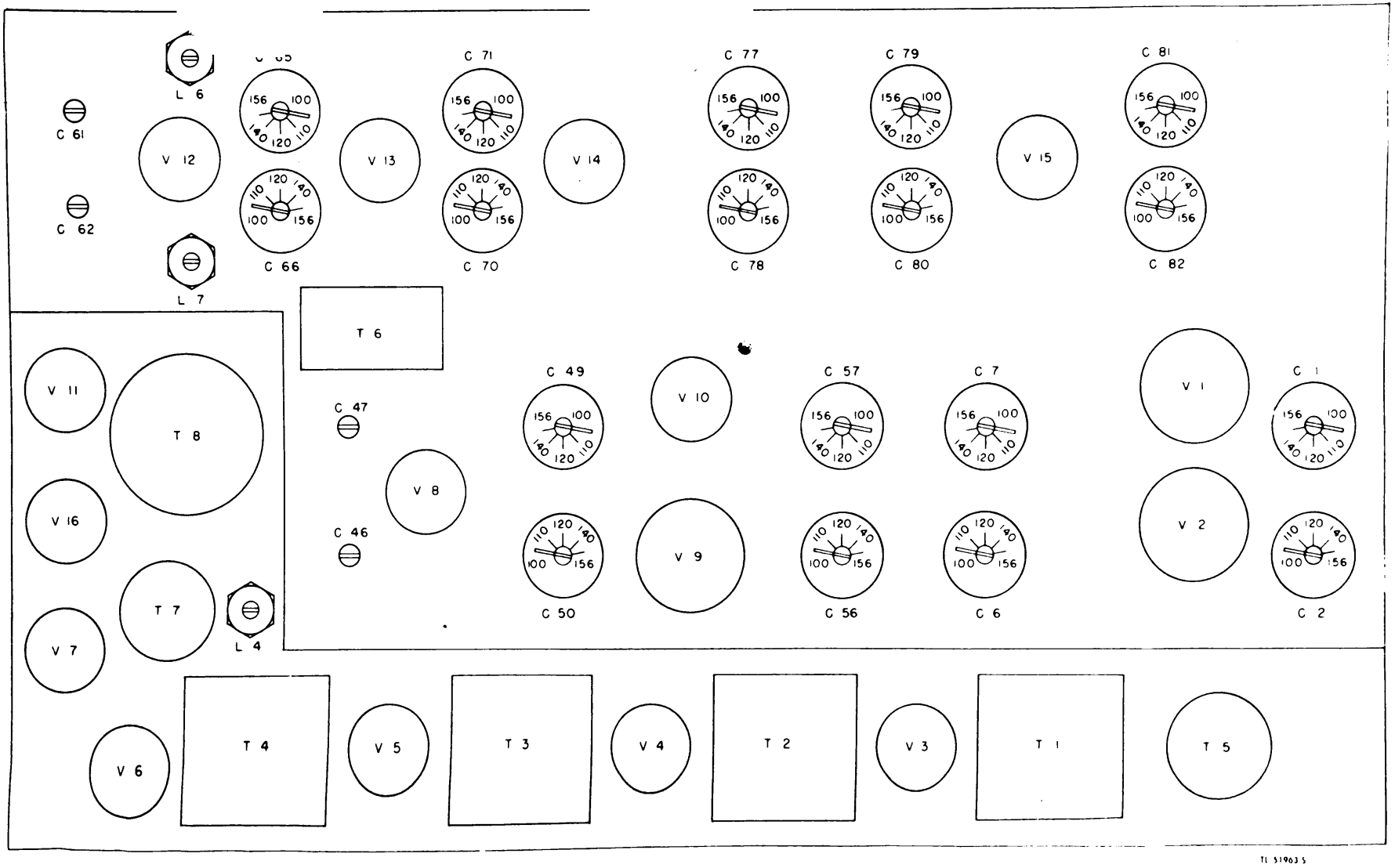


Figure 79. Receiver-Transmitter RT-53A/TRC-7, chassis left side.



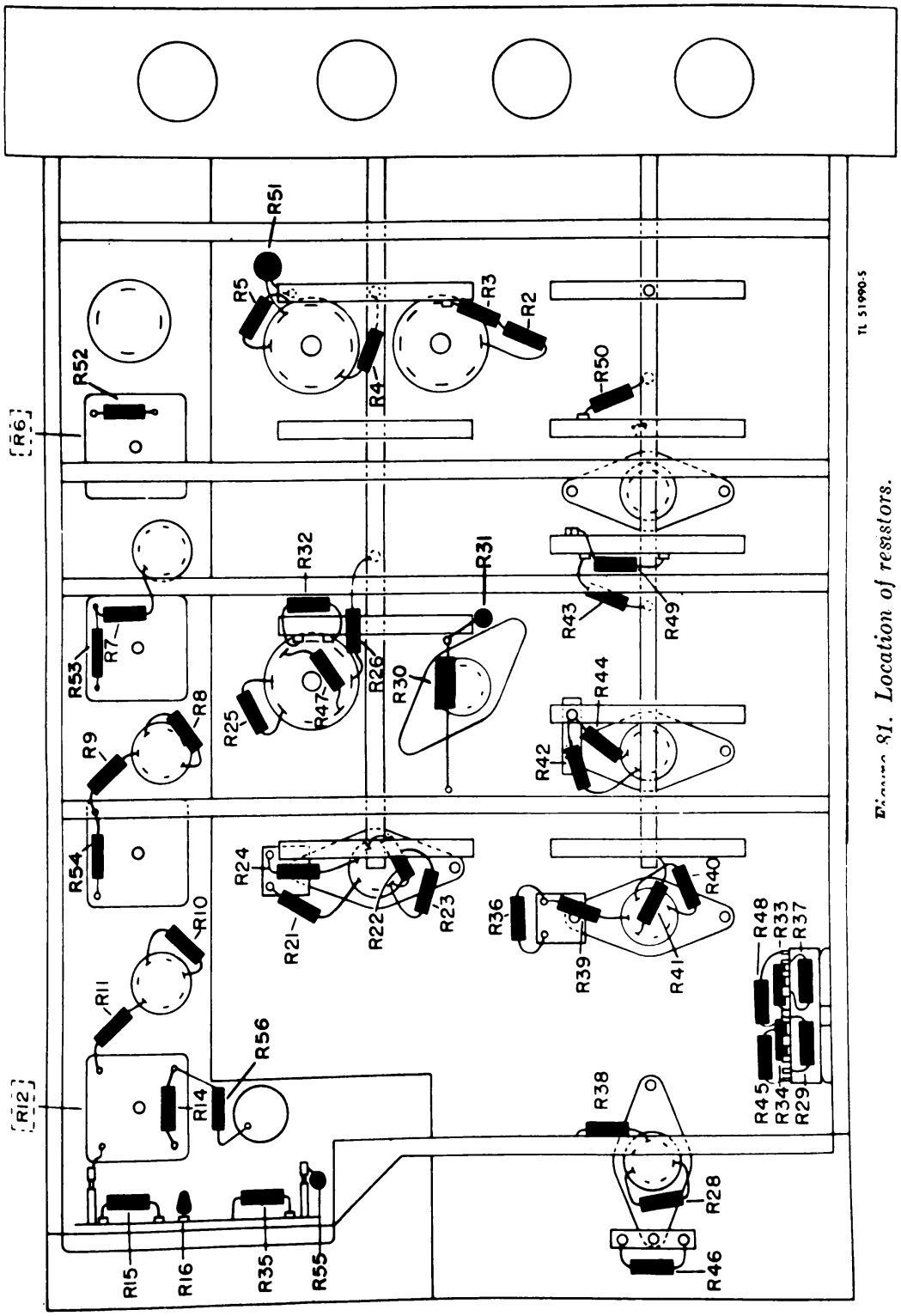


Figure 91. Location of resistors.

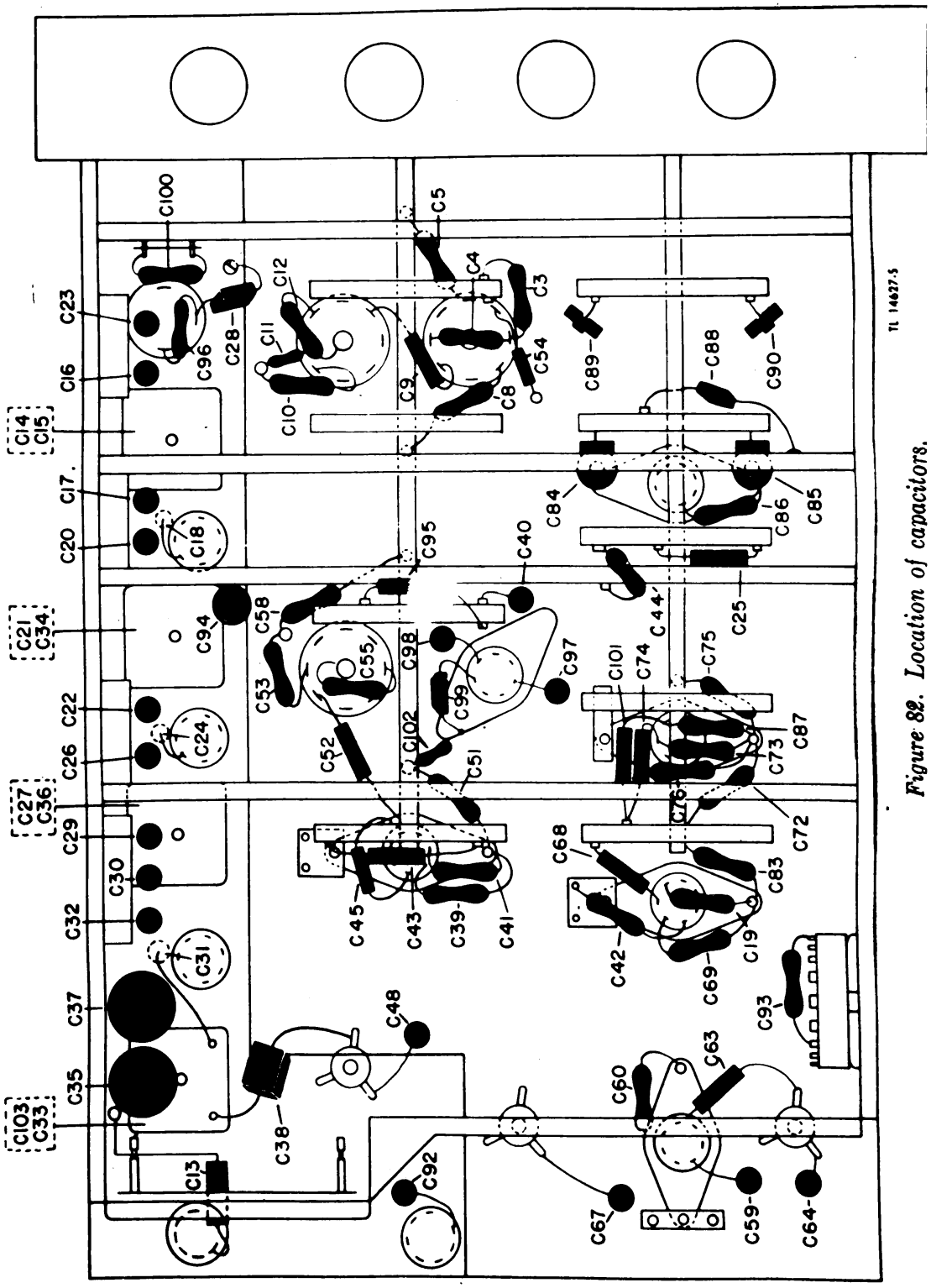


Figure 82. Location of capacitors.

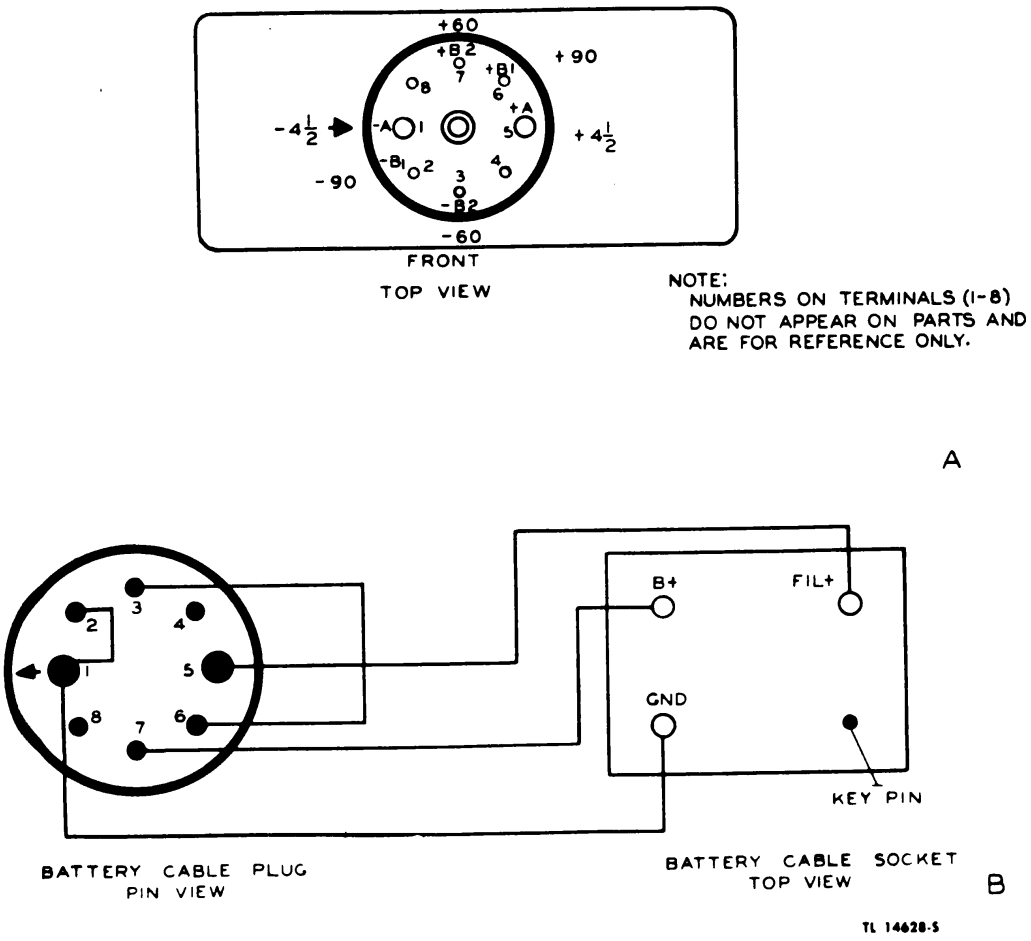


Figure 86. Battery cable plug.

Order No. 29016-Phila.—45-08; 13,986 copies, April 18, 1945.