TM 11-247

WAR DEPARTMENT TECHNICAL MANUAL

This manual supersedes TM 11-247, 13 March 1943.

RADIO SET SCR-551-A AND RADIO SET SCR-551-B

[redacted] DISSEMINATION OF RESTRICTED MATTER. [redacted] information contained in restricted documents and the essential characteristics of restricted materiel may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or to the press except by authorized military public relations agencies. (See also par. 28, AR 380-5, 15 Mar. 1944.)

WAR DEPARTMENT 26 AUGUST 1944

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AND
RADIO SET SCR-551-B

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WAR DEPARTMENT
WASHINGTON 25, D. C., 26 AUGUST, 1944

TM 11-247, Radio Set SCR-551-A and Radio Set SCR-551-B, is published for the information and guidance of all concerned.

[A. G. 300.7 (5 August 1944).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:
J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

As prescribed in Par 9a, FM 21-6; IBn 11 (2); IC 11 (5) (2); AF Dep & Sub-Dep (Sig Sec) (2); ASF Dep (Sig Sec) (2); Sig C Dep (2); AGF Repl Dep (Sig Sec) (2); Sig C Lab (2); Sig C Rep Shs (2); Sig C Inspec Z (2); Sig C Proc Dist (2); Air Forces (2); ASC (2); PE (Sig) (2).

IBn 11: T/O & E 11-15, 11-95.

IC 11 (5): T/O & E 11-77, 11-97, 11-107, 11-127, 11-237, 11-287, 11-297, 11-587, 11-597, 11-617, 11-677S.

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IC 11 (2): T/O & E 11-500, Dir Finder Team (IC), FCC-intercept and Dir Finding Team (D), Intercept Team (IE).

For explanation of symbols, see FM 21-6.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

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 — Vacuum tubes, tuning capacitors, batteries, receiver controls, castings, and ends of crossarm.
2. Cut — R-f cables going from antenna to receiver, battery and power cables, telephone line, antenna crossarm.
3. Burn — Technical manuals: tear out circuit diagrams and burn; then burn pictures, last the text. Burn schematic diagram on receiver.
4. Bend — Cabinet, antenna rods, tower, and shelter.
5. Bury or scatter — Any or all of the above pieces.

DESTROY EVERYTHING

SAFETY NOTICE

THE EQUIPMENT EMPLOYS HIGH VOLTAGES WHICH ARE DANGEROUS AND MAY BE FATAL IF CONTACTED BY OPERATING PERSONNEL. EXTREME CAUTION SHOULD BE EXERCISED WHEN WORKING ON THE EQUIPMENT.

IN SERVICING, CAREFULLY GROUND ANY COMPONENT BEFORE TOUCHING OR REMOVING IT FROM ITS CHASSIS.

IF IT IS NECESSARY TO WORK ON ANY OF THE UNITS WHEN THE POWER IS ON, BE THOROUGHLY FAMILIAR WITH THE EQUIPMENT AND THE INFORMATION ABOUT IT CONTAINED IN THIS TECHNICAL MANUAL.

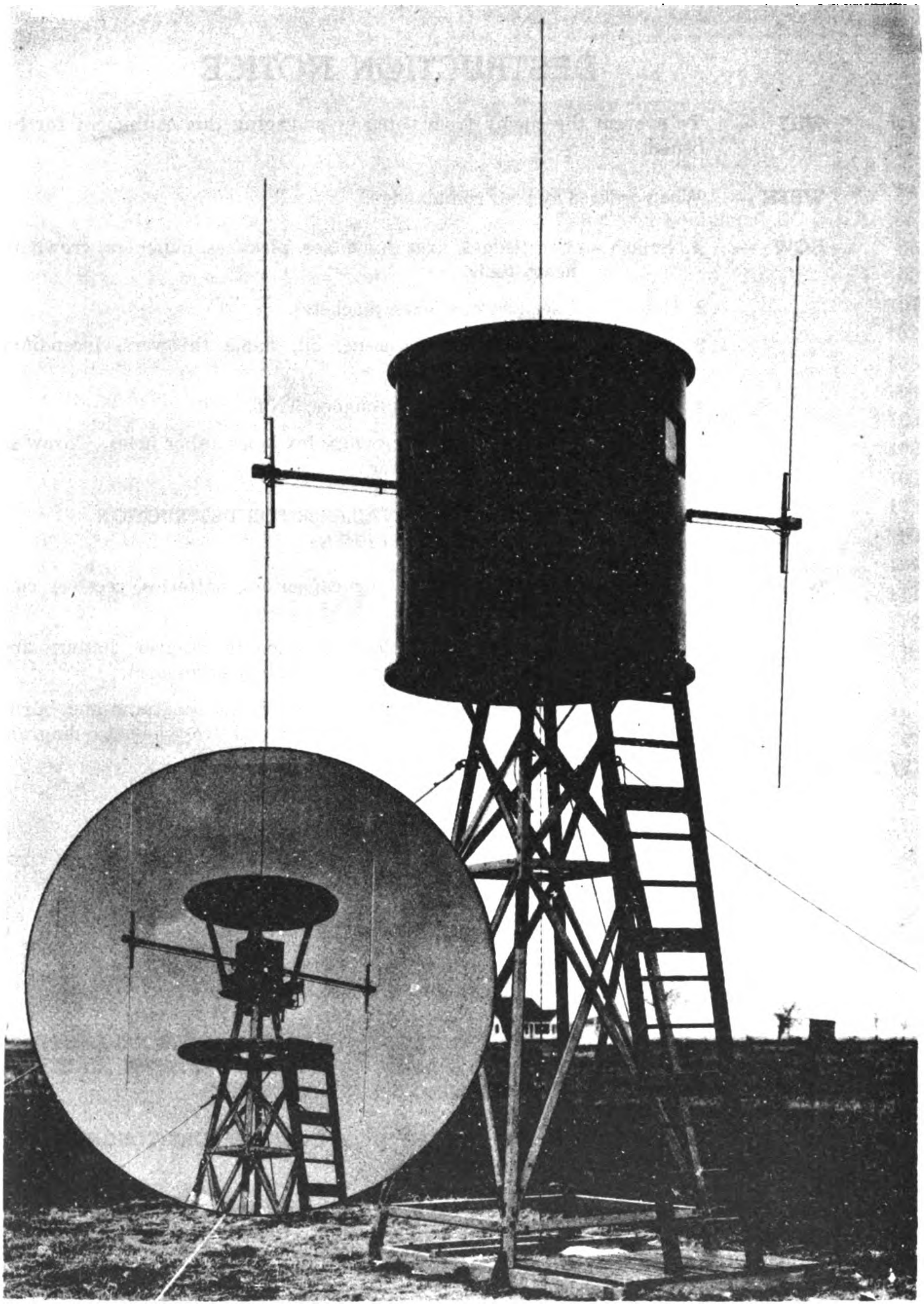


Figure 1. Radio Set SCR-551-( ), typical installation with and without shelter. TL-11819-A

SECTION I
DESCRIPTION

1. GENERAL.

a. Radio Set SCR-551-( )[1] is a semi-portable, ground, radio direction finder (RDF) station (fig. 1). The equipment has a frequency range of 2 to 20 megacycles, and provides for the reception of amplitude-modulated (a-m) or continuous-wave (c-w) signals. A rotatable Adcock antenna is used and signal nulls (a condition of minimum or no signal which exists at that position of the Adcock when its plane is at right angles to the direction of arrival of the radio wave) are indicated both visually and aurally. The visual indicator is an oscilloscope, and a speaker or headsets are used for aural operation. A seat is provided for the operator from which he can rotate the radio equipment and the Adcock by moving his body. After the RDF has been oriented to some reference line, using the compass and telescopic sight, the direction of the incoming signal with respect to the reference line is indicated in degrees on the azimuth scale.

b. Three Radio Transmitters BC-978-A (fig. 2) are supplied with Radio Set SCR-551-( ). They are compact, self-powered, short-range transmitters. Any one of them will serve as a target to assist in checking the operation of the RDF in the field when placed at predetermined positions about the directional antenna. The transmitters are also valuable in training personnel in the operation of the RDF.

2. FREQUENCY COVERAGE.

a. Radio Set SCR-551-( ) covers a frequency range from 2 to 20 megacycles, divided into five bands as follows: 2 to 2.8 megacycles, 2.8 to 4.4 megacycles, 4.4 to 6.4 megacycles, 6.4 to 10 megacycles, and 10 to 20 megacycles.

b. Radio Transmitter BC-978-A covers a frequency range from 2 to 20 megacycles, in four bands as follows: band A, 9.6 to 20.1 megacycles; band B, 5.1 to 10.4 megacycles; band C, 3.2 to 6.1 megacycles; and band D, 1.9 to 3.5 megacycles.

3. POWER REQUIREMENTS.

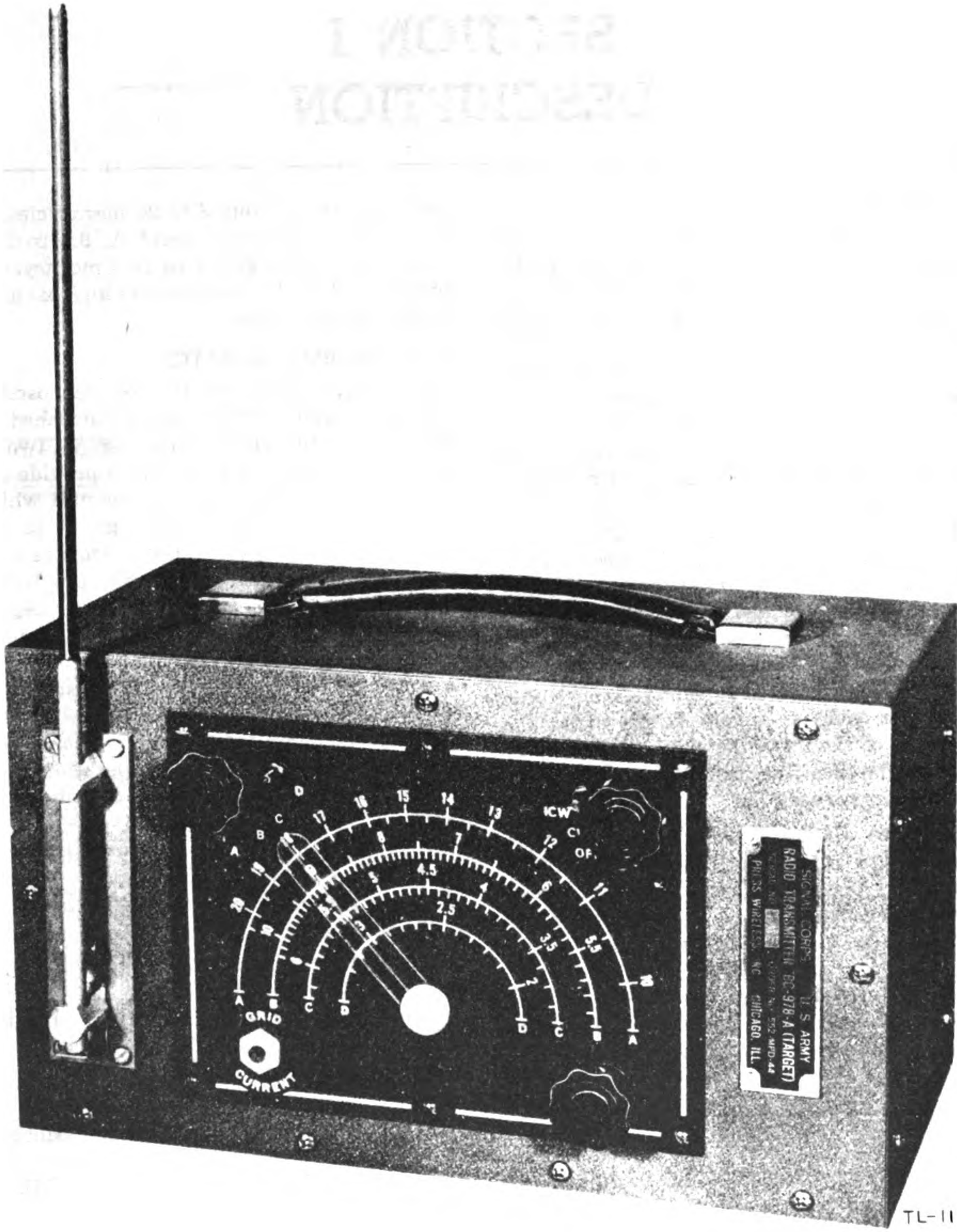
a. Primary power for the receiver, oscilloscope unit, and control panel is furnished by three 6-volt storage batteries (fig. 3), two of which are connected in series to provide energy for the vibrator-type power unit which delivers 110-volt alternating current to the receiver unit. The other 6-volt storage battery supplies heater current for the tubes. Each battery has a 102-ampere hour capacity. The current drain on the 12-volt source is 8 amperes. The drain on the 6-volt source is 7.5 amperes. *Never operate the set when the meter shows less than 11 volts on the 12-volt source or less than 5 volts on the 6-volt source.* The average period of operation from a set of fully-charged batteries is about 10 hours.

b. Power required for Radio Transmitter BC-978-A is supplied by two Batteries BA-15-A, 1.5 volt each, and two Batteries BA-2, 22½ volts each.

(1) The 1.5-volt batteries supply filament current of 50 milliamperes when the control switch is in the CW position and 100 milliamperes when the switch is in the I.C.W. position.

(2) The two 22½-volt batteries provide plate current of 2.6 milliamperes when the control switch is in the CW position, and four milliamperes when the switch is in the I.C.W. position.

[1] The nomenclature SCR-551-( ) is used in this manual to designate Radio Set SCR-551-A or Radio Set SCR-551-B. Appropriate nomenclature, Radio Set SCR-551-A or SCR-551-B, is used to specify the particular model when instructions are not applicable to both.



TL-11794

Figure 2. Radio Transmitter BC-978-A (Target).

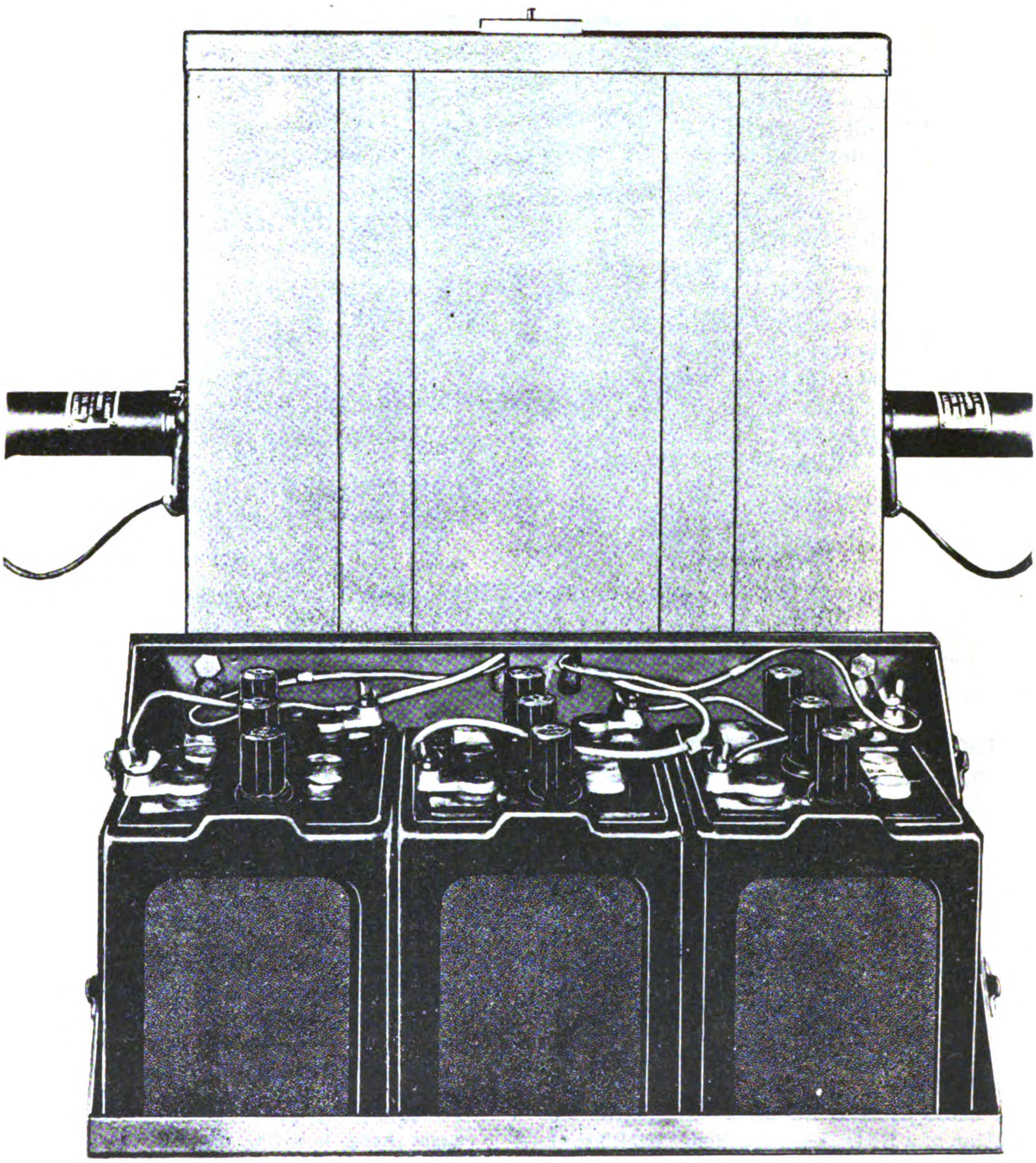


Figure 3. Storage batteries.

4. LIST OF COMPONENTS FOR RADIO SET SCR-551-( ).

Quantity	*Component*	*Dimensions**	*Weight**
1	Antenna AN-121-A system, complete	8¾ x 74½ x 16½	98.5
9	Batteries, 6-v, storage (39 lb. each)	3 chests, each 10¾ x 11¼ x 23⅜	412.8
1	Central unit, complete assembly.	29 x 36⅝ x 23⅝	*325.2
1	Control Panel PN-21-A	***	***
1	Oscilloscope BC-991-A	***	***
1	‡Radio Receiver BC-976-A	***	***
1	**Radio Receiver BC-976-B	***	***
1	Shelter HO-11-A	22 x 84 x 84 26 x 63 x 86	522.0
1	Spare and auxiliary parts	37 x 26¼ x 15½	205.0
1	Telephone EE-8-A		*
1	Tower TR-51-A, including Mounting FT-371-A	†	1093.0
1	‡Vibrator Unit PE-151-A	***	***
1	**Vibrator Unit PE-151-B	***	***
5	†Crates for tower parts		
	Base	†16 x 13 x 114	
	Ladder	†30½ x 9¼ x 164	
	Mounting FT-371-A and operator's seat	†19 x 40 x 45½	
	Operator's platform	†4¾ x 90 x 87	
	Posts and braces with 4 Stakes GP-25	†20½ x 14¼ x 106	

*Crated.
***All electrical components marked * are carried together in the Central Unit Cabinet CS-121-A.
†The tower parts are carried in five separate crates.
‡Used on Radio Set SCR-551-A only.
**Used on Radio Set SCR-551-B only.

5. DESCRIPTION OF COMPONENTS.

a. Radio Receiver BC-976-A. This item occupies the top section of Central Unit Cabinet CS-121-A (figs. 4 and 5). This receiver is a superheterodyne using 13 tubes with radio-frequency input circuits provided to accept signals from a vertical sense antenna and an Adcock directional antenna system. Controls for frequency selection, tuning, and adjusting gain of the various circuits, all clearly labeled, are located on the front panel of the receiver. A panel light switch and a telephone jack are also provided.

b. Radio Receiver BC-976-B. Except for the addition of a BFO (beat-frequency oscillator) circuit and a toggle switch (Adcock relays) the receiver is identical in all respects to Radio Receiver BC-976-A (figs. 6 and 7).

c. Oscilloscope BC-991-A. This item occupies the center section of Central Unit Cabinet CS-121-A (fig. 4). A power supply, amplifiers, and blanking circuits necessary for the proper operation of the cathode-ray tube are located in this unit. Two fuses, marked according to the circuits in which they are used, are located on the front panel. The cover marked REMOVE TO ADJUST CONTROLS provides access to semi-fixed adjustments in various circuits of the cathode-ray tube. The switch marked MONITOR BEARING determines the method (aural or visual) by which the bearings are indicated.

NOTE: The oscilloscope unit supplied with Radio Set SCR-551-B differs slightly from the previous model by the addition of a toggle switch (BFO) which necessitated a slight change in wiring (fig. 6).

d. Control Panel PN-21-A. This item contains the primary power controls for Radio Set SCR-551-( ), and is located in the bottom section of Central Unit Cabinet CS-121-A (fig. 4 or 6).

(1) The twin circuit breaker marked

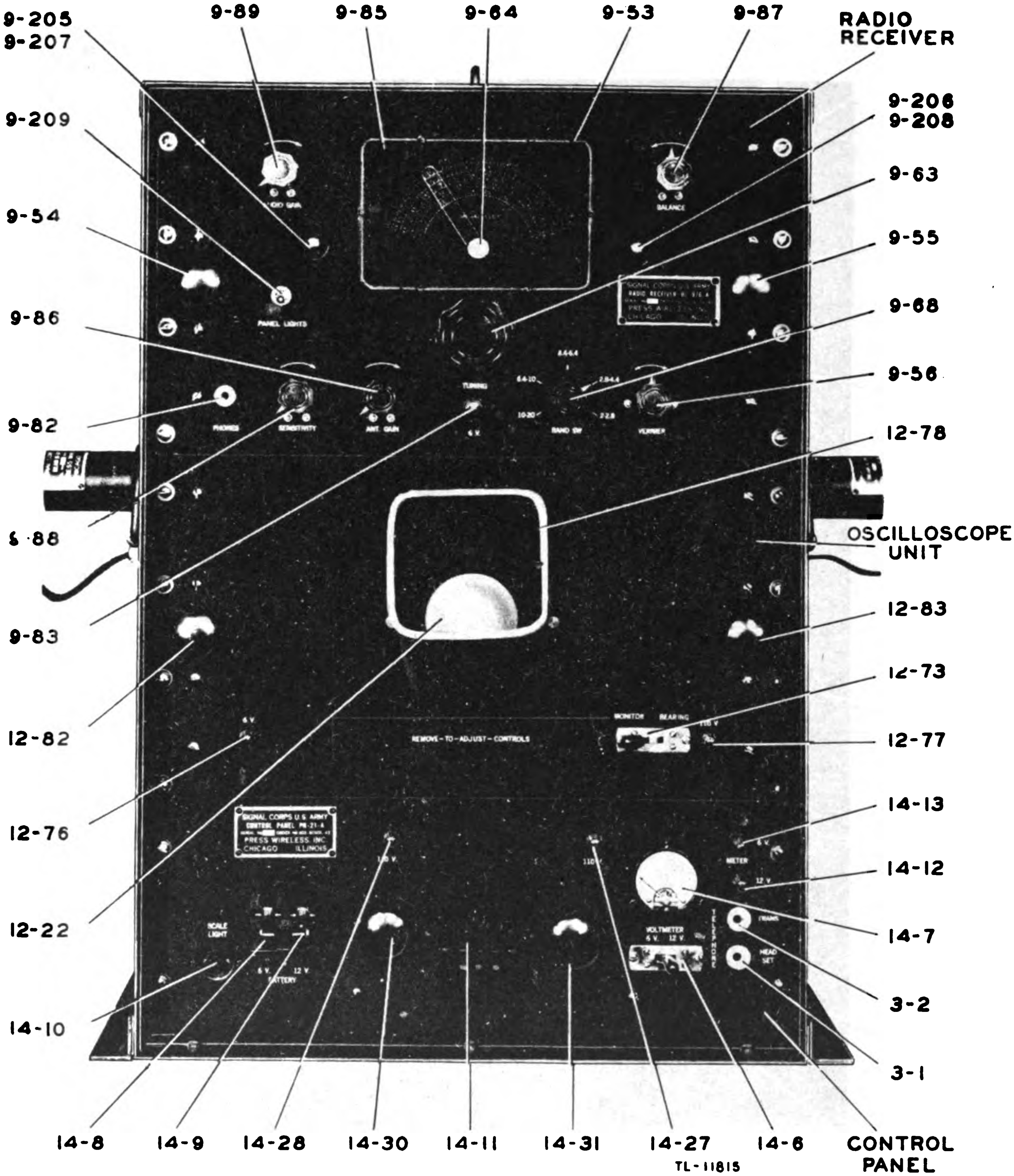


Figure 4. Radio Set SCR-551-A, central unit front panel assembly.

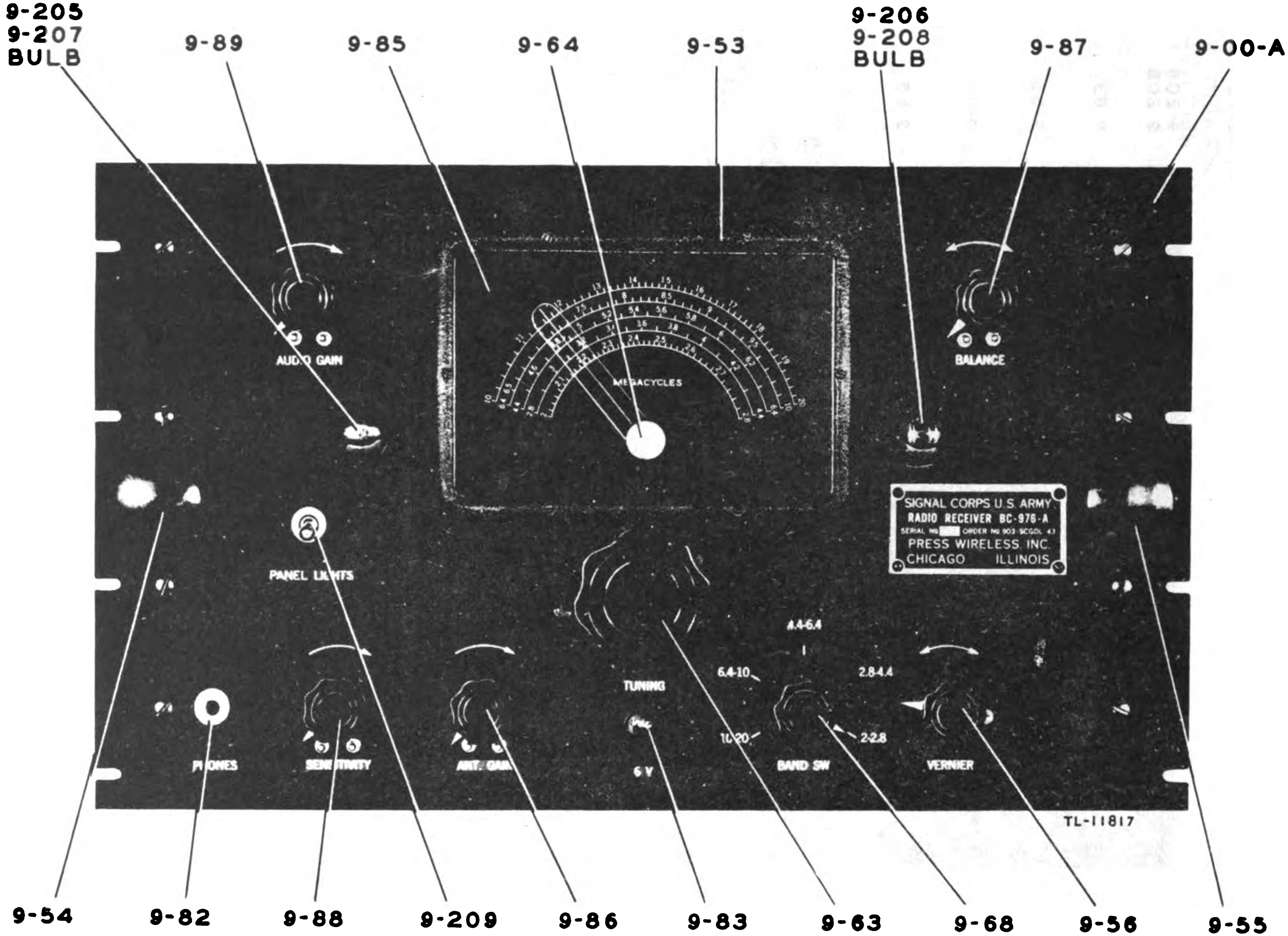


Figure 5. Radio Receiver BC-976-A, panel view.

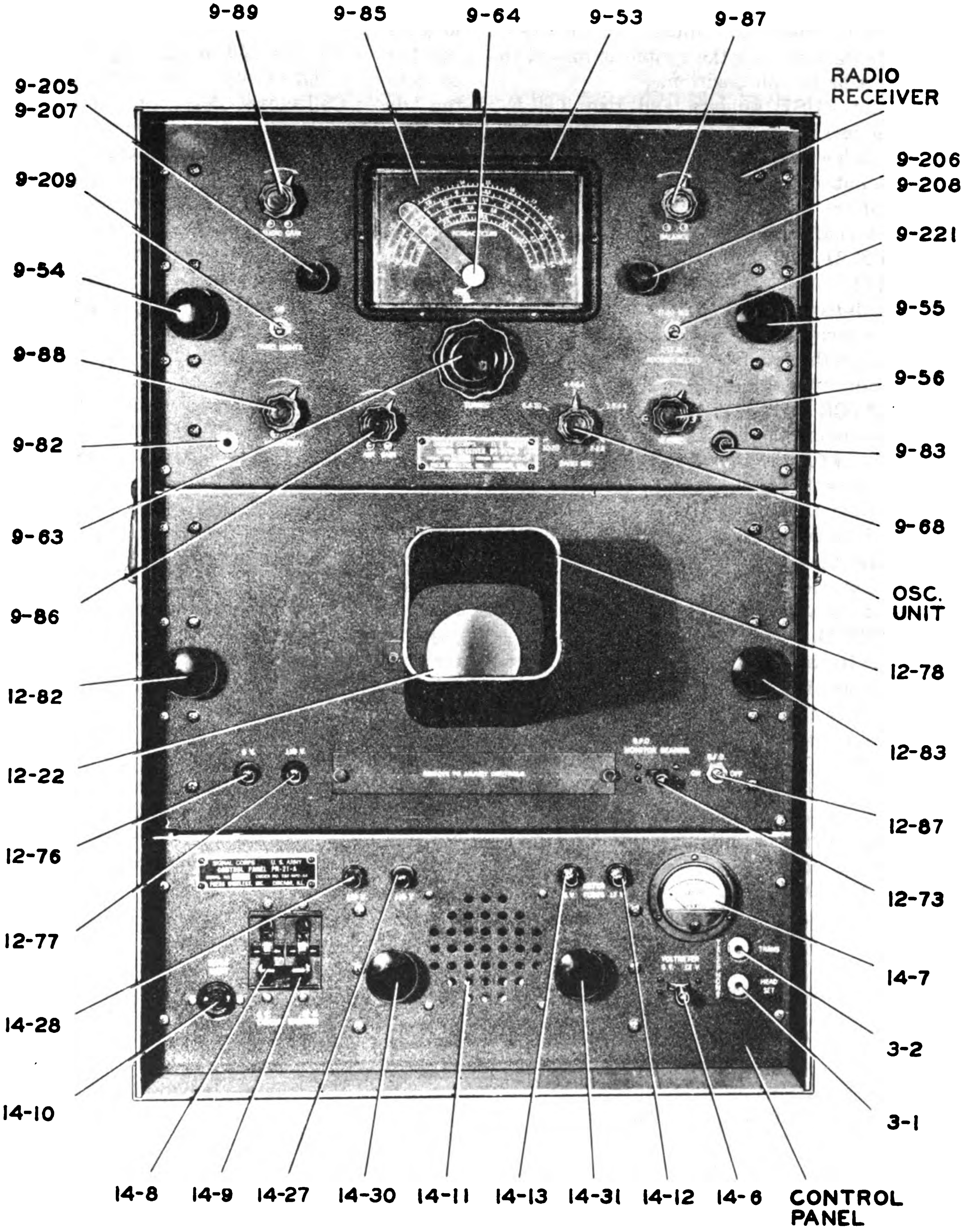


Figure 6. Radio Set SCR-551-B, central unit front panel assembly.

BATTERY controls the 6-volt filament source and the 110-volt vibrator power source.

(2) Mounted directly above toggle switch 14-6 is a voltmeter to indicate the condition of the batteries when the switch is moved to the 6-volt or 12-volt position.

(3) Four FUSE holders and two TELEPHONE jacks are also mounted on the panel.

(4) A 5-inch permanent magnet speaker with an output transformer is located in the center of the panel.

(5) External connections to the Control Panel PN-21-A is made through four receptacles (14-3, 14-26, 14-5, and 14-4) mounted on the sub-base in the rear of the panel.

(6) The receptacle marked SCALE LIGHT mounted on the front panel provides a means for illuminating the azimuth dial.

6. VIBRATOR UNIT PE-157-( ) (fig. 8).

This component operates on 12-volt direct current and furnishes 110-volt 60-cycle alternating current which, through transformers and rectifier tubes, supplies high voltage for the receiver and oscilloscope circuits. The vibrator itself is a nonsynchronous plug in type, mounted at one end of the chassis. The power rating of the vibrator unit is 150 watts.

7. BATTERIES.

The batteries used with Radio Set SCR-551-( ) are the 6-volt storage type of 102-ampere hour capacity. All connections to the batteries are secured by wing nuts provided on the terminal posts. When installed for use, the batteries are housed in battery Box BX-51-A and all connections to the radio set are made through holes in the rear of the cabinet and battery box.

8. ANTENNA AN-121-A.

This antenna, consisting of three sections, is 88 inches in length when assembled. It is mounted in a vertical position at the midpoint between the two dipole antennas by plugging into a receptacle on the roof of the weatherproof shelter. It functions in conjunction with the Adcock antenna system to give direct azimuth indications.

9. ADCOCK ANTENNA SYSTEM.

Radio Set SCR-551-( ) uses an Adcock antenna structure with approximately 12-foot spacing between the two dipole assemblies. The antenna is constructed in five main sections, one of which is permanently located in the direction finder cabinet. The other four sections are referred to as Dipole Collectors AN-122-A and Adcock Beams M-339-A (left) and M-340-A (right). Each beam is 6 feet long and plugs into the center section, extending from each side of the cabinet. Attached to the outer end of these Adcock beams are the Dipole Collectors AN-122-A. The lower dipoles may be adjusted in length by turning the small crank under each beam near the cabinet. By lifting the pin in the collar on the right side of the cabinet, the entire Adcock structure can be turned so that the two dipoles swing forward toward the operator from a vertical position. When the dipoles are returned to vertical, the pin drops in place, locking the beams in this position. Parallel transmission lines within the Adcock beams conduct the radio-frequency signal picked up by each dipole to the input system of the receiver. When BAND SW9-68 on the receiver panel of Radio Set SCR-551-A is turned to select the 10- to 20-mc frequency range, the antenna relays mounted on each dipole collector are energized. This puts a 30-mmf capacitance across the extremities of the transmission lines. This effectively detunes the antenna system, preventing any possibility of resonance in the antenna system over the 10- to 20-mc range of the receiver. Any approach to resonance in the antenna system would make a true azimuth impossible. In Radio Set SCR-551-B, the ADCOCK RELAYS switch on the receiver permits energizing of the Adcock relay circuit only when this switch is in the 17-20 MC position (fig. 7).

10. RADIO TRANSMITTER BC-976-A (TARGET) (fig. 2).

This transmitter consists of a four-band radio-frequency vacuum-tube oscillator, a self-excited audio-frequency vacuum-tube modulator, and a self-contained battery power supply. A welded steel chassis and front panel form an integral unit on which all components, except batteries, are mounted and wired. The chassis is bolted to a welded sheet steel cabinet, finished in olive drab enamel. A reinforced leather handle is attached to the top of the case for ease in transporting, and four rubber pads are attached to the bottom of the cabinet to protect the surface upon which the instrument may be placed.

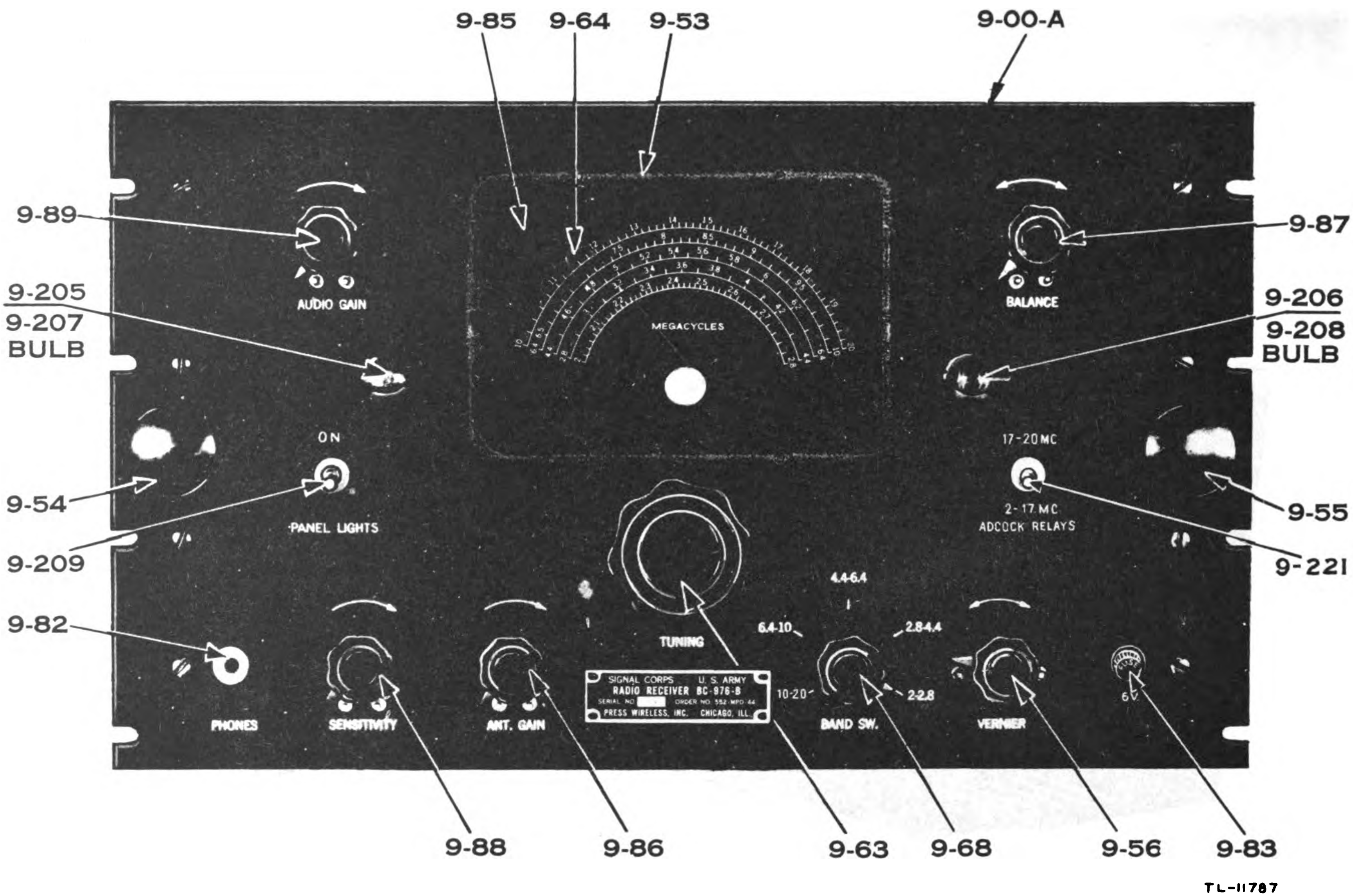


Figure 7. Radio Receiver BC-976-B, panel view.

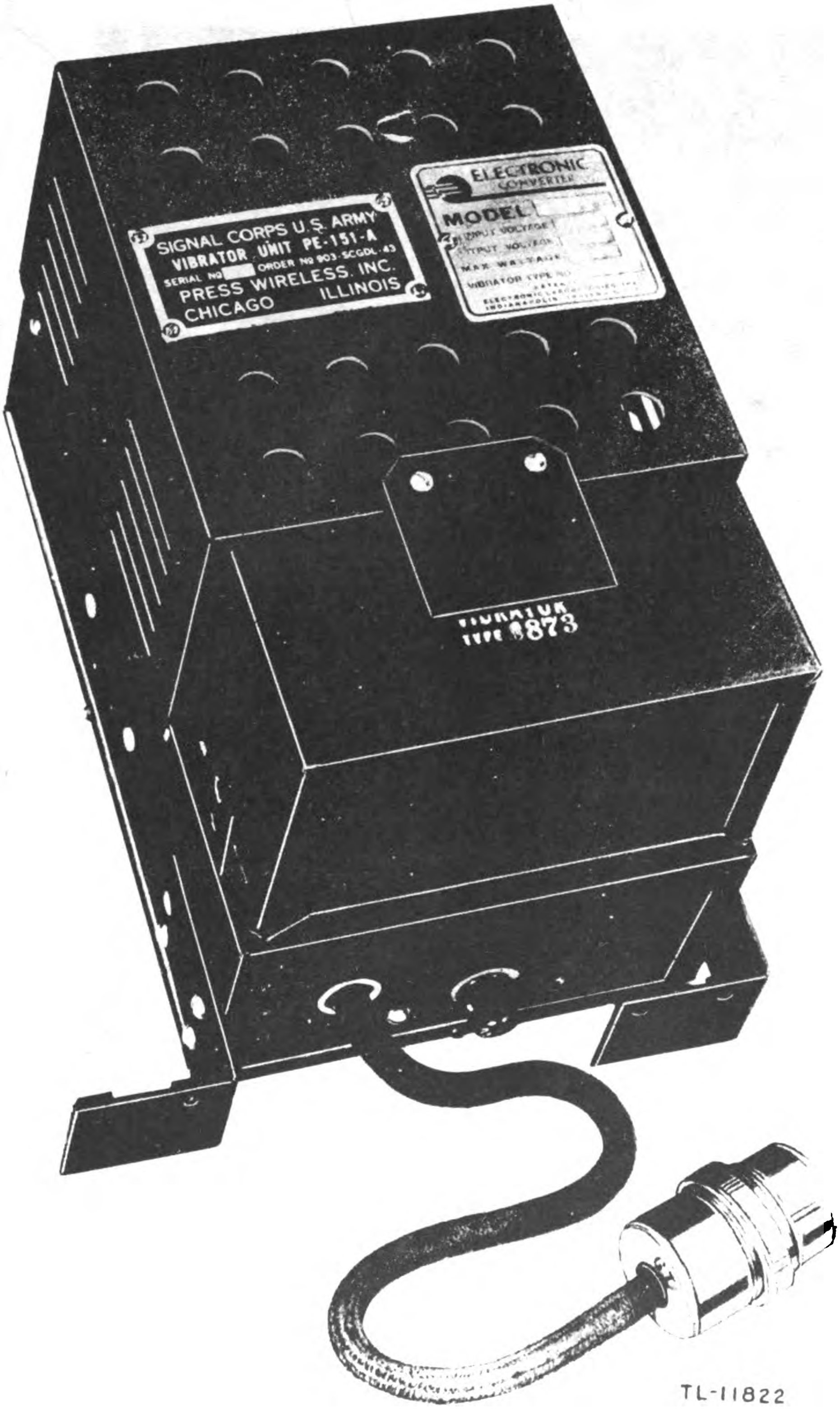


Figure 8. Vibrator Unit PE-151-( ).

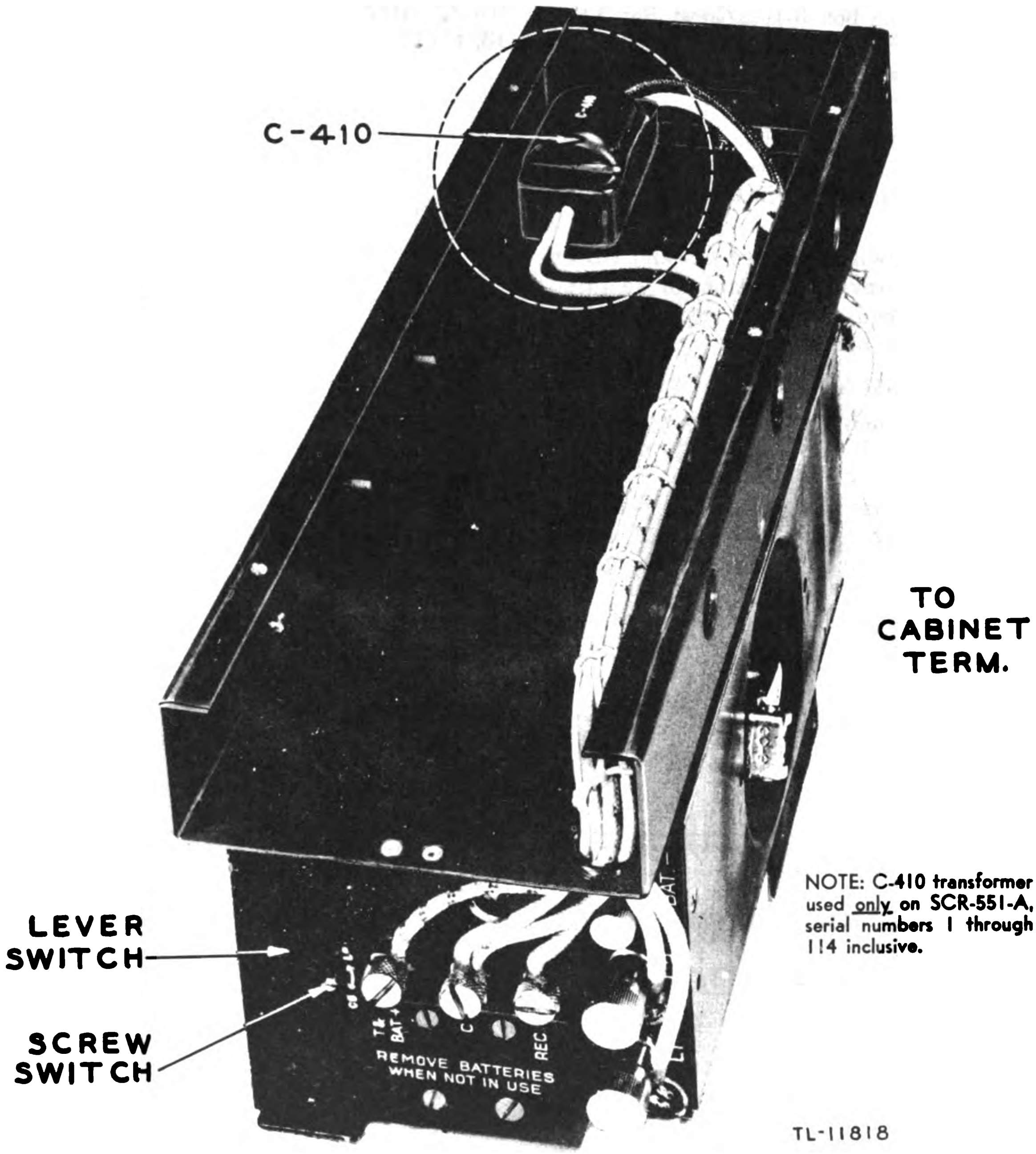


Figure 9. Telephone EE8-A (modified), bottom view, part of Telephone Equipment RC-161-A.

11. TELEPHONE EQUIPMENT RC-161-A (fig. 9).

This equipment, supplied with Radio Set SCR-551-( ), consists of the following components: Telephone EE-8-A (modified), slip ring 3-7, collector 3-8, upper choke box 3-9, and lower choke box 3-10. Chest Set TD-1 and Headset HS-30-B are also supplied. However, Chest Set T-26 may be substituted for Chest Set TD-1.

a. Two 1½-volt dry cells, Battery BA-30, are necessary for operation of Telephone EE-8-A and are located in the battery compartment.

b. A screw switch marked LB and CB on the telephone provides a means for adapting the telephone equipment for either local or common battery operation.

12. TOWER TR-51-A.

The over-all height of the tower assembly for Radio Set SCR-551-( ) is approximately 15 feet. It consists of the tower proper, a base platform, circular operator's platform, ladder, Azimuth Scale M-334-A, Mounting FT-371-A, an assembly to which the telephone slip ring and collector assembly is securely fastened, and the operator's seat. The tower is of oak construction throughout with steel hardware connecting the various sections. The tower may be disassembled and its parts placed in five separate crates furnished for transporting the equipment (figs. 10, 11, 12, 13, and 14).

13. WEATHERPROOF SHELTER HO-11-A.

The weatherproof shelter protects the operator and the equipment during bad weather. It is circular in shape and consists of four detachable side sections of molded plywood construction. There is a roof section which provides a mounting for the vertical antenna and two V-shaped members that support the roof. These supporting members are fastened to Mounting FT-371-A. There are doors in two of the side panels for access to the front and rear of the central unit. The roof remains in position at all times when the set is in operation. The side sections can be removed at the will of the operator. Figures 15 and 16 show the complete shelter crated.

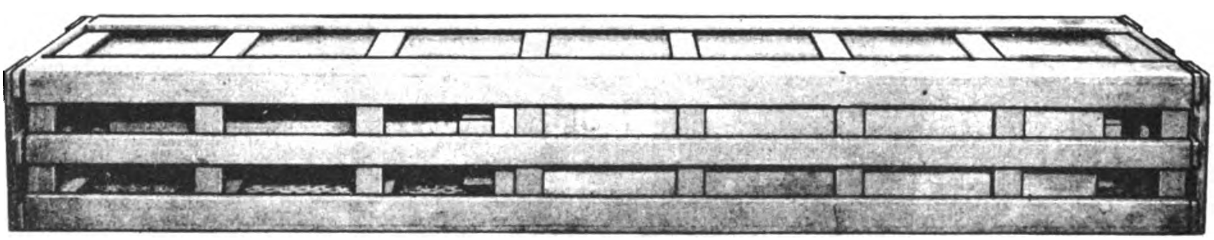


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Figure 10. Tower base, crated.

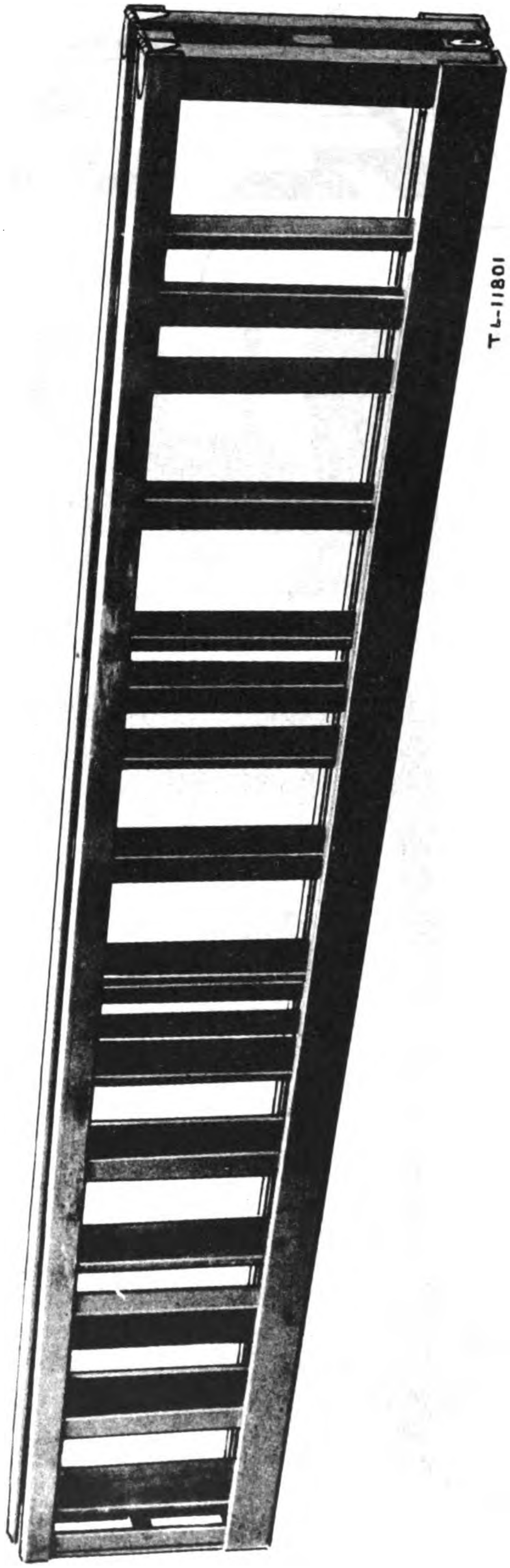


Figure 11. Tower ladder, crated.

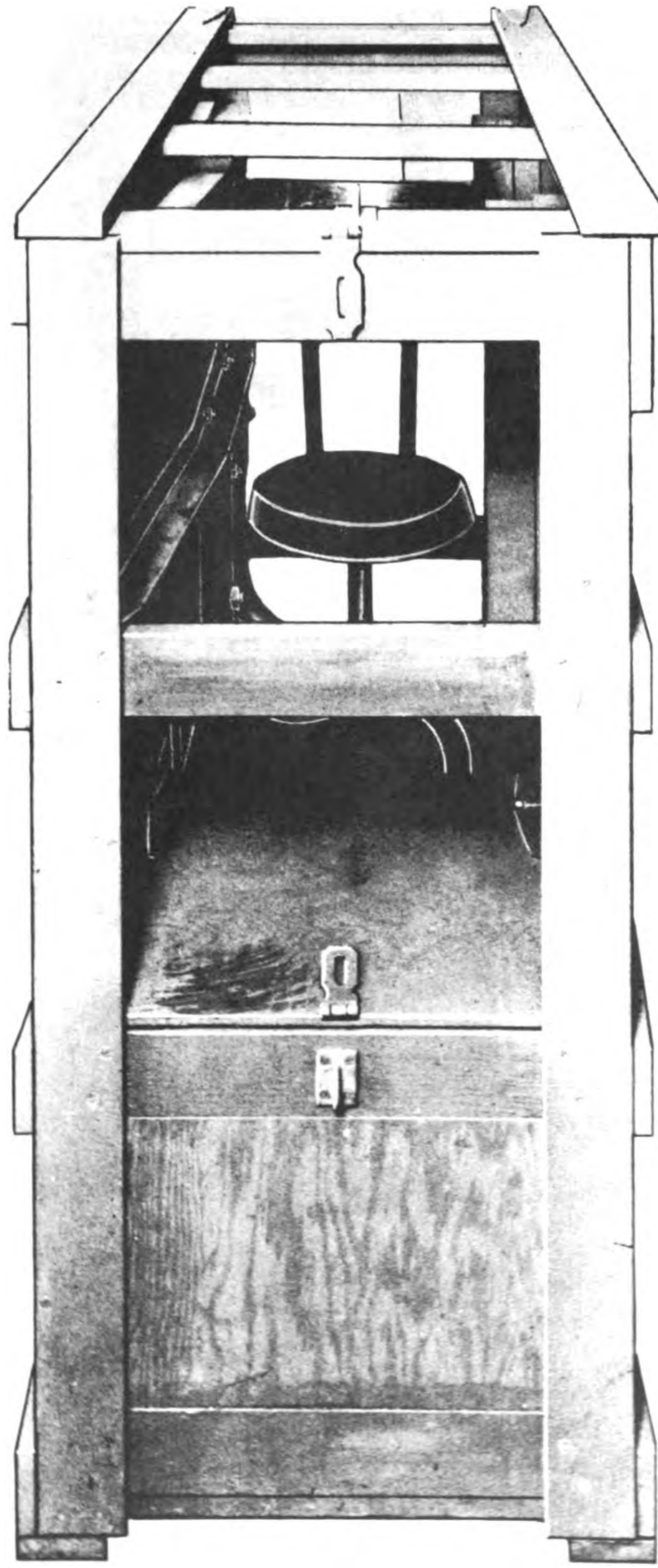
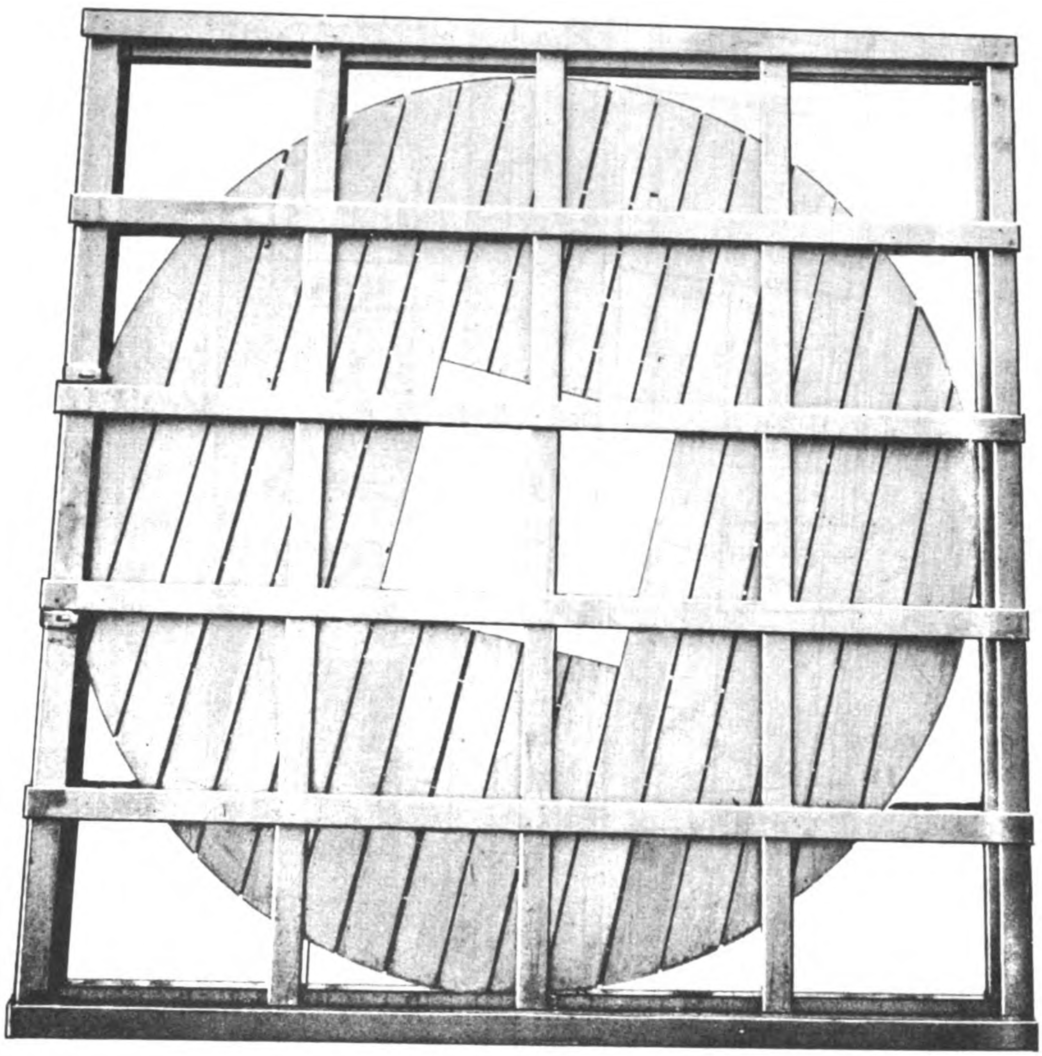


Figure 12. Tower seat, crated.



TL-11791

Figure 13. Operator's platform, crated.

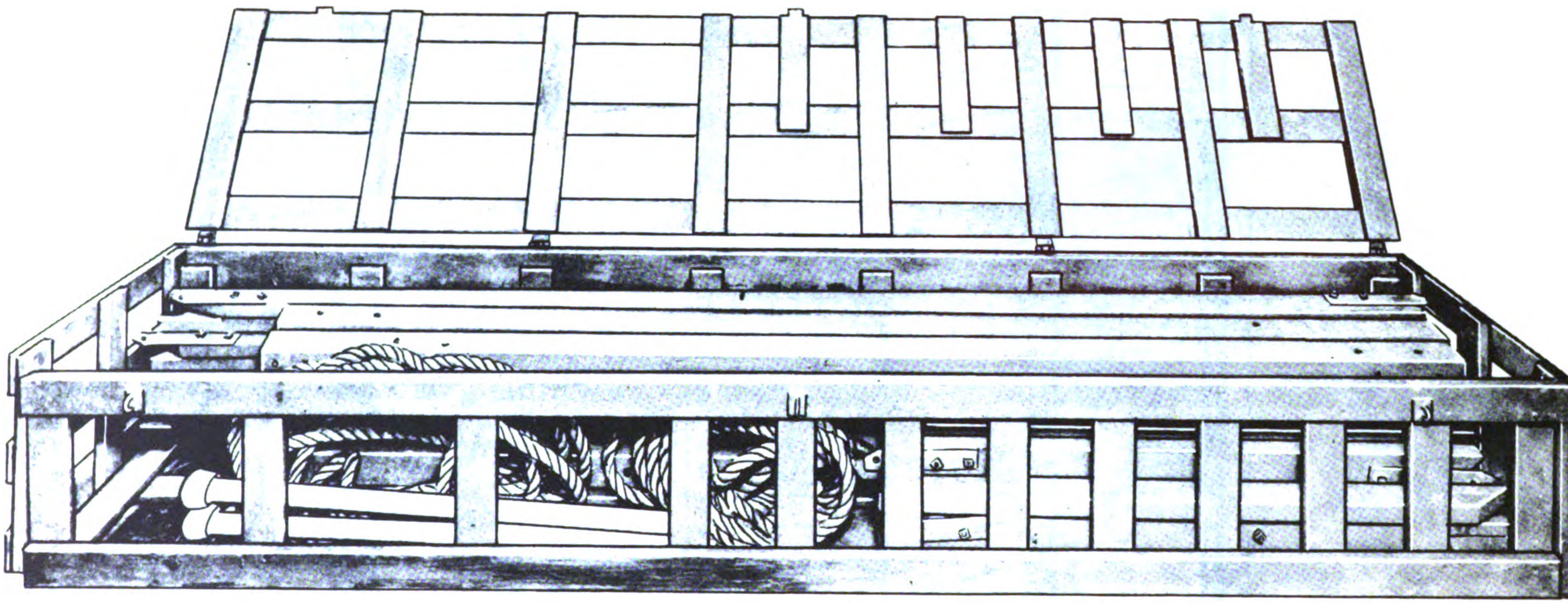


Figure 14. Tower posts and braces, crated.

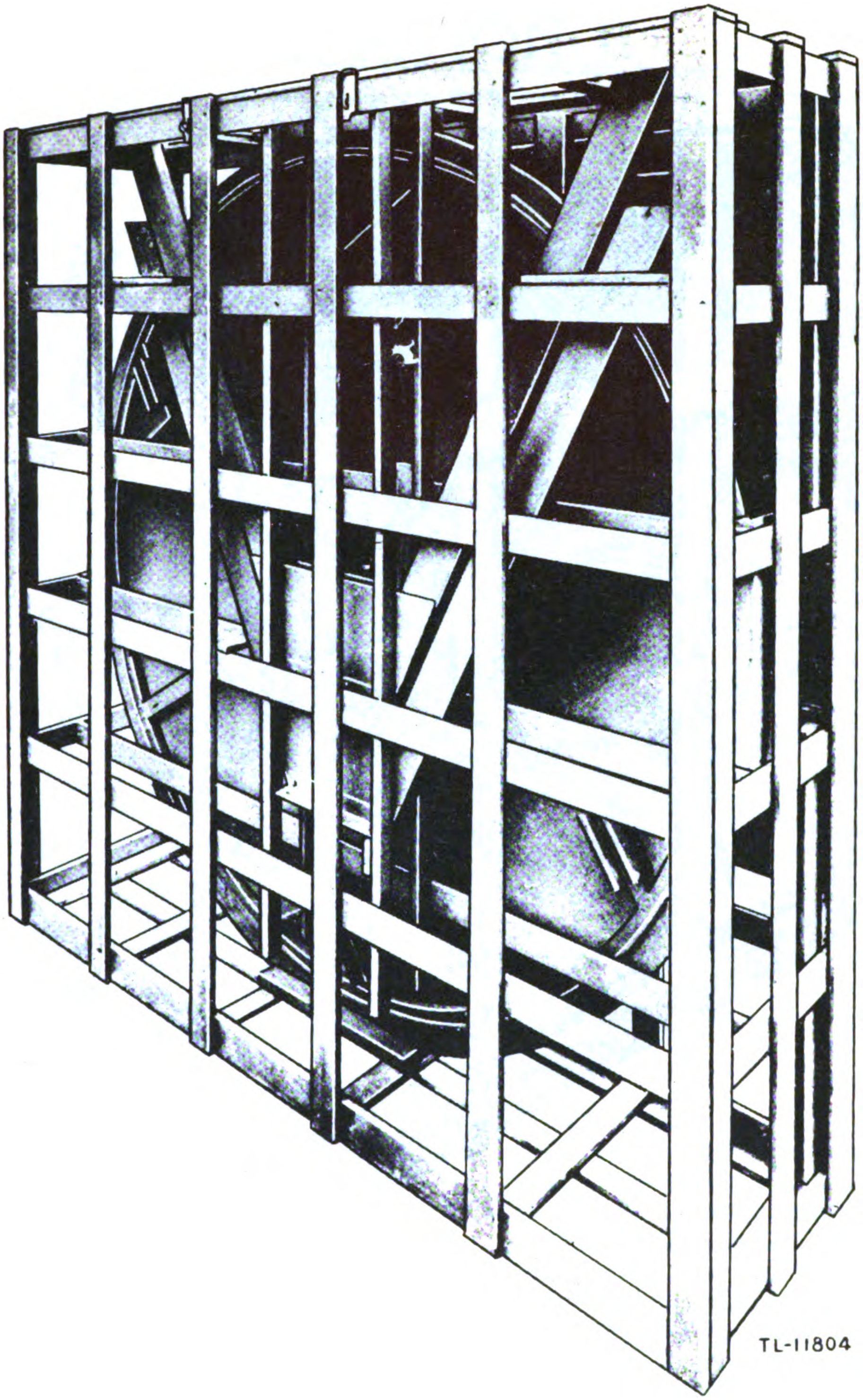


Figure 15. Shelter top and ladder, crated.

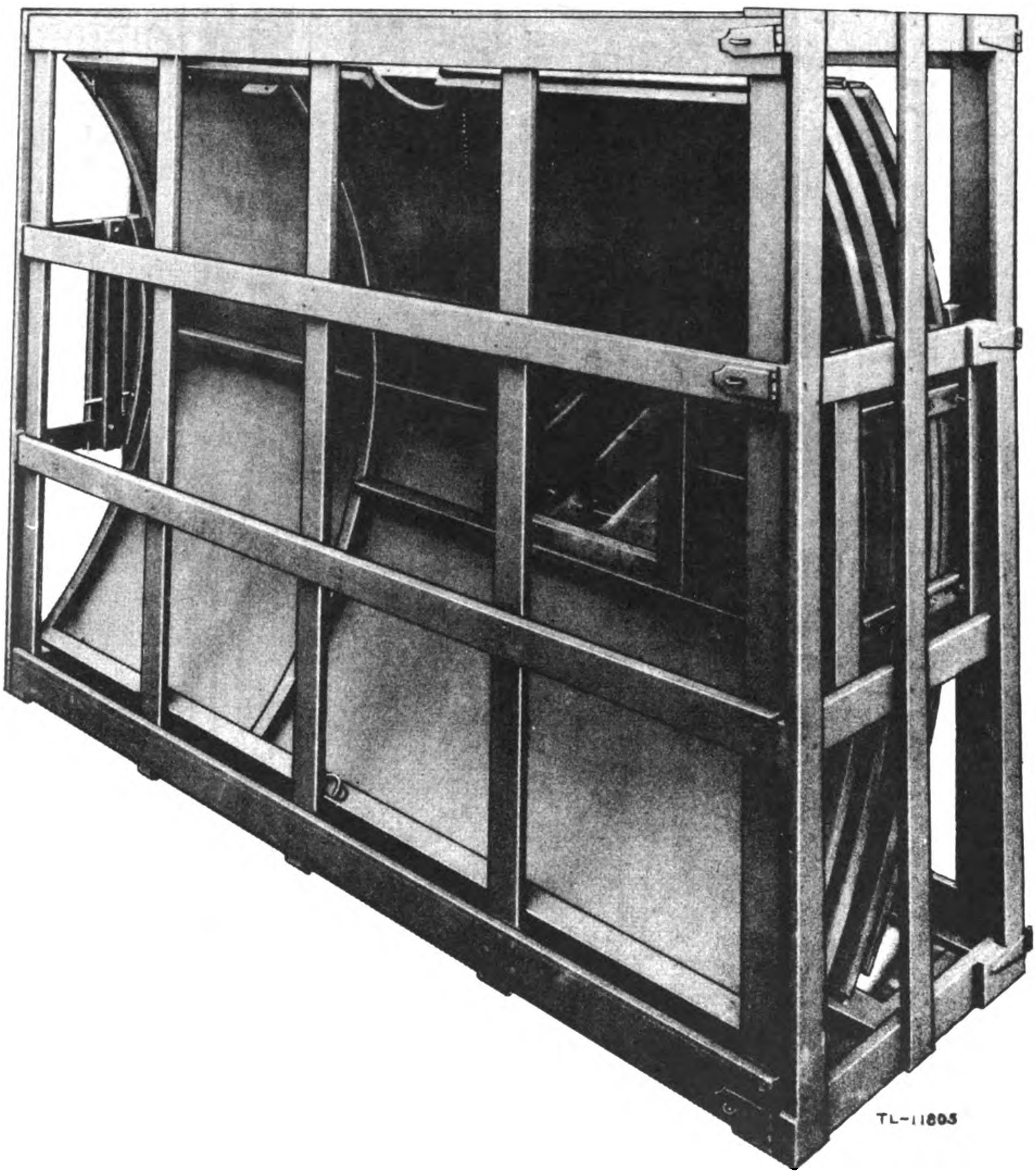


Figure 16. Shelter, crated.

SECTION II
INSTALLATION AND OPERATION

14. SELECTION OF SITE.

It is not always practical or possible to calibrate an RDF site because of the time involved. For this reason, the best possible location for the installation should be chosen to insure optimum performance of the equipment without calibration. The following factors should govern the choice of the site.

a. Terrain.

(1) The area should be substantially flat for at least 100 yards from the RDF antenna and should not have more than a gentle slope for several times that distance.

(2) The area should be the highest level area in the vicinity. A site in a valley is generally unsatisfactory.

(3) Mountains or hilly country should be avoided whenever possible.

(4) The area should be removed as far as possible from the coastline or large bodies of water. If the installation must be made on or near the coast, the flattest area should be selected and the antenna erected in such a position that the azimuth arc to be serviced is as nearly perpendicular to the coastline as possible.

(5) The earth at and around the site should have uniformly high conductivity and moisture content. Areas uniformly covered with grass or vegetation usually meet this requirement. Rocky or sandy soil is poor as a site; however, areas having uniformly low conductivity are preferable to areas having high conductivity spotted with rock formations, sand, or varying moisture content.

(6) Regions where there are abrupt discontinuities of the earth's surface should be avoided as this usually indicates the presence of rocks or mineral outcroppings, or underground streams.

b. Objects to be Avoided. The site should be removed from tall trees, buildings, wire fences, power or telephone lines, radio antennas, railroad tracks, sharp ground contours (mountains, cliffs, and ravines), buried metal conductors (cables and pipe lines), chimney stacks, water towers, rivers, lakes, and streams.

c. Distances to be Observed. The distances listed in the following table should be maintained between the RDF antenna and the obstructions given to minimize their effect on the accuracy of the azimuths:

Obstruction	*Distance*
Scattered trees and single small wooden buildings	150 yards
Wire fences	150 yards
High cliffs and deep ravines	150 yards
Buried metallic conductors (other than lines to RDF)	300 yards
Chimney stacks and water towers	300 yards
Overhead conductors (power lines, telephone lines, and antennas) and railroad tracks	500 yards
Rivers, streams and lakes	150 to 500 yards
Forest and metal structures	500 to 1,000 yards
Mountains	5 to 25 miles

15. UNPACKING.

a. Carefully unpack all components. Make a visual inspection for damaged parts and check the contents with parts list.

b. Central Unit Cabinet CS-121-A should be inspected after removal from Chest CH-114-A. Remove the panel screws on each side of the individual panels and silde the units forward to allow room for inspection of tubes, parts, and cable plugs. All tubes should be pressed down firmly in their respective sockets. After inspection, the components are secured in their original position by the panel screws.

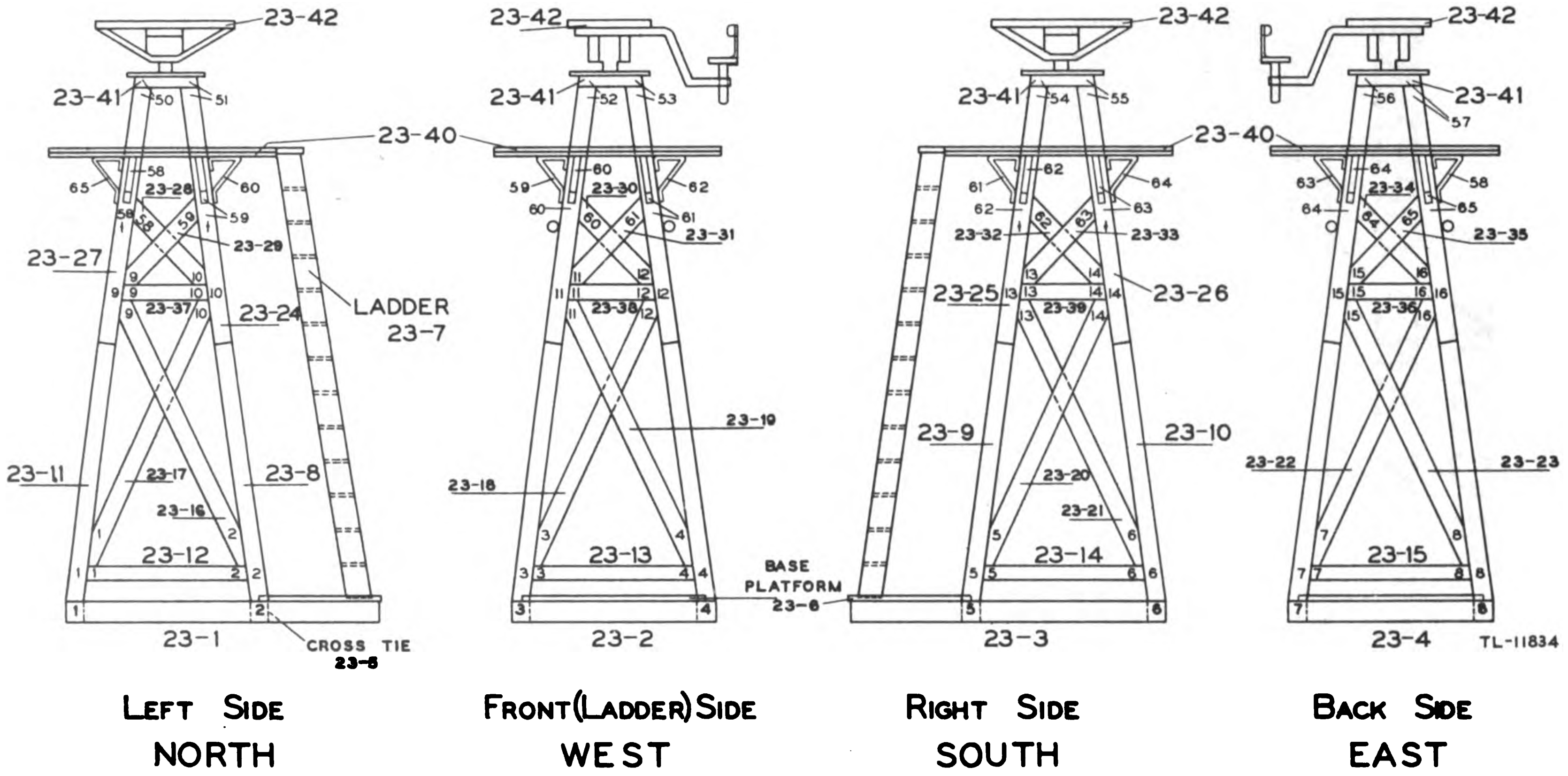


Figure 17. Tower assembly sketch.

c. Although the components may be removed for ease of handling, it is recommended that the central cabinet remain intact to simplify installation on the tower Mounting FT-371-A. If components are removed, follow the procedure in paragraph 59.

d. After all parts have been unpacked proceed in the following manner:

NOTE: For training purposes it is suggested that the RDF Central Unit Cabinet CS-121-A containing all electical components be mounted on a temporary platform. This platform should be just high enugh so that, with the Adcock antenna system in position, the lower dipole will be 6 inches from the ground. All connections should be made and the set placed in operation. Using Radio Transmitter BC-978-A for a target, the various controls of Radio Set SCR-551( ) can be demonstrated. The target transmitter can be moved to simulate rotation of the Adcock. Azimuths taken under these conditions should not be considered correct.

16. ASSEMBLY AND ERECTION OF TOWER TR-51-A.

a. **Assembly Identification Numbers.** Each member of the tower has a tower part number. Where this member is to be joined to other pieces the ends will bear assembly numbers. Throughout the tower structure these junction points are numbered and all pieces coming together at one common point will have the same assembly number.

EXAMPLE: Refer to figure 17. In the view marked "Left Side—North" the horizontal member marked 23-37 joins with 23-27, 23-29, and 23-16 at a common point 9. Each of these members bears an assembly number 9 at the end where it bolts to this point. The tower members should be assembled so that the junction point identification numbers are on the outside when assembly is complete. Bolts, nuts, washers, etc., for connecting the tower parts are carried in the tower seat crate.

b. **Assembly Procedure.** Assemble the tower members on the ground before erecting it to a vertical position. Keep all nuts and bolts loose until the tower is completely put together and erected to vertical position; then securely tighten them.

(1) Put together the base structures first.

(2) Then put together the side designated as north.

(3) Assemble the south side in like manner.

(4) Then place remaining horizontal and cross members forming the east and west sides in proper positions. This ties the north and south sides together, forming a four-sided pyramid.

(5) Then attach the wooden block 23-41 which supports the bearing for Mounting FT-371-A. This ties the tops of the four corner legs together.

(6) Attach the circular platform 23-40 with its steel supporting angles to the tower legs.

(7) Erect the tower to a vertical position in its proper place on the base platform.

(8) Attach the steel plates holding the tower to the base.

(9) Lay the base platform 23-6 in place and erect the ladder and fasten it to the circular platform.

(10) Tighten all nuts firmly.

(11) Put the azimuth scale in place so that the zero figure on the bottom scale is approximately due south.

(12) Remove the tower seat assembly, consisting of Mounting FT-371-A, telephone, slip-ring and collector assembly, 3-7 and 3-8, and the bearing and housing for rotating the RDF, from the tower seat crate. Remove the dummy wooden block bolted to the bottom of the bearing housing. (This dummy block holds the bolts in place at the bottom of this assembly.) Set the assembly into the square wooden base, 23-41 in such a way that the binding posts on the collector, 3-8, are as close as possible to the hole in the wooden base provided for the telephone cable. Bolt this assembly down firmly.

(13) Level the tower base with the spirit level provided with the set.

(14) Securely guy the four corners of the tower with ropes and Stakes GP-25 as the last operation.

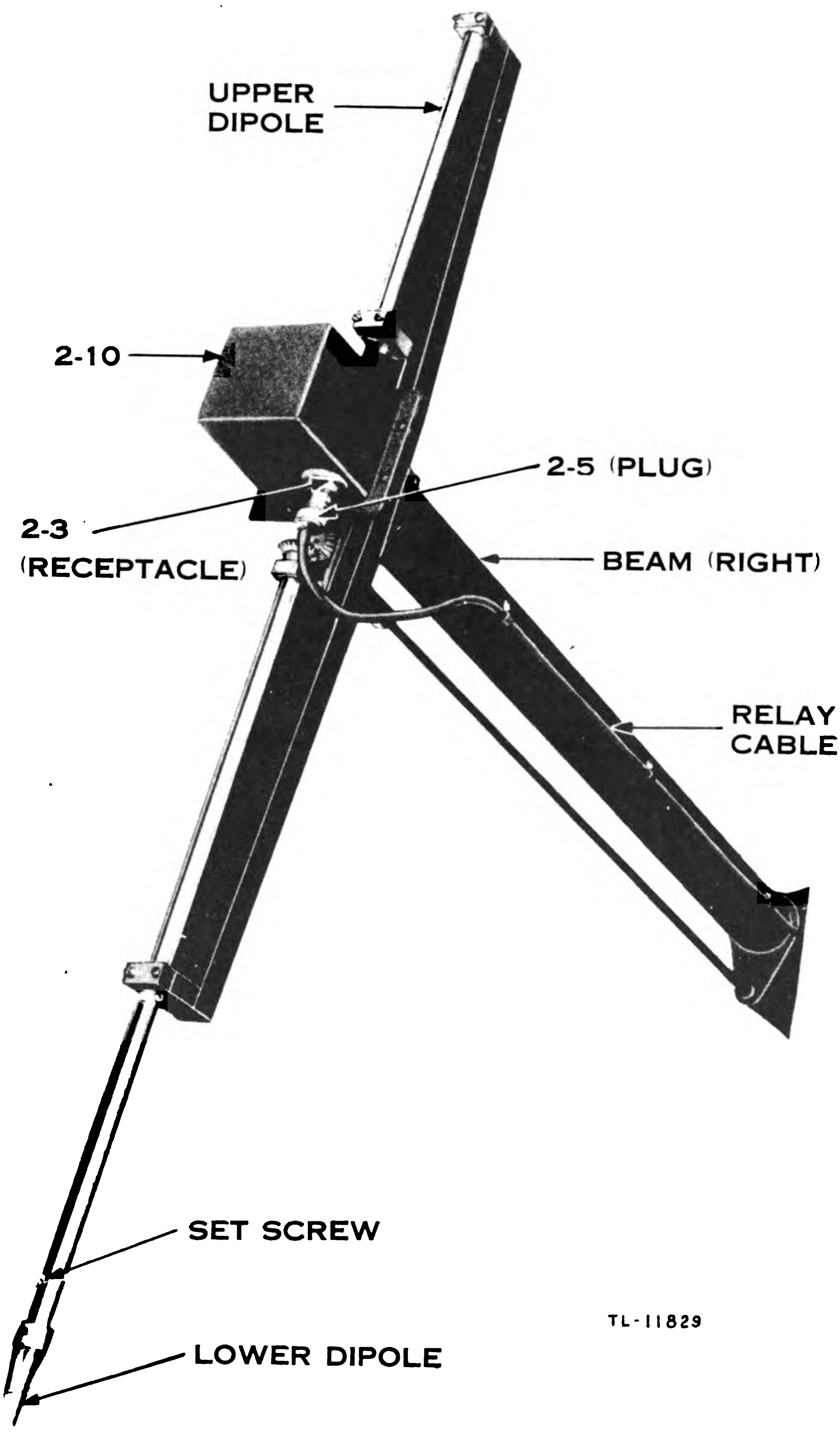


Figure 18. Right Adcock beam and dipole assembly.

17. WEATHERPROOF SHELTER HO-11-A.

a. Roof Assembly. Bolt the two V-shaped wooden members to the Mounting FT-371-A. All bolts required to assemble the shelter are carried in Chest CH-122-( ), or chained to shelter members. Plug the vertical antenna into the receptacle on the roof of the shelter. *It is important that this be done at this time since it cannot be done after the roof is in place.* Place the roof section on the V-shaped supports and bolt it to them.

NOTE: Side sections should not be attached until after the installation and adjustment of the RDF is completed.

b. Side Sections.

Bolt the four side panels to the roof member stamped with the corresponding number. Bolt the adjacent panels to one another through the holes provided in the wooden strips along the edge of the panels. For additional support the panels are also bolted to Mounting FT-371-A through the attached angle brackets.

18. CENTRAL UNIT.

Place Central Unit Cabinet CS-121-A on Mounting FT-371-A so that the controls are facing the operator's seat. Drop the bolts, carried in the spare parts chest, into the holes in the mounting angle along the sides of the base of the cabinet and screw securely to the mounting.

19. BATTERY BOX BX-51-A.

This battery box is installed by placing the box against the rear of Cabinet CS-121-A so that the hexagonal lugs on the back of the cabinet fit into the holes in the back of the battery box. Select three 6-volt storage batteries from one of the battery chests and mount them in the box (fig. 3).

20. ADCOCK ANTENNA SYSTEM.

a. Dipole Assembly.

(1) Install the two upper dipoles in the clamps on the dipole Collectors AN-122-A.

(2) Adjust these to equal length and tighten clamps securely.

(3) Remove the set screws from the side of each lower dipole.

(4) Insert the tapped end of the dipole in the slotted tube end of the dipole collector.

(5) Screw the lower dipole to the right until the tapped hole for the set screw appears in the slot on this sleeve-like tube.

(6) Put the set screws in place. The set screw now acts as a stop to prevent the lower dipoles from being lowered too far and falling out (fig. 18).

(7) Extend the lower dipoles to their full length (set screw against lower end of slot in sleeve).

(8) Attach one of these dipole Collectors AN-122-A to each Adcock Beam M-339-A (left) and M-340-A (right).

NOTE: Mount the dipole collector assemblies so that the lower dipoles are pointed to the ground in a vertical position and the crank rods which operate the lower dipoles are in a position along the under side of the beams.

(9) This completes the dipole assembly but before the beams are attached to the central cabinet make cable connections as directed in paragraph **22a.**

b. Mounting Dipole Beams. (1) The center section of the Adcock system remains permanently in Cabinet CS-121-A. It is secured at both ends by collars and wingnuts which fasten it to the cabinet. A set screw and pin device on the right side locks the beams in a vertical position. The center section is arranged so that it will turn through 90° in the collars. Turn this section so that the bakelite block with the antenna leads faces downwards and the locking pin drops in place.

(2) Now face the front of the cabinet. The side of the cabinet on your left is considered "left" throughout this text. Plug the beam marked "left" into the left end of the center section and the beam marked "right" into the right end of this section. The lower dipole crank rod will run along the lower edge of the beam if the beam is properly mounted and the lower dipoles point downward in a vertical position. Fasten the beams to the cabinet with the retaining collars and wingnuts.

21. RADIO TRANSMITTERS BC-978-A (TARGET).

These transmitters, supplied with Radio Set SCR-551-( ), are shipped complete with tubes and batteries. All that is necessary to prepare the unit for operation is to connect the antenna to the front panel by means of the two supports (fig. 2).

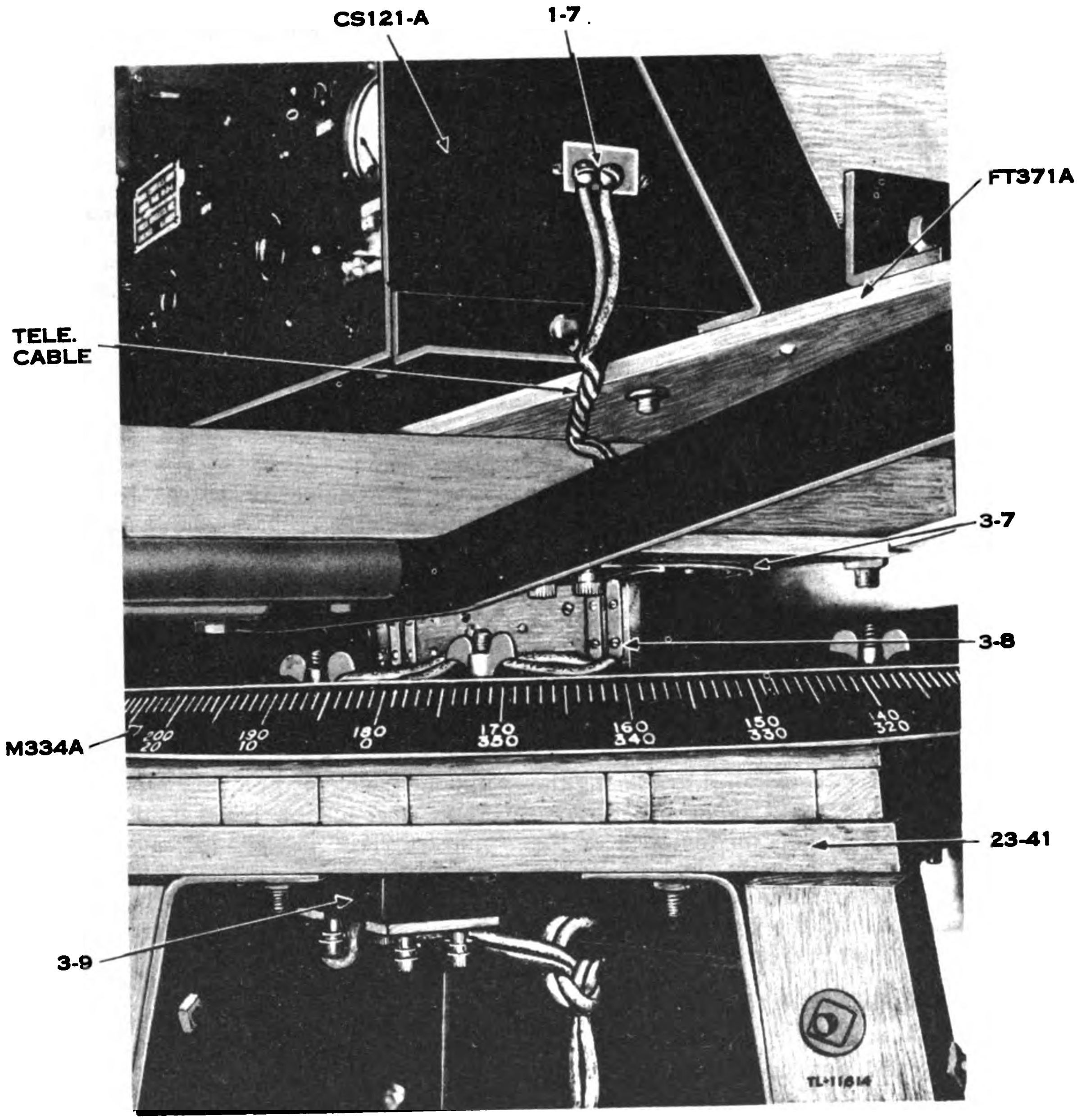


Figure 19. Central Unit Cabinet CS-121-A, showing telephone connection to central unit.

22. CABLING.

a. Dipoles. Put the plug 2-4, on relay control cable along the left beam, into receptacle 2-2 on the left relay housing. Insert plug 2-5, on the right relay cable, into receptacle 2-3 on relay housing 2-10.

b. Adcock Beams. After the beams are attached to the central unit cabinet, insert plug 2-6, on left relay cable, into receptacle 1-4 on the left side of cabinet. Insert plug 2-7, on the right relay cable, into receptacle 1-5 on the right side of the central unit cabinet.

23. TELEPHONE.

a. Connect the 30-inch telephone cable to the terminal strip 1-7 on the right front side of the Central Unit Cabinet CS-121-A, placing the lug ends under the binding screws (fig. 19).

b. Pass the wires under the cable clamp near this terminal and clamp the other ends in the binding posts of the slip ring assembly 3-7 below the mounting plate.

c. Connect the short, 18-inch telephone cable to the binding posts of the collector 3-8.

d. Pass the wires down through the hole in the Azimuth Scale M-334-A and Mounting FT-371-A.

e. On the lower side of the tower top platform, 23-41, mount radio-frequency choke 3-9.

f. Connect the lose end of the 18-inch cable to the binding posts, stenciled COLLECTOR, at one end of this choke.

g. Screw the angle bracket, which centers the telephone wire, diagonally across the bottom of the base 23-41.

h. Put one end of the 19½-foot two-conductor telephone cable through the hole in the center of this bracket and tie in a knot around the bracket to secure the wire. Be sure to leave enough wire to reach the binding posts of choke box 3-9.

i. Connect these leads to this choke box at the two remaining terminals stenciled VERTICAL. The rest of the wire will drop straight through the exact center of the tower.

j. At the base of the tower, mount the 2 x 4 wooden member horizontally across the center of the base from north side to south side. This member is drilled at a point which, when properly mounted, is directly beneath the center of the azimuth scale.

k. Bring the wire down through this hole and draw taut so that there will be no slack in the vertical line. Tie the wire in a knot around the 2 x 4.

l. Mount the lower radio-frequency choke 3-10 to the 2 x 4 alongside this hole and connect the cable terminals to the end pair of binding posts stenciled VERTICAL. This choke at the center of the tower base provides connections to the field telephone line.

24. VERTICAL ANTENNA.

Vertical Antenna AN-121-A is plugged into a banana receptacle 4-3 on the roof of the waterproof shelter. Connect flexible cable plug 1-2 from the lower portion of this receptacle to the receiver receptacle R-9-57 at the top of Central Unit Cabinet CS-121-A.

25. COMPASS MC-324-A.

Erect the jacob staff directly under the center of the central unit cabinet at the base of the tower. Mount the compass on the top of the staff.

NOTE: The jacob staff is a steel-shoed wooden pole about 54 inches long which serves as a mounting for the compass. A threaded ball-pivot universal joint provides a means for attaching the compass to the staff.

26. TELESCOPE MC-325-A.

Clamp the telescope adapter block (fig. 20), carried in the antenna chest, around the right Adcock beam so that the center of the telescope when mounted will be exactly 3 feet from the center of the central unit cabinet. The vertical antenna mounting on top of the central unit cabinet may be considered the center of the RDF. Mount the telescope on the adapter block and tighten with the two thumb screws.

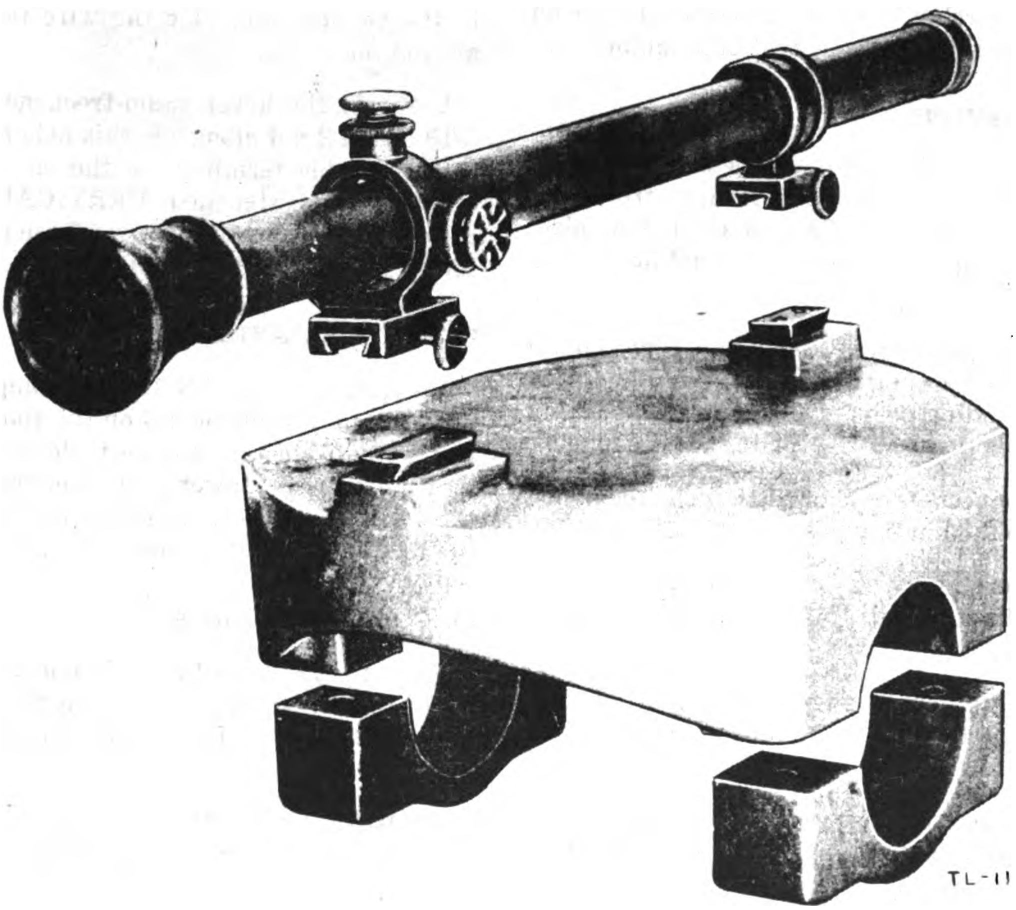


Figure 20. Telescope and adapter block.

27. BATTERIES.

A jumper is provided in spare parts Chest CH-122-( ) to connect two of the batteries in series for the 12-volt power supply. Leads from the control panel are marked to show positive and negative polarity for the 6- and 12-volt supply. Make these connections as indicated.

28. FIELD TELEPHONE LINE.

The field line for connection to Telephone EE-8-A, when used as a part of Radio Set SCR-551-( ), must be buried underground for at least 150 feet to a depth of 8 to 10 inches. Dig a small ditch and lay the conductor in it; then cover it. This is very important as failure to bury the field line will introduce bearing errors. Connect the end of the field line to the terminals on the choke box 3-10 stenciled FIELD.

29. ORIENTATION.

Through the sight provided on the compass, sight along the compass needle in a due magnetic north direction. Drive a stake into the earth 250 feet from the compass (fig. 21). The position of this stake must be determined as accurately as possible through the compass sight. Measure 3 feet due east of the No. 1 *stake just located* and drive stake No. 2. Sight through the telescope mounted on the right Adcock beam and locate stake No. 2 at the intersection of the crosshairs. Hold the RDF in this position and loosen the screws securing the azimuth scale. Rotate the scale until the 0° on the *lower* scale is indicated by the pointer. Tighten the azimuth scale. Recheck the position of stake No. 2 by again sighting through the telescope.

30. ALIGNMENT OF ADCOCK ANTENNA.

a. Place the target transmitter a minimum distance of 250 feet from the direction finder.

b. Put the target transmitter in operation by turning the power switch to CW or ICW according to the output desired.

c. Move the band switch to C.

d. Turn the tuning control until the dial pointer is at 5 mc.

e. Tune the direction finder, to the transmitted signal, using the visual-null method as described in paragraph **35.**

f. Turn the Adcock antenna until a null point is evident, and note the reading on the azimuth scale.

g. Turn the Adcock antenna approximately 180° until a second null is indicated by the oscilloscope, and note the reading on the azimuth scale.

h. If the two null points are not 180° apart, adjust the lower dipole by varying their individual lengths with the small cranks on the bottom of each Adcock beam. It may be necessary to repeat the above operation until the two nulls are 180° apart.

31. LOCATION OF TEST POINTS.

Using the compass and telescope, locate eight points according to the method described in paragraph **29**, using stakes 250 feet from the RDF, starting with true or magnetic north and spacing the stakes 45° apart around the RDF. These are the points where the target transmitter will be placed to test the operation of Radio Set SCR-551-( ).

32. TESTING FOR SIGHT ERRORS.

Proper operation of Radio Set SCR-551-( ) consists of getting approximately correct azimuths (±2° or 3°) for each stake point of the target transmitter. It also consists of getting a good response on the RDF at all frequencies with the target transmitter placed at a distance up to 250 feet from the RDF.

a. Turn on the target transmitter.

b. Set the frequency.

c. Take an azimuth on the RDF as described in paragraph **36.** The difference between this azimuth and the true azimuth is the apparent error. If errors larger than 3° are observed, move the RDF to a new location rather than attempt to calibrate the site. This test equipment and procedure may be used to calibrate the RDF for certain types of site errors, but such calibrations should not be undertaken by inexperienced operating personnel.

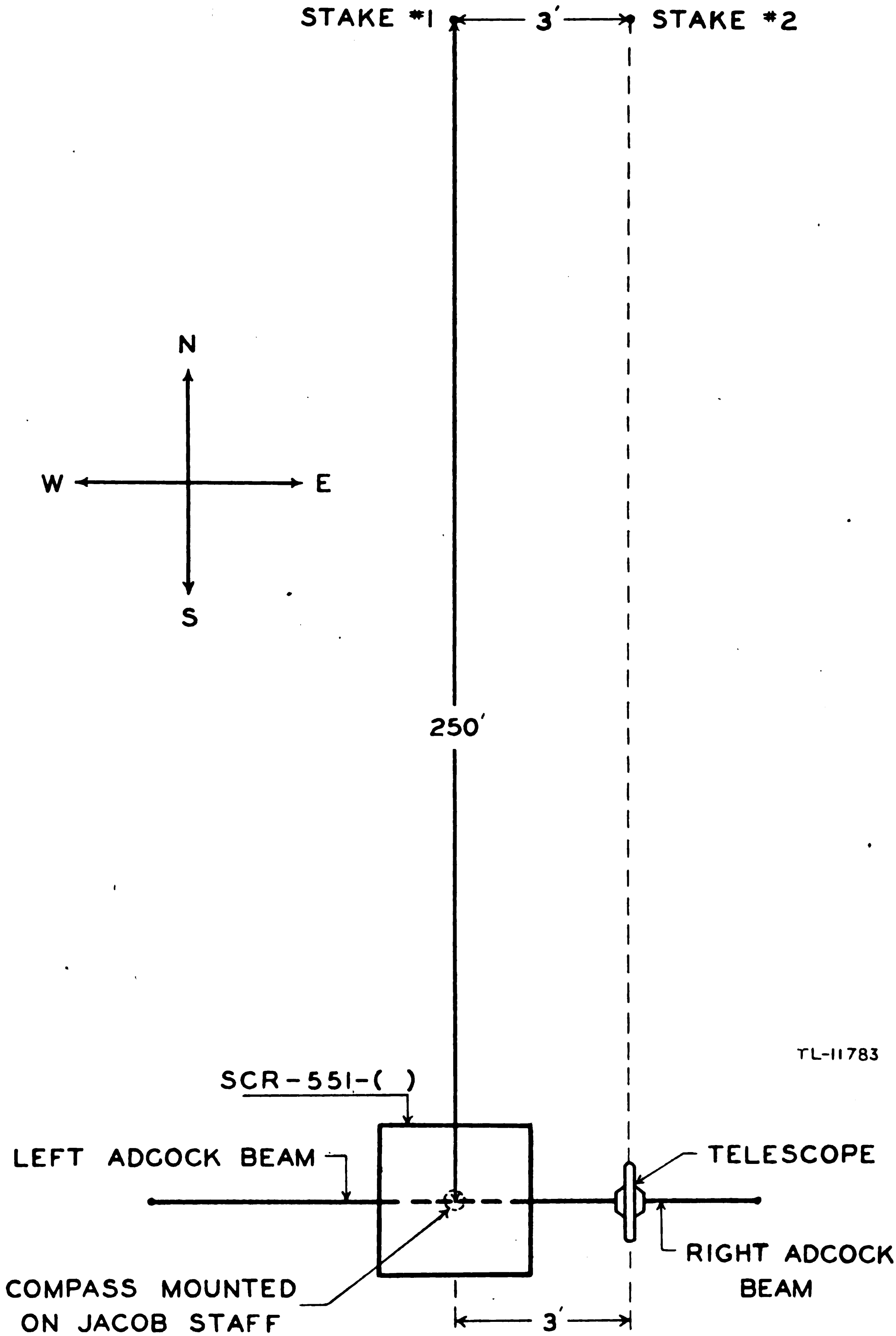


Figure 21. Azimuth alignment sketch.

33. METHODS OF OPERATION.

Conditions encountered during field use will determine the method of operation. For example, when ICW or badly fading signals are received, it is recommended that the RDF be operated as an aural-null indicator. As an aural-null indicator, only the audio signal from the speaker or phone is used as an azimuth indication. When operated as a visual-null indicator, the position of minimum trace height on the oscilloscope screen denotes an azimuth. In either case, discrimination between direct or reciprocal azimuth indication is impossible as only the Adcock antenna is used. When possible the RDF should be operated as a left-right indicator. When used in this manner, it is capable of indicating direct or reciprocal azimuths. In this case, the sense antenna is used in conjunction with the Adcock system.

NOTE: Normally Radio Set SCR-551-A should not be operated as a RDF within the frequency range of 12 to 13.5 mc. In this range it may be used as a communication receiver for monitoring purposes but resonant conditions in the antenna system are such as to produce azimuth errors of 10 to 20° when operation as a RDF is attempted.

In cases where it is absolutely necessary to take azimuths in the frequency range of 12 to 13.5 mc and when the operator has sufficient time to obtain both direct and reciprocal azimuth as described in this technical manual, azimuths accurate within ±2° can be obtained by the following procedure.

a. Take the direct and reciprocal azimuth.

b. If the reciprocal azimuth is less than 180°, add 180° to the reciprocal reading.

c. If the reciprocal azimuth is greater than 180°, subtract 180° from the reciprocal reading.

d. Add together the direct azimuth reading obtained in sub-paragraph **a** and the value obtained in **b** or **c**.

e. Divide the value obtained in subparagraph **d** above by 2. The result will be the direct mean azimuth. This mean azimuth will be correct within 2°. Use 360° instead of 0° in performing the above calculations if an azimuth reading of this value is indicated.

34. OPERATION AS AN AURAL-NULL DIRECTION FINDER.

a. Turn on the set by moving the twin BATTERY switch mounted on the control panel to ON.

b. Wait about 30 seconds, then turn the SENSITIVITY, AUDIO, AND ANT. GAIN controls on the receiver panel to a high level.

b. Move the MONITOR BEARING switch, on the oscilloscope panel to BEARING position.

d. Select the desired frequency band by turning the BAND SW selector knob to the proper position as shown by the pointer; the range corresponding to the band selected will be found on the main tuning dial.

NOTE: When operating Radio Set SCR-551-B on any frequency between 17 and 20 mc., move the ADCOCK RELAYS switch on the receiver panel to the 17-20 MC position. This lowers the resonant frequency of the adcock circuit, thereby compensating for bearing deviation throughout this range of frequencies. When operating Radio Set SCR 551-B below 17 mc., leave the switch in the 2-17 MC position. Serious bearing errors will result if the switch is in the incorrect position.

e. Tune the receiver carefully to the desired signal with the TUNING knob and VERNIER. The latter provides a more accurate method of tuning. Optimum tuning will be indicated by the maximum audible signal.

f. Turn the ANT. GAIN control to the extreme left or minimum position. This operation is very important and must be done before the succeeding operations or false azimuths will result. Recheck the tuning of the receiver and VERNIER for maximum audible signal.

g. Turn the RDF until a null (minimum signal) is heard.

h. Turn the SENSITIVITY control to the right and the AUDIO GAIN control to the left until the null is sharp. The exact center of this null is the true azimuth.

35. OPERATION AS A VISUAL-NULL RDF.

a. Before placing the RDF in operation for the first time using the oscilloscope indicator the following method is used.

b. Move the MONITOR BEARING switch to BEARING position. Remove the panel marked REMOVE TO ADJUST CONTROLS, and make the following adjustments:

(1) With the aid of a small screwdriver turn the TRACE HEIGHT adjustment to the extreme right.

(2) Turn the TRACE CALIB adjustment until the height of the trace is ¾ of an inch. These adjustments must be made with the receiver controls at the extreme left.

(3) Slowly turn the TRACE HEIGHT adjustment to the left un il the two traces are reduced to two dots.

(4) Turn the HORIZONTAL and VERTICAL adjustments until the two dots are located in the center of the cathode-ray tube.

(5) Turn the FOCUS adjustment until the two dots are clearly defined.

> **NOTE:** It may be necessary to repeat the above adjustments occasionally.

c. Turn the SENSITIVITY, AUDIO, and ANT. GAIN controls on the receiver panel to a high level.

d. Select the desired frequency band by turning the BAND SW selector knob to the proper position as shown by the pointer; the range corresponding to the band selected will be found on the main tuning dial.

> **NOTE:** When operating Radio Set SCR-551-B on any frequency between 17 and 20 mc., move the ADCOCK RELAYS switch on the receiver panel to the 17-20 MC position. This lowers the resonant frequency of the adcock circuit thereby compensating for bearing deviation throughout this range of frequencies. When operating Radio Set SCR-551-B below 17 mc., leave the switch in the 2-17 MC position. Serious bearing errors will result if the switch is in the incorrect position.

e. Tune the receiver carefully to the desired signal with the TUNING knob and VERNIER. The latter provides an accurate method of tuning. Optimum tuning will be indicated by maximum trace height.

f. Turn the ANT. GAIN control to the extreme left. This operation is very important and must be done before the succeeding operations or false azimuth will result.

g. Recheck the TUNING and VERNIER controls for maximum trace height. If the trace is beyond the range of the oscilloscope screen, decrease the SENSITIVITY control until the limits of the signal trace do fall within the range of the scope. When operating the RDF by the visual-null method it may increase the over-all sensitivity of the set to rotate the dipoles from the vertical position. First lift the pin in the cabinet bearing ring (1-21) on the right Adcock beam. Slowly turn the Adcock beams. This will rotate the dipoles from their normal vertical position into the best plane to accept the incoming signal. This is indicated by the increase in sensitivity or gain found in one position during the rotation. When this position is found the traces may again extend beyond the range of the scope. If so, decrease the SENSITIVITY control to bring the limits of the traces back onto the scope screen. This is only permissible when operating the RDF as an aural-null or visual-null instrument.

h. Tune the VERNIER for maximum signal trace height on the oscilloscope screen.

i. Adjust the BALANCE control until both traces are of equal height. Recheck the TUNING and VERNIER controls.

j. Turn the RDF until the signal traces on the oscilloscope screen decrease to a minimum height. It may be necessary to turn the SENSITIVITY control until this minimum height falls within the limits of the screen.

k. Adjust the SENSITIVITY control until a sharply defined null (minimum trace height) is attained when rotating the RDF through an azimuth position. The midpoint of this angular rotation is the true azimuth.

36. OPERATION AS A LEFT-RIGHT INDICATOR RDF.

When Radio Set SCR-551-( ) is operated as a left-right indicator type RDF, the following procedure is followed:

NOTE: UNDER NO CIRCUMSTANCES MAY THE RDF BE OPERATED AS A LEFT-RIGHT INDICATOR UNLESS THE DIPOLES ARE IN A VERTICAL POSITION AND THE LOCKPIN ON THE ADCOCK BEAM AT THE RIGHT SIDE OF THE CABINET IS SET IN ITS LOCKING POSITION. IT IS ABSOLUTELY NECESSARY THAT THE DIPOLES BE IN THE SAME VERTICAL PLANE WITH THE VERTICAL SENSE ANTENNA TO OPERATE THE SET AS A LEFT-RIGHT INDICATING INSTRUMENT OR AZIMUTH ERRORS WILL RESULT.

a. Turn on the set by moving twin BATTERY switch mounted on the control panel to ON. One side of the switch controls the 6-volt filament heater source, the other the 110-volt vibrator power source.

b. After the set has become warm and before placing the RDF in oeration for the first time using the oscilloscope indicator, check the adjustments on the oscilloscope by removing the panel marked, REMOVE TO ADJUST CONTROLS. Throw the Monitor BEARING switch to BEARING position and make the following test:

c. Turn the ANT. GAIN and SENSITIVITY controls to the extreme left. Turn the TRACE HEIGHT adjustment to the extreme right and turn the TRACE CALIB adjustment until trace height is 3/4 of an inch. Slowly turn the TRACE HEIGHT adjustment to the left until the two traces are reduced to two dots.

d. When operating Radio SET SCR-551-( ) as a left-right indicator type of RDF, one further adjustment on the oscilloscope is necessary to insure proper sense indication. Turn the SPREAD adjustment to the extreme left position. This causes the right dot to move to, or to the left of, the left dot. Then turn the SPREAD adjustment to the right until the movable dot is again to the right of the left one. The distance between the dots is not critical; 1/16 to 1/4 of an inch is recommended. With the dots adjusted as described they are in the correct position for true sense indication.

e. Place the two dots in the center of the cathode-ray tube, horizontally and vertically, by adjusting the HORIZONTAL and VERTICAL position adjustment. Turn the FOCUS adjustment so that the dots are sharp and well defined.

NOTE: It may be necessary to repeat these adjustments occasionally.

f. Turn the SENSITIVITY, AUDIO, and ANT. GAIN controls on the receiver panel to a high level.

g. Leave the switch on the oscilloscope panel marked MONITOR BEARING in the BEARING position.

h. Select the desired frequency band by turning the band switch selector knob to the proper position as shown by the pointer; the range corresponding to the band selected will be found on the main tuning dial.

NOTE: When operating Radio Set SCR-551-B on any frequency between 17 and 20 mc., move the ADCOCK RELAYS switch on the receiver panel to the 17-20 MC position. This lowers the resonant frequency of the adcock circuit, thereby compensating for bearing deviation throughout this range of frequencies. When operating Radio Set SCR-551-B below 17 mc., leave the switch in the 2-17 MC position. Serious azimuth errors will result if the switch is in the incorrect position.

i. Tune the receiver carefully to the desired signal with the main TUNING control and VERNIER. The latter gives a highly sensitive method of accurate tuning. Optimum tuning will be indicated by the maximum audible signal.

j. Turn the ANT. GAIN control to the extreme left position. This operation is very important and must be performed before the succeeding operations or false azimuths will result.

k. Retune the receiver and VERNIER for maximum signal intensity as indicated by maximum trace height on the oscilloscope. If this signal appears weak it is probable that

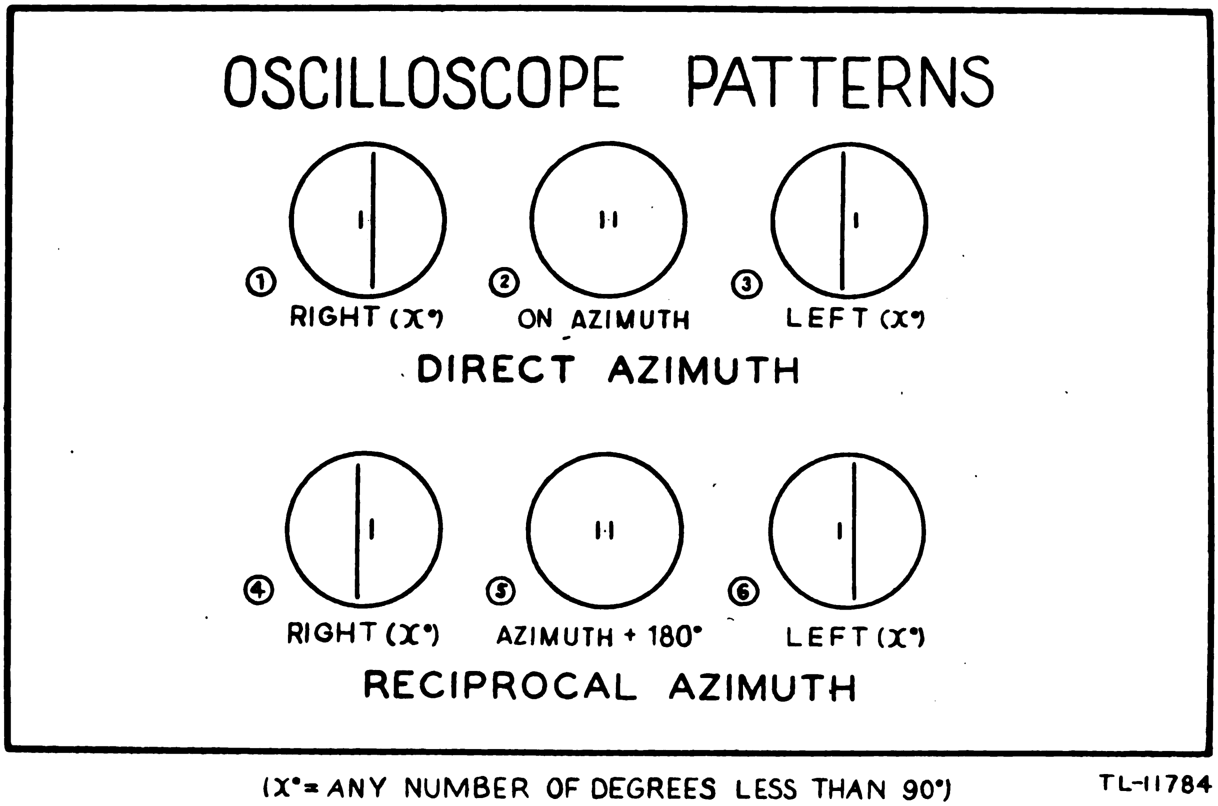


Figure 22. Oscilloscope patterns.

the RDF is near the azimuth position. In this case, turn the set approximately 90° and again tune the receiver and VERNIER. If this maximum trace is beyond the range of the oscilloscope screen, decrease the SENSITIVITY control until the signal traces do appear on the scope.

l. After tuning the receiver and VERNIER as indicated by maximum trace height on the oscilloscope, increase the ANT. GAIN control. In response to this operation, one trace on the oscilloscope will increase in height while the other decreases. The ANT. GAIN control should be advanced until the one trace has decreased to a minimum height. Any further increase of this control will result in an overload condition which will cause the short trace to again increase in height. The ANT. GAIN control, when so adjusted as to decrease the one trace to a minimum height, will be in the optimum position for sensitive azimuth indication.

m. One trace on the oscilloscope will now be large and the other nearly a dot. This indicates an off-azimuth position of the RDF.

n. Turn the RDF in either direction until the two traces are of approximately equal height which is an indication of azimuth position.

o. Adjust the SENSITIVITY control until the two traces cover about two-thirds the height of the oscilloscope screen.

p. Turn the RDF until the two traces are of exactly equal height. This indicates an azimuth position. Figure 22 shows patterns that can be obtained on the oscilloscope, together with the circumstances which produce them. (This assumes proper receiver adjustment.) Pattern 2 (two small traces) results when Radio Set SCR-551-( ) is on azimuth, that is the Adcock beams are perpendicular to the direction of, and face the signal. When the operator moves to his right, the oscilloscope will reproduce pattern 1 (a long trace on the right and a short trace on the left). The magnitude of these traces depends on the degree of rotation. Pattern 3 is produced by moving to the left (a long left trace and a short right trace). Patterns 1, 2, and 3 are all *direct azimuths;* patterns 4, 5, and 6 are obtained when the signal source is behind the operator (reciprocal azimuth).

q. When the RDF has been adjusted and operated as previously described, the optimum azimuth sensitivity will normally result. However, when the RDF is near the azimuth position, it may be necessary to further coordinate the relative positions of the SENSITIVITY and ANT. GAIN controls. To do this, proceed as follows:

(1) If the SENSITIVITY control is too low and the ANT. GAIN control too high, the traces will not increase and decrease abruptly as the RDF is swung side to side through the azimuth point. Rather, they will move very sluggishly and the azimuth will be broad.

(2) If, on the other hand, the SENSITIVITY control is too high and the ANT. GAIN control too low, both traces will tend to decrease in height as the azimuth position is approached. When the relative gains of these two controls have been correctly balanced one trace will increase and the other decrease as the azimuth position is approached. Moreover, the movement of the two traces will be symetrical; that is, one trace will increase proportionately as the other decreases.

NOTE: Subparagraph (q) must be accomplished with the RDF near the azimuth position, otherwise the receiver might become overloaded or the traces extend beyond the range of the oscilloscope.

r. Turn the RDF and obtain the reciprocal azimuth and, if necessary, adjust the dipoles until the reciprocal and direct azimuth are exactly 180° apart as described in paragraph 30h.

s. When the RDF is operated as a left-right indicator, sense as well as azimuth indication is possible. Sense indication is established in the following manner:

(1) Turn the RDF so that the operator moves to his right from the azimuth position. If the right trace increases, the azimuth is a direct one; that is, the operator is facing the target. This azimuth should be read from the *bottom row* of figures on the azimuth scale.

(2) If the right trace decreases as the RDF is rotated to the right from the azimuth position, a reciprocal azimuth is indicated. In this case, the target is *behind* the operator and the azimuth should be read from the *top row* of figures on the azimuth scale.

37. COPYING CW SIGNALS.

a. Radio Set SCR-551-A. Because there is no beat-frequency oscillator BFO in Radio Set SCR-551-A, it is difficult to copy CW signals when the MONITOR BEARING switch is in the MONITOR POSITION. The presence of a CW station, however, can be discovered by the carrier rush. The following are instructions for copying CW signals on Radio Set SCR-551-A:

(1) As soon as the presence of a CW station is indicated, place the MONITOR-BEARING switch in the BEARING position.

(2) Turn the direction finder until it is slightly off bearing, where a buzzing note produced by the electronic switching is heard.

(3) This note will be heard while the transmitter is in ON or in key-down position. Thus the buzzing note is heard in dots and dashes corresponding to the transmitted message.

(4) Copy the message in the usual manner.

b. Radio Set SCR-551-B. A BFO circuit has been added to Radio Set SCR-551-B, for reception of c-w signals. Referring to figure 6, follow the operating procedures outlined below:

(1) Turn on the set by throwing the twin circuit breaker 14-8 and 14-9, mounted on the control panel, to ON.

(2) When the unit has reached operating temperature, set the SENSITIVITY, AUDIO, and ANT. GAIN controls on the receiver to a high level.

(3) Turn the MONITOR BEARING switch to the MONITOR position.

(4) Turn the BFO switch, 12-87, to the ON position.

(5) Select the desired frequency band by turning the BAND SW selector knob, 9-68, to the proper position.

(6) Tune the receiver to the desired signal with the main TUNING knob and VERNIER.

NOTE: When operating Radio Set SCR-551-B on any frequency between 17 and 20 megacycles, move the ADCOCK RELAYS switch on the receiver to the 17-20 MC position. This lowers the resonant frequency of the adcock circuit, thereby compensating for bearing deviation throughout this range of frequencies. When operating Radio Set SCR-551-B below 17 megacycles, leave this switch in the 2-17 MC position. The position of this switch must be carefully observed. Serious bearing errors will result if the switch is in the incorrect position.

(7) Adjust the AUDIO GAIN control, 9-89, to a suitable level.

38. OPERATION OF TELEPHONE EE-8-A (MODIFIED).

A modified standard field telephone EE-8-A is incorporated in Radio Set SCR-551-( ). The connection between the lever switch and the bottom of the holding coil has been opened. A black-red conductor has been spliced to the red-blue wire coming from the lever switch while a green wire is soldered to the number 2 terminal of the holding coil. The black-red and green wires come out of the side of the telephone case and are brought forward to a jack, 3-2, on the front of the telephone chassis. When operating on central battery, the operator plugs his chest set into this jack which accomplishes the same thing as lifting the handset from the lever switch in field operation of Telephone EE-8-A. Audio transformer C-410 is wired into the headphone circuit under the telephone chassis to match the impedance of Headset P-19.

NOTE: Transformer C-410 is used *only* on SCR-551-A, serial numbers 1 to 114 inclusive. Serial numbers 115 to 395 inclusive of this model and SCR-551-B use Headset HS-30-B and C-410 is not used.

a. After installation, it should be determined whether the telephone is to be used on LOCAL or CENTRAL battery circuits. If LOCAL battery is to be used, the switch alongside the lever switch (fig. 9) must be turned to LB or local battery position. This is reached with a long screwdriver through a small hole at the lower rear of the cabinet. When operating in this position, plug the chest set into the TRANS. jack 3-2 and plug the headset into HEAD SET jack 3-1. Turn the generator crank on the lower rear side of Cabinet CS-121-A to signal the other end of the line.

b. When operating on CENTRAL battery turn the screw switch to CB. Plug the headset into HEAD SET jack 3-1.

> **NOTE:** Do not plug the chest set into TRANS. jack 3-2 until you are ready to signal the central operator.

c. The special adaptation of the Telephone EE-8-A to this equipment is so arranged that when the local operator plugs into jack 3-2, an annunciator circuit is closed which flashes a light on the central switchboard. After the conversation has been completed, REMOVE THE CHEST SET PLUG FROM JACK 3-2 AT ONCE. Failure to do this will keep the annunciator circuit closed and the signal lamp lighted at the central switchboard. When using the telephone in this way it is not necessary to turn the generator crank to signal the other end of the line.

39. OPERATING PRECAUTIONS.

a. Azimuth Errors. When using the cathode-ray indicator it is of utmost importance that the receiver and VERNIER be tuned exactly to resonance; that is, for maximum trace height as indicated on the oscilloscope. As an aid in making the preliminary receiver adjustments, it is permissible to have the ANT. GAIN control in an advanced position, but for precision tuning on the receiver and VERNIER, it is absolutely necessary that the ANT. GAIN control be turned to its minimum position. Failure to tune in this manner will introduce azimuth errors of several degrees. Whenever Radio Set SCR-551-( ) is being operated as a RDF, no person other than the operator may be present within 50 feet of the set or azimuth errors will be introduced.

b. Monitor Bearing Switch. The switch marked MONITOR-BEARING must be in the MONITOR position except while tuning and taking azimuth visually. When taking an azimuth visually, the MONITOR-BEARING switch must be in the BEARING position. This procedure will prevent burning of the cathode-ray tube.

c. Overloading. Take extreme care that the set is not overloaded when tuning or taking azimuth. This is readily observed by the action of the traces on the oscilloscope. If an overload condition exists while tuning, the traces will not increase and then decrease abruptly when approaching critical tuning as they should. Rather, they will increase to maximum height and remain at that height for an appreciable motion of the TUNING control. An overload condition *while obtaining an azimuth* will result in both traces rising to a maximum height and remaining in that position for an appreciable rotation of the RDF. Never judge this condition as azimuth indication when operating the set as a left-right indicator. An overload condition results in both traces increasing simultaneously and remaining fixed over 10° to 70° of rotation depending upon the amount of overload. A true azimuth indication results in one trace increasing and the other decreasing until they are of equal trace height, when again one trace will proportionately increase and the other decrease. If either of these overload conditions exists, decrease the SENSITIVITY or ANT. GAIN control until normal operation results.

d. Tuning. Critical tuning and adjustment of the gain controls must be made near the azimuth position to insure against overload conditions mentioned in subparagraph c above.

e. Telephone. After using the telephone for communication with the field, *remove the chest-set plug from the jack on the panel.* This, in effect, *hangs up the receiver* on the telephone.

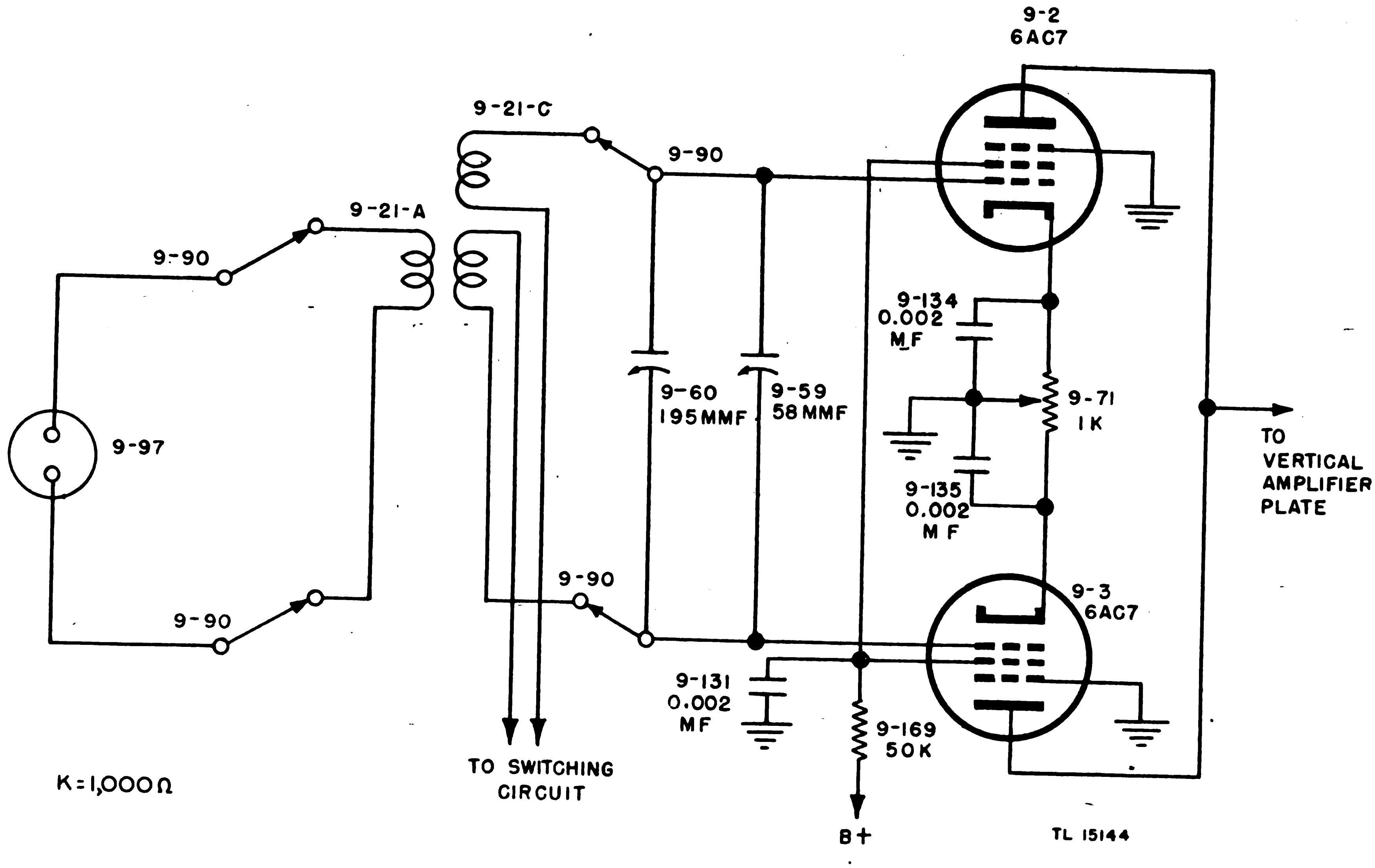


Figure 23. Adcock amplifier circuit.

SECTION III
FUNCTIONING OF PARTS

40. ADCOCK AMPLIFIER CIRCUIT (fig. 23).

The signal voltage from the Adcock system is applied through plug 9-97 to one of five untuned antenna primaries (9-17a on band 5, 9-18a on band 4, etc.). Since the electrical functioning of all bands are essentially identical, this discussion will describe the circuits with the band switches in band 1 position and the individual schematics will indicate band 1 only. A separate secondary is provided with each primary numbered accordingly, 9-17c for band 5, 9-18c for band 4, etc. Band selection is afforded by the main rotary band switch 9-90. One-half of the split secondary feeds the control grid of tube 9-2, referred to as the right Adcock tube, and the other half of the secondary feeds the control grid of tube 9-3, referred to as the left Adcock tube. This means actually that the grids of these two tubes are connected in series across the split secondary of the antenna transformers. Resistor 9-71, which develops the grid bias for these tubes, has been made variable so that a balance can be obtained which will insure an equal gain through each tube. The normal negative bias of these two tubes is approximately 1½ volts. The plates of these two tubes (right and left Adcock tubes) are connected in parallel. It follows from the above discussion that, assuming a correct balance adjustment has been made, the net output from these two tubes would be zero but this difficulty is overcome by the use of an electronic switch arrangement which alternately over-biases one tube, then the other, at the rate of 60 times per second. In the grid circuits of the two Adcock tubes and across the antenna transformer secondaries is a section of the main tuning capacitor 9-60 whose various elements are in turn ganged to the first r-f, the mixer, and oscillator stages. These will be mentioned again later in the text. This tuning capacitor, with the aid of the trimmer 9-59 across it, varies the resonant frequency of the antenna secondary coils to accommodate the particular signal being received. The electrode connections of the two Adcock tubes are conventional. Capacitors 9-134 and 9-135 are r-f cathode filters. The screen-grid voltage is dropped to approximately plus 115 volts by resistor 9-169 and filtered by capacitor 9-131. The suppressor grid on both tubes is grounded.

41. SWITCHING CIRCUIT (fig. 24).

The switching circuit manifests itself in tubes 9-11 and 9-12. Energy of 60 volts, 60 cycles is applied to the plate-cathode circuit of tube 9-12, where it is rectified and passed on to the control grids of the twin triode tube 9-11. These pulses are here amplified causing a voltage of approximately 7 volts to be developed across resistors 9-173 and 9-174 of a polarity which will bias the control grids of 9-2 and 9-3 (right and left Adcock tubes) an additional negative 7 volts. This is a virtual reciprocating action so that at any particular moment one of the Adcock tubes is biased approximately 8½ volts negative (beyond cut-off) and the other Adcock tube carries the normal bias of approximately 1½ volts negative. *Thus, only one of the Adcock tubes delivers a signal output at a time.* This switching action, as previously mentioned, takes place at the rate of 60 times per second. In other words, the grid in each Adcock tube is driven beyond cut-off 60 times per second. Resistor 9-154 is introduced into the switching or pulsing circuit when the MONITOR-BEARING switch is in the MONITOR posi-

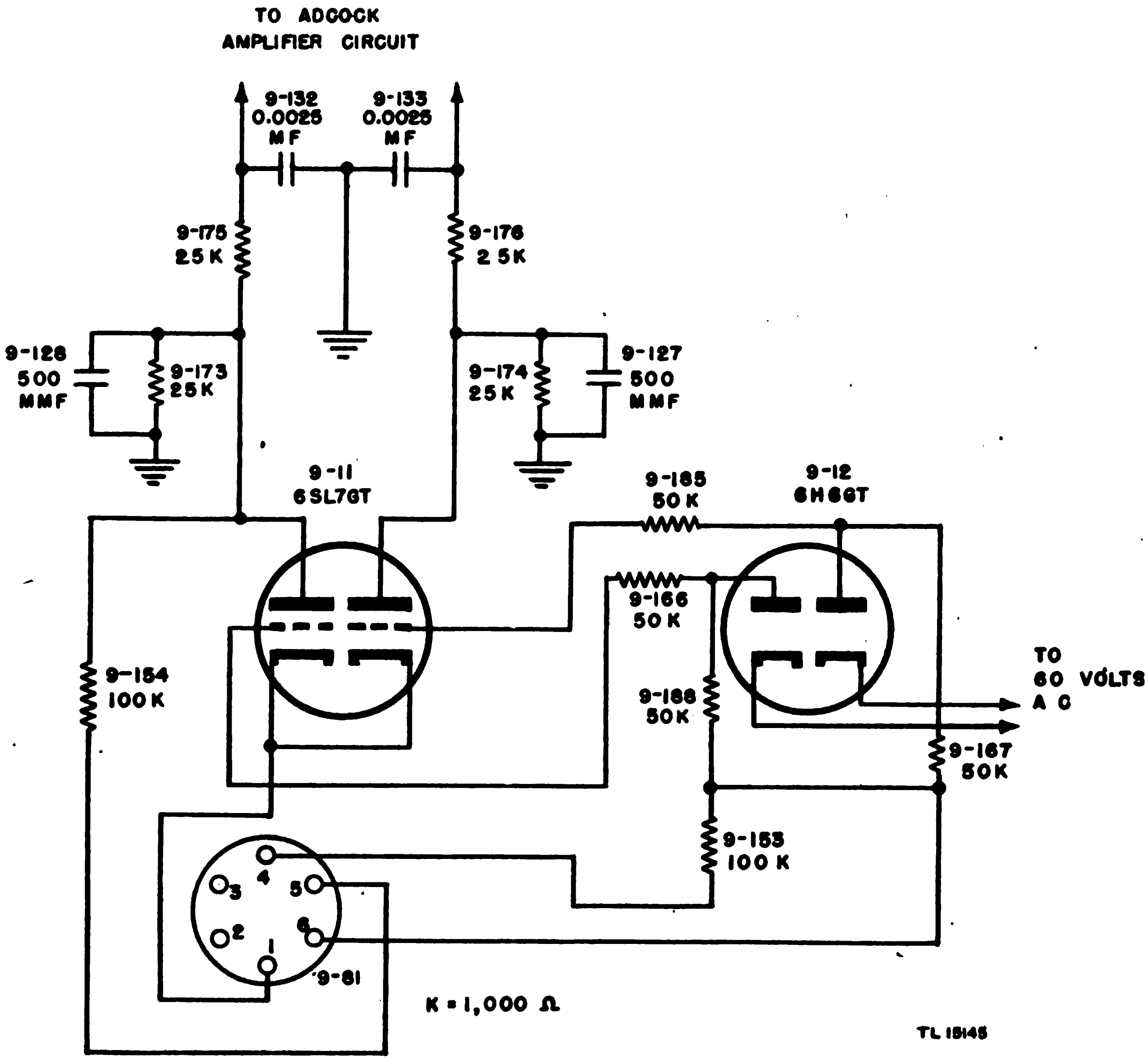


Figure 24. Electronic switching circuit.

tion. In this position a negative voltage is developed across this resistor and applied to the plate of the left Adcock tube, cutting it off completely. At the same time, when the switch is in MONITOR position, the cathode circuit of pulse amplifier tube 9-11 is opened and this tube is rendered inoperative. Thus, when in MONITOR position, only the right Adcock tube is functioning and the left Adcock tube is effectively out of the circuit. It should be noted that the anode of this tube (9-11) is grounded and the cathode is operated at a high negative voltage. Resistors 9-165 and 9-166 function as grid current limiting resistors and further serve to protect tube 9-12 in case the grids of 9-11 are shorted to ground. Resistors 9-167 and 9-168 are voltage dropping elements. Capacitors 9-127 and 9-128, which shunt the plate load resistors (9-173 and 9-174) of tube 9-11, serve as r-f filters and tend to eliminate r-f fluctuations from the bias on the Adcock tubes. A grid isolation circuit is formed by resistors 9-175 and 9-176 in conjunction with capacitors 9-132 and 9-133 which prevents r-f voltage from reentering the grid circuit and causing regeneration.

42. VERTICAL AMPLIFIER CIRCUIT (fig. 25).

As has previously been mentioned, the plates of the two Adcock tubes are connected in parallel. They are in turn tied to the plate of tube 9-1, designated as the *sense* or vertical antenna amplifier. This tube amplifies the signal intercepted by the vertical antenna. The plug 9-57 serves as the input from the sense antenna and this signal voltage is applied to the control grid of 9-1 through the coupling capacitor 9-136. Cathode bias voltage on this tube is developed by resistor 9-184 and filtered by capacitor 9-130. Resistor 9-146 is the grid leak or grid return. The screen grid voltage in this tube is made variable from 0 to approximately 30 volts positive by the potentiometer 9-70. This variation in screen potential serves as an effective gain control for the vertical amplifier and permits the operator to modify the directional characteristics of the Adcock system. Resistor 9-178 has been inserted in series with this gain control to limit the amplification through this stage and so avoid azimuth error. Capacitors 9-129 and 9-222 filter out r-f ripple voltages that may find their way into the screen circuit. To establish an azimuth it is necessary that the signal from the Adcock system be coupled to the signal from the vertical antenna in such a way that one will either add to or subtract from the other. In other words, the two signals must be combined in phase or 180° out of phase with each other. This requirement is accomplished in this circuit by the fact that the signal from the Adcock system is inductively coupled to the Adcock tubes while the signal from the sense antenna is capacitively coupled to the vertical amplifier. Thus the combined output from the vertical antenna and the Adcock system is taken from the load resistor 9-140 and applied through the coupling capacitor 9-139 to the 1st r-f stage of a conventional superheterodyne receiver.

43. FIRST R-F STAGE (fig. 26).

In the grid circuit of this first stage are five tuned circuits corresponding to five operating bands, which are tuned by the main tuning capacitor 9-60. Each tuned circuit in turn has provisions for fine adjustment by slug tuning the coil in addition to a shunted trimmer. Of all tuned circuits except band 1 (10-20 mc) a padder is provided (9-195 in band 2, 9-191 on band 3, etc.). A damping resistor is associated with each band circuit (9-145, 9-214, 9-215, etc.) to eliminate spurious oscillations in the grid circuits. Capacitor 9-210 is used for signal coupling and resistor 9-212 is the grid return. An input filtration circuit comprises resistor 9-158 and capacitor 9-119. This combination, as in the previous case, isolates the grid circuit from stray r-f voltages. The gain through this tube 9-4 is controlled by the potentiometer 9-72 which varies the grid bias voltage. The screen-grid potential is dropped from the original B-plus voltage by resistor 9-159 and filtered by capacitor 9-109. The suppressor grid on this tube is grounded. The signal voltage, after being amplified through the tube, is developed across plate load resistor 9-141 and fed on to the next stage, the mixer or converter, through the coupling capacitors 9-137 and 9-211.

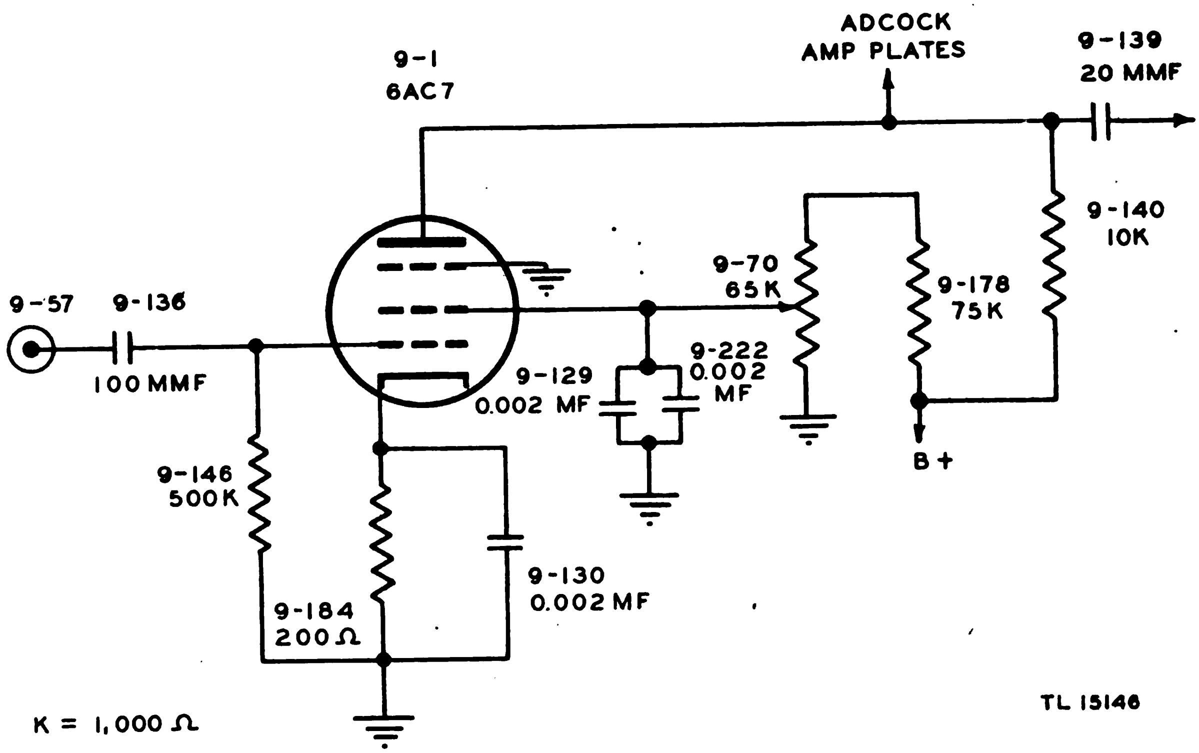


Figure 25. Vertical antenna amplifier circuit.

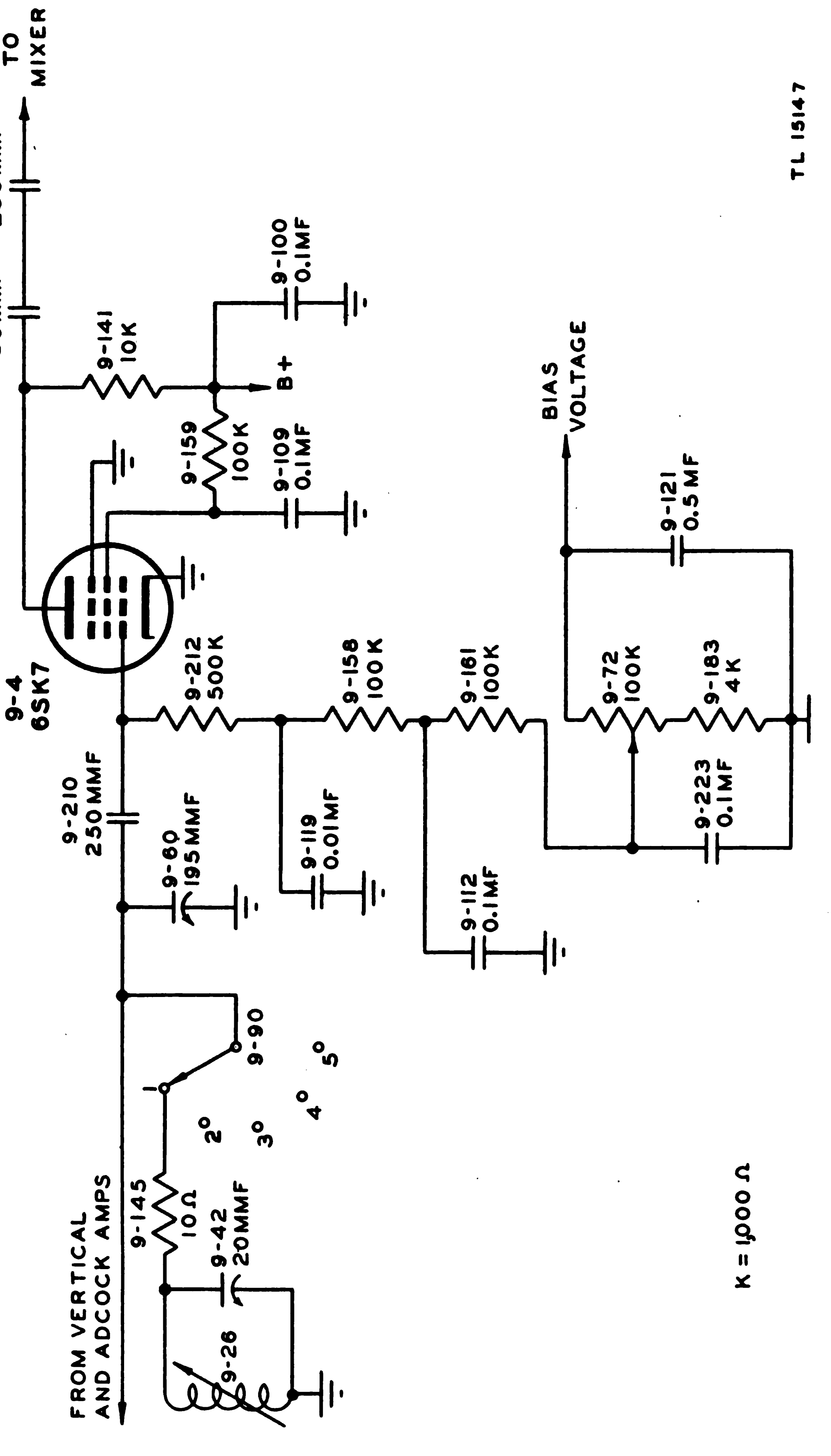


Figure 26. First r-f amplifier circuit.

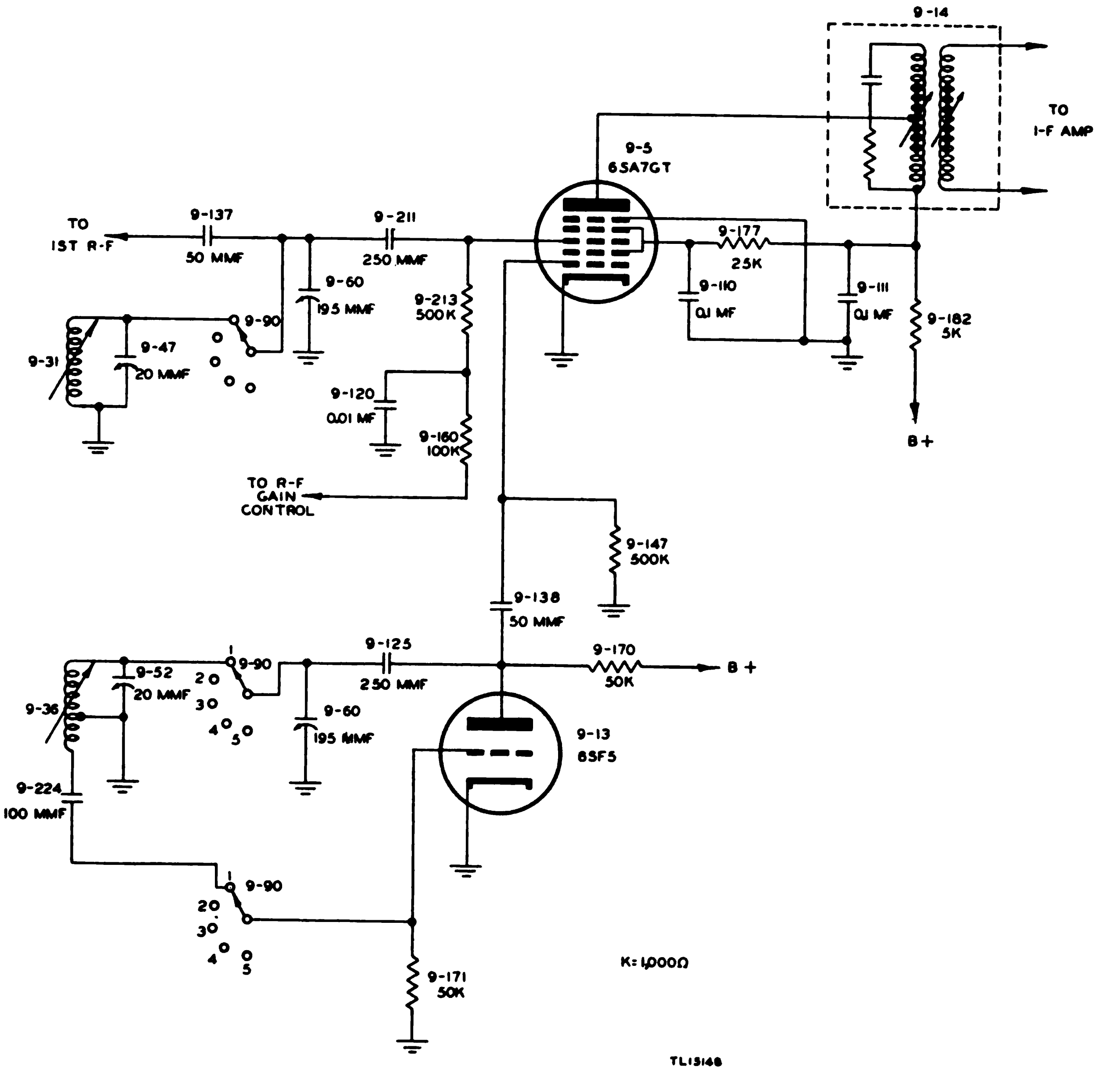


Figure 27. Mixer and h-f oscillator circuit.

44. MIXER AND R-F OSCILLATOR (fig. 27)

a. The arrangement in the grid circuit of the mixer stage 9-5 is identical with that of the first r-f stage, i.e., the five tuned circuits are controlled by the main tuning capacitor, and provisions are made for fine adjustment of each tuned circuit. It should be noted that the grid damping resistors which were used in the grid circuit of the first r-f stage have not been used in the input circuit of the mixer stage. Resistor 9-213 functions as a grid leak, and grid isolation is accomplished through the combination of resistor 9-160 and capacitor 9-120. In the mixer stage a process of heterodyning is performed whereby the signal voltage is electronically mixed with an injection voltage generated by a local oscillator. Tube 9-13 with its associated circuit generates this high-frequency voltage. Five tuned circuits are employed in this oscillator, any one of which may be selected by the main band switch 9-90. In turn, the tuning of these five circuits is accomplished by the main tuning capacitor 9-60 which also tunes the Adcock tubes, the 1st r-f and the mixer. The amount of capacity across the tuned circuit of the Adcock tubes, 1st r-f, and mixer is the same for any setting of the main tuning capacitor, while the amount of capacity across the tuned circuit in the oscillator is somewhat less. In other words, there is a constant ratio of capacity in the oscillator tuned circuit with respect to the three previous stages. Thus the oscillator is always tuned to a frequency *higher* than that of the received signal. The amount by which the frequency of the oscillator differs from a signal being received is 465 kc. The circuit of the oscillator itself is similar to a conventional Hartley. A grid return is provided in resistor 9-171. Plate-to-grid feedback is through capacitor 9-125. Slug tuning and trimmers are provided in the tuned circuits which make possible fine adjustment of the h-f oscillator signal.

b. Resistor 9-170 is a plate-voltage dropping resistor. Voltage developed by the oscillator is taken from the plate of the oscillator tube 9-13 and coupled to grid No. 1 of tube 9-5 (pin No. 5) through capacitor 9-138. Resistor 9-147 is the grid load. Signal voltage superimposed upon a suitable bias is applied to the injector grid number 3 of tube 9-5 (pin No. 8). Thus the tube current is influenced by two r-f voltages, one 465 kc higher than the other. In the plate circuit a resultant current flows which contains what are known as "sum and difference frequencies," i.e., frequencies which are the *sum* of the two frequencies applied to the control and injector grids, and frequencies which are the *difference* between the two. Consider for example, that the receiver has been tuned to 1,000 kc and that a modulated carrier is applied to the injector grid of the mixer. The frequency of the oscillator is 1,465 kc and the output of the oscillator is applied to the control grid. In the plate circuit of the mixer will appear, among other frequencies, the sum and difference frequencies, in this particular case 2,465 kc and 465 kc each of which contains the modulation that was on the original carrier. By adjusting the tuned circuit, into which the plate of the mixer feeds, so that it is resonant at 465 kc, the other frequencies will be rejected and only the 465-kc beat-frequency signal will be passed on to succeeding circuits. This signal (465 kc) is known as the intermediate frequency. The balance of the associated circuit in the mixer stage is conventional. Resistor 9-182 is a plate-voltage dropping resistor and resistor 9-177 reduces the screen voltage to its operating value. Capacitor 9-110 is a screen-circuit filter while capacitor 9-111 performs the same function in the plate circuit. The suppressor grid is grounded as usual.

45. I-F CIRCUITS (fig. 28).

The 465-kc signal present in the plate-tuned circuit of the mixer stage is inductively coupled into a secondary which is likewise tuned to 465 kc and applied to the control grid of the first i-f stage tube 9-6. A grid filtration circuit is provided with 9-163 in conjunction with capacitor 9-118. This arrangement serves the same function as did the grid isolation circuits of the r-f stages. Grid bias, and in turn the gain of this stage, is varied by r-f gain potentiometer 9-72. This stage functions simply as a high-gain linear amplifier. The output of this tube is fed into a tuned transformer similar to the one coupling

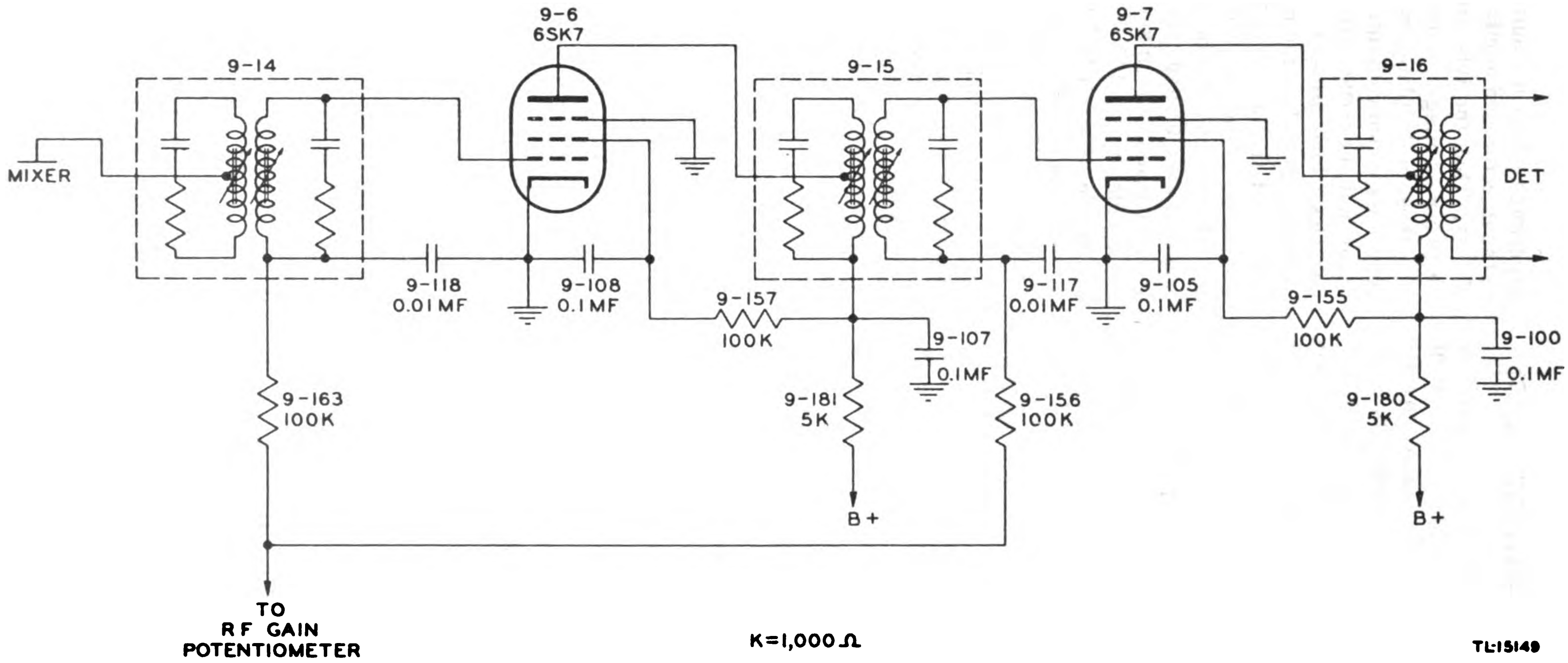


Figure 28. I-f amplifier circuit.

the mixer to the first i-f. In the second i-f stage (tube 9-7) the signal is again amplified and applied to a tuned transformer of the type used to couple the mixer and the first i-f and the first i-f, to the second i-f.

46. DETECTOR, BFO, AND AUDIO AMPLIFIER (fig. 29).

From the secondary of the i-f transformer the signal is applied to one of the plates of the duo-diode inclosed in the same envelope with the triode (9-8). The triode section of the tube is a BFO of the conventional Hartley type, and is used only for monitoring. It has no effect on the bearing indication. A portion of the output of the BFO is applied to the other plate of the diode section of the tube. In this stage the signal is detected and at the same time, when monitoring, is electronically mixed with the output of the BFO so that an audible beat note is produced across the potentiometer 9-73. The diode load is composed of resistors 9-152 and 9-144. Capacitor 9-123 serves to couple the i-f signal voltage to the cathode of the diode circuit and at the same time function as an audio filter. Additional r-f filtering is accomplished by capacitor 9-124 while 9-113 serves as an audio coupling element. The audio voltage developed across potentiometer 9-73, which also serves as an audio gain control, is applied through capacitor 9-114 to the control grid of tube 9-9 which is an audio-voltage amplifier. This triode tube has as its grid leak 9-142 while resistor 9-149 and capacitor 9-101 function as a grid isolation circuit. Grid bias for this tube is developed across the bleeder resistor 9-183. Capacitors 9-122 and 9-103 are plate filters and resistors 9-172 is a plate-voltage-dropping resistor. The amplified signal voltage is taken from the plate resistor 9-148 and applied through the coupling capacitor 9-115 to the control grid of the final stage, the audio power stage. This tube 9-10 is a beam power tube characterized by high-power output with the screen operating directly from B-plus line. In the plate circuit a jack plug has been introduced for aural monitoring purposes. Capacitor 9-218 functions as a blocking capacitor preventing high voltage from getting into the monitoring device and at the same time coupling the audio voltage. R-f filter 9-116 eliminates any r-f fluctuations that may leak into the monitoring circuit. Grid bias for tube 9-10 is developed across resistors 9-164 and 9-183.

47. D-C AMPLIFIER, AUDIO OSCILLATOR, AND A-C AMPLIFIER (fig. 30).

a. Rectified signal voltage from the 2d detector stage of the receiver is applied to a conventional d-c amplifier, tube 12-13, across pins 1 and 2 of plug 12-8 on the oscilloscope chassis. This is a polarized voltage with pin No. 2 connected to the cathode which is grounded, and pin No. 1 connected to the control grid. Further elimination of r-f ripple is afforded by the 500-mmf filtering capacitor 12-57. The plate circuit load resistor 12-71 has been made variable so that the stage gain can be increased or decreased. This resistor also controls the grid bias on the following stage. The signal voltage developed across resistor 12-71 is applied to the grid of the next stage 12-14 through a series isolation resistor 12-34 which prevents voltage from the audio-frequency oscillator from modulating the anode of tube 12-13.

b. In addition to the d-c signal voltage on the control grid of 12-14, a 5,000-cycle voltage generated by a local oscillator is applied to the cathode circuit of tube 12-14 referred to as the "gate" tube. The local oscillator is a typical plate-tuned audio oscillator actuated by tube 12-12. The plate section of the audio transformer 12-70 is fixed-tuned to approximately 5,000 cycles by the capacitor 12-59. A 25,000-ohm resistor 12-44 is shunted across the grid section of the transformer to dampen the amplitude of oscillation. Capacitor 12-58 and resistor 12-43 function as the grid-coupling and grid-leak elements respectively. The output of the oscillator is taken from the plate circuit and applied to the cathode of tube 12-14 through a coupling capacitor 12-61 and through potentiometer 12-68. This control varies the amount of oscillator voltage reaching the cathode of 12-14. The normal effective oscillator voltage at this point is approximately 5 volts. The voltage applied to the grid of tube 12-13 is supplied from the diode rectifier tube 9-8 in the receiver. This d-c voltage is negative with respect to ground and is proportional to the strength of the re-

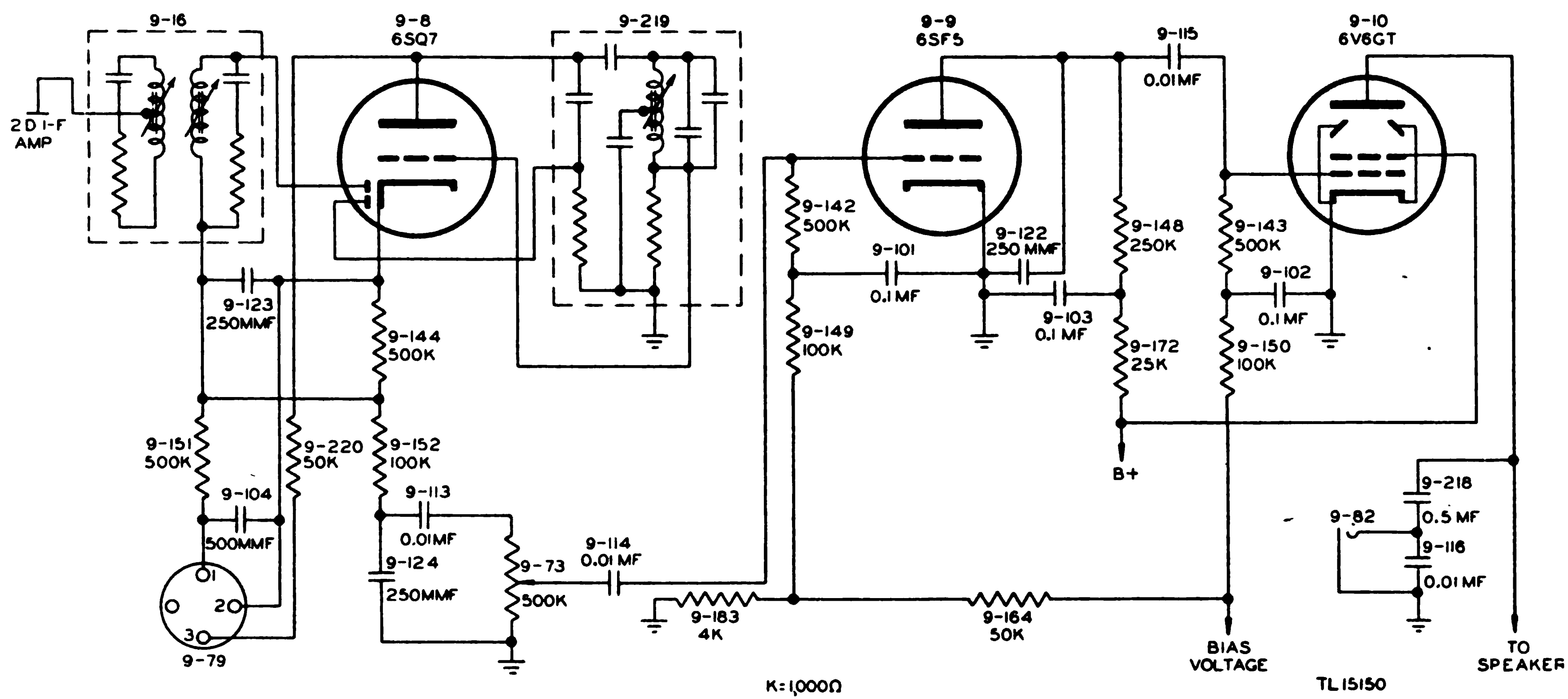


Figure 29. Detector, BFO, and audio-amplifier circuit.

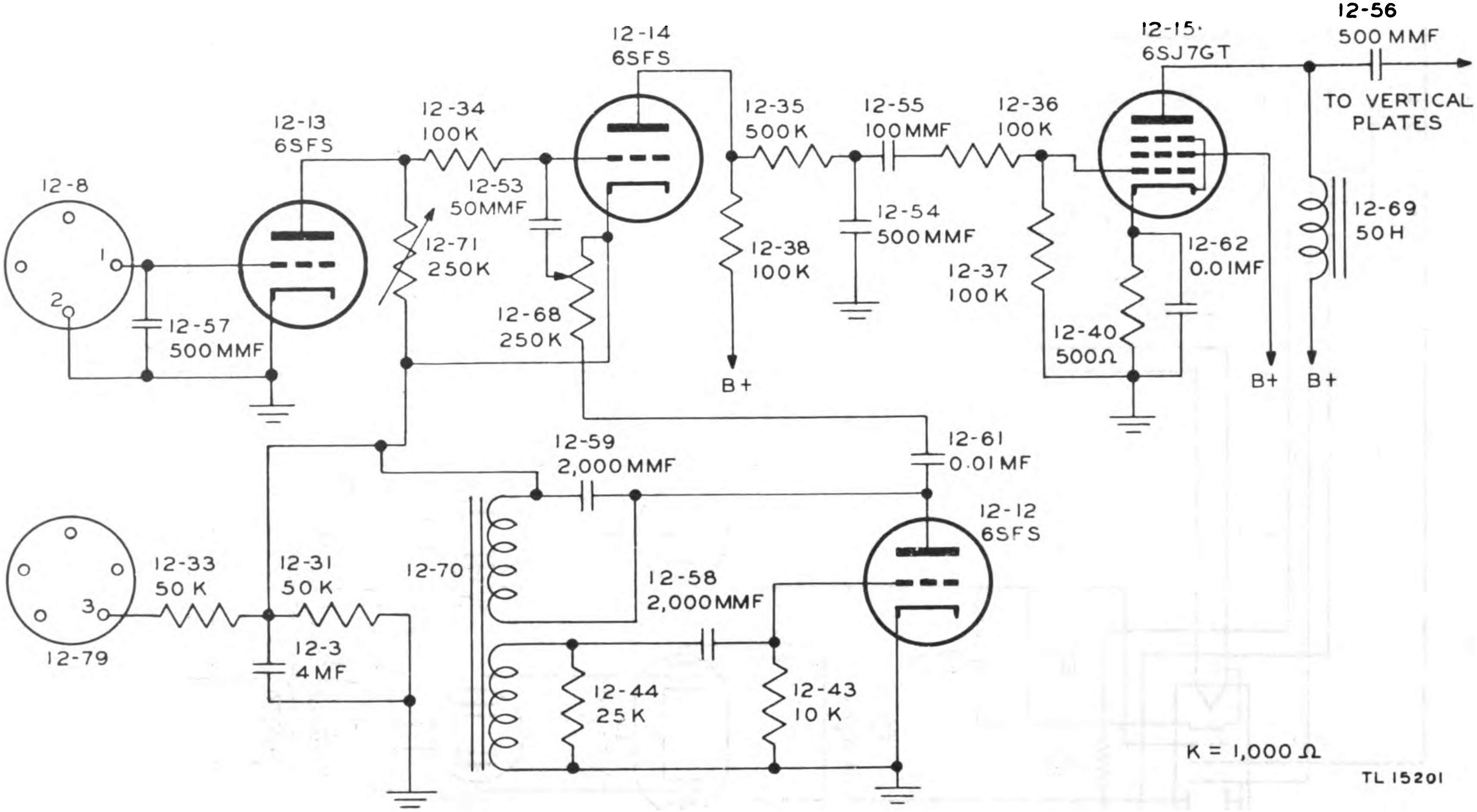


Figure 30. D-c amplifier, audio-oscillator, and a-c amplifier circuit.

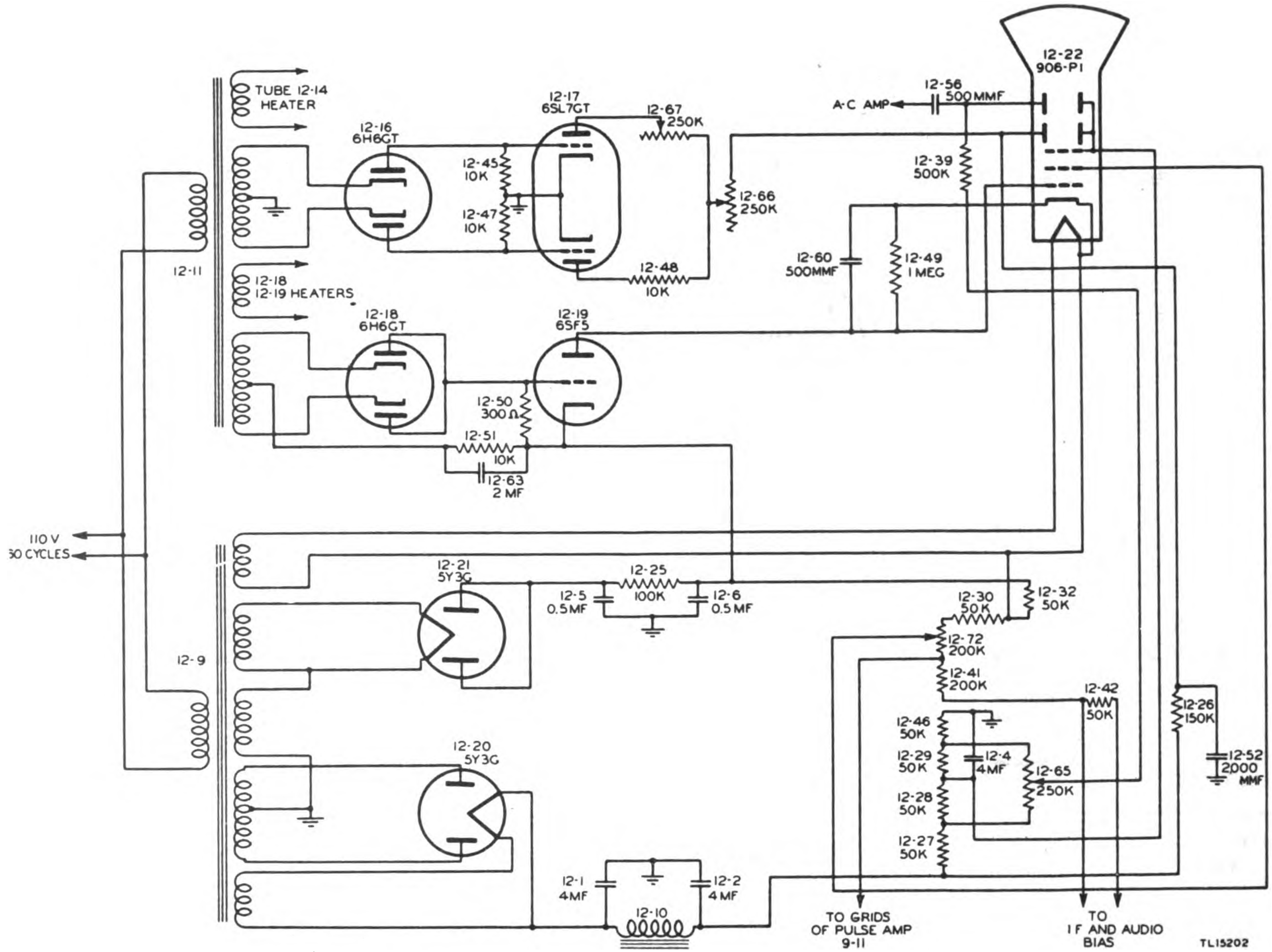


Figure 31. Cathode-ray tube, horizontal sweep, and power supply circuit.

ceived signal. When this negative voltage applied to the grid of tube 12-13 increases, the voltage drop across resistor 12-71 decreases. This decrease in voltage across resistor 12-71 reduces the negative potential applied to the grid of tube 12-14, since the grid and cathode of tube 12-14 are connected across resistor 12-71. This reduction in grid bias causes an increase in plate current through tube 12-14, thereby permitting greater amplification of the signal from the audio oscillator tube 12-12. In short, as the signal voltage from the receiver increases, more oscillator output passes through the "gate" tube. As the signal decreases, less oscillator voltage is present in the anode circuit of the "gate" tube. The 50-mmf capacitor 12-53 serves the dual function of blocking the d-c signal voltage from the cathode circuit of 12-14 and at the same time offers a high impedance to the audio voltage from the 5-kc oscillator. The controlled oscillator voltage is developed across the load resistor 12-38 in the plate circuit of the "gate" tube. Resistor 12-35 and capacitor 12-54 function as a low-pass filter, i.e., a filter designed to pass frequencies below approximately 5 kc and attenuate those above. The series capacitor 12-55, in addition to the 100,000-ohm resistor 12-36, introduces a high impedance in the grid circuit of tube 12-15, preventing excessive grid current flow and dropping the exciting voltage to a nominal level. Capacitor 12-55 also serves as a blocking capacitor, preventing positive d-c voltage from appearing on the grid of 12-15. Tube 12-15 functions as an audio-voltage amplifier with resistor 12-37 serving as the grid return. Grid bias is developed by resistor 12-40. A 50-henry choke 12-69 serves as the plate load for this stage and the output voltage is coupled to the vertical deflecting plates of the oscilloscope through the coupling capacitor 12-56, across which a fairly large reactive voltage drop is developed. This is not necessary since the potentials on the first and second anodes of the cathode ray tube introduce a normal sensitivity of 0.5 millimeters per volt. Impedance coupling is employed between this audio amplifier and the cathode ray tube in order to maintain a reasonably high degree of linearity, and at the same time insures the required amount of stage gain.

48. CATHODE-RAY CIRCUIT (fig. 31).

Thus, there is applied to the vertical deflecting plates a 5,000-cycle voltage causing the electron beam to sweep vertically at the rate of 5,000 times per second, the amplitude of which is governed by the intensity of the signal from the receiver. To the horizontal deflecting plates is applied a 120-cycle voltage generated by tubes 12-16 and 12-17 in conjunction with their associated circuits. Energy of 110 volts, 60 cycles is applied to transformer 12-11, the secondary of which is split into four windings. One of the secondaries supplies a-c energy to the filament of tube 12-14. Another secondary supplies a-c energy to the filaments of tubes 12-18 and 12-19, and the third and fourth windings are connected to the cathodes of duo-diode tubes 12-16 and 12-18. Full-wave rectification takes place in tube 12-16 and a 60-cycle voltage is developed across resistors 12-45 and 12-47, which in turn supply the control grids of tube 12-17. Thus, across the load in the plate circuit of tube 12-17 there is a voltage developed the polarity of which reverses at the rate of 120 times per second. Resistor 12-48 and potentiometer 12-67 are the elements which comprise this plate load. 12-67 is made variable so that the potential, as seen at the center tap, can be made asymetric. As will be seen later, this results in a means by which trace spreading can be controlled. The varying voltage at the junction of these two resistors is applied to potentiometer 12-66. This potentiometer controls the horizontal position of the vertical traces. Accordingly, a complicated Lissajou figure is produced on the face of the oscilloscope as a result of the 5,000-cycle voltage impressed on the vertical deflecting plates and the 120-cycle voltage impressed across the horizontal deflecting plates. This figure has the appearance of two vertical lines laced with a 120-cycle sine wave. For the purpose of direction finding it is necessary to remove this sine wave which actually is a trace-back. This is accomplished by using a full-wave rectifier tube 12-18 which drives the grid of amplifier 12-19. 120-cycle voltage is developed across resistor 12-49 and partially fil-

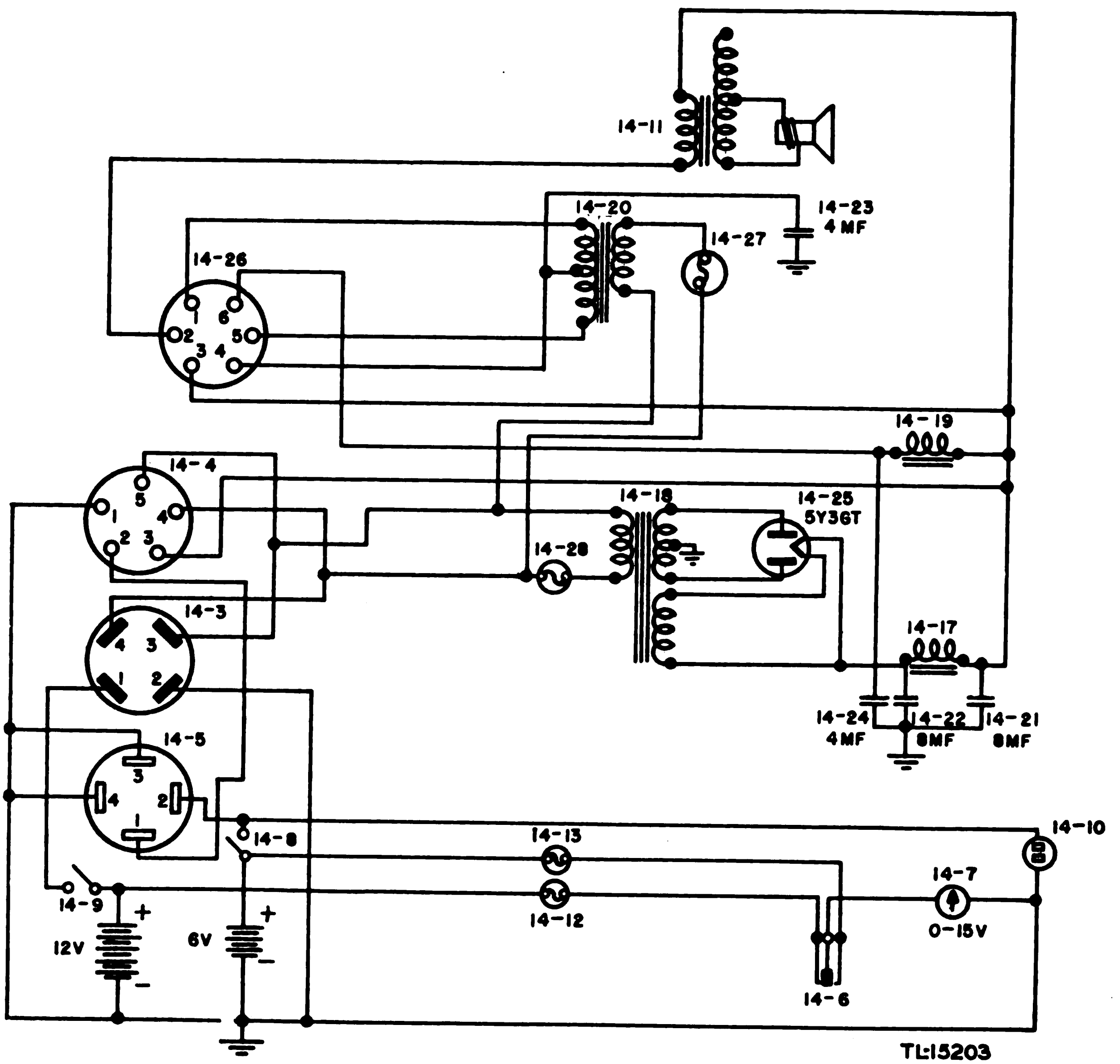


Figure 32. Control Panel PN-21-A, schematic diagram.

tered by capacitor 12-60 in the plate circuit of the blanking control tube 12-19. Voltage is taken from this resistor and applied to the control grid of the cathode-ray tube in such a way as to bias this grid beyond cut-off at the rate of 120 times per second. Thus, the sine wave in the pattern or the trace-backs are eliminated and the final pattern appearing on the face of the scope is simply two straight vertical lines. It is important to note that transformer 12-11 which actuates the blanking pulse and the horizontal sweep circuits has been wound so that its output energy is in phase with the energy present in the pulsing transformer 14-20 on the control panel chassis. *As a direct result of this identical phasing, the left and right trace on the scope correspond respectively to the left and right Adcock tubes. A 120-cycle filter, resistor 12-51 and capacitor 12-63, prevents a 120-cycle ripple from getting into the negative power supply.* Grid bias for the blanking tube 12-19 is developed across resistor 12-50. The high d-c voltages required for cathode-ray tube operation are obtained from transfromer 12-9. In the secondary of this transformer are two full-wave rectifiers, 12-20 and 12-21. 12-21 is referred to as the negative power supply and 12-20 is referred to as the positive power supply. Filtering in the negative power supply circuit is accomplished by resistor 12-25 and capacitors 12-5 and 12-6. A voltage divider, composed of resistors 12-32, 12-30, 12-72, 12-41, and 12-42, provide different voltage levels. Resistor 12-72 is the potentiometer supplying voltage to the 1st anode of the cathode-ray tube. The grids on the pulse amplifier 9-11 in the receiver are biased with a negative voltage taken from resistor 12-41. Bias voltage for the i-f and audio stages of the receiver is taken from 12-42 in the negative power supply. A 120-cycle filter is composed of choke coil 12-10 and shunting capacitors 12-1 and 12-2. Here again a voltage divider composed of resistors 12-27, 12-28, 12-29, 12-46, and potentiometer 12-65 provides various positive voltage levels. The second anode of cathode-ray tube 12-22 is operated at a potential of about 600 volts positive with respect to the cathode, and derives its potential at the connection between resistors 12-28 and 12-29. A potentiometer 12-65 which shunts these two resistors is a control which varies the vertical position of the two traces by making one or the other of the vertical deflecting plates slightly more positive. A filter composed of resistor 12-26 and capacitor 12-52 prevents the 120-cycle voltage, generated by the horizontal sweep circuit, from entering the positive power supply. Resistor 12-26 serves the added function of dropping the positive d-c anode voltages of tube 12-17.

49. CONTROL PANEL CIRCUIT (fig. 32).

The 110-volt alternating current from the vibrator is applied to pin Nos. 3 and 4 of plug 14-3. These pins lead to the primary of the power transformer 14-18, and through fuse 14-27 to the pulsing transformer 14-20. The pulse transformer secondary delivers 60-volt, 60-cycle alternating current to the switching circuit in the receiver. In the secondary circuit of the power transformer, full-wave rectification takes place in tube 14-25. A typical capacity-input low-pass constant k type filter composed of choke coils 14-17 and 14-19 as the series elements and capacitors 14-21, 14-22, and 14-24 as the shunt elements, sufficiently filters the output of the rectifier tube. The high positive d-c voltage is distributed to pin No. 3 of plug 14-4 supplying the amplifier tubes in the oscilloscope; to pin No. 2 of plug 14-26 for the plate of the audio beam power tube; to pin No. 3 of the same plug which supplies plate and screen voltages for the r-f, HFO, mixer, 1st i-f, 2d i-f, BFO, and a-f voltage amplifier stages; and to pin No. 6 of the same plug which delivers positive voltage to the anodes of the two adcock tubes and the vertical amplifier. A voltmeter 14-7 has been provided so that the terminal voltage across the 12-volt and 6-volt supplies can be measured by throwing the toggle switch 14-6 in one director or the other. Meter protection is provided by the fuses 14-12 and 14-13.

50. VIBRATOR POWER SUPPLY CIRCUIT (fig. 33).

a. Inasmuch as three 6-volt batteries are employed as a power source, a method is needed to develop the high potentials required to operate the amplifier tubes and the cathode-ray oscilloscope. The vibrator power unit converts 12-volt direct current to 110-volt

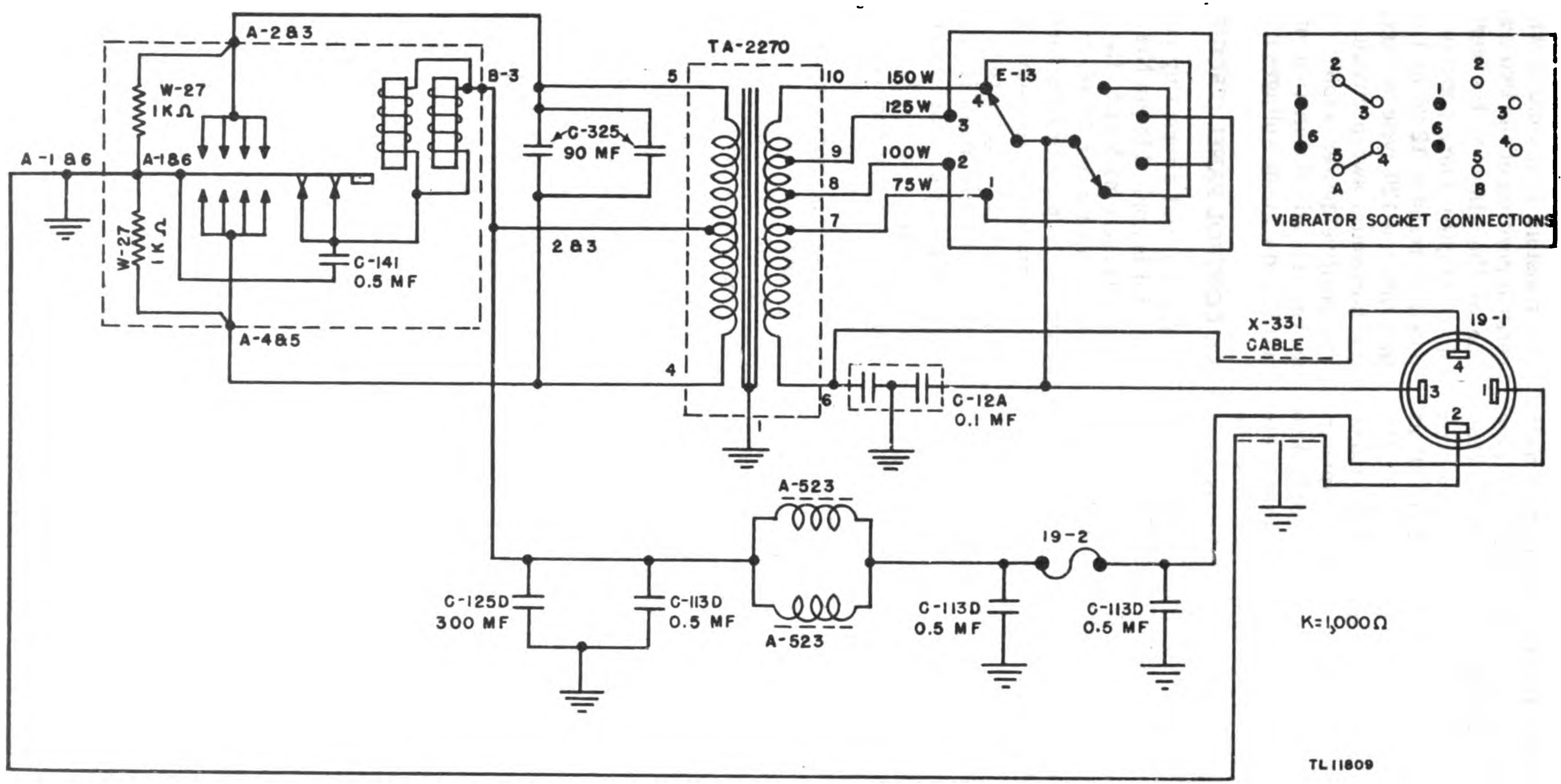


Figure 33. Vibrator Unit PE-151-( ), schematic diagram.

alternating current for the high-voltage transformer in the CONTROL PANEL. The principle of operation is similar to that of a simple buzzer. The vibrator used in this circuit is of the nonsynchronous type and produces direct-current plate power from the storage batteries by using a vibrating contact to change the d-c from the battery into a-c which can be stepped up in voltage by a transformer, and rectified to produce high-voltage d-c power. The two resistors W-27 and the capacitor C-141 prevent excessive sparking at the contacts. The C-325 capacitors in parallel across the transformer primary absorb transients that would otherwise cause radio interference.

b. The 12-volt d-c energy from the two series-connected 6-volt storage batteries is applied to pin Nos. 1 and 2 of plug 19-1 (pin No. 1 positive and pin No. 2 negative.) In series with the positive lead are two 65 mh A-523 r-f chokes connected in parallel which prevent r-f fluctuations from getting back into the power supply. These capacitors numbered C-113d, plus a fourth numbered C-125d, function as additional filters. A fuse, 19-2, is also provided. The 110-volt, 60-cycle energy from the vibrator power unit is taken from plug 19-1 across pin Nos. 3 and 4.

51. RADIO TRANSMITTER BC-978-A (TARGET) (fig. 34)

Radio Transmitter BC-978-A uses a type 1A5-GT power amplifier pentode (22-14) in the r-f oscillator circuit which is an Armstrong plate feedback type. Tube 22-15 also a type 1A5GT power amplifier pentode is used in an audio-oscillator circuit to generate an audio signal which modulates the r-f oscillator. Separate coils for each hand are selected in the grid and plate circuits by switch 22-12. Coils 12-8 cover the frequency range of 10 to 20 megacycles, coils 12-9 cover 5 to 10 megacycles, coils 12-10 cover 3 to 6 megacycles, and coils 12-11 cover 2 to 3.5 megacycles. Capacitor 22-7 is the grid tuning capacitor and, together with trimmer capacitors 22-30, 22-31, and the grid coil selected, determine the frequency of oscillations. Choke 22-21 and capacitor 22-4 form a decoupling network for the r-f plate coil. The primary of coil 12-11 is damped by resistor 22-29 which broadens the band of frequencies generated. A microammeter may be inserted in jack 22-6 which is connected in series with the grid resistor 22-2 to indicate the presence of grid current, usually indicating oscillator circuit operation. Power switch 22-3 may be positioned to energize tube 22-14 filament only, providing an unmodulated r-f signal. The switch may also be positioned to energize both filaments, providing a modulated signal. When the power switch 22-3 is turned on the grid and filament of tube 22-14 are at the same potential, and plate current is maximum, causing energy to be fed from the plate coil to the grid coil. The grid will be biased negative by grid current flowing through resistor 22-2 charging capacitor 22-1 negative on the grid side. The plate current will then drop, reducing the feedback energy in the plate coil. The amplitude of oscillations will become stable when conditions of least loss occur, which will be at the resonant frequency of the tuned grid circuit. R-f energy from the plate coil is fed to the antenna through capacitor 22-19. Oscillations in the modulator circuit (tube 22-15) occur in the manner described above except that energy from the plate circuit of this tube is returned to the grid through transformer 22-13. The a-f power generated in the plate circuit of tube 22-15 is combined with the r-f oscillator plate and screen current through transformer 22-13 and modulates the amplitude of the r-f oscillator at an audio rate.

52. TELEPHONE EQUIPMENT RC-161-A (fig. 35).

The standard Signal Corps Telephone EE-8-A (modified as described in paragraph 38) is part of the central unit. This is placed in the lower right-hand side with the ringer extending through the lower right side of the cabinet. Jacks are at the right side of the front control panel for both transmitter and telephone headsets. Use Chest Set TD-1 (or T-26) and P-19 or other high-impedance headset. Place batteries in Telephone EE-8-A through the door in the rear of the receiver cabinet. The telephone line terminals are on the right side of Cabinet CS-121-A, adjacent to the ringer. Since the entire central unit and antenna assembly is so mounted as

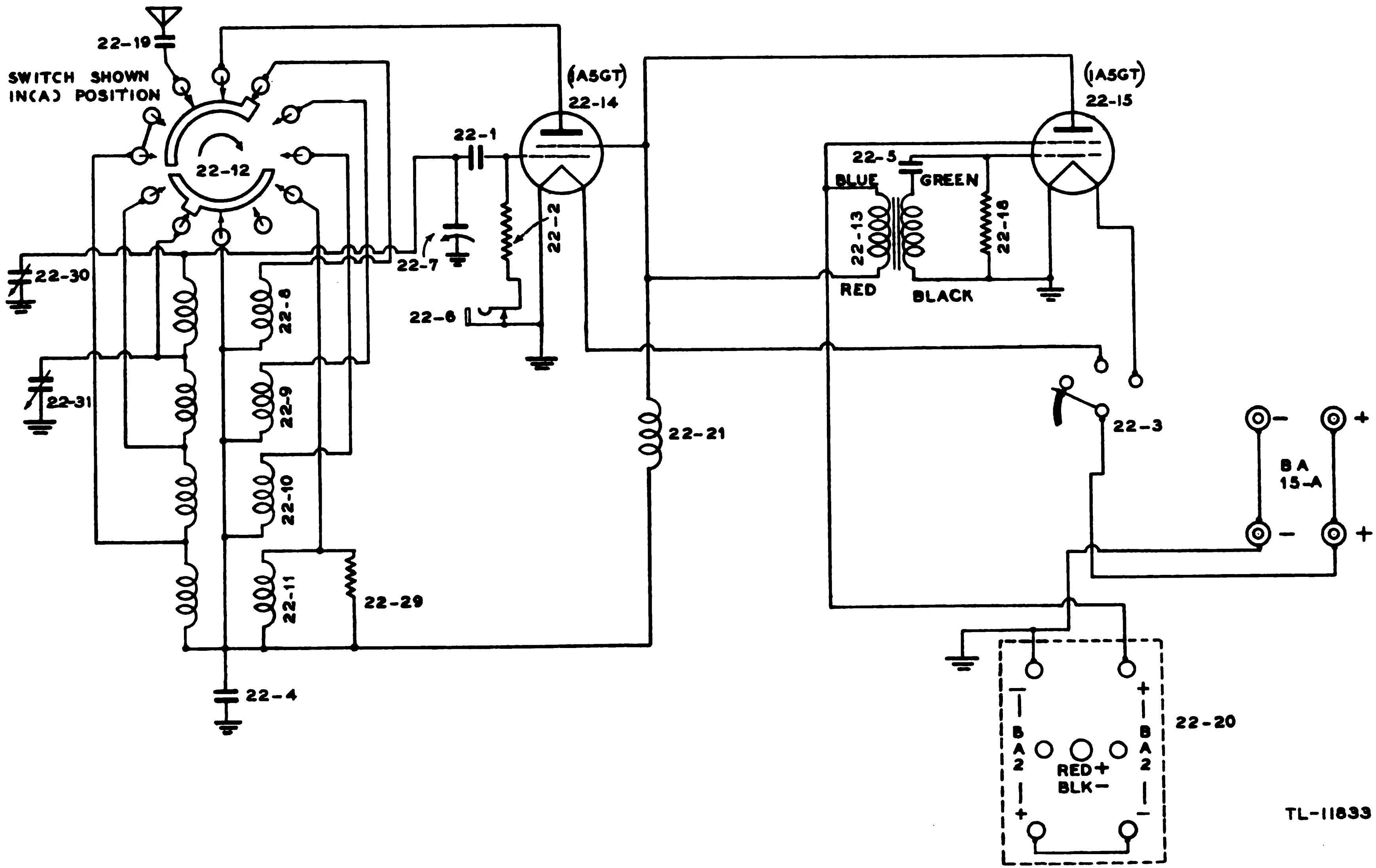


Figure 34. Radio Transmitter BC-978-A, schematic diagram.

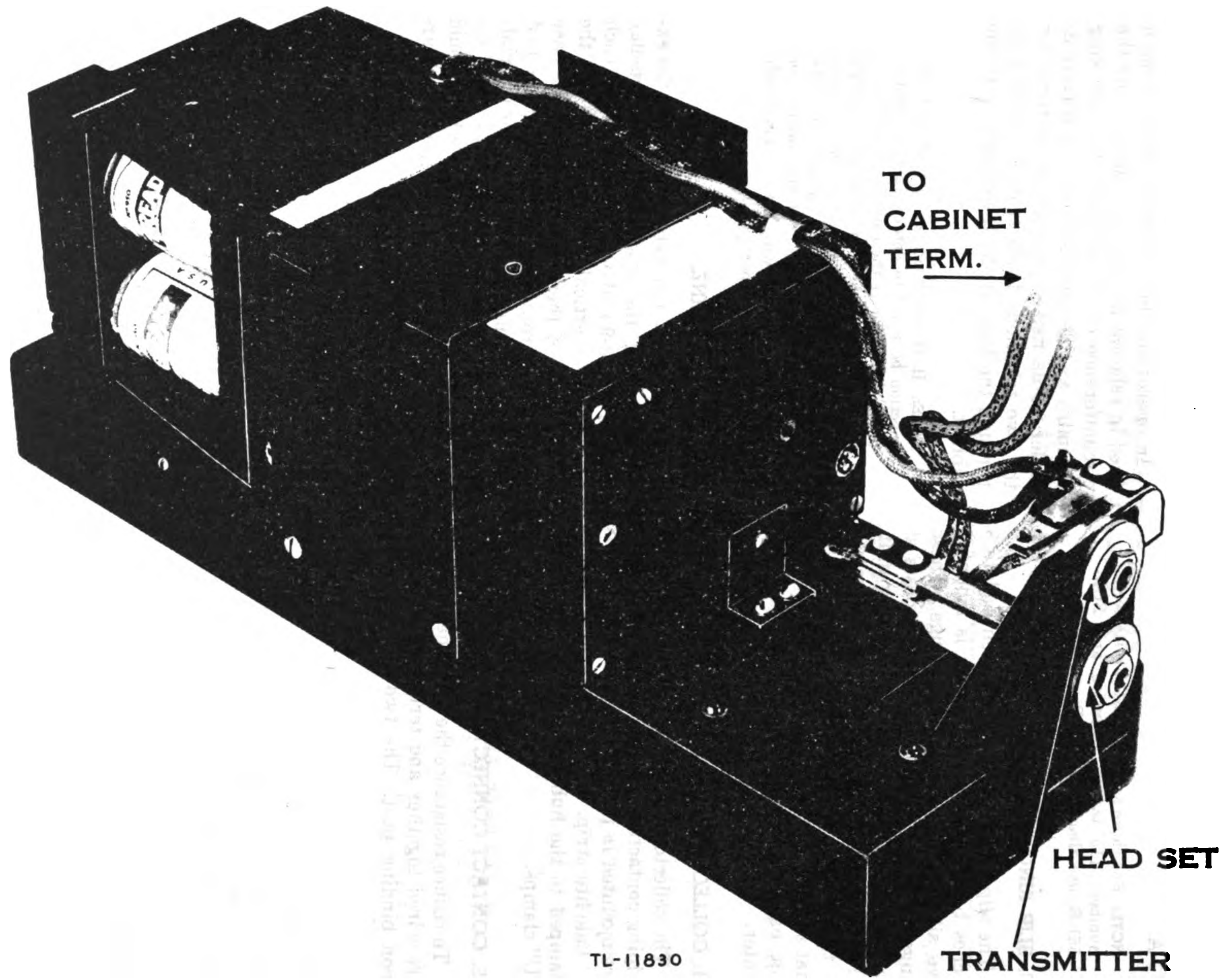


Figure 35. Telephone EE-8-A (modified), top view, part of Telephone Equipment RC-161-A

to rotate through 360° on a horizontal plane, provision is made for connection to the fixed telephone line by means of a slip ring and collector placed underneath Mounting FT-371-A.

NOTE: For those sets SCR-551-A with serial numbers 115 to 395 inclusive and SCR-551-B, use Headset HS-30-B.

53. SLIP RING.

The slip ring consists of a bakelite plate 8 inches by 10½ inches on which is mounted two silver surface concentric rings. These rings are wired to a pair of binding posts at one corner of the plate. This slip ring unit, with the rings facing downward, is screwed to the underside of Mounting FT-371-A so that the hub of the entire revolving mechanism passes through the hole in its exact center.

54. COLLECTOR.

The collector consists of two pair of silver wiping contacts on finger-like springs. These are mounted in pairs at the ends of a 1¾″ x 8″ bakelite strip. This collector assembly is clamped to the hub housing with two large "U" clamps.

55. CONTACT CONNECTIONS.

To reduce resistance the two inner contacts are wired together and terminate at a common binding post. The two outer contacts are wired together and terminate at the other binding post on the collector.

56. SLIP RING AND COLLECTOR OPERATION.

In operation, the collectors, which remain fixed in relation to the tower, wipe along the circumference of the rings on the slip ring assembly as the operator turns the direction-finder. This makes continuous contacts for the two telephone leads from the field line, through the base of the tower and up to the cabinet.

NOTE: It is extremely important that inspection be made to determine the position of the contacts. If the collector assembly is set too close to the slip rings, the springs will short across the two slip rings. If this should occur, loosen the collector U-bolts and adjust the position of the springs so that a firm contact with the slip rings will be made without shorting.

57. TELEPHONE LINE.

The telephone line extends through the exact center of the tower. Radio frequency choke boxes 3-9 and 3-10 are mounted at each end of the vertical telephone line on the tower. One of these is mounted at the base on the 2 x 4 cross member and the other just below the azimuth scale on the tower top platform 23-41. They prevent the pick-up of radio signals on the telephone line which would interfere with the making of accurate bearings.

SECTION IV
MAINTENANCE

NOTE: Failure or unsatisfactory performance of equipment will be reported on W.D., A.G.O. form No. 468. If this form is not available, see TM 38-250.

58. GENERAL TROUBLE CHECKING.

If trouble should develop in the direction finder look for the most obvious causes first, such as a burned out fuse, discharged battery, or defective tube. If this preliminary check does not reveal the trouble, the following clues may assist in locating the difficulty:

NOTE: To replace the tubes it will be necessary to remove the panel screws and slide the components forward. If for any reason complete removal from cabinet is necessary follow the procedure in paragraph 59.

a. **One Trace on Oscilloscope.** This condition could be caused by failure of tubes 9-11, 9-12, 9-2, or 9-3 in this receiver unit, or tubes 12-16 or 12-17 in the oscilloscope unit.

b. **No Change in Trace Height.** Failure of the oscilloscope traces to change in height when the antenna gain control is advanced may be caused by failure of tube 9-1 in the receiver unit.

c. **Horizontal Traces.** The evidence of horizontal traces appearing between the two vertical traces on the oscilloscope may be caused by failure of tube 12-18 or 12-19 in the oscilloscope unit.

d. **Dots But No Traces.** Dots but no traces appearing on the oscilloscope may be caused by failure of tube 14-25 in the control panel, 12-22, 12-12, or 12-15 in the oscilloscope unit, or tube 9-8 in the receiver unit.

e. **No Output from Speaker.** Weak reception or a fuse which continues to burn out in vibrator pack may be caused by a defective vibrator.

f. **No Traces on Oscilloscope.** Failure in the receiver will result in no output or decreased output from the speaker as well as nonappearance of traces on the oscilloscope. In the event no traces appear on the oscilloscope, vertical position control 12-66 should be checked. All failures except item a, paragraph 58, will affect the oscilloscope as noted, but the operation of the receiver will be normal. Even in the case of item a, reception from the vertical antenna will be possible.

g. **Further Checking.** If tests mentioned above fail to return the direction finder to normal operation, it indicates trouble of a more serious nature and should be returned to a depot for further checking.

59. REMOVING COMPONENTS FROM CENTRAL UNIT CABINET CS-121-A.

To remove the components from the cabinet follow the procedure given below:

a. Disconnect and remove the three batteries from the battery box.

b. Lift the battery box upward and away to remove it from the supporting lugs.

c. Remove the plate on rear of the cabinet after loosening the airloc fasteners.

d. Disconnect the four plugs on the rear of the control panel chassis.

e. Remove the four screws at the rear bottom edge of the cabinet to free the control panel chassis.

f. Remove the four screws on the front panel of the control unit, 2 on each side.

g. Using pull-out knobs, remove the control unit from the cabinet.

h. Remove the four screws on both sides of the front panel near the outer edge of the oscilloscope unit.

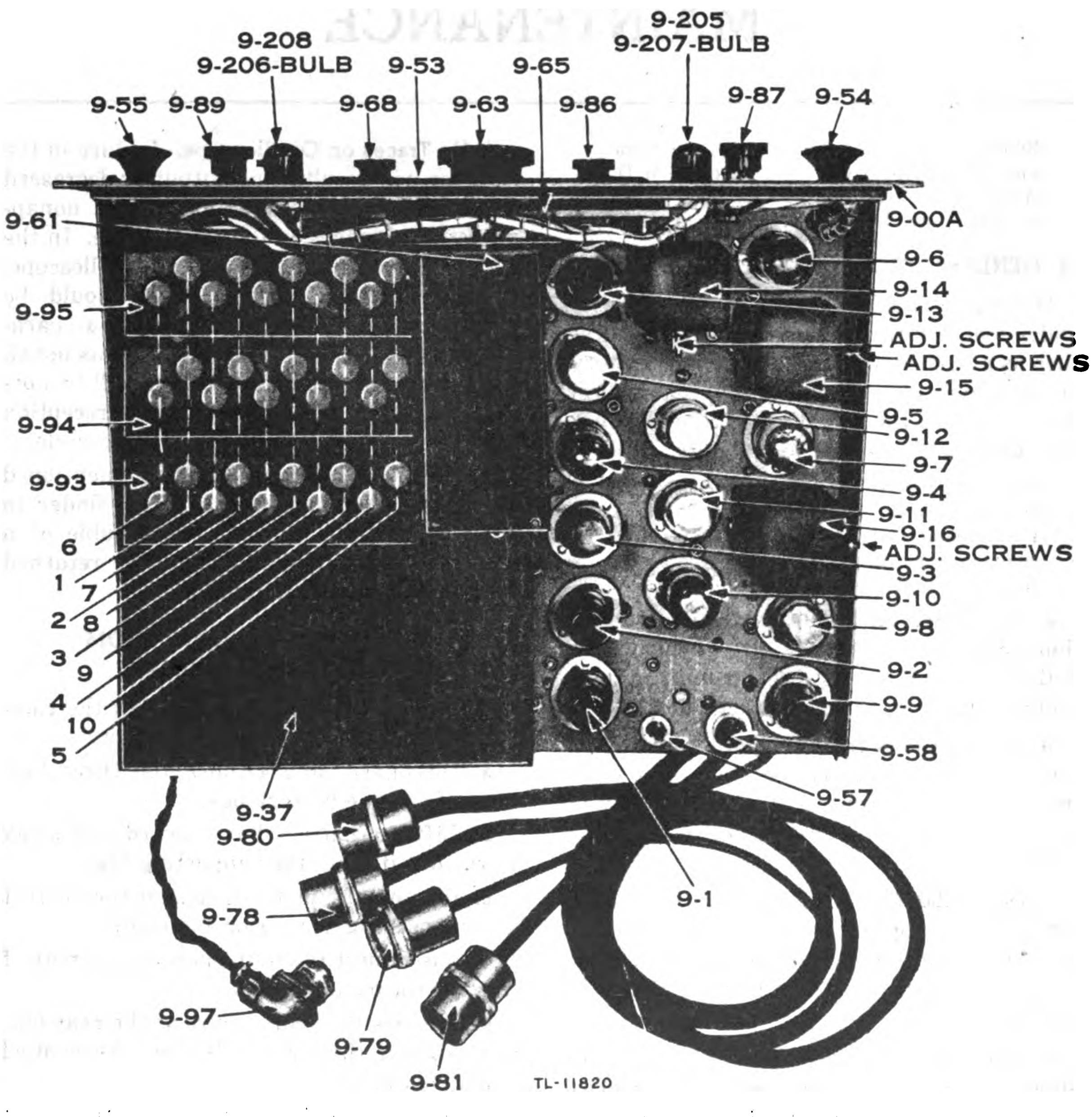


Figure 36. Radio Receiver BC-976-A, top view.

i. Using pull-out knobs, slide the unit forward and disconnect the two plugs on the top of the chassis.

j. While continuing to pull the chassis forward, lift the front of the chassis so that the two stops on the bottom plate of the chassis clears the cross bar. Oscilloscope unit is now free to be removed.

k. Remove the four screws nearest the edge on both sides of the receiver unit front panel.

l. Using the pull-out knobs slide the unit forward to allow enough room to disconnect the two plugs located on top at the rear of the chassis.

m. Reach under the chassis on the right side of the cabinet and remove the adcock antenna plug.

n. Remove the receiver unit as directed in step j.

60. TESTING PROCEDURE.

After all components have been removed from the cabinet, they should be connected and arrange in such a manner that all circuit connections are easily accessible. Measure the voltages at the tube socket terminals and compare with the table of voltages given in section V. If the voltages are low or nonexistent, disconnect the vibrator unit and apply 110-volt, 60-cycle a-c source across prongs 3 and 4 of the receptacle 14-3 on the control panel. This procedure is used for a comparative indication of the vibrator efficiency. Should the voltages on the tube terminals return to their normal value, it indicates a defective vibrator unit. However, if voltages remain low or nonexistent in the whole or a section of the set, a circuit failure is indicated. Use the schematic diagram and check the various paths in the voltage distribution network. Locate points where voltage is normal and proceed toward points where voltages are incorrect, checking for defective component such as resistors, capacitors, coils, etc.

61. ALIGNMENT PROCEDURE.

a. Alignment of Intermediate Frequency Stages. The intermediate frequency of the receiver is 465 kc. A standard all-wave audio-modulated r-f signal generator is needed, capable of producing a carrier of the above frequency, as well as from 2 to 20 mc for r-f alignment of the receiver unit.

(1) Remove any connections to the antenna terminals of the set.

(2) Connect the high potential side of the output of the signal generator to the grid of the first i-f tube 9-6, through a 1,000-mmf capacitor. Connect the ground side of the generator to the receiver chassis.

(3) Set the main tuning dial of the receiver at the low-frequency end of the scale. Turn the BAND SW knob 9-68 to the 2.0 to 2.8 mc range.

(4) With both AUDIO GAIN and SENSITIVITY controls turned to the extreme right, set the signal generator at 465 kc, regulating the signal generator output level to hold the traces within the range of the cathode-ray screen.

(5) Tune the primary and secondary of the i-f transformer 9-16 for maximum trace height on the cathode-ray screen.

(6) Leave the signal generator connected to the grid of the 1st i-f tube and repeat the above procedure, tuning the primary and secondary of the i-f transformer 9-15.

(7) Do not move the receiver or generator controls but transfer the signal output of the generator to the signal grid (terminal No. 8) of the 1st detector tube 9-5. Tune i-f transformer 9-14 for maximum trace height on the oscilloscope.

NOTE: It is advisable that the operator go back over the three i-f transformers for final precision adjustment while the signal generator output remains connected to the signal grid of the 1st detector tube 9-5. For location of i-f trimmer adjustment screws see figure 36.

b. Alignment of Receiver Radio-Frequency Stages.

(1) Refer to figure 36. The three cover cans, 9-95, 9-94, and 9-93 contain the trimmer capacitors and tuning inductors for the oscillator, 1st detector and r-f sections, respectively. On the top of each of these three cans are small, round, metal buttons which must be removed to make any r-f alignment adjustment.

NOTE: Use a fiber or bakelite hexagonal aligning tool for all tuning adjustments.

(2) Considering Radio Set SCR-551-( ) in all normal conditions of field operation it is highly unlikely that the tuning of the three r-f sections will require more than a slight

adjustment for alignment. In this case, the following procedure should be observed:

c. Oscillator Section. Method 1.

(1) The entire oscillator tuning section contained in cover can 9-95 must be tuned very carefully throughout before touching any of the other sections.

(2) Ground the signal generator to the receiver chassis and connect the high potential side of the generator to the sense antenna input receptacle 9-57.

(3) Turn the BAND SW selector knob 9-68 on the front of the receiver panel to select the 2.0-2.8 mc frequency band.

(4) Adjust the main tuning dial pointer, if necessary, to make sure that when the TUNING knob 9-63 has turned the pointer to each extreme end, the hairline on the pointer is coincident with, or equally distant from each reference line at the bottom sides of the dial. To make this adjustment, set the hairline pointer to the reference line on the extreme right and, while pressing the pointer firmly against the dial in this position, turn the main TUNING knob to the extreme right. Release the pointer and turn the TUNING knob to the extreme left. If the hairline does not now coincide with the left hand reference line it will be necessary to again adjust the pointer mechanically as above until the hairline is equally distant from the reference lines at each extreme position of the TUNING knob.

(5) Carefully set the signal generator and the dial pointer on the receiver to 2.8 mc.

(6) Refer again to figure 36. Tune the No. 1 position trimmer in can 9-95 for maximum trace height on the oscilloscope. Reduce the signal generator output if this maximum is outside the range of the scope.

(7) Carefully set the signal generator and the dial pointer on the receiver to 2.0 mc.

(8) Tune the inductor in position No. 6 on this can for maximum trace height on the scope.

(9) Now reset the signal generator and the receiver dial pointer to 2.8 mc. Check and again adjust, if necessary, the No. 1 trimmer for maximum trace height.

(10) Return the receiver pointer and generator to 2.0 mc. Check and adjust if necessary, the inductor No. 6 for maximum trace height.

NOTE: In this manner it is necessary to continue to tune and adjust the inductance and capacitance three of four times at each end of this and the succeeding bands until both ends of the band tune correctly at each end of the receiver dial.

(11) Turn the BAND SW knob 9-68 to 2.8-4.4 mc and, using the signal generator for the required signal frequencies, proceed in like manner to align the 2.8 to 4.4 mc oscillator band in can 9-95. Adust the trimmer in position No. 2 at the 4.4-mc end and the inductor in position No. 7 at the 2.8-mc end of the band for maximum trace height, checking back over the adjustment at each end several times to assure accurate tuning.

(12) Turn the BAND SW knob, 9-68, to 4.4-6.4 mc and, using the signal generator for the required signal frequencies, proceed in like manner to align the 4.4 to 6.4 mc oscillator band in can 9-95. Adjust the trimmer in position No. 3 at the 6.4-mc end and the inductor in position No. 8 at the 4.4-mc end of the band for maximum trace height.

(13) Turn the BAND SW knob to 6.4-10.0 mc and, using the signal generator for the required signal frequencies, proceed to align the 6.4- to 10.0-mc oscillator band in can 9-95. Adjust the trimmer in position No. 4 at the 10.0-mc end and the inductor in position No. 9 at the 6.4-mc end of the band for maximum trace height.

(14) When tuning the 10.0-20.0 mc oscillator band, however, a different procedure is necessary. Turn the BAND SW to select the 10.0-20.0 mc range. Screw the adjustment on inductor No. 10 to the extreme left position. Set the signal generator and receiver dial pointer at 10.0 mc and slowly turn the inductor adjusting screw to the right until a maximum trace height appears on the scope.

(15) Now set the generator and receiver dial pointer to 20.0 mc and tune trimmer No. 5 for maximum trace height. *Leave the receiver dial setting alone* but increase the generator output to maximum and tune the signal frequency to approximately 20.93 mc. At this point another signal will be observed on the scope. If this signal does not appear, return the generator frequency control to 20.0 mc and reduce the output to keep the traces within the range of the scope.

(16) Then, slowly turn trimmer No. 5 to the right until *another* maximum trace is observed. Again advance the generator output to maximum and the signal frequency to approximately 20.93 mc. The traces will now increase to indicate another signal. This is the proper setting but final precision tuning adjustments must be made at each end of the band as described for tuning the inductance and capacitance of previous bands.

d. First Detector and R-f Sections.

(1) Refer to figure 36. Cover can 9-94 contains the 1st detector section and can 9-93, the r-f section.

(2) Ground the signal generator to the receiver chassis and connect the high potential side of the generator to the sense antenna input receptacle 9-57.

(3) Turn the BAND SW selector knob 9-68 on the front of the receiver to select the 2.0-2.8 mc frequency band.

(4) Carefully set the signal generator and the dial pointer on the receiver to 2.8 mc.

(5) Refer to figure 36. Adjust the trimmer in position No. 1 in both cans 9-94 and 9-93 for maximum trace height on the scope. Reduce the signal generator output if the traces extend beyond the range of the oscilloscope screen.

(6) Carefully set the dial pointer on the receiver and the signal generator to 2.0 mc.

(7) Tune the inductor in position No. 6 in both cans 9-94 and 9-93 for maximum trace height.

(8) Reset the signal generator and dial pointer to 2.8 mc and check the tuning of trimmer No. 1 in both cans. Adjust again, if necessary, for maximum trace height.

(9) Return the generator frequency control and dial pointer to 2.0 mc and check and adjust, if necessary, the inductance at the low end of this band.

> **NOTE:** In this manner it is necessary to continue to tune and adjust the inductance and capacitance three of four times at each end of this and the succeeding bands in each section until both ends tune correctly.

(10) Turn the BAND SW knob 9-68—2.8-4.4 and proceed likewise to align the 2.8-4.4 mc 1st detector and r-f sections in cans 9-94 and 9-93. Using the signal generator, tune the trimmers in both cans in position No. 2 to 4-4 mc, and both inductors in position No. 7 to 2.8 mc.

(11) Turn the BAND SW knob to 4.4-6.4 and align the 4.4-6.4 mc st detector and r-f sections in cans 9-94 and 9-93. Using the signal generator, tune the trimmers in both cans in position No. 3 to 6.4 mc and both inductors in position No. 8 to 4.4 mc.

(12) Turn the Band SW knob to 6.4-10.0 and align the 6.4-10.0 mc 1st detector and r-f sections in cans 9-94 and 9-93. Continuing to use the signal generator, tune the trimmers in both cans in position No. 4 to 10.0 mc and both inductors in position 9 to 6.4 mc.

(13) Turn the BAND SW knob to 10.0-20.0 and align the 10.0-20.0 mc 1st detector and r-f sections in cans 9-94 and 9-93. Set the signal generator as required and tune the trimmers in both cans in position No. 5 to 20.0 mc and both inductors in position No. 10 to 10.0 mc.

> **NOTE:** If there is reason to believe that Radio Set SCR-551-( ) has been mishandled or seriously misaligned, the following procedure shall be ovserved to completely readjust the oscillator section. This will be followed by realigning the 1st detector and r-f sections as previously detailed.

e. Oscillator Section. Method 2.

(1) Remove the bottom plate of the receiver and set all five trimmers in this section so that the rotor plates are half in and half out of the stators. Replace the bottom plate and screw firmly in place.

(2) Turn all five inductances to the extreme left position.

(3) Ground the signal generator to the receiver chassis and connect the high potential side of the generator to the sense antenna input receptacle 9-57.

(4) Turn the BAND SW knob 9-68 on the receiver to select the 2.0-2.8 mc band.

(5) Adjust the main tuning dial pointer, if necessary, to make sure that when the TUNING knob 9-63 has turned the pointer to each extreme and, the hairline on the pointer is coincident with, or equally distant from, each reference line at the bottom sides of the dial. To make this adjustment, set the hairline pointer to the reference line on the extreme right and, while pressing the pointer firmly

against the dial in this position, turn the main TUNING knob to the extreme right. Release the pointer and turn the TUNING knob to the extreme left. If the hairline does not now coincide with the left-hand reference line it will be necessary to again adjust the pointer mechanically as above until the hairline is equally distant from the reference lines at each extreme position of the TUNING knob.

(6) Carefully set the signal generator and the dial pointer on the receiver to 2.0 mc.

(7) Slowly turn the inductor in position No. 6 of can 9-95 to the right until a maximum trace height appears on the scope. Reduce the signal generator output if this maximum is outside the range of the scope.

(8) Set the dial pointer and generator to 2.8 mc and slowly turn trimmer No. 1 in can 9-95 to the right until again the traces rise to a maximum.

(9) Return the dial pointer and signal generator frequency control to 2.0 mc and again tune the inductor No. 6 for maximum trace height.

> NOTE: It will be necessary to continue to tune and adjust the inductance and capacitance three or four times at each end of this and the succeeding bands until both ends tune correctly at each end of the receiver dial.

(10) Turn the BAND SW knob 9-68 to 2.8-4.4 mc and, using the signal generator for the required signal frequency, proceed in like manner to align the 2.8-4.4 mc oscillator band in can 9-95. Turning slowly, always to the right, tune inductor No. 7 to 2.8 mc and trimmer No. 2 to 4.4 mc for maximum trace height, checking back over the adjustment at each end of the band several times to insure accurate tuning.

(11) Turn the BAND SW knob 9-68 to 4.4-6.4 mc and, using the signal generator for the required signal frequency, proceed in like manner to align the 4.4 to 6.4 mc oscillator in can 9-95. Turning slowly, always to the right, tune inductor No. 8 to 4.4 mc and trimmer No. 3 to 6.4 mc for maximum trace height, checking back over the adjustment at each end of the band several times to insure accurate tuning.

(12) Turn the Band SW knob to 6.4-10.0 mc and, using the signal generator for the required signal frequency, proceed to align the 6.4-10.0 mc oscillator band in can 9-95. Turning slowly, to the right, tune inductor No. 9 to 6.4 and trimmer No. 4 to 10.0 mc for maximum trace height, again checking back over the adjustment at each end of the band several times to assure accurate tuning.

(13) Turn the BAND SW knob to 10.0-20.0 mc and, using the signal generator for the required frequency, proceed to align the 10.0-20.0 mc oscillator band in can 9-95. Turning slowly to the right, tune inductor No. 10 to 10.0 mc and trimmer No. 5 to 20.0 mc for maximum trace height. *Leave the receiver dial setting alone*, but increase the generator output to maximum and tune the signal frequency to approximately 20.93 mc. At this point another signal will be observed on the scope. If this signal does not appear, return the generator frequency control to 20.0 mc and reduce the output to keep the traces within the range of the scope. Then, slowly turn trimmer No. 5 to the right until another maximum trace is observed. Again advance the generator output to maximum and the signal frequency to approximately 20.93 mc. The traces will now increase to indicate another signal. This is the proper setting, but final precision tuning adjustments must be made at each end of the band as described for tuning the inductance and capacitance of previous bands.

f. First Detector and R-f Sections. The alignment of the 1st detector and r-f sections at this point is identical to the procedure used under subparagraph **d** of this paragraph. Repeat the procedure outlined thereunder.

62. RADIO TRANSMITTER BC-978-A (TARGET).

a. Location and Remedy of Faults. Faults can be more readily located by following an orderly, systematic procedure in a series of logical steps with the purpose of isolating the fault. For example, it should be determined first if the trouble is common to all four bands. If experienced in one band only, it would tend to exempt from suspicion those elements common to all four bands; for instance, the audio oscillator, the variable tuning capacitor, the oscillator tube and associated circuits, as well as the battery supply. Thus, one would suspect an element associated with the non-operating band, such as the coil or band switch. A resistance analysis of the coil and capacitor circuit for the particular band in question should be made. If in the defective circuit, the indicated resistance value should change with a slight movement of the band switch, it might indicate a faulty contact.

b. Routine Inspection.

(1) ELECTRICAL INSPECTION.

(a) Set up the equipment and, using a good receiver, check a signal in each frequency band of the transmitter.

(b) Check electrical and mechanical functioning of both switches.

(c) Check both tubes with a good tube checker or by substituting known good tubes and checking performance as in *(a)*. Replace any tube in which plate current is less than 75 percent of normal at a filament voltage of 1.4 volts. Return the tubes to their sockets, making sure that they are properly seated.

(d) Check Battery BA-15A and BA-2. Replace Battery BA-15A if it measures less than 1.0 volt under normal load. Replace Battery BA-2 if it measures less than 17 volts under normal load.

(e) Check grid current by plugging a 0-100 microammeter into grid current jack. Normal current will vary from 6 to 50 microamperes with tuning.

(2) MECHANICAL INSPECTION.

(a) Inspect all wiring and soldered connections, looking especially for loose strands of stranded conductors which may cause a ground or short circuit. Resolder any if found.

(b) Remove any foreign matter (dust, corrosion from batteries, etc.).

(c) Check for traces of corrosion; clean; and touch up where necessary.

(d) Inspect all nuts, bolts, and screws for looseness (both above and below chassis and on front panel).

(e) Inspect tube socket contacts, tube base pins, and band switch contacts, cleaning with carbon tetrachloride if necessary. Do not employ sandpaper or emery cloth for this purpose.

63. MOISTUREPROOFING AND FUNGIPROOFING RADIO SET SCR-551-( ).

a. General.

(1) PROBLEMS ENCOUNTERED. Communication failures commonly occur when Signal Corps equipment is operated in tropical areas where the temperature and relative humidity are extremely high. The following problems are typical:

(a) Resistors and capacitors fail.

(b) Electrolytic action takes place in coils, chokes, transformer windings, etc., causing eventual break-down.

(c) Hook-up wire and cable insulation break down. Fungus growth accelerates deterioration.

(d) Moisture forms electrical leakage paths on terminal boards and insulating strips, causing flash-overs and crosstalk.

(e) Moisture provides leakage paths between battery terminals.

(2) TREATMENT. A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture-resistant and fungi-resistant varnish applied by means of a spray gun. A brief description of the method of application follows:

(a) Make all repairs and adjustments necessary for the proper operation of the equipment.

(b) Thoroughly clean all dirt, dust, rust, fungus oil, grease, etc., from equipment to be processed.

(c) Partially disassemble equipment, and cover certain points, such as relay contacts, open switches, air capacitors, sockets, bearings etc., with masking tape.

(d) Thoroughly dry equipment by heat to dispel moisture which the circuit elements have absorbed.

(e) Paint or spray all circuit elements and all parts of the equipment with three coats of moistureproofing and fungiproofing varnish.

(f) Give the equipment a final operational check; radio sets should receive a 24- to 36-hour aging period, when time permits, before alignment.

> **CAUTION:** Varnish spray may have toxic effects. Use respirator, if available. Otherwise fasten cheesecloth or other cloth material over nose and mouth.
>
> **NOTE:** Read and carefully study the instructions furnished with the moistureproofing

kit before processing Radio Set SCR-551-( ). After each unit is completely processed, mark MFP followed by the date of completion.

b. Step-by-step Instruction for Radio Receiver BC-976-( ).

(1) DISASSEMBLY.

(a) Remove the rear door of Cabinet CS-121-A after loosening the Airlox fasteners with a screwdriver.

(b) Remove the front panel mounting screws from Radio Receiver BC-976-( ) and Oscilloscope BC-991-A.

(c) Pull the two units forward to the limit of the stops on the sliding carriages.

(d) Remove the two plugs attached to receptacles on Radio Receiver BC-976-( ) and the five plugs attached to cables on Radio Receiver BC-976-( ) from the oscilloscope and control panel.

(e) Raise the front end of the receiver unit, and lift the chassis from the sliding carriage. Be careful that the cables attached to the receiver unit do not strike the fragile parts of the oscilloscope and control panel.

(f). Remove the 13 tubes from their sockets.

(g) Remove the bottom cover plate.

(h) Remove the four square coil shields, covering the coils 9-14, 9-15, 9-16 and 9-219. Also remove the large shield 9-37 covering the r-f coils on the top right-hand side at the rear of the chassis as viewed from the front panel.

(i) Remove the four retaining screws from the terminal board 9-92, and pull it away slightly from the side of the chassis.

(2) MASKING.

(a) Apply masking tape to Telephone Jack 9-82 so that it completely covers the contacts, frame, and phone plug hole.

(b) Mask the bottom of each of the 13 tube sockets with tape, as illustrated in the instructions furnished with the kit.

(c) Mask the bottom of receptacle 9-57 and 9-58 in the same manner as used on the tube socket.

(d) Mask completely the section of the chassis containing the 15 trimmer capacitors 9-38 to 9-52, the band switch, and antenna trimer capacitor 9-59. This can be accomplished by running strips of masking tape from the side of the chassis nearest the trimmer capacitors, over the banswitch and down to the chassis at a point which will cover the holes through which the wires pass to the tuning capacitors on the top of the chassis. Be careful that no cracks appear between adjacent strips of the masking tape.

(e) Mask the small opening in the ANTENNA GAIN control 9-70 and the SENSITIVITY control 9-72 mounted on the rear of front panel.

(3) TREATMENT.

(a) Bake as per instructions furnished with kit.

(b) Spray underside of chassis only, as per instructions furnished with kit.

(c) Apply lacquer with brush to all exposed coils to top of chassis and to the five cotton-covered cables leading to the oscilloscope unit, control panel, and Adcock antenna.

(d) Bake and repeat spraying, brushing and baking operation two times as per instructions furnished with kit.

(e) Remove masking tape from all masked sections and apply lacquer with brush to all untreated wires and components. Be extremely careful that lacquer does not touch band switch, trimmer capacitors and pins in the tube sockets.

(f) Bake and repeat this latter brushing operation one more time, as per instructions furnished with kit.

(g) Upon completion of this latter baking operation, processing of Radio Receiver BC-976-( ) is complete and the unit is ready for assembly.

c. Step-by-Step Instructions for Oscilloscope

(1) DISASSEMBLY.

(a) Remove the plug attached to the cable on Oscilloscope Unit BC-991-A from the rear of Control Panel PN-21-A.

(b) Raise the front end of the oscilloscope unit, and lift the chassis from the sliding carriage.

(c) Remove the 10 vacuum tubes 12-12 to 12-21. Do not remove cathode ray tube 12-22 from its socket.

(d) Remove the bottom cover plate.

(2) MASKING.

(a) Mask the bottom of each of the 10 tube

sockets with tape as iustrated in the instructions furnished with the kit.

(b) Mask the bottom of receptacles 12-7 and 12-8 in the same manner used on the tube sockets.

(c) Mask the MONITOR BEARING switch 12-73 by wrapping strips of tape completely about the switch.

(3) TREATMENT.

(a) Bake chassis as per instructions furnished with the kit.

(b) Remove chassis from the baking oven and spray the underside of the chassis only, as described in instructions furnished with the kit.

(c) Apply lacquer with a brush on the cotton covered cable connecting the oscilloscope to the control unit. Also lacquer the wires leading to the cathode-ray tube socket, transformers 12-9, 12-11, and choke 12-10 on top of the chassis.

(d) Repeat the baking, spraying, and brushing operation two times, as per instructions furnished with the kit.

(e) After the third baking operation, remove the masking tape. Where there is more than 1 inch of unlacquered wire, apply one coat of lacquer with the brush. Baking after this application is not necessary.

(f) This completes processing of Oscilloscope Unit BC-991-A. Reassemble for use.

d. Step-by-step Instructions for Control Panel PN-21-A.

(1) DISASSEMBLY.

(a) Remove the four panel mounting screws and the four screws at the bottom rear of the cabinet.

(b) Remove the remaining cable plug connected to the control panel.

(c) Lift the control panel from the cabinet carefully, dragging the battery cables through the holes in the rear of the cabinet.

(d) Remove tube 14-25 from the socket.

(2) MASKING. Mask the bottom of the single tube socket and the four receptacles on the rear of the chassis, as illustrated in the instructions furnished with the kit.

(3) TREATMENT.

(a) Bake the chassis as per instructions with the kit.

(b) Spray the underside of the chassis only, as per instructions furnished with the kit. Be careful that spray does not contact voltmeter switch 14-6.

(c) Apply lacquer with a brush to all exposed wires on the following parts; rear of front panel, meter case, circuit breaker case 14-8 and 14-9, speaker transformer, battery cables, transformers 14-18 and 14-20, chokes 14-17 and 14-19.

(d) Repeat the spraying, baking, and brushing operation two times, as per instructions furnished with the kit.

(e) After third baking operation, remove masking tape. Where more than one inch of wire is not lacquered, apply one coat of lacquer with a brush. Baking after this application is unnecessary.

(f) This completes processing of the Control Panel PN-21-A.

e. Step-by-Step Instructions for Vibrator Unit PE-151-( ).

(1) DISASSEMBLY.

(a) Remove the four mounting screws from the rear and the two mounting screws from the bottom of Cabinet CS-121-A.

(b) Lift the vibrator unit from the bottom of the cabinet.

(c) Remove bottom cover plate, top cover, and vibrator element from the vibrator unit chassis.

(2) MASKING.

(a) Mask the top and bottom of the two vibrator sockets in the manner illustrated for tube sockets, as per instructions furnished with the kit.

(b) Mask bottom of switch E-13 by completely covering the switch with strips of tape.

(c) Remove cover from vibrator element and fish-paper insulation wrapped around element.

(3) TREATMENT.

(a) Bake chassis and vibrator element as per instructions furnished with kit.

(b) Apply lacquer with brush to the cotton-covered power cable, vibrator coils, and all exposed wires within vibrator element.

CAUTION: Do not permit any lacquer to cover vibrator contacts.

(c) Repeat spraying, baking, and brushing operation two times, as per instructions furnished with kit.

(d) After third baking operation, remove the masking tape. Where more than 1 inch of wire is not lacquered, apply one coat of lacquer with a brush. Baking after this application is unnecessary.

(e) This completes processing of Vibrator Unit PE-151-( ).

f. Step-by-Step Instructions for Telephone Chassis.

(1) DISASSEMBLY.

(a) Remove the six mounting screws from the bottom and the two mounting screws from the side of Cabinet CS-121-A.

(b) Remove the two screws holding the bakelite terminal plate to the right side of the cabinet.

(c) Remove the chassis from the cabinet.

(2) TREATMENT.

(a) Bake chassis per instructions furnished with the kit.

(b) Apply lacquer with brush to all exposed wires, transformer C-410, bakelite terminal board and joints in case of Telephone Unit EE-8-A as per the instructions furnished with kit.

(c) Repeat baking and brushing operation two times as per instructions furnished with kit.

(d) After third baking operation, processing of the chassis is complete. Reassemble the vibrator, telephone, and control panel chassis.

g. Step-by-step Instruction for Dipole Collector AN-122-A.

(1) DISASSEMBLY.

(a) Remove the Adcock Beams M-340-A, M-339-A, from their sockets in Cabinet CS-121-A.

(b) Remove the dipole collectors AN-122-A from the end of the Adcock beams.

(c) Remove upper and lower dipoles from dipole collectors.

(d) Remove shield covers over relay housings 2-10 and 2-11.

(2) TREATMENT.

(a) Bake remaining parts of dipole collectors as per instructions furnished with kit.

(b) Apply lacquer with brush to relay coils and all exposed wires and components within relay housing.

> **CAUTION:** Be careful that lacquer does not cover relay contacts.

(c) Repeat baking and spraying operation two times, as per instructions furnished with kit.

(d) After third baking operation, processing of dipole collectors is complete.

h. Step-by-step Instruction for Radio Transmitter BC-978-A (Target).

(1) DISASSEMBLY.

(a) Remove rear cover plate from target transmitter.

(b) Disconnect the leads from chassis to battery terminal board.

(c) Remove the nine screws from the edge of the front panel.

(d) Remove the panel and chassis from the case.

(e) Remove the two tubes.

(2) TREATMENT.

(a) Bake chassis as per all instructions furnished with the kit except that for temperature. Maximum temperature should not exceed 150° F.

> **CAUTION:** Higher baking temperatures will warp the plastic dial drive.

(b) Apply lacquer with brush to all wires, coils, terminal boards, transformers, resistors, and capacitors.

> **CAUTION:** Do not lacquer bandswitch, tube sockets, dial drive mechanism, tuning capacitors, trimmer capacitors, telephone jack, and the OFF-CW-ICW switch.

(c) Bake at a maximum temperature of 150°F. Repeat brushing and baking operation two times.

(d) After third baking operation, remove the masking tape. Where more than 1 inch of wire is not lacquered, apply a coat of lacquer with brush. Baking after this operation is not necessary.

(e) This completes processing of Radio Transmitter BC-978-A. Reassemble for use.

SECTION V
SUPPLEMENTARY DATA

64. TUBE SOCKET TERMINAL VOLTAGES.

The following pages contain complete tables of all the tube socket terminal voltages in *Radio Set SCR-551-( ).*

a. Voltage Readings. It is important when taking readings for comparison with these tables, the following conditions be considered:

(1) All a-c and d-c voltages, measured from ground to the designated terminal, were taken with a 20,000-ohm-per-volt voltmeter unless otherwise indicated.

(2) D-c voltages are *positive* unless otherwise indicated by a minus sign (—).

(3) A-c indicates voltage measured is *alternating-current* voltage.

(4) N.C. indicates *no connection* to terminal.

(5) Gnd indicates *grounded* terminal.

(6) Voltage readings *across* filament (heater) terminals are given in last three columns. Filament voltages are independent of readings to ground.

(7) All voltages are taken with every control in a maximum gain position except the BALANCE control on the receiver panel. This should be turned to the approximate center of its range. The variable voltage on terminal No. 6 of tube 9-1 is read with the ANT. GAIN control in a minimum and maximum position.

(8) The MONITOR BEARING switch *must* be at BEARING when taking voltage readings.

TABLE I.

TUBE SOCKET TERMINAL VOLTAGES

b. Receiver Unit BC-976-A.

	Tube socket terminal no.								Filament voltages		
Tube unit no.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Terminals*		*Volts*
9-1	Gnd.	Gnd.	Gnd.	0	1.0	*0 to 50.0	6.0	155.0	2	7	6.0
9-2	Gnd.	Gnd.	Gnd.	—7.5	.9	115.0	6.0	155.0	2	7	6.0
9-3	Gnd.	Gnd.	Gnd.	—7.5	.9	115.0	6.0	155.0	2	7	6.0
9-4	Gnd.	Gnd.	Gnd.	—2.0	Gnd.	55.0	6.0	155.0	2	7	6.0
9-5	Gnd.	6.0	140.0	76.0	—9.0	Gnd.	Gnd.	—2.0	2	7	6.0
9-6	Gnd.	Gnd.	Gnd.	—2.0	Gnd.	50.0	6.0	140.0	2	7	6.0
9-7	Gnd.	Gnd.	Gnd.	—2.0	Gnd.	53.0	6.0	135.0	2	7	6.0
9-8	Gnd.	Gnd.	—0.6	0.4	—.1	N.C.	6.0	0.4	2	7	6.0
9-9	Gnd.	0	—2.0	N.C.	130.	N.C.	6.0	Gnd.	7	8	6.0
9-10	Gnd.	6.0	150.0	152.0	—13.0	N.C.	Gnd.	Gnd.	2	7	6.0
9-11	—90.0	—7.0	—60.0	—90.0	—7.5	—60.0	6.0	Gnd.	7	8	6.0
9-12	Gnd.	Gnd.	—90.0	—62.0	—90.0	N.C.	6.0	—62.0	2	7	6.0
9-13	Gnd.	Gnd.	—2.0	N.C.	115.0	N.C.	6.0	Gnd.	7	8	6.0

*This voltage variable due to setting of ANT. GAIN control when measurement is taken. Zero voltage is measured when ANT. GAIN control is in extreme counterclockwise, or zero position, and 50 volts when the ANT. GAIN control is in the maximum, or extreme clockwise position.

TUBE SOCKET TERMINAL VOLTAGES (contd)

c. Oscilloscope Unit BC-991-A.

	Tube socket terminal no.								Filament voltages		
Tube unit no.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*Terminals*		*Volts*
12-12	Gnd.	Gnd.	—1.5	N.C.	45.0	N.C.	Gnd.	6.0	7	8	6.0
12-13	Gnd.	Gnd.	—0.7	N.C.	40.0	N.C.	Gnd.	6.0	7	8	6.0
12-14	Gnd.	45.0	40.0	N.C.	155.0	44.0	44.0	44.0	7	8	a-c 6.3
12-15	Gnd.	6.0	0.8	0	0.8	44.0	Gnd.	155.0	2	7	6.0
12-16	Gnd.	Gnd.	—27.0	a-c 68.0	—26.0	N.C.	6.0	a-c 68.0	2	7	6.0
12-17	—27.0	84.0	Gnd.	—26.0	105.0	Gnd.	6.0	Gnd.	7	8	6.0
12-18	Gnd.	—400.0	—400.0	—345.0	—400.0	—340.0	—400.0	—345.0	2	7	a-c 6.3
12-19	Gnd.	—400.0	—400.0	—400.0	—345.0	N.C.	—400.0	—400.0	7	8	a-c 6.3
12-20	N.C.	440.0	N.C.	a-c 360.0	N.C.	a-c 360.0	N.C.	440.0	2	8	a-c 5.0
12-21	N.C.	a-c 470.0	N.C.	—520.0	N.C.	—520.0	N.C.	a-c 470.0	2	8	a-c 5.0
12-22	—340.0	—350.0	220.0	—210.0	220.0	215.0	—340.0		1	7	a-c 2.5

d. Control Panel PN-21-A.

14-25	N.C.	175.0	N.C.	a-c 190.0	N.C.	a-c 190.0	N.C.	175.0	2	8	a-c 5.0

65. TUBE SOCKET TERMINAL RESISTANCES.

The following resistance tables indicate the resistances between each tube terminal and ground.

a. When taking readings for comparison with these tables, the following conditions are to be considered:

(1) All readings to ground.

(2) N.C. indicates no connection.

(3) Gnd. indicates grounded terminal.

(4) N.R. indicates no reading.

(5) Fil. indicates filament terminal.

TABLE II

TUBE SOCKET TERMINAL RESISTANCES

b. Radio Receiver BC-976-B for Radio Set SCR-551-B.

Tube unit No.	Tube socket terminal number							
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
9-1 6AC7	Gnd.	Fil.	Gnd.	500,000 ohms	200 ohms	0 to 65,000 ohms	Fil.	350,000 ohms
9-2 6AC7	Gnd.	Fil.	Gnd.	50,000 ohms	*0 to 1,000 ohms	400,000 ohms	Fil.	350,000 ohms
9-3 6AC7	Gnd.	Fil.	Gnd.	50,000 ohms	*0 to 1,000 ohms	400,000 ohms	Fil.	350,000 ohms
9-4 6SK7	Gnd.	Fil.	Gnd.	700,000 ohms	Gnd.	100,000 ohms to P-9-78 Pin No. 3	Fil.	10,000 ohms to P-9-78 Pin No. 3
9-5 6SA7	Gnd.	Fil.	5,300 ohms to P-9-78 Pin No. 3	30,000 ohms to P-9-78 Pin No. 3	500,000 ohms	Gnd.	Fil.	700,000 ohms
9-6 6SK7	Gnd.	Fil.	Gnd.	140,000 ohms	Gnd.	105,000 ohms	Fil.	5,500 ohms
9-7 6SK7	Gnd.	Fil.	Gnd.	135,000	Gnd.	105,000 ohms	Fil.	5,000 ohms
9-8 6SQ7	Gnd.	50,000 ohms	N.R.	N.R.	500,000 ohms	5,000 ohms to P-9-79 Pin No. 3	Fil.	N.R.
9-9 6SF5	Gnd.	Gnd.	600,000 ohms	N.C.	300,000 ohms to P-9-78 Pin No. 3	N.C.	Fil.	Fil.
9-10 6V6	Gnd.	Fil.	N.R.	N.R.	70,000 ohms	Gnd.	Fil.	Gnd.
9-11 6SL7	100,000 ohms to P-9-81 Pin No. 4	25,000 ohms	N.R.	100,000 ohms to P-9-81 Pin No. 4	25,000 ohms	N.R.	Fil.	Fil.
9-12 6H6	Gnd.	Gnd.	150,000 ohms P-9-81 Pin No. 4	N.R.	150,000 ohms to P-9-81 Pin No. 4	N.C.	Fil.	N.R.
9-13 6SF5	Gnd.	Gnd.	50,000 ohms	N.R.	N.R.	N.R.	Fil.	Fil.

*This reading variable due to setting of BALANCE control.

TUBE SOCKET TERMINAL RESISTANCES

c. Oscilloscope Unit BC-991-A for Radio Set SCR-551-( ).

Tube unit No.	Tube socket terminal number							
	1	2	3	4	5	6	7	8
12-12 6SF5	Gnd.	Gnd.	10,000 ohms	N.C.	50,000 ohms	N.C.	Fil.	Fil.
12-13 6SF5	Gnd.	Gnd.	Open	N.C.	*300,000 ohms	N.C.	Fil.	Fil.
12-14 6SF5	Gnd.	50,000 ohms	*400,000 ohms	N.C.	200,000 ohms	N.C.	50,000 ohms	50,000 ohms
12-15 6SJ7	Gnd.	Fil.	500 ohms	100,000 ohms	500 ohms	50,000 ohms	Fil.	100,000 ohms
12-16 6H6	Gnd.	Fil.	10,000 ohms	100 ohms	10,000 ohms	N.C.	Fil.	100 ohms
12-17 6SL7	10,000 ohms	**400,000 ohms	Gnd.	10,000 ohms	**400,000 ohms	Gnd.	Fil.	Fil.
12-18 6H6	Gnd.	Open	Open	Open	Open	N.C.	Open	Open
12-19 6SF5	Gnd.	Open	Open	N.C.	Open	**400,000 ohms	Open	Open
12-20 5Y3	N.C.	200,000 ohms	N.C.	200 ohms	N.C.	200 ohms	N.C.	200,000 ohms
12-21 5Y3	N.C.	700 ohms	N.C.	Open	N.C.	Open	N.C.	700 ohms

*Trace calibration control in full counterclockwise position.

**Horizontal and trace spread controls in extreme counterclockwise position.

66. TABLE OF SPARE AND AUXILIARY PARTS FOR RADIO SET SCR-551-( ).

a. Tubes.

Quantity	*Ref. No.*	*Description*		
1	9-1	Tube	6AC7	VT 112
1	9-2	Tube	6AC7	VT 112
1	9-3	Tube	6AC7	VT 112
1	9-4	Tube	6SK7GT	VT 117A
1	9-5	Tube	6SA7	VT 150
1	9-6	Tube	6SK7GT	VT 117A
1	9-7	Tube	6SK7GT	VT 117A
1	*9-8	Tube	6SQ7	VT 103
1	9-9	Tube	6SF5	
1	9-10	Tube	6V6GT	VT 107A
1	9-11	Tube	6SL7GT	VT 229
1	9-12	Tube	6H6GT	VT 90A
1	9-13	Tube	6SF5	
1	12-12	Tube	6SF5	
1	12-13	Tube	6SF5	
1	12-14	Tube	6SF5	
1	12-15	Tube	6SJ7GT	VT 116A
1	12-16	Tube	6H6GT	VT 90A
1	12-17	Tube	6SL7GT	VT 229
1	12-18	Tube	6H6GT	VT 90A
1	12-19	Tube	6SF5	
1	12-20	Tube	5Y3G	
1	12-21	Tube	5Y3G	
1	12-22	Tube	3AP1/906P1	
1	14-25	Tube	5Y3G	
3	22-14	Tubes	1A5GT	VT 124
3	22-15	Tubes	1A5GT	VT 124

†Additional Spare Tubes

1	Tube	6AC7	VT 112
1	Tube	5Y3G	
1	Tube	3AP1/906P1	
6	Tubes	1A5GT	VT 124

*This tube is a 6H6GT, VT-90 in the Radio Set CR-551-A.

†These additional spare tubes supplied only for CR-551-B.

b. Parts.

Quantity	*Description*
1	Azimuth scale and center disk.
3	Radio Transmitters BC-978-A (target).
1	Level.
1	Telescopic sight.
1	Wooden mallet.
1	4" screwdriver (radio blade).
1	4" screwdriver.
1	Drift punch.
2	Double end wrenches (no. 727).
1	Double end wrench (no. 729).
1	Double end wrench (no. 731-B).
1	Offset socket wrench (no. 262-D).
3	*Allen Head setscrew wrenches.
1	*Screwdriver, phillips.
16	Screws ¾" no. 8R H W S (for mounting choke boxes).
1	Compass.
1	Tube, viewing, oscilloscope.
2	Fuses, cartridge, 30-amp.-19-2 for vibrator.
2	Fuses, cartridge, 10 amp.-9-83 for receiver.
12	Fuses, cartridge,
	4 5-amp, 25-volts { 2 12-76; 2 14-13 }
	2 5-amp, 25-volts 14-12
	6 5-amp, 220-volts { 2 12-77; 2 14-27; 2 14-28 }
3	Bristo wrenches #6.
10	Dial and panel light bulbs.
1	Scale light bulb and cord assembly.
1	Universal-Joint mounting (for compass).
24	⅜"x½" hex. hd. Bolt with lockwashers (Mounting Cabinet CS-121-A, and V arms to Mounting FT-371-A).
8	⅜"x1-¾" hex. hd. Bolt and washers (Mounting support arm of shelter to Mounting FT-371-A).
1	Battery jumper.
4	Screws 10-32-1½ (for telescope casting).
18"	2 conductor weatherproof telephone wire No. 18 (Collector to upper choke box).
30"	2 conductor weatherproof telephone wire No. 18 (slip ring to cabinet).
19½'	2 conductor weatherproof telephone wire No. 18 (lower to upper choke boxes).
4	Screws 6-32x⅜" (gun sight mtg.).
2	Technical Manuals TM 11-247.
4	4"x¼"-20 hex. hd. Brass Bolts with chain and washer. (Support arms to shelter.)
1	Vibrator Unit PE-151-( ) (electronic model S-887).
1	Battery box.
2	Choke boxes.
2	Headsets (phones with plugs) HS-30.
1	Chest Set T-35 (transmitter with Cord CD-605).

*Supplied only with SCR-551-B.

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B.

a. Major Components of Radio Set SCR-551-( ).

* Ref. Symbol SCR-551- A	B	Signal Corps Stock No.	Name of part and description	Quan. per SCR-551-( )	Running spares	Orgn stock	3rd ech	4th ech	5th ech	Depot stock
		2A302-339A	ADCOCK BEAM M-339-A: left.	1			*	*		*
		2A302-340	ADCOCK BEAM M-340-A: right.	1			*	*		*
		2A275-121A	ANTENNA AN-121-A: vertical.	1			*	*	*	*
		2Z399-334	AZIMUTH SCALE M-334-A.	1			*	*	*	*
		3B102	BATTERY: storage, 6-volt.	3	6	*	*	*	*	*
		2Z1577-121A	CABINET CS-121-A	1					*	*
		7A728A	COMPASS MC-324-A.	1			*	*	*	*
		2Z6950-21A	CONTROL PANEL PN-21-A.	1			*	*	*	*
		2A977-122-A	DIPOLE COLLECTOR AN-122-A.	1			*	*	*	*
		6L3825	HARDWARE KIT: for mounting cabinet, shelter and tower.	1					*	*
		2Z6721-371A	MOUNTING FT-371-A.	1					*	*
		2C2780-991A.1	OSCILLOSCOPE UNIT BC-991-A: with BFO switch, used with Receiver BC-976-B.	1			*	*	*	*
		2C2780-991A	OSCILLOSCOPE UNIT BC-991-A: without BFO switch, used with Receiver BC-976-A.	1			*	*	*	*
		2C4976A	RADIO RECEIVER BC-976-A: part of SCR-551-A.	1			*	*	*	*
		2C4976B	RADIO RECEIVER BC-976-B: part of SCR-551-B.	1			*	*	*	*
		2C6596-978A	RADIO TRANSMITTER BC-978-A: (Target).	3			*	*	*	*
		3Z7700-11A	SHELTER HO-11-A.	1					*	*
		3F5315	STAFF: JACOBS; for Compass MC-324-A.	1					*	*
		6D13145	TECHNICAL MANUAL TM 11-247.	2			*	*	*	*
		4B8200-161A	TELEPHONE EQUIPMENT RC-161-A.	1			*	*	*	*
		2Z9225	TELESCOPIC SIGHT MC-325( ).	1			*	*	*	*
		6R38166	TOOL SET.	1			*	*	*	*
		2A3459-51	TOWER TR-51-A.	1						*
		3H6800-151-A	VIBRATOR UNIT PE-151-A.	1	1		*	*	*	*

b. Cabinet CS-121A.

1-2	1-2	2Z7235	PLUG: 1-prong, male.	1		*	*	*	*
1-3	1-3	2Z7113.4	PLUG: 3-prong, male.	1		*	*	*	*
1-4	1-4	2Z8658	RECEPTACLE: 3-prong, female, (for relay).	1		*	*	*	*
1-5	1-5		Same as 1-4.						
1-6	1-6	2Z8672.10	RECEPTACLE: 2-prong, female (Adcock Amplifier).	2		*	*	*	*
1-8	1-8	2Z5594.24	JACK & NUT: female.	1		*	*	*	*
1-9	1-9	3G1838-48.4	INSULATOR: bakelite.	1		*	*	*	*
1-10	1-10,	2Z4867.47	GASKET: rubber.	1		*	*	*	*
1-16	1-16	2Z5594.1	PLUG: banana, male.	1		*	*	*	*
1-17	1-17		Same as 1-16.						
1-18	1-18		Same as 1-16.						
1-19	1-19		Same as 1-16.						
1-23	1-23	2Z7067.6	PIN: vertical, locating, for Adcock Beam.	1		*	*	*	*

c. Dipole Collector AN-122-A.

2-2	2-2	2Z8658	RECEPTACLE: 3-prong, female, (for relay).	1		*	*	*	*
2-3	2-3		Same as 2-2.						

d. Adcock Beam M-340-A (Right).

2-5	2-5	2Z7113.28	PLUG: 3-prong, male, (for relay control).	2		*	*	*	*
2-7	2-7		Same as 2-5.						

e. Adcock Beam M-339-A (Left).

2-4	2-4	2Z7113.28	PLUG: 3-prong, male, (for relay control).	2		*	*	*	*
2-6	2-6		Same as 2-4.						

f. Telephone Equipment RC-161-A.

3-1	3-1	2Z5581-14	JACK: headset, closed-circuit 2 contacts.	1		*	*	*	*
3-2	3-2	2Z5598-1	JACK: microphone, 2-circuit.	1		*	*	*	*
3-7	3-7	2Z7856.7	SLIP RING: wiping contacts.	1		*	*	*	*

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B (contd).

Ref. Symbol SCR-551- A	Ref. Symbol SCR-551- B	Signal Corps Stock No.	Name of part and description	Quan. per unit	Running spares	Orgn stock	3rd ech	4th ech	5th ech	Depot stock
		2B830A	HEADSET HS-30:	2			*	*	*	*
		2B1300	INSERT M-300: headset ear plug.	4		*	*	*	*	*
		4B5008	TELEPHONE EE-8.	1	1		*	*	*	*
		2Z9940-410.1	TRANSFORMER: matching C-410, used only on sets of serial numbers below 114 on SCR-551-A.	1			*	*	*	*
		4G1335	CHEST SET T-35.	1			*	*	*	*
		3A30	BATTERY: BA-30.	2	4	*	*	*	*	*

g. Shelter HO-11-A.

4-1	4-1	3G1838-48.10	INSULATOR: bakelite.	1						*
4-2	4-2	2Z4867.48	GASKET: rubber.	2						*
4-3	4-3	2Z7111.71	PLUG: banana, male, giant.	1			*	*	*	*

Tower TR-51-A.

		2A3325	STAKE GP-25.	4					*	*
		2A3459-51	TOWER TR-51-A.	1						*
		6Z7897	ROPE: guy, manila, ¾" thick, 30′ long.	4			*	*	*	*

h. Receiver Unit BC-976-A and BC-976-B.

9-1	9-1	2J6AC7	TUBE: JAN-6AC7 (VT-112).	1	1	*	*	*	*	*
9-1S	9-1S	2Z8678.74	SOCKET: tube, octal.	1			*	*	*	*
9-2	9-2		Same as 9-1.							
9-2S	9-2S		Same as 9-1S.							
9-3	9-3		Same as 9-1.							
9-3S	9-3S		Same as 9-1S.							
9-4	9-4	2J6SK7GT	TUBE: JAN-6SK7GT (VT-117).	1	1	*	*	*	*	*
9-4S	9-4S		Same as 9-1S.							
9-5		2J6SA7G7	TUBE: JAN-6SA7GT.	1	1	*	*	*	*	*
	9-5	2J6SA7	TUBE: JAN-6SA7 (VT-150)	1	1	*	*	*	*	*

9-5S	9-5S		Same as 9-1S.							
9-6	9-6		Same as 9-4.							
9-6S	9-6S		Same as 9-1S.							
9-7	9-7		Same as 9-4.							
9-7S	9-7S		Same as 9-1S.							
9-8		2J6H6GT	TUBE: JAN-6H6GT (VT-90).	1	1	*	*	*	*	*
	9-8	2J6SQ7	TUBE: JAN-6SQ7 (VT-103).	1	1	*	*	*	*	*
9-8S	9-8S		Same as 9-1S.							
9-9	9-9	2J6SF5GT	TUBE: JAN-6SF5GT.	1	1	*	*	*	*	*
9-9S	9-9S		Same as 9-1S.							
9-10	9-10	2J6V6GT	TUBE: JAN-6V6GT (VT-107).	1	1	*	*	*	*	*
9-10S	9-10S		Same as 9-1S.							
9-11	9-11	2J6SL7GT	TUBE: JAN-6SL7GT (VT-229).	1	1	*	*	*	*	*
9-11S	9-11S		Same as 9-1S.							
9-12	9-12	2J6H6GT	TUBE: JAN-6H6GT (VT-90).	1	1	*	*	*	*	*
9-12S	9-12S		Same as 9-1S.							
9-13	9-13		Same as 9-9.							
9-13S	9-13S		Same as 9-1S.							
9-14	9-14	2Z9641.60	TRANSFORMER: i-f, 455-kc, 10-ohm resistor, 150-mmfd, capacitor.	1			*	*	*	*
9-15	9-15		Same as 9-14.							
9-16	9-16		Same as 9-14.							
9-17			COIL ASSEMBLY: (includes electrostatic shield), consists of following:							
		3C1084X-24	COIL: primary, 1.33-microhenrys, 0.15-ohms, dc resistance.	1				*		*
		3C1084X-23	COIL: secondary, 285-microhenrys, 0.6-ohms, dc resistance.	1				*		*
	9-17	2C4976/C2	COIL ASSEMBLY: (includes electrostatic shield), consists of following: COIL: primary, dual winding, 13-microhenrys, 0.07-ohms, dc resistance. COIL: secondary, dual winding, each 10.5 microhenrys, 1.3-ohms, dc resistance.	1				*		*
9-18			COIL ASSEMBLY: (includes electrostatic shield), consists of following:							

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B (contd).

Ref. Symbol SCR-551- A	B	Signal Corps Stock No.	Name of part and description	Quan. per unit	Running spares	Orgn stock	3rd ech	4th ech	5th ech	Depot stock
		3C1084X-25	COIL: primary, 0.539-microhenrys, 0.08-ohms, dc resistance.	1				*		*
		3C1084X-16	COIL: secondary, 173-microhenrys, 0-18-ohms, dc resistance.	1				*		*
	9-18	2C4976B/C1	COIL ASSEMBLY: (includes electrostatic shield), consists of following:	1				*		*
			COIL: primary, 5.5 microhenrys, 0.04-ohms, dc resistance.							
			COIL: secondary, dual winding, each 5.7-microhenrys, 0.05-ohms, dc resistance.							
9-19			COIL ASSEMBLY: (includes electrostatic shield), consists of following:							
		3C1084X-20	COIL: primary, 0.0322-microhenrys, 0.06-ohms, dc resistance.	1				*		*
		3C1084X-17	COIL: secondary, 0.63-microhenrys, 0.08-ohms, dc resistance.	1				*		*
	9-19	2C4976B/C5	COIL ASSEMBLY: (includes electrostatic shield), consists of following:	1				*		*
			COIL: primary, 1.9-microhenrys, 0.03-ohms, dc resistance.							
			COIL: secondary, dual winding, each 2.3-microhenrys, 0.03-ohms, dc resistance.							
9-20			COIL ASSEMBLY: (includes electrostatic shield), consists of following:							
		3C1084X-21	COIL: primary, 0.08-microhenrys, 0.02-ohms, dc resistance.	1				*		*
		3C1084X-18	COIL: secondary, 0.308-microhenrys, 0.06-ohms, dc resistance.	1				*		*
	9-20	2C4976B/C3	COIL ASSEMBLY: (includes electrostatic shield), consists of following:	1			*			*
			COIL: primary, 0.8 microhenrys, 0.01-ohms, dc resistance.							
			COIL: secondary, dual winding, each 1.1-microhenrys, 0.02-ohms, dc resistance.							

9-21			COIL ASSEMBLY; (includes electrostatic shield), consists of following:					
		3C1084X-22	COIL: primary, 0.0456-microhenrys, 0.016-ohms, dc resistance.	1		*		*
		3C1084X-19	COIL: secondary, 0.136-microhenrys, 0.03-ohms, dc resistance.	1		*		*
	9-21	2C4976B/C4	COIL ASSEMBLY; (includes electrostatic shield), consists of following:	1		*		*
			COIL: primary, in-tap 0.43-microhenrys, out-tap 3.1-microhenrys, 0.03 ohms, dc resistance.					
			COIL: secondary, dual winding, each 1.45-microhenrys, 0.02-ohms, dc resistance.					
9-22	9-22	3C1084X-3	COIL: r-f, 19.3-microhenrys, distributed capacity, 0.324-mmfd.	1		*		*
9-23	9-23	3C1084X-4	COIL: r-f.	1		*		*
9-24	9-24	3C1084X-8	COIL: r-f.	1		*		*
9-25	9-25	3C1084X-9	COIL: r-f.	1		*		*
9-26	9-26	3C1084X-10	COIL: r-f.	1		*		*
9-27	9-27	3C1084X-11	COIL: 1st detector.	1		*		*
9-28	9-28	3C1084X-12	COIL: 1st detector.	1		*		*
9-29	9-29	3C1084X-13	COIL: 1st detector.	1		*		*
9-30	9-30	3C1084X-14	COIL: 1st detector.	1		*		*
9-31	9-31	3C1084X-15	COIL: 1st detector, 1-microhenry, distributed capacity, 0.47-mmfd.	1		*		*
9-32	9-32	3C1081-16A	COIL: Oscillator.	1		*		*
9-33	9-33	3C1081-16B	COIL: Oscillator.	1		*		*
9-34	9-34	3C1081-16C	COIL: Oscillator.	1		*		*
9-35	9-35	3C1081-16D	COIL: Oscillator.	1		*		*
9-36	9-36	3C1081-16E	COIL: Oscillator.	1		*		*
9-38	9-38	3D9020V-24	CAPACITOR: variable, air dielectric, 2.8 to 20 mmfd.	1	*	*	*	*
9-39	9-39		Same as 9-38.					
9-40	9-40		Same as 9-38.					
9-41	9-41		Same as 9-38.					
9-42	9-42		Same as 9-38.					
9-43	9-43		Same as 9-38.					

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B (contd).

Ref. Symbol SCR-551- A	B	*Signal Corps Stock No.*	*Name of part and description*	*Quan. per unit*	*Running spares*	*Orgn stock*	*3rd ech*	*4th ech*	*5th ech*	*Depot stock*
9-44	9-44		Same as 9-38.							
9-45	9-45		Same as 9-38.							
9-46	9-46		Same as 9-38.							
9-47	9-47		Same as 9-38.							
9-48	9-48		Same as 9-38.							
9-49	9-49		Same as 9-38.							
9-50	9-50		Same as 9-38.							
9-51	9-51		Same as 9-38.							
9-52	9-52		Same as 9-38.							
9-54	9-54	2Z5822-55	KNOB: pull-out.	1			*	*	*	*
9-55	9-55		Same as 9-54.							
9-56	9-56	2Z5822	KNOB: with pointer, bakelite.	1			*	*	*	*
9-57	9-57	2X7235-1	RECEPTACLE: 1-prong, female.	1			*	*	*	*
9-58	9-58	2Z8658	RECEPTACLE: 3-prong, female.	1			*	*	*	*
9-59		3D9050V-68	CAPACITOR: variable, 6.7 to 50 mmfd.	1			*	*	*	*
	9-59	3D9058V	CAPACITOR: variable, 58-mmfd.	1			*	*	*	*
9-60		3D9195V-1	CACAPITOR: 4-gang, 10 to 195 mmfd. (each section).	1					*	*
	9-60	3D9195V-4	CAPACITOR: variable, 3-gang, 10 to 195 mmfd. (each section). Part of 9-60.	1					*	*
		3D9195V-5	CAPACITOR: variable, single section, 10 to 195 mmfd. Part of 9-60.	1					*	*
9-62		2Z3873	DRIVE SHAFT ASSEMBLY: (Includes drive shaft).	1						*
	9-62	2Z3873.1	DRIVE SHAFT ASSEMBLY: (includes drive shaft).	1						*
9-63	9-63	2Z5877-31	KNOB: tuning, bakelite.	1			*	*	*	*
9-64	9-64	2Z7259-3	POINTER: dial-scale.	1			*	*	*	*
9-65		2Z3806	DISK: friction (turns tuning capacitor)	1			*	*	*	*
	9-65	2Z3806.1	DISK: friction (turns tuning capacitor)	1			*	*	*	*

9-68	9-68		Same as 9-56.							
9-70	9-70	2Z7271-82	POTENTIOMETER: carbon, 65,000-ohms.	1			*	*	*	*
9-71	9-71	2Z7279-38	POTENTIOMETER: 1,000-ohms, 4-watt.	1			*	*	*	*
9-72	9-72	2Z7271-5	POTENTIOMETER: carbon, 100,000-ohms, 1-watt.	1			*	*	*	*
9-73	9-73	2Z7272-62	POTENTIOMETER: carbon, 500,000-ohms, 1-watt.	1			*	*	*	*
9-74	9-74	2Z5883-39	SOCKET: bayonet base, dial-light.	1			*	*	*	*
9-75	9-75		Same as 9-74.							
9-76		2Z5952	LAMP: dial-light, bayonet-base, 6 to 8 volts, 150-ma.		*	*	*	*	*	*
9-77			Same as 9-76.							
9-78	9-78	2Z7116.30	PLUG: 6-prong, round, male.	1			*	*	*	*
9-79	9-79	2Z8674.66	PLUG: 4-prong, round, female.	1			*	*	*	*
9-80	9-80	2Z7114.20	PLUG: 4-prong, flat, male.	1			*	*	*	*
9-81	9-81	2Z8676.44	PLUG: 6-prong, round, female.	1			*	*	*	*
9-82		2Z5581-14	JACK: phone.	1			*	*	*	*
	9-82	2Z5534A	JACK: phone.	1			*	*	*	*
9-83	9-83	3Z1921	FUSE: cartridge, 10-amp, 25 volt.		*	*	*	*	*	*
9-83S	9-83S	3Z3275-1	FUSE HOLDER: extractor.	1			*	*	*	*
9-86	9-86		Same as 9-56.							
9-87	9-87		Same as 9-56.							
9-88	9-88		Same as 9-56.							
9-89	9-89		Same as 9-56.							
9-90		3Z9903-4.2.	SWITCH: wafer, 5-position, 9-section gang.	1			*	*	*	*
	9-90	3Z9825-79.1	SWITCH: wafer, 5-position, 9-section gang.	1			*	*	*	*
9-97	9-97	2Z7112.24	PLUG: 2-prong, angle, male.	1			*	*	*	*
9-100	9-100	3DA100-197	CAPACITOR: fixed, paper, 0.1 mfd, 600 v dc (working).	1			*	*	*	*
9-101	9-101		Same as 9-100.							
9-102	9-102		Same as 9-100.							
9-103	9-103		Same as 9-100.							
9-104	9-104	3D9500-24	CAPACITOR: fixed, 500-mmfd, 600 v dc (working).	1			*	*	*	*
9-105	9-105		Same as 9-100.							
9-106	9-106		Same as 9-100.							

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B (contd).

Ref. Symbol SCR-551- A	Ref. Symbol SCR-551- B	Signal Corps Stock No.	Name of part and description	Quan. per unit	Running spares	Orgn stock	3rd ech	4th ech	5th ech	Depot stock
9-107	9-107		Same as 9-100.							
9-108	9-108		Same as 9-100.							
9-109	9-109		Same as 9-100.							
9-110	9-110		Same as 9-100.							
9-111	9-111		Same as 9-100.							
9-112	9-112		Same as 9-100.							
9-113	9-113	3D281	CAPACITOR: fixed, paper, 10,000-mmfd, 600 v dc (working).	1			*	*	*	*
9-114	9-114		Same as 9-113.							
9-115	9-115		Same as 9-113.							
9-116	9-116		Same as 9-113.							
9-117	9-117		Same as 9-113.							
9-118	9-118		Same as 9-113.							
9-119	9-119		Same as 9-113.							
9-120	9-120		Same as 9-113.							
9-121	9-121	3DA500-37.2	CAPACITOR: fixed, paper, 0.5 mfd, 600 v dc (working).	1			*	*	*	*
9-122	9-122	3D9250-20	CAPACITOR: fixed, mica, 250-mmfd, 500 v dc (working).	1			*	*	*	*
9-123	9-123		Same as 9-122.							
9-124	9-124		Same as 9-122.							
	9-125	3D9250-13	CAPACITOR: fixed, silver mica, 250-mmfd, 500 v dc (working).	1			*	*	*	*
9-127	9-127		Same as 9-104.							
9-128	9-128		Same as 9-104.							
9-129	9-129	3K3020222	CAPACITOR: fixed, mica, 2,000-mmfd, 500 v dc (working).	1			*	*	*	*
9-130	9-130		Same as 9-129.							
9-131	9-131		Same as 9-129.							
9-132			Same as 9-129.							

	9-132	3DA2.500-15	CAPACITOR: fixed, silver mica, 2,500-mmfd, 500 v dc (working).	1	*	*	*	*
9-133			Same as 9-129.					
	9-133		Same as 9-132.					
9-134	9-134		Same as 9-129.					
9-135	9-135		Same as 9-129.					
9-136		3D9100-95.1	CAPACITOR: fixed, mica, 100-mmfd, 500v dc (working).	1	*	*	*	*
	9-136	3DK9100-98	CAPACITOR: fixed, silver mica, 100-mmfd, 500 v dc (working).	1	*	*	*	*
9-137		3D9050-45	CAPACITOR: fixed, mica, 50-mmfd, 500 v dc (working).	1	*	*	*	*
	9-137	3D9050-33.2	CAPACITOR: fixed, silver mica, 50-mmfd, 500 v dc (working).	1	*	*	*	*
9-138			Same as 9-137.					
	9-138		Same as 9-137.					
9-139		3D9020-20	CAPACITOR: fixed, 20-mmfd, 500 v dc (working).	1	*	*	*	*
	9-139	3D9020-20	CAPACITOR: fixed, 20-mmfd, 500 v dc (working).	1	*	*	*	*
9-140	9-140	3RC31AE103M	RESISTOR: carbon, 10,000-ohms, 1-watt.	1	*	*	*	*
9-141	9-141		Same as 9-140.					
9-142	9-142	3Z6750-30	RESISTOR: fixed, carbon, 500,000-ohms, 1-watt.	1	*	*	*	*
9-143	9-143		Same as 9-142.					
9-144	9-144	3Z6750-53	RESISTOR: carbon, 500,000-ohms, ½-watt.	1	*	*	*	*
9-145	9-145	3Z6001-34	RESISTOR: fixed, carbon, 10-ohms, ½-watt.	1	*	*	*	*
9-146	9-146		Same as 9-142.					
9-147	9-147		Same as 9-144.					
9-148	9-148	3Z6725-20	RESISTOR: fixed, carbon, 250,000-ohms. 1-watt.	1	*	*	*	*
9-149	9-149	3RC31AE104K	RESISTOR: carbon, 10,000-ohms, 1-watt.	1	*	*	*	*
9-150	9-150		Same as 9-149.					
9-151	9-151		Same as 9-142.					
9-152	9-152		Same as 9-149.					
9-153	9-153		Same as 9-149.					
9-154	9-154		Same as 9-149.					

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B (contd).

Ref. Symbol SCR-551- A	B	Signal Corps Stock No.	Name of part and description	Quan. per SCR-551-( )	Running spares	Orgn stock	3rd ech	4th ech	5th ech	Depot stock
9-155	9-155		Same as 9-149.							
9-156	9-156		Same as 9-149.							
9-157	9-157		Same as 9-149.							
9-158	9-158		Same as 9-149.							
9-159	9-159		Same as 9-149.							
9-160	9-160		Same as 9-149.							
9-161	9-161		Same as 9-149.							
9-162	9-162		Same as 9-149.							
9-163	9-163		Same as 9-149.							
9-164	9-164	3Z6650-91	RESISTOR: carbon, 50,000-ohms, 1-watt.	1			*	*	*	*
9-165	9-165		Same as 9-164.							
9-166	9-166		Same as 9-164.							
9-167	9-167		Same as 9-164.							
9-168	9-168		Same as 9-164.							
9-169	9-169		Same as 9-164.							
9-170	9-170		Same as 9-164.							
9-171	9-171		Same as 9-164.							
9-172	9-172	3Z6625-38	RESISTOR: carbon, 25,000-ohms, 1-watt.	1			*	*	*	*
9-173	9-173	3Z4557	RESISTOR: carbon, 25,000-ohms, ½-watt.	1			*	*	*	*
9-174	9-174		Same as 9-173.							
9-175	9-175		Same as 9-173.							
9-176	9-176		Same as 9-173.							
9-177	9-177		Same as 9-172.							
9-178		3Z6675-32	RESISTOR: fixed, carbon, 75,000-ohms, 2-watt.	1			*	*	*	*
	9-178		Same as 9-148.							
9-180	9-180	3Z4528	RESISTOR: carbon, 5,000-ohms, ½-watt.	1			*	*	*	*
9-181	9-181		Same as 9-180.							
9-182	9-182		Same as 9-180.							
9-183		3ZK6400-40	RESISTOR: carbon, 4,000-ohms, 1-watt.	1			*	*	*	*

	9-183	3RC31AE392J	RESISTOR: carbon, 4,000-ohms, 1-watt.	1	*	*	*	*
9-184	9-184	3Z6020-36	RESISTOR: fixed, carbon, 200-ohms, ½-watt.	1	*	*	*	*
9-185	9-185	3D9110-3	CAPACITOR: fixed, 110-mmfd, 500 v dc (working).	1	*	*	*	*
9-186	9-186	9D9112	CAPACITOR: fixed, 112-mmfd, 500 v dc (working).	1	*	*	*	*
9-187	9-187	3D9128	CAPACITOR: fixed, 128-mmfd, 500 v dc (working).	1	*	*	*	*
9-188	9-188	3D9050-62	CAPACITOR: fixed, 50-mmfd, 500 v dc (working).	1	*	*	*	*
9-189	9-189		Same as 9-188.					
9-190	9-190	3D9061-1	CAPACITOR: fixed, 61-mmfd, 500 v dc (working)	1	*	*	*	*
9-191		3D9090-7	CAPACITOR: fixed, 90-mmfd, 500 v dc (workng).	1	*	*	*	*
	9-191	3D9080-3.1	CAPACITOR: fixed, 800-mmfd, 500 v dc (working)	1	*	*	*	*
9-192	9-192	3D9092	CAPACITOR: fixed, 92-mmfd, 500 v dc (working).	1	*	*	*	*
9-193	9-193	3D9100-15.1	CAPACITOR: fixed, 100-mmfd, 500 v dc (working).	1	*	*	*	*
9-194		3D9010-42	CAPACITOR: fixed, 10-mmfd, 500 v dc (working)	1	*	*	*	*
9-195	9-195	3D9059	CAPACITOR: fixed, 59-mmfd, 500 v dc (working).	1	*	*	*	*
9-196	9-196	3DK9062-6	CAPACITOR: fixed, 62-mmfd, 500 v dc (working).	1	*	*	*	*
9-197	9-197		Same as 9-196.					
9-198		3D9020-20	CAPACITOR: fixed, 20-mmfd, 500 v dc (working).	1	*	*	*	*
9-199		3D9040-22	CAPACITOR: fixed, 50-mmfd, 500 v dc (working).	1	*	*	*	*
9-200	9-200	3DFB3100	CAPACITOR ASSEMBLY: 500 v dc (working).	1	*	*	*	*
9-201	9-201		Same as 9-200.					
9-202	9-202		Same as 9-200.					
9-203	9-203		Same as 9-200.					

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B (contd).

Ref. Symbol SCR-551- A	B	*Signal Corps Stock No.*	*Name of part and description*	*Quan. per unit*	*Running spares*	*Orgn stock*	*3rd ech*	*4th ech*	*5th ech*	*Depot stock*
9-204	9-204	3DA100-197	CAPACITOR: paper, 0.1 mfd, 600 v dc (working).	1			*	*	*	*
9-205	9-205	2Z5883-57	SOCKET: bayonet-base, panel-light.	1			*	*	*	*
9-206	9-206		Same as 9-205.							
9-207			Same as 9-76.							
9-208			Same as 9-76.							
9-209	9-209	3Z9692-3	SWITCH: toggle, SPST.	1			*	*	*	*
9-210			Same as 9-122.							
	9-210		Same as 9-125.							
9-211			Same as 9-122.							
	9-211		Same as 9-125.							
9-212	9-212		Same as 9-144.							
9-213	9-213		Same as 9-144.							
9-214	9-214		Same as 9-145.							
9-215	9-215		Same as 9-145.							
9-216	9-216	3Z6001-19	RESISTOR: fixed, carbon, 20-ohms, ½-watt.	1			*	*	*	*
9-217	9-217		Same as 9-216.							
	9-218		Same as 9-121.							
	9-219	2Z9644.15	COIL Assembly: contains Coil Capacitor, 50-mmfd Capacitor, 4.5-mmfd Capacitor, 1,000-mmfd Capacitor, 150-mmfd Resistor, 50,000-ohms Resistor, 500,000-ohms Can.							
	9-220		Same as 9-164.							
	9-222		Same as 9-129.							
	9-223		Same as 9-100.							

i. Oscilloscope Unit BC-991-A.

12-1	12-1	3DB4-125	CAPACITOR: fixed, paper, 4-mfd, 1500 v dc (working).	1			*	*	*	*
12-2	12-2		Same as 12-1.							
12-3	12-3	3DB4-34.1	CAPACITOR: fixed, paper, 4-mfd, 600 v dc (working).	1			*	*	*	*
12-4	12-4		Same as 12-3.							
12-5	12-5	3DA500-190	CAPACITOR: fixed, paper, 0.5-mfd, 600 v dc (working).	1			*	*	*	*
12-6	12-6		Same as 12-5.							
12-7	12-7	2Z8676.9	RECEPTACLE: 6-prong, male, round.	1			*	*	*	*
12-8	12-8	2Z7114.41	RECEPTACLE: 4-prong, male, round.	1			*	*	*	*
	12-9	2Z9613.177	TRANSFORMER: power, primary 117-v, 60-c, secondary 750-v, 60-c.	1			*	*	*	*
12-9		2Z9613.114	TRANSFORMER: power.	1			*	*	*	*
12-10	12-10	3C323-6J	COIL: choke, filter.	1			*	*	*	*
12-11	12-11	2Z9614-37	TRANSFORMER: tuning.	1			*	*	*	*
12-12	12-12	2J6SF5GT	TUBE: JAN-6SF5GT.	1	1	*	*	*	*	*
12-12S	12-12S	2Z8678.74	SOCKET: tube, octal.	1			*	*	*	*
12-13	12-13		Same as 12-12.							
12-13S	12-13S		Same as 12-12S.							
12-14	12-14		Same as 12-12.							
12-14S	12-14S		Same as 12-12S.							
12-15	12-15	2J6SJ7GT	TUBE: JAN-6SJ7GT (VT-116-A).	1	1	*	*	*	*	*
12-15S	12-15S		Same as 12-12S.							
12-16	12-16	2J6H6GT	TUBE: JAN-6H6GT (VT-90-A).	1	1	*	*	*	*	*
12-16S	12-16S		Same as 12-12S.							
12-17	12-17	2J6SL7GT	TUBE: JAN-6SL7GT (VT-229).	1	1	*	*	*	*	*
12-17S	12-17S		Same as 12-12S.							
12-18	12-18		Same as 12-16.							
12-18S	12-18S		Same as 12-12S.							
12-19	12-19		Same as 12-12.							
12-19S	12-19S		Same as 12-12S.							
12-20	12-20	2J5Y3G	TUBE: JAN-5Y3G (VT-197-A).	1	1	*	*	*	*	*
12-20S	12-20S		Same as 12-12S.							
12-21	12-21		Same as 12-20.							
12-21S	12-21S		Same as 12-12S.							

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B (contd).

Ref. Symbol SCR-551- A	B	*Signal Corps Stock No.*	*Name of part and description*	*Quan. per unit*	*Running spares*	*Orgn stock*	*3rd ech*	*4th ech*	*5th ech*	*Depot stock*
12-22	12-22	2VAP1/906P1	TUBE: Cathode ray, 3AP1/906P1.	1	2	*	*	*	*	*
12-25	12-25	3RC31AE104K	RESISTOR: fixed, carbon, 100,000-ohms, 1-watt.	1			*	*	*	*
12-26	12-26	3RC31AE154K	RESISTOR: fixed, carbon, 150,000-ohms, 1-watt.	1			*	*	*	*
12-27	12-27	3Z6650-108	RESISTOR: fixed, carbon, 50,000-ohms, 2-watt.	3			*	*	*	*
12-28	12-28		Same as 12-27.							
12-29	12-29	3Z6650-30	RESISTOR: fixed, carbon, 50,000-ohms, 1-watt.	1			*	*	*	*
12-30	12-30		Same as 12-29.							
12-31	12-31		Same as 12-29.							
12-32	12-32		Same as 12-29.							
12-33	12-33		Same as 12-27.							
12-34	12-34		Same as 12-25.							
12-35	12-35	3Z6750-30	RESISTOR: fixed, carbon, 500,000-ohms, 1-watt.	1			*	*	*	*
12-36	12-36		Same as 12-25.							
12-37	12-37		Same as 12-25.							
12-38	12-38		Same as 12-25.							
12-39	12-39		Same as 12-35.							
12-40	12-40	3Z6050-37	RESISTOR: fixed, carbon, 500-ohm, 1-watt.	1			*	*	*	*
12-41	12-41	3Z6720-25	RESISTOR: fixed, carbon, 200,000-ohms, 1-watt.	1			*	*	*	*
12-42	12-42		Same as 12-29.							
12-43	12-43	3RC21AE103K	RESISTOR: fixed, carbon, 10,000-ohms, ½-watt.	1			*	*	*	*
12-44	12-44	3Z6625-38	RESISTOR: fixed, carbon, 25,000-ohms, 1-watt.	1			*	*	*	*
12-45	12-45	3RC31AE103M	RESISTOR: fixed, carbon, 10,000-ohms, 1-watt.	1			*	*	*	*

12-46	12-46		Same as 12-29.					
12-47	12-47		Same as 12-45.					
12-48	12-48		Same as 12-45.					
12-49	12-49	3RC31AE105K	RESISTOR: fixed, carbon, 1-meg, 1-watt.	1	*	*	*	*
12-50	12-50	3Z6030-41	RESISTOR: fixed, carbon, 300-ohms, ½-watt.	1	*	*	*	*
12-51			Same as 12-43.					
	12-51	3Z4528	RESISTOR: fixed, carbon, 5,000-ohms, ½-watt.	1	*	*	*	*
12-52	12-52	3DA2-66	CAPACITOR: fixed, mica, 2,000-mmfd, 600 v dc (working).	1	*	*	*	*
12-53	12-53	3D9050-45	CAPACITOR: fixed, mica, 50-mmfd, 500 v dc (working).	1	*	*	*	*
12-54	12-54	3D9500-24	CAPACITOR: fixed, mica, 500-mmfd, 600 v dc (working).	1	*	*	*	*
12-55	12-55	3D9100-95.1	CAPACITOR: fixed, mica, 100-mmfd, 500 v dc (working).	1	*	*	*	*
12-56	12-56		Same as 12-54.					
12-57	12-57		Same as 12-54.					
12-58	12-58		Same as 12-52					
12-59	12-59		Same as 12-52					
12-60	12-60		Same as 12-54.					
12-61		3DA10-124	CAPACITOR: fixed, paper, 0.01-mfd, 600 v dc (working).	1	*	*	*	*
	12-61	3DKA10-211	CAPACITOR: fixed, paper, 0.01-mfd, 600 v dc (working).	1	*	*	*	*
12-62	12-62	3DA10-124	CAPACITOR: fixed, mica, 0.01-mfd, 600 v dc (working).	1	*	*	*	*
12-63	12-63	3DK2B-16	CAPACITOR: fixed, paper, 2-mfd, 300 v dc (working)	1	*	*	*	*
12-65	12-65	2Z7272-61	POTENTIOMETER: 250,000-ohms, 1-watt.	1	*	*	*	*
12-66	12-66		Same as 12-65.					
12-67	12-67		Same as 12-65.					
12-68	12-68		Same as 12-65.					
12-69	12-69	3C323-6H	COIL: Choke, a-f.	1	*	*	*	*
12-70	12-70	2Z9638-15	TRANSFORMER: audio.	1	*	*	*	*
12-71	12-71		Same as 12-65.					
12-72	12-72	2Z7271.6	POTENTIOMETER: 200,000-ohms, 1-watt.	1	*	*	*	*

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B (contd).

Ref. Symbol SCR-551- A	B	Signal Corps Stock No.	Name of part and description	Quan. per unit	Running spares	Orgn stock	3rd ech	4th ech	5th ech	Depot stock
12-73	12-73	3Z8112	SWITCH: anti-capacity, monitor bearing.	1			*	*	*	*
12-76	12-76	3Z1925	FUSE: cartridge, 5-amp, 20-volt.	1	2	*	*	*	*	*
12-76S	12-76S	3Z3275-1	FUSE HOLDER: extractor.	1			*	*	*	*
12-77	12-77	3Z2605.2	FUSE: cartridge, 5-amp, 20-volt.	1	2	*	*	*	*	*
12-77S	12-77S		Same as 12-76S.							
12-79	12-79	2Z7115	PLUG: 5-prong, male.	1			*	*	*	*
12-80	12-80	2Z8677.33	SOCKET: tube.	1			*	*	*	*
12-82	12-82	2Z5822-55	KNOB: pull-out bakelite.	1			*	*	*	*
12-83	12-83		Same as 12-82.							
	12-87	3Z9692-3	SWITCH: toggle, SPST.	1			*	*	*	*

j. Control Panel PN-21-A.

A	B	Signal Corps Stock No.	Name of part and description	Quan. per unit	Running spares	Orgn stock	3rd ech	4th ech	5th ech	Depot stock
14-3	14-3	2Z7114.27	RECEPTACLE: 4-prong, male, flat.	1			*	*	*	*
14-4	14-4	2Z8675.3	RECEPTACLE: 5-prong, female, round.	1			*	*	*	*
14-5	14-5	2Z8674.34	RECEPTACLE: 4-prong, female, flat.	1			*	*	*	*
14-6	14-6	3Z9859-25	SWITCH: anti-capacity.	1			*	*	*	*
14-7		3F8015-27	VOLTMETER: dc, 0 to 15 v 1,000-ohms per volt.	1			*	*	*	*
	14-7	3F8015-26	VOLTMETER: dc, 0 to 15 v 1,000-ohms per volt.	1			*	*	*	*
14-8	14-8	3H900-15-7	CIRCUIT BREAKER: magnetic; SPST 15-amp.	2			*	*	*	*
14-8A	14-8A	3H4000-21A/H1	HANDLE: left, extension for circuit breaker.	1			*	*	*	*
14-9	14-9		Same as 14-8.							
14-9A	14-9A	3H4000-21A/H1	HANDLE: right, extension for circuit breaker.	1			*	*	*	*
14-10	14-10	6Z816-3	RECEPTACLE: 2-prong, female.	1			*	*	*	*
14-11	14-11	3C35-11	SPEAKER: pm dynamic, 4-ohm voice coil.	1			*	*	*	*
14-12	14-12	3Z1925	FUSE: cartridge, 5-amp, 25-volt.	2	4	*	*	*	*	*
14-12S	14-12S	3Z3275-1	FUSE HOLDER: single hole mounting, bakelite.	1			*	*	*	*

14-13	14-13		Same as 14-12.							
14-13S	14-13S		Same as 14-12S.							
14-14	14-14	6Z3151/1	PLUG: 2-prong, male.	1			*	*	*	*
14-15	14-15	2Z5883-39	SOCKET: bayonet type.	1			*	*	*	*
14-17	14-17	3C323-6A	COIL: choke, filter.	1			*	*	*	*
14-18	14-18	2Z9613.143	TRANSFORMER: Power.	1			*	*	*	*
14-19	14-19	3C323-6J	COIL: choke, filter.	1			*	*	*	*
14-20	14-20	2Z9612.31	TRANSFORMER: pulsing voltage.	1			*	*	*	*
14-21	14-21	3DB8-104	CAPACITOR: fixed, 8-mf, 600 v dc (working).	2			*	*	*	*
14-22	14-22		Same as 14-21.							
14-23	14-23	3DB4-34.1	CAPACITOR: fixed, paper, 4-mf, 600 v dc (working).	2			*	*	*	*
14-24	14-24		Same as 14-23.							
14-25	14-25	2J5Y3G	TUBE: JAN-5Y3G (VT-197-A).	1	1	*	*	*	*	*
14-25S	14-25S	2Z8678.74	SOCKET: 8-prong octal.	1			*	*	*	*
14-26	14-26	2Z8676.26	RECEPTACLE: 6-prong, round, female.	1			*	*	*	*
14-27	14-27	3Z2605.2	FUSE: cartridge; 5-amp 250-volt.	2			*	*	*	*
14-27S	14-27S		Same as 14-12S.							
14-28	14-28	3Z2605.2	Same as 14-27.							
14-28S	14-28S		Same as 14-12S.							
14-29	14-29	2Z5952	LAMP: dial-light, bayonet-base, 6 to 8 volt, 150-ma.	1	5		*	*	*	*
14-30	14-30	2Z5822-55	KNOB: pull-out.	2			*	*	*	*
14-31	14-31		Same as 14-30.							

k. Vibrator Unit PE-151-A and PE-151-B.

19-1	19-1	6Z3179	PLUG: 4-prong, female.	1			*	*	*	*
19-2	19-2	3Z1940	FUSE: cartridge, 30-amp. 25-volts.	1	2	*	*	*	*	*
19-2S	19-2S	3Z1939	FUSE HOLDER: extractor.	1			*	*	*	*
	A-523	3C323-35C	COIL: choke, r-f.	2			*	*	*	*
C-12	C-12A	3DA100-43	CAPACITOR: fixed, paper, dual, 0.1 mfd, 200 v dc (working).	1			*	*	*	*
C-107		3D9090-11	CAPACITOR: fixed, electrolytic, 90-mfd, 45 v dc (working).	2			*	*	*	*

67. MAINTENANCE PARTS LIST FOR RADIO SET SCR-551-A AND SCR-551-B (contd).

Ref. Symbol SCR-551- A	Ref. Symbol SCR-551- B	Signal Corps Stock No.	Name of part and description	Quan. per unit	Running spares	Orgn stock	3rd ech	4th ech	5th ech	Depot stock
C-113	C-113D	3DA500-126	CAPACITOR: fixed, paper, 0.5-mfd, 50 v dc (working).	3			*	*	*	*
C-125	C-125D	3DB300-1	CAPACITOR: fixed, electrolytic, 300-mfd, 35 v dc (working).	1			*	*	*	*
C-141	C-141	3DA500-46	CAPACITOR: fixed, paper, 0.5-mfd, 600 v dc (working).	1			*	*	*	*
	C-325		Same as C-107.							
E-13	E-13	3Z9825-33.9	SWITCH: rotary tap, 2-pole 4 position, 5-amp, 110-v.	1			*	*	*	*
	MTD 748	3H6691-4	VIBRATOR: non-synchronous 12-v, 60-c, 6-prong base.	1			*	*	*	*
S-75		278676.33	SOCKET: 6 prong, (for vibrator).	2			*	*	*	*
	S-369	2Z8688	SOCKET: 6 prong, (for vibrator).	2			*	*	*	*
S-873V		3H6691-2	VIBRATOR: non-synchronous 12-v, 60-c, 6-prong base.	1			*	*	*	*
T-625		2Z9625-15	TRANSFORMER: power, 12-v, 60-c, 1.28 amp.	1			*	*	*	*
T-626		3C325-35C	COIL: choke, r-f.	2			*	*	*	*
	TA-2270	2Z9625-21	TRANSFORMER: 12-v, 60-c, 1.28 amp.	1			*	*	*	*

l. Radio Transmitter BC-978-A (Target).

22-1	22-1	3D9250-20	CAPACITOR: fixed, mica, 250-mmfd, ±10%, 600 v dc (working).	1			*	*	*	*
22-2	22-2	3ZF4060	RESISTOR: fixed, carbon, 100,000-ohms, ½-watt.	1			*	*	*	*
22-3	22-3	3Z9903-4.3	SWITCH: rotary, 3-position.	1			*	*	*	*
22-4	22-4	3DA2-138	CAPACITOR: fixed, mica, 2,000 mmfd, +0-10%, 500 v dc (working).	3			*	*	*	*
22-5	22-5	3K2510214	CAPACITOR: fixed, mica, 1,000 mmfd, ±20%, 600 v dc (working).	1			*	*	*	*
22-6	22-6	2Z5581-2	JACK: phone, closed-circuit.	1			*	*	*	*

22-7	22-7	3D9149VE7	CAPACITOR: variable, air dielectric; 9 to 149.7 mmfd.	1			*	*	*	*
22-8	22-8	3C1084X-5	COIL: tuning, 10 to 20 mc. 0.02-ohms, dc resistance.	1			*	*	*	*
22-9	22-9	3C1084X-7	COIL: tuning, 5 to 10 mc. 0.03-ohms, dc resistance.	1			*	*	*	*
22-10	22-10	3C1084X	COIL: tuning, 3 to 6 mc. 0.1-ohm, dc resistance.	1			*	*	*	*
22-11	22-11	3C1084X-1	COIL: tuning, 2 to 3.5 mc. 3-ohms, dc resistance.	1			*	*	*	*
22-12	22-12	3Z9903-4.1	SWITCH: rotary, 4-position.	1			*	*	*	*
22-13	22-13	2Z9631.99	TRANSFORMER: audio.	1			*	*	*	*
22-14	22-14	2J1A5GT	TUBE: JAN-1A5GT (VT-124).	2	4		*	*	*	*
22-14S	22-14S	2Z8678.74	SOCKET: tube, 8-prong octal, bakelite.	2			*	*	*	*
22-15	22-15		Same as 22-14.							
22-15S	22-15		Same as 22-14S.							
22-18	22-18	3Z4533	RESISTOR: fixed, carbon, 500,000-ohms, ½-watt.	1			*	*	*	*
22-19	22-19	3D9050-45	CAPACITOR: fixed, mica, 50-mmfd, ±10%, 500 v dc (working).	1			*	*	*	*
22-21	22-21	3C323-8J	COIL: choke, r-f, 45-ohms, dc resistance.	1			*	*	*	*
22-26		2Z3806	DISK: friction, dial, ¼-inch shaft.	1			*	*	*	*
	22-26	2Z3806.1	DISK: friction, dial, ¼-inch shaft.	1			*	*	*	*
22-27	22-27	2Z3874	SHAFT: friction-drive, dial, ¼-inch x 1⅝-inch, 28-32 thread, ¼-inch long.	1			*	*	*	*
22-29	22-29	3Z4528	RESISTOR: fixed, carbon, 5,000-ohms, ½-watt.	1			*	*	*	*
22-30	22-30	3D9020V-24	CAPACITOR: variable, air dielectric, 2.8 to 20 mmfd.	2			*	*	*	*
22-31	22-31		Same as 22-30.							
22-32	22-32	2Z5822	KNOB: round, bakelite, with pointer.	2			*	*	*	*
22-33	22-33		Same as 22-32.							
22-34	22-34	2Z5748.18	KNOB: round, bakelite, without pointer.	1			*	*	*	*
		2A2956	ANTENNA: whip.	1						*
		3A2	BATTERY: BA-2.	6	6	*	*	*	*	*
		3A15A	BATTERY: BA-15-A.	6	6	*	*	*	*	*

LEGEND

RADIO RECEIVER BC-976-( )

Capacitors

9-38	variable	20 mmf	air-tuned	1st r-f input trimmer
9-39	variable	20 mmf	air-tuned	1st r-f input trimmer
9-40	variable	20 mmf	air-tuned	1st r-f input trimmer
9-41	variable	20 mmf	air-tuned	1st r-f input trimmer
9-42	variable	20 mmf	air-tuned	1st r-f input trimmer
9-43	variable	20 mmf	air-tuned	1st det trimmer
9-44	variable	20 mmf	air-tuned	1st det trimmer
9-45	variable	20 mmf	air-tuned	1st det trimmer
9-46	variable	20 mmf	air-tuned	1st det trimmer
9-47	variable	20 mmf	air-tuned	1st det trimmer
9-48	variable	20 mmf	air-tuned	r-f oscillator trimmer
9-49	variable	20 mmf	air-tuned	r-f oscillator trimmer
9-50	variable	20 mmf	air-tuned	r-f oscillator trimmer
9-51	variable	20 mmf	air-tuned	r-f oscillator trimmer
9-52	variable	20 mmf	air-tuned	r-f oscillator trimmer
9-59	variable	58 mmf	air-tuned	Adcock vernier
9-60	3-gang	195 mmf each		tuning
9-100	0.1 mf	400 v dc	(working)	B+ bypass
9-101	0.1 mf	400 v dc	(working)	1st audio grid bypass
9-102	0.1 mf	400 v dc	(working)	2d audio grid bypass
9-103	0.1 mf	400 v dc	(working)	1st audio plate bypass
9-104	500 mmf	500 v dc	(working)	diode decoupling
9-105	0.1 mf	400 v dc	(working)	2d i-f screen bypass
9-106	0.1 mf	400 v dc	(working)	2d i-f plate bypass
9-107	0.1 mf	400 v dc	(working)	1st i-f plate bypass
9-108	0.1 mf	400 v dc	(working)	1st i-f screen grid bypass
9-109	0.1 mf	400 v dc	(working)	1st i-f screen grid bypass
9-110	0.1 mf	400 v dc	(working)	1st det screen grid bypass
9-111	0.1 mf	400 v dc	(working)	1st det plate bypass
9-112	0.1 mf	400 v dc	(working)	r-f bias bypass
9-113	0.01 mf	600 v dc	(working)	1st audio coupler
9-114	0.01 mf	600 v dc	(working)	1st audio grid blocking
9-115	0.01 mf	600 v dc	(working)	2d audio grid blocking
9-116	0.01 mf	600 v dc	(working)	2d audio plate bypass
9-117	0.01 mf	600 v dc	(working)	2d i-f grid bypass
9-118	0.01 mf	600 v dc	(working)	1st i-f grid bypass
9-119	0.01 mf	600 v dc	(working)	1st r-f grid bypass
9-120	0.01 mf	600 v dc	(working)	1st det grid bypass
9-121	0.5 mf	600 v dc	(working)	bias bypass
9-122	250 mmf	500 v dc	(working)	1st audio plate bypass
9-123	250 mmf	500 v dc	(working)	r-f bypass
9-124	250 mmf	500 v dc	(working)	2d det audio bypass
9-125	250 mmf	500 v dc	(working)	oscillator plate blocking
9-127	500 mmf	500 v dc	(working)	pulse tube plate filter
9-128	500 mmf	500 v dc	(working)	pulse plate filter
9-129	0.002 mf	500 v dc	(working)	vertical antenna amp screen bypass
9-130	0.002 mf	500 v dc	(working)	vertical antenna cathode bypass
9-131	0.002 mf	500 v dc	(working)	Adcock amp screen grid bypass

9-132	0.0025 mf	500 v dc	(working)	right Adcock amp grid bypass
9-133	0.0025 mf	500 v dc	(working)	left Adcock amp grid bypass
9-134	0.002 mf	500 v dc	(working)	right Adcock amp cathode bypass
9-135	0.002 mf	500 v dc	(working)	left Adcock amp cathode bypass
9-136	100 mmf	500 v dc	(working)	vertical amp grid coupling
9-137	50 mmf	500 v dc	(working)	1st det grid coupling
9-138	50 mmf	500 v dc	(working)	oscillator output
9-139	20 mmf	500 v dc	(working)	1st r-f grid coupling
9-185	110 mmf	500 v dc	(working)	r-f padder
9-186	112 mmf	500 v dc	(working)	1st det padder
9-187	128 mmf	500 v dc	(working)	oscillator padder
9-188	50 mmf	500 v dc	(working)	r-f padder
9-189	50 mmf	500 v dc	(working)	1st det padder
9-190	61 mmf	500 v dc	(working)	oscillator padder
9-191	80 mmf	500 v dc	(working)	r-f padder
9-192	92 mmf	500 v dc	(working)	1st det padder
9-193	100 mmf	500 v dc	(working)	oscillator padder
9-195	59 mmf	500 v dc	(working)	r-f padder
9-196	62 mmf	500 v dc	(working)	1st det padder
9-197	62 mmf	500 v dc	(working)	oscillator padder
9-200	1,840 mmf	500 v dc	(working)	oscillator padder
9-201	2,000 mmf	500 v dc	(working)	oscillator padder
9-202	3,100 mmf	500 v dc	(working)	oscillator padder
9-203	3,100 mmf	500 v dc	(working)	oscillator padder
9-204	0.1 mf	400 v dc	(working)	adcock amp plate bypass
9-210	250 mmf	500 v dc	(working)	1st r-f grid blocking
9-211	250 mmf	500 v dc	(working)	1st det grid blocking
9-218	0.5 mf	600 v dc	(working)	speaker cut-off
9-222	0.002 mf	500 v dc	(working)	vertical ant. sense control bypass
9-223	0.1 mf	400 v dc	(working)	r-f gain control bypass
9-224	100 mmf	500 v dc	(working)	grid blocking

Resistors

9-140	10,000 ohms	1 watt	carbon	Adcock amp plate
9-141	10,000 ohms	1 watt	carbon	1st r-f plate
9-142	500,000 ohms	1 watt	carbon	1st audio grid
9-143	500,000 ohms	1 watt	carbon	2d audio grid
9-144	500,000 ohms	½ watt	carbon	2d det load
9-145	10 ohms	½ watt	carbon	r-f damping
9-146	500,000 ohms	1 watt	carbon	vertical ant. amplifier grid
9-147	500,000 ohms	½ watt	carbon	1st det control grid bias
9-148	250,000 ohms	1 watt	carbon	1st audio plate load
9-149	100,000 ohms	1 watt	carbon	1st audio grid isolating
9-150	100,000 ohms	1 watt	carbon	2d audio grid isolating
9-151	500,000 ohms	1 watt	carbon	2d det isolating
9-152	100,000 ohms	1 watt	carbon	2d det filter
9-153	100,000 ohms	1 watt	carbon	negative power supply filter
9-154	100,000 ohms	1 watt	carbon	Adcock amp grid bias
9-155	100,000 ohms	1 watt	carbon	2d i-f screen grid
9-156	100,000 ohms	1 watt	carbon	2d i-f grid isolating
9-157	100,000 ohms	1 watt	carbon	1st i-f screen grid
9-158	100,000 ohms	1 watt	carbon	1st r-f grid isolating

9-159	100,000 ohms	1 watt	carbon	1st r-f screen grid
9-160	100,000 ohms	1 watt	carbon	1st det grid isolating
9-161	100,000 ohms	1 watt	carbon	r-f gain control bridge
9-162	100,000 ohms	1 watt	carbon	r-f gain control bridge
9-163	100,000 ohms	1 watt	carbon	1st i-f grid isolating
9-164	50,000 ohms	1 watt	carbon	negative bias voltage divider
9-165	50,000 ohms	1 watt	carbon	pulse rectifier filter
9-166	50,000ohms	1 watt	carbon	pulse rectifier filter
9-167	50,000 ohms	1 watt	carbon	pulse control grid
9-168	50,000 ohms	1 watt	carbon	pulse control grid
9-169	50,000 ohms	1 watt	carbon	Adcock amp screen grid
9-170	50,000 ohms	1 watt	carbon	oscillator plate
9-171	50,000 ohms	1 watt	carbon	oscillator grid leak
9-172	25,000 ohms	1 watt	carbon	1st audio plate isolating
9-173	25,000 ohms	½ watt	carbon	right Adcock amp grid
9-174	25,000 ohms	½ watt	carbon	left Adcock amp grid
9-175	25,000 ohms	½ watt	carbon	right Adcock amp grid isolating
9-176	25,000 ohms	½ watt	carbon	left Adcock amp grid isolating
9-177	25,000 ohms	1 watt	carbon	1st det screen grid
9-178	250,000 ohms	1 watt	carbon	ant. gain control limiting
9-180	5,000 ohms	½ watt	carbon	2d i-f plate isolating
9-181	5,000 ohms	½ watt	carbon	1st i-f plate isolating
9-182	5,000 ohms	½ watt	carbon	1st det plate isolating
9-183	4,000 ohms	1 watt	carbon	bias voltage divider
9-184	200 ohms	½ watt	carbon	vertical amp cathode bias
9-212	500,000 ohms	½ watt	carbon	1st r-f grid
9-213	500,000 ohms	½ watt	carbon	1st det grid
9-214	10 ohms	½ watt	carbon	damping r-f amplifier
9-215	10 ohms	½ watt	carbon	damping r-f amplifier
9-216	20 ohms	½ watt	carbon	damping r-f amplifier
9-217	20 ohms	½ watt	carbon	damping r-f amplifier
9-220	50,000 ohms	1 watt	carbon	plate dropping BFO

Transformers and Coils

9-14 transformer		1st i-f
9-15 transformer		2d i-f
9-16 transformer		2d det input
9-17A and 9-17C transformer	2-2.8 mc	adcock input
9-18A and 9-18C transformer	2.8-4.4 mc	adcock input
9-19A and 9-19C transformer	4.4-6.4 mc	adcock input
9-20A and 9-20C transformer	6.4-10 mc	adcock input
9-21A and 9-21C transformer	10-20 mc	adcock input
9-22 coil	2-2.8 mc	r-f amplifier
9-23 coil	2.8-4.4 mc	r-f amplifier
9-24 coil	4.4-6.4 mc	r-f amplifier
9-25 coil	6.4-10 mc	r-f amplifier
9-26 coil	10-20 mc	r-f amplifier
9-27 coil	2-2.8 mc	1st detector
9-28 coil	2.8-4.4 mc	1st detector
9-29 coil	4.4-6.4 mc	1st detector
9-30 coil	6.4-10 mc	1st detector
9-31 coil	10-20 mc	1st detector

9-32 coil	2-2.8 mc	r-f oscillator
9-33 coil	2.8-4.4 mc	r-f oscillator
9-34 coil	4.4-6.4 mc	r-f oscillator
9-35 coil	6.4-10 mc	r-f oscillator
9-36 coil	10-20 mc	r-f oscillator
9-219 coil		BFO assembly

LEGEND

OSCILLOSCOPE BC-991-A

Capacitors

12-1	4 mf	1500 v dc	(working)	positive power supply filter
12-2	4 mf	1500 v dc	(working)	positive power supply filter
12-3	4 mf	600 v dc	(working)	positive power supply filter
12-4	4 mf	600 v dc	(working)	positive power supply filter
12-5	0.5 mf	1500 v dc	(working)	negative power supply filter
12-6	0.5 mf	1500 v dc	(working)	negative power supply filter
12-52	2,000 mmf	500 v dc	(working)	CRT horizontal plate bypass
12-53	50 mmf	500 v dc	(working)	audio gate tube coupler
12-54	500 mmf	500 v dc	(working)	audio filter network
12-55	100 mmf	500 v dc	(working)	audio filter network
12-56	500 mmf	500 v dc	(working)	audio output coupler
12-57	500 mmf	500 v dc	(working)	d-c amp grid bypass
12-58	2,000 mmf	500 v dc	(working)	audio oscillator grid
12-59	2,000 mmf	500 v dc	(working)	audio oscillator fixed tuning
12-60	500 mmf	500 v dc	(working)	blanking control bypass
12-61	0.01 mf	600 v dc	(working)	audio oscillator coupler
12-62	0.01 mf	300 v dc	(working)	audio amp cathode bypass
12-63	2 mf	300 v dc	(working)	blank rectifier biasing

Resistors

12-25	100,000 ohms	1 watt	carbon	negative power supply filter
12-26	150,000 ohms	1 watt	carbon	CRT horizontal plate
12-27	50,000 ohms	2 watt	carbon	voltage divider
12-28	50,000 ohms	2 watt	carbon	voltage divider
12-29	50,000 ohms	1 watt	carbon	voltage divider
12-30	50,000 ohms	1 watt	carbon	voltage divider
12-31	50,000 ohms	1 watt	carbon	voltage divider
12-32	50,000 ohms	1 watt	carbon	voltage divider
12-33	50,000 ohms	2 watt	carbon	voltage divider
12-34	100,000 ohms	1 watt	carbon	audio gate tube grid isolation
12-35	500,000 ohms	1 watt	carbon	audio filter network
12-36	100,000 ohms	1 watt	carbon	audio filter network
12-37	100,000 ohms	1 watt	carbon	audio filter network
12-38	100,000 ohms	1 watt	carbon	audio gate tube plate
12-39	500,000 ohms	1 watt	carbon	CRT vertical plate
12-40	500 ohms	1 watt	carbon	audio amplifier cathode
12-41	200,000 ohms	1 watt	carbon	voltage divider
12-42	50,000 ohms	1 watt	carbon	voltage divider
12-43	10,000 ohms	½ watt	carbon	audio oscillator grid
12-44	25,000 ohms	1 watt	carbon	audio oscillator damper

12-45	10,000 ohms	1 watt	carbon	horizontal pulse control grid
12-46	50,000 ohms	1 watt	carbon	voltage divider
12-47	10,000 ohms	1 watt	carbon	horizontal pulse control grid
12-48	10,000 ohms	1 watt	carbon	horizontal pulse control plate
12-49	1 meg	1 watt	carbon	blanking control grid
12-50	300 ohms	½ watt	carbon	blanking control plate
12-51	5,000 ohms	½ watt	carbon	blanking rectifier biasing
12-65	250,000 ohms	potentiometer		vertical positioning control
12-66	250,000 ohms	potentiometer		horizontal positioning control
12-67	250,000 ohms	potentiometer		trace spread control
12-68	250,000 ohms	potentiometer		trace height control
12-71	250,000 ohms	potentiometer		trace calibration
12-72	200,000 ohms	potentiometer		focus control

Transformers and Chokes

12-9	transformer	scope power supply
12-11	transformer	timing
12-70	transformer	audio
12-10	choke	positive power supply filter
12-69	choke	audio amplifier plate

LEGEND

RADIO TRANSMITTER

Capacitors

22-1	250 mmf	500 v dc	(working)	grid coupling r-f osc
22-4	0.002 mf	500 v dc	(working)	filter
22-5	0.001 mf	500 v dc	(working)	grid coupling a-f osc
22-7	140.7 mmf	variable		tuning
22-19	50 mmf	mica		antenna coupling
22-30	20 mmf	variable		tuning trimmer
22-31	20 mmf	variable		tuning trimmer

Resistors

22-2	100,000 ohms	½ watt	carbon	grid bias r-f osc
22-18	500,000 ohms	½ watt	carbon	grid bias a-f osc
22-29	5,000 ohms	½ watt	carbon	plate dropping

Transformers and Coils

22-13	transformer	audio coupling
22-8	coil	tuning 10-20 mc
22-9	coil	tuning 5-10 mc
22-10	coil	tuning 3-6 mc
22-11	coil	tuning 2-3.5 mc
22-21	coil	r-f choke

LEGEND
VIBRATOR UNIT

Capacitors

C-12A	0.1 mf	200 v dc	(working)	transformer tuning
C-113D	0.5 mf	50 v dc	(working)	r-f filter
C-125D	300 mf	35 v dc	(working)	r-f filter
C-141	0.5 mf	600 v dc	(working)	vibrator discharge
C-325	90 mf	45 v dc	(working)	vibrator bypass

Resistors

W-27	1,000 ohms	½ watt	carbon	spark suppressor

Transformers and Chokes

TA2270	transformer	12 volts	60 cycles	power
A523	choke			r-f filter

LEGEND
CONTROL PANEL

Capacitors

14-21	8 mf	600 v dc	(working)	power supply filter
14-22	8 mf	600 v dc	(working)	power supply filter
14-23	4 mf	600 v dc	(working)	power supply filter
14-24	4 mf	600 v dc	(working)	power supply filter

Meters

14-7	0-15 v dc 1,000 ohms per volt	battery voltage indicator

Transformers and Chokes

14-18 transformer	power supply
14-20 transformer	pulsing voltage

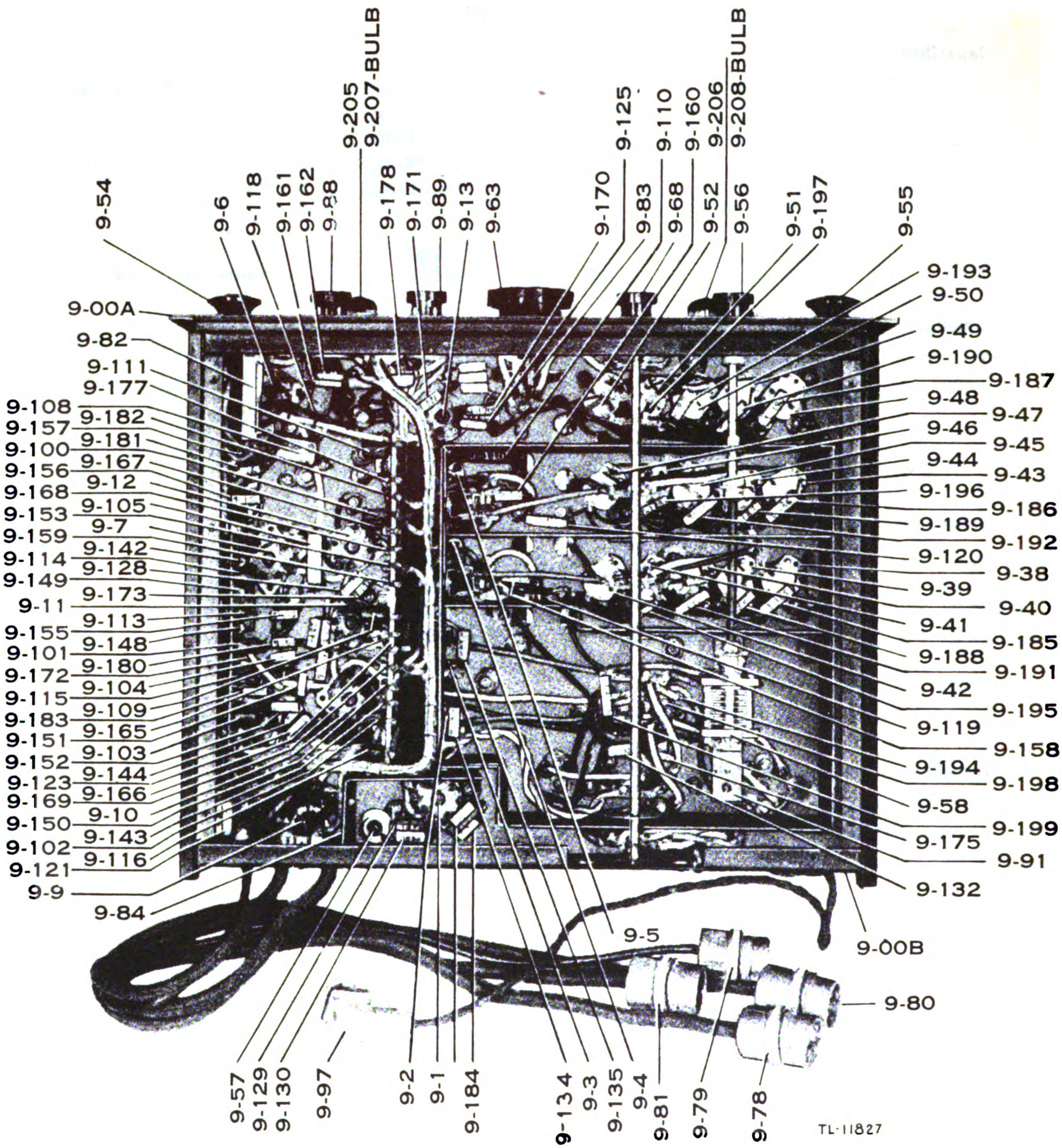


Figure 37. Radio Receiver BC-976-A, bottom view.

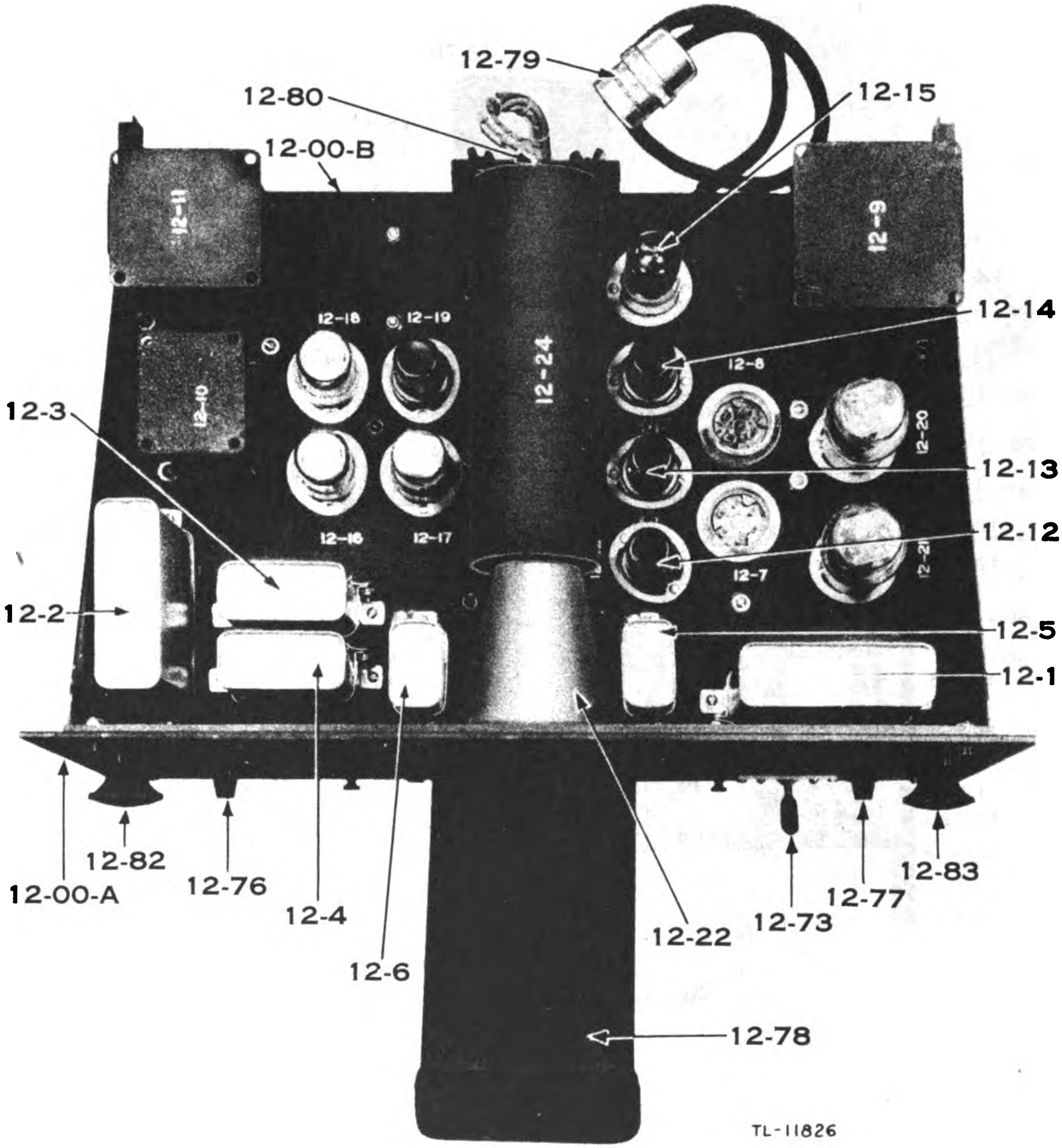


Figure 38. Oscilloscope Unit BC-991-A, top view.

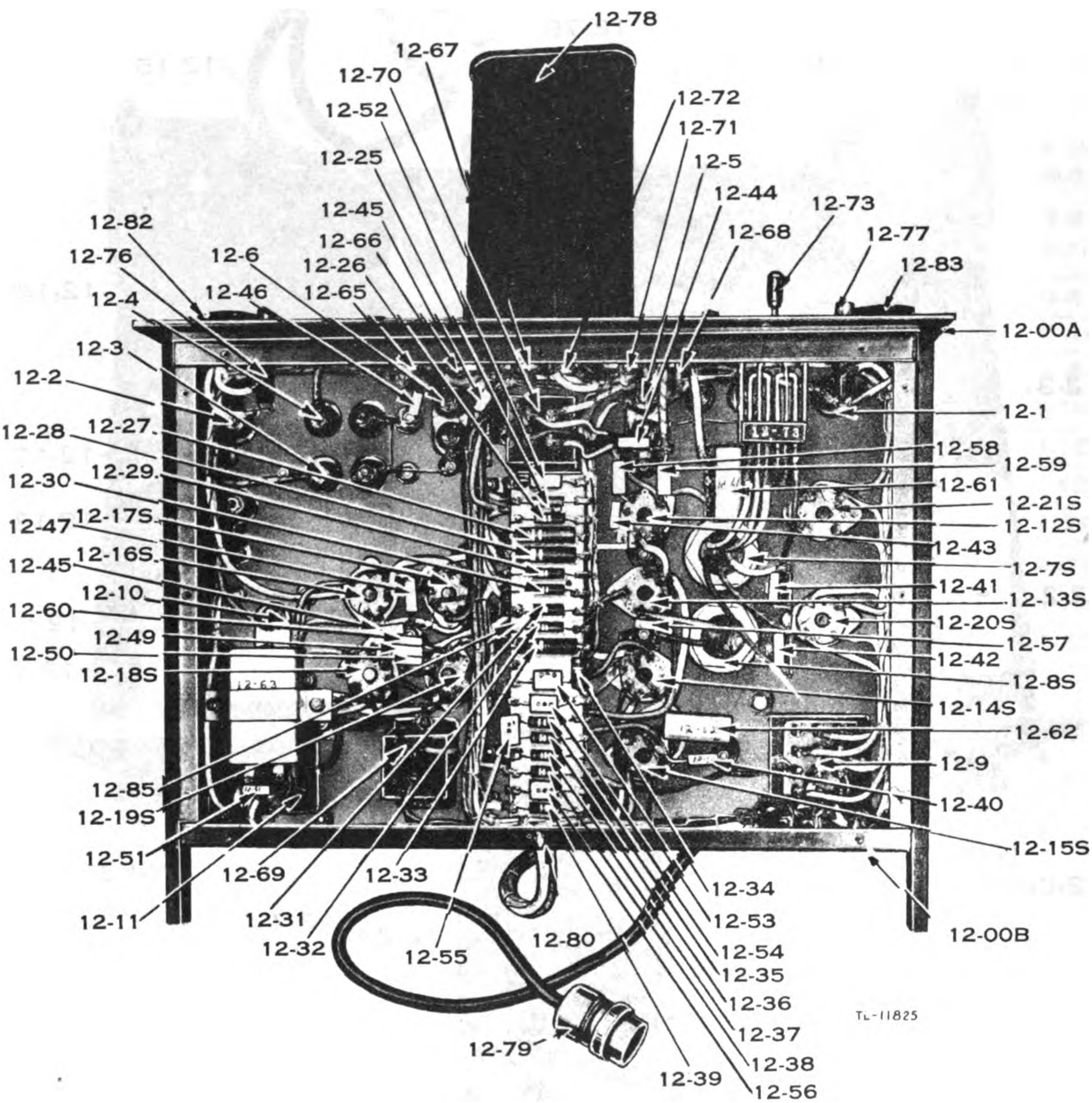


Figure 39. Oscilloscope Unit BC-991-A, bottom view.

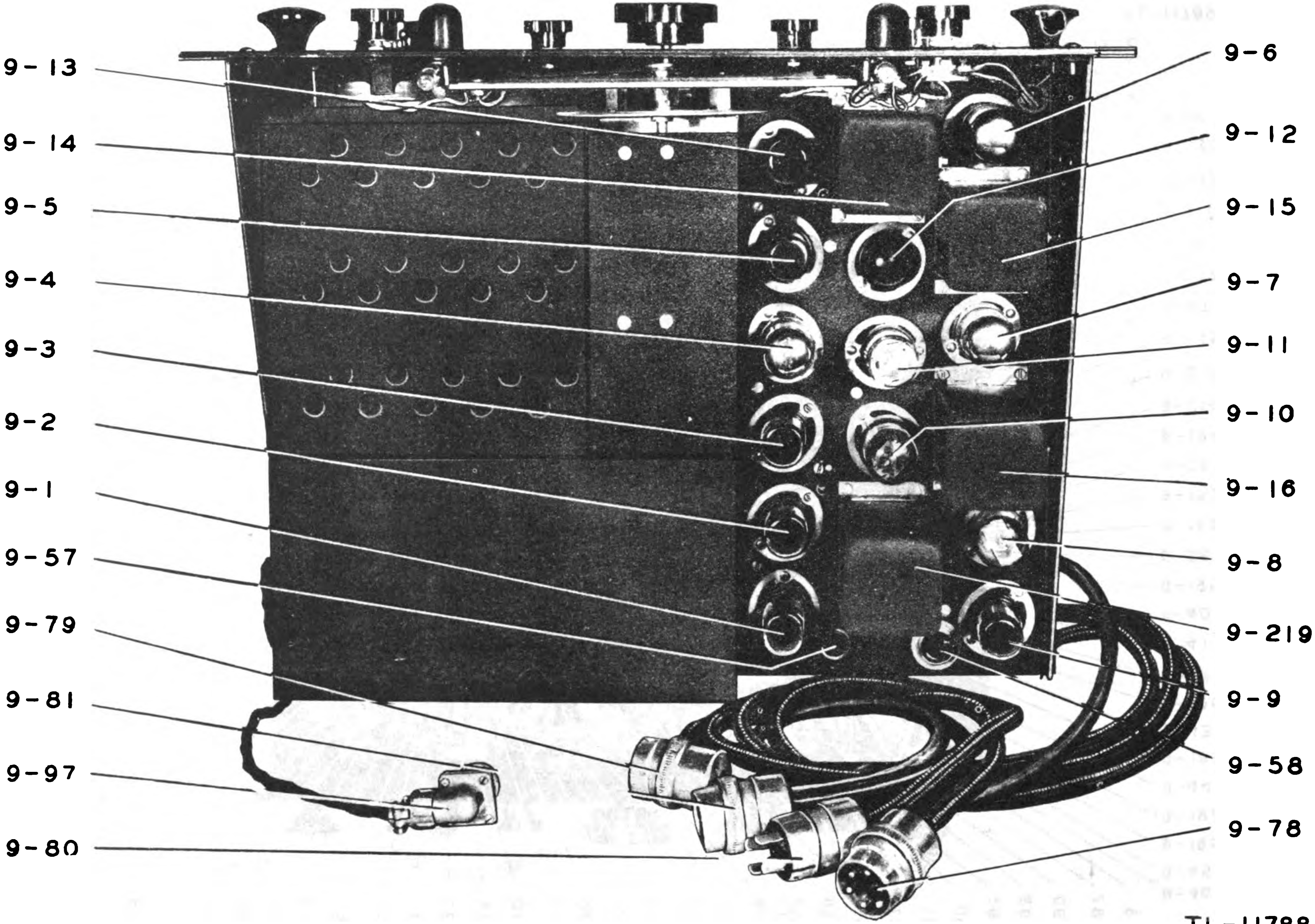


Figure 40. Radio Receiver BC-976-B, top view.

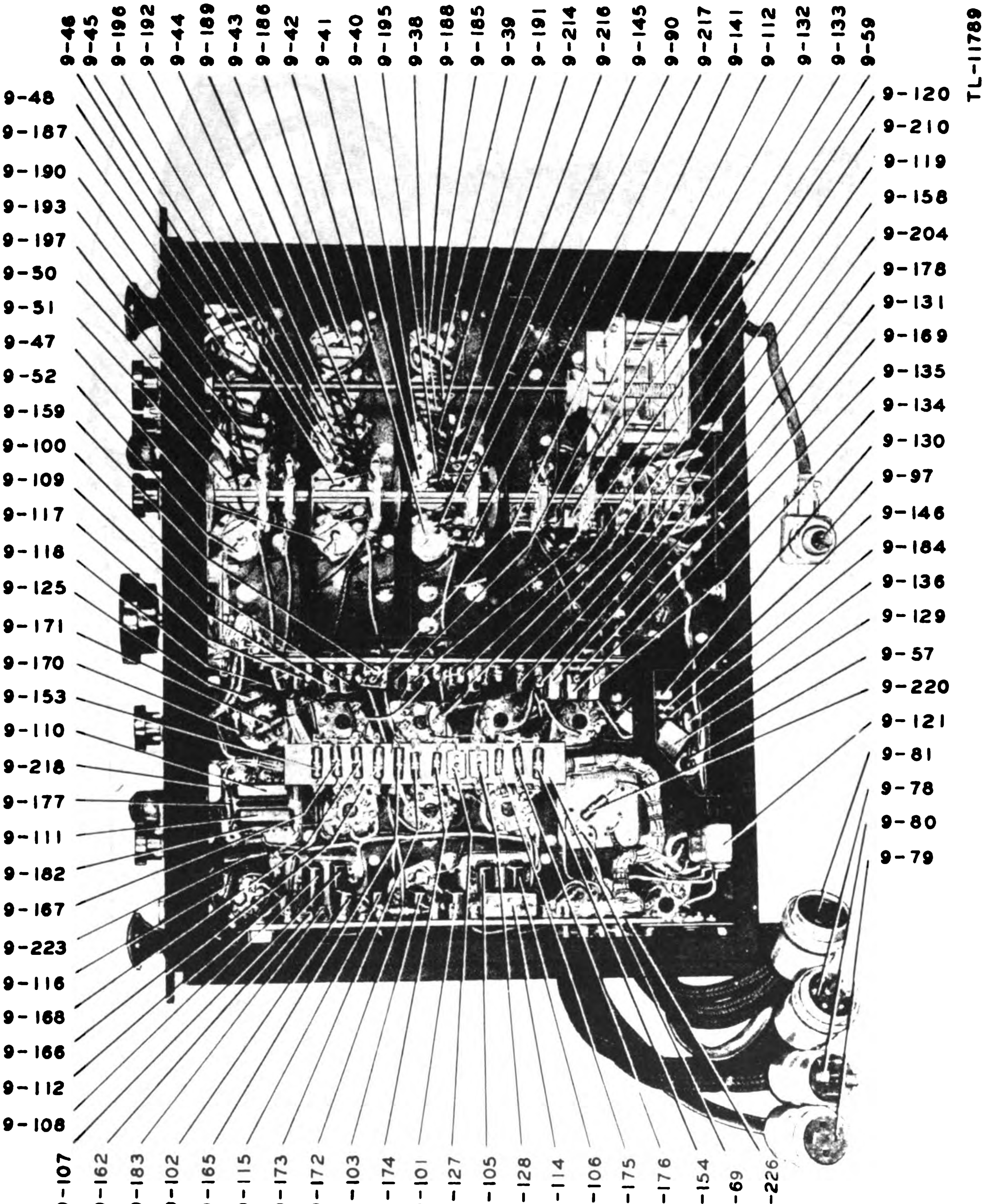


Figure 41. Radio Receiver BC-966-B, bottom view.

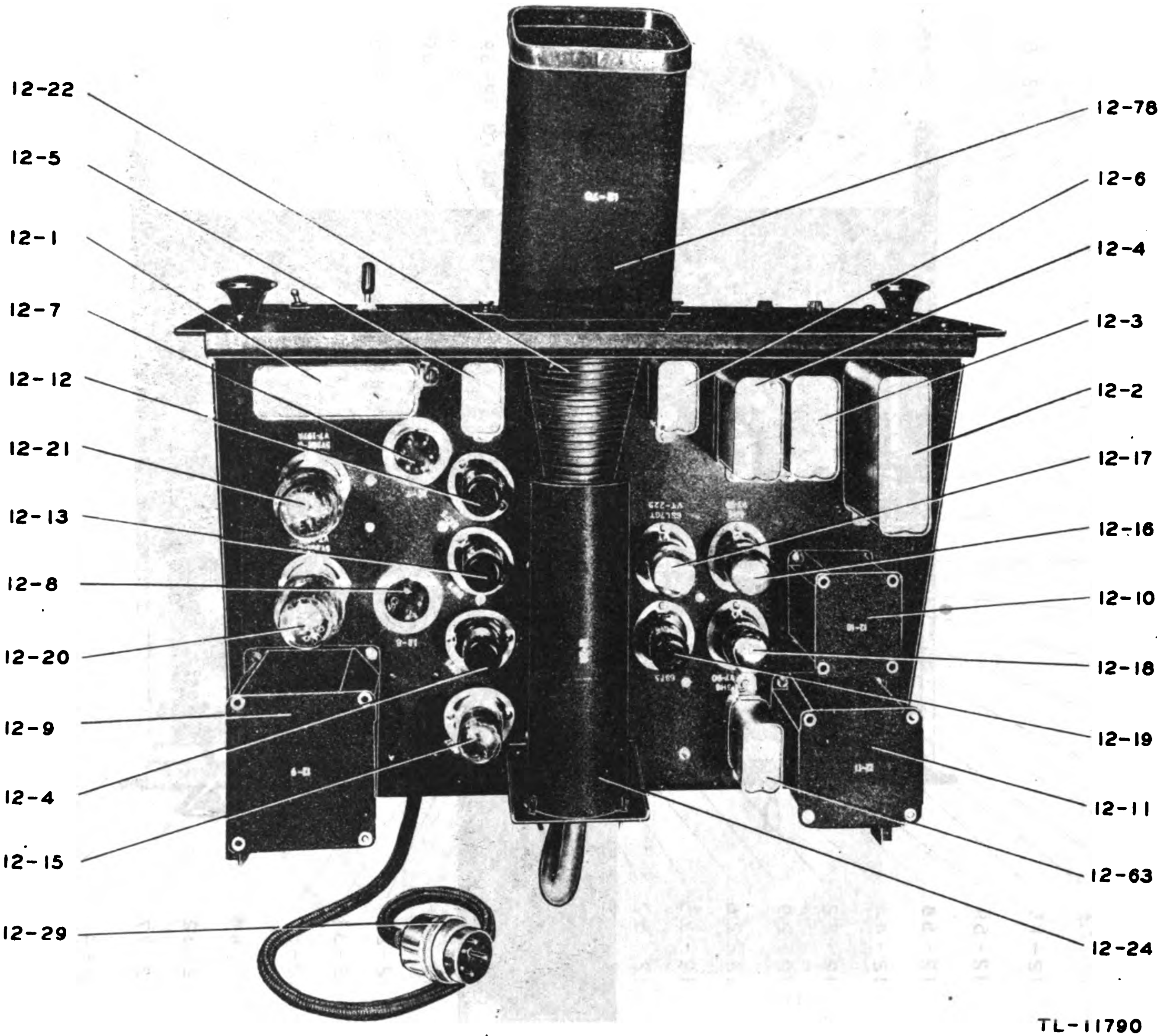


Figure 42. Oscilloscope Unit BC-991-A (modified), top view.

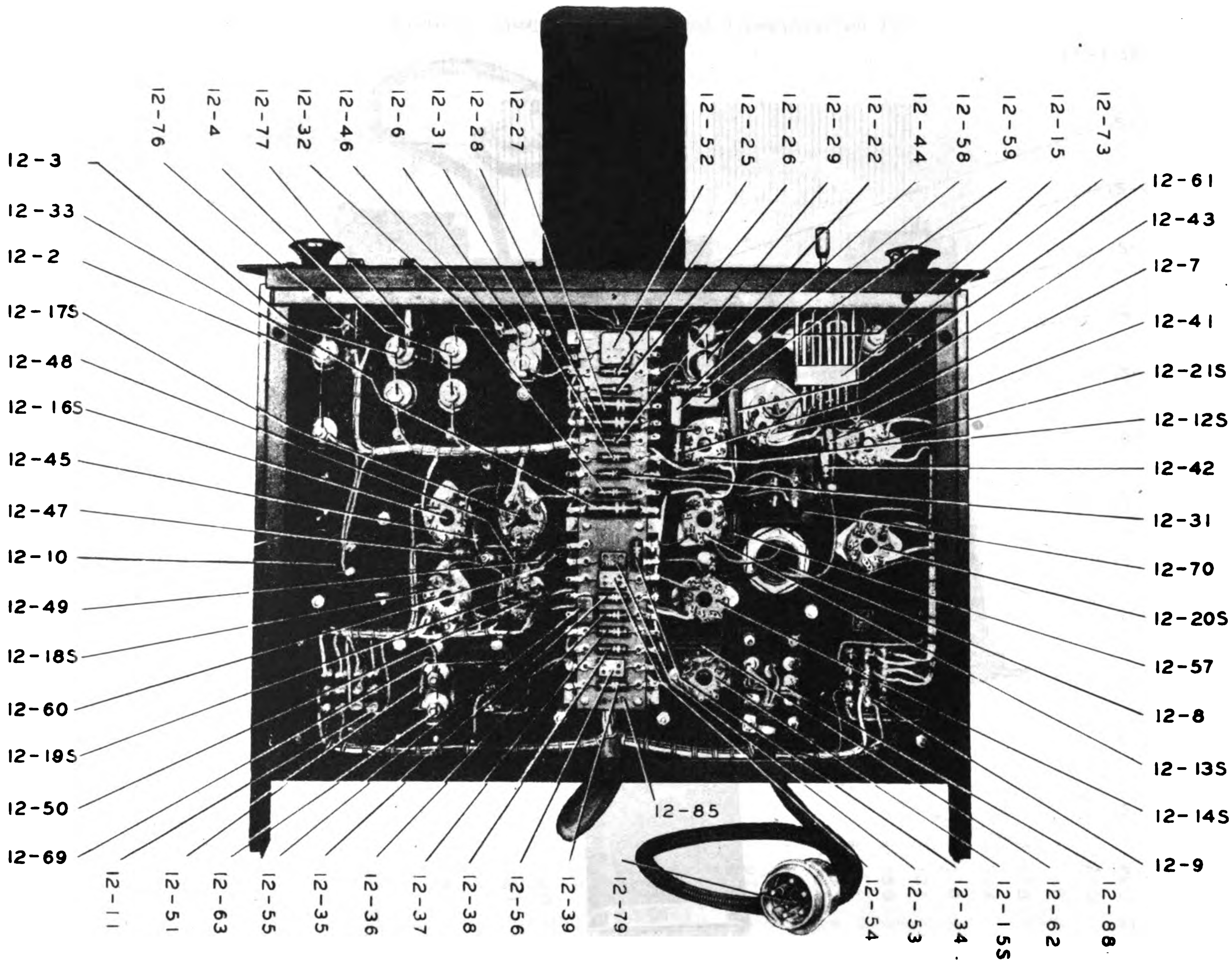


Figure 43. Oscilloscope Unit BC-991-A (modified), bottom view.

TL-11791

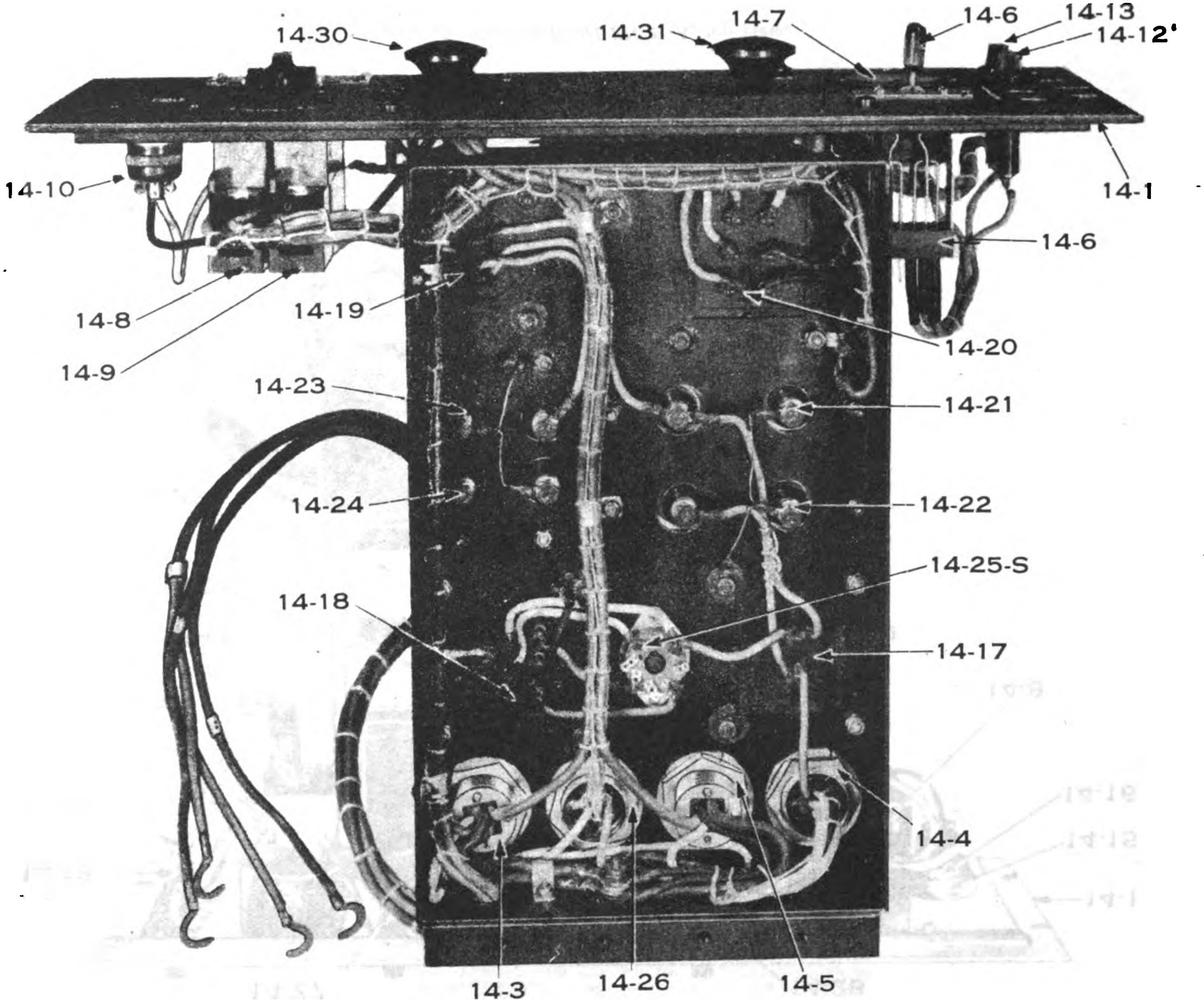


Figure 44. Control Panel PN-21-A, bottom view.

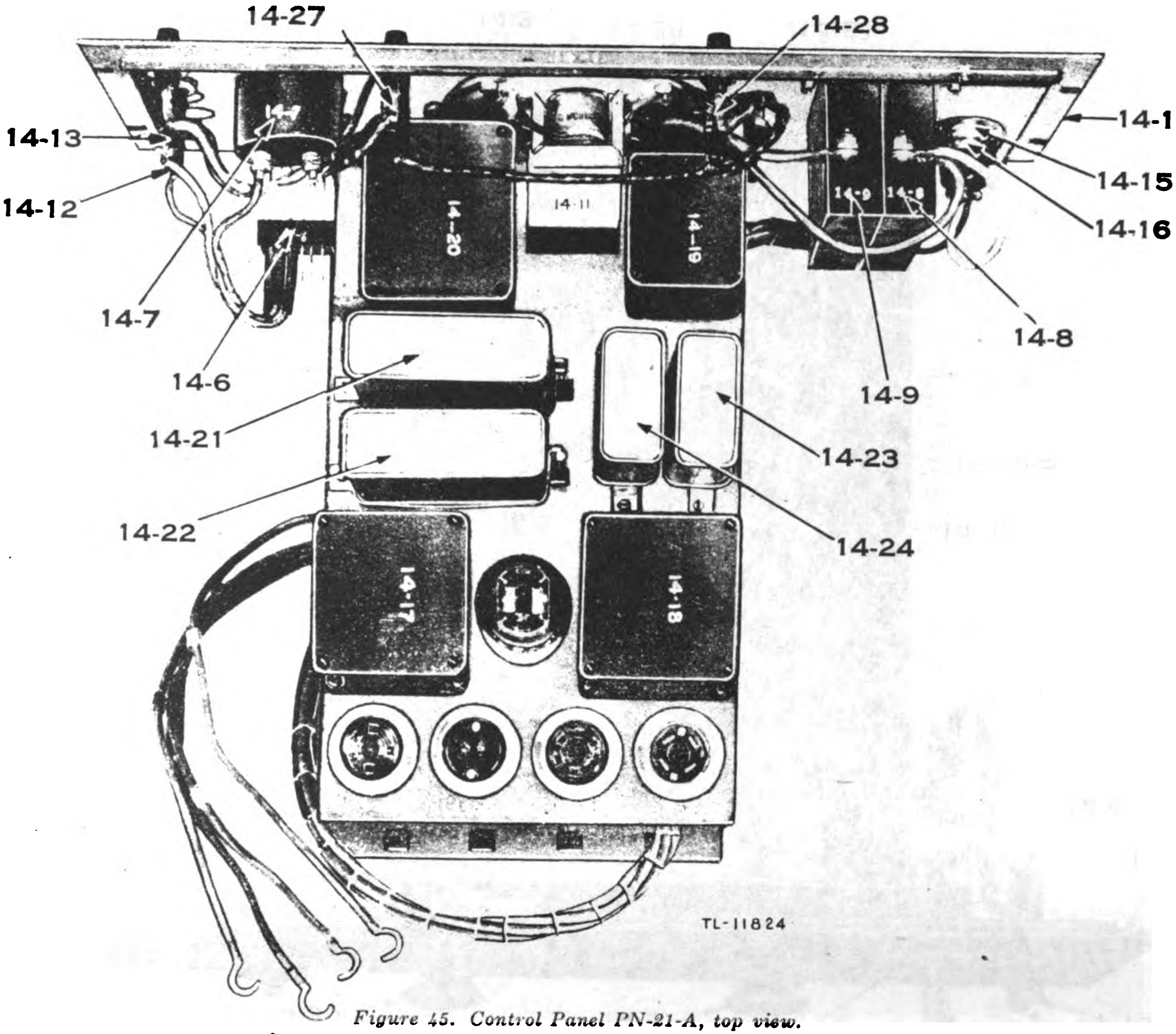


Figure 45. Control Panel PN-21-A, top view.

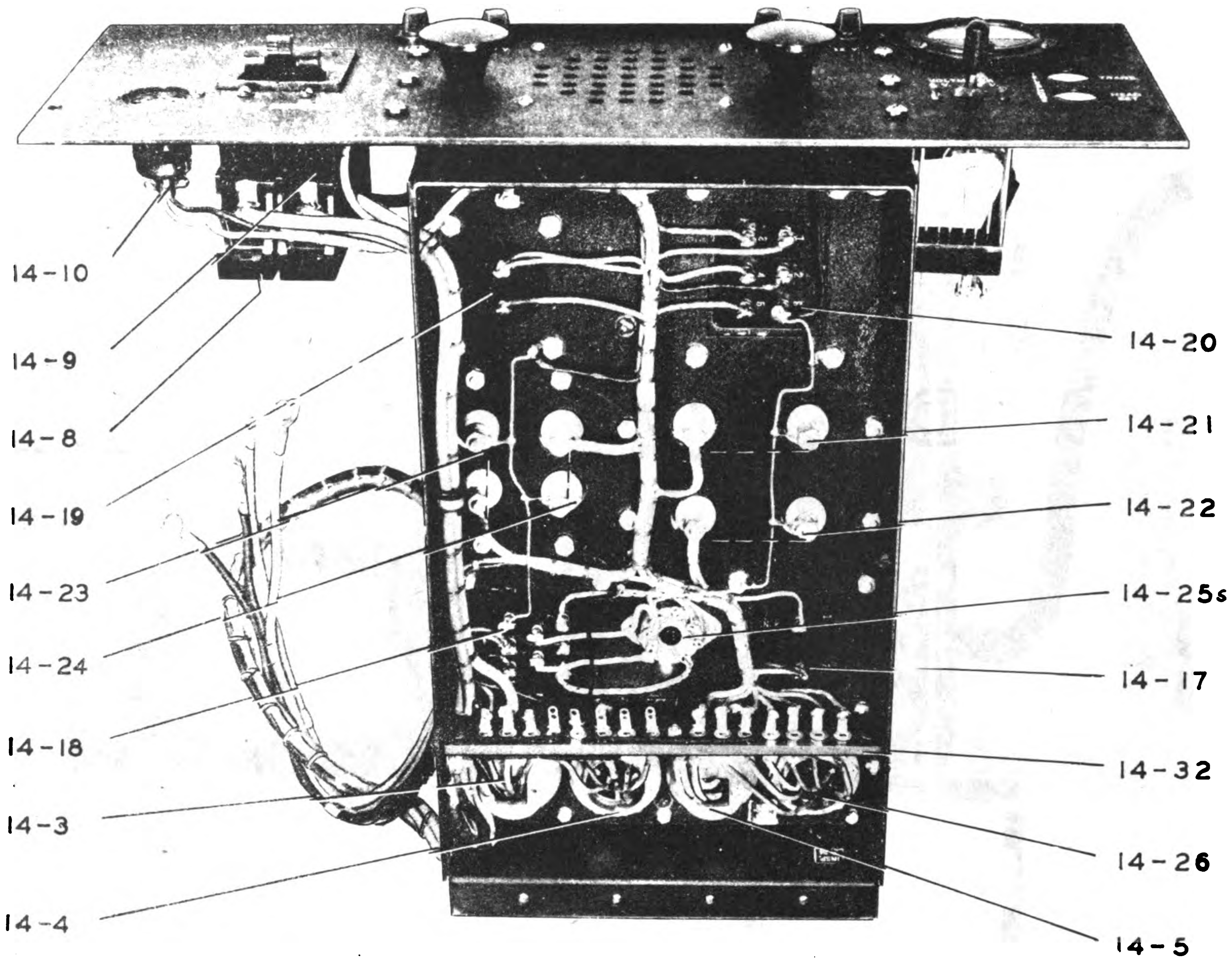


Figure 46. Control Panel PN-21-A (modified), bottom view.

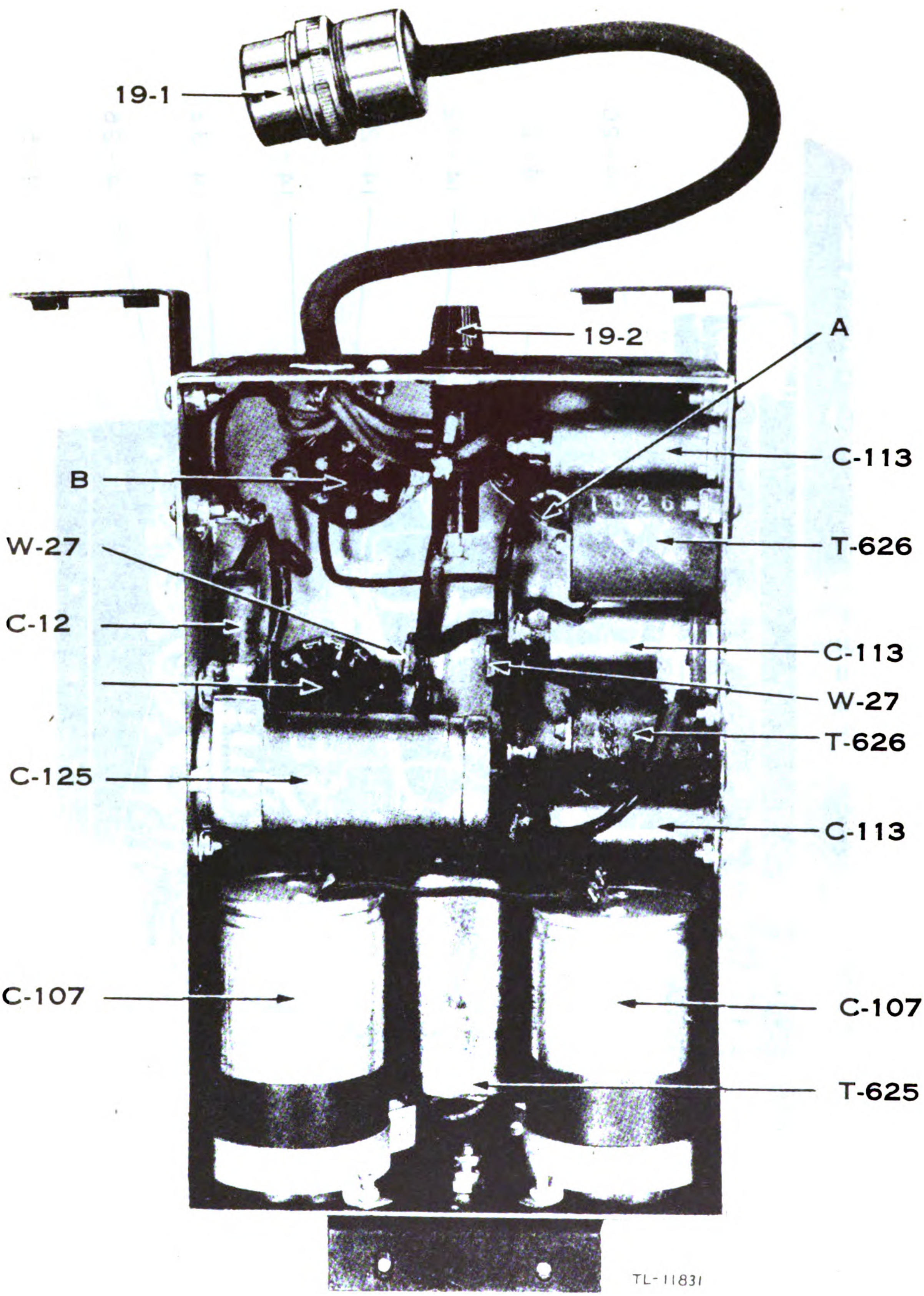


Figure 47. Vibrator Unit PE-151-A, bottom view.

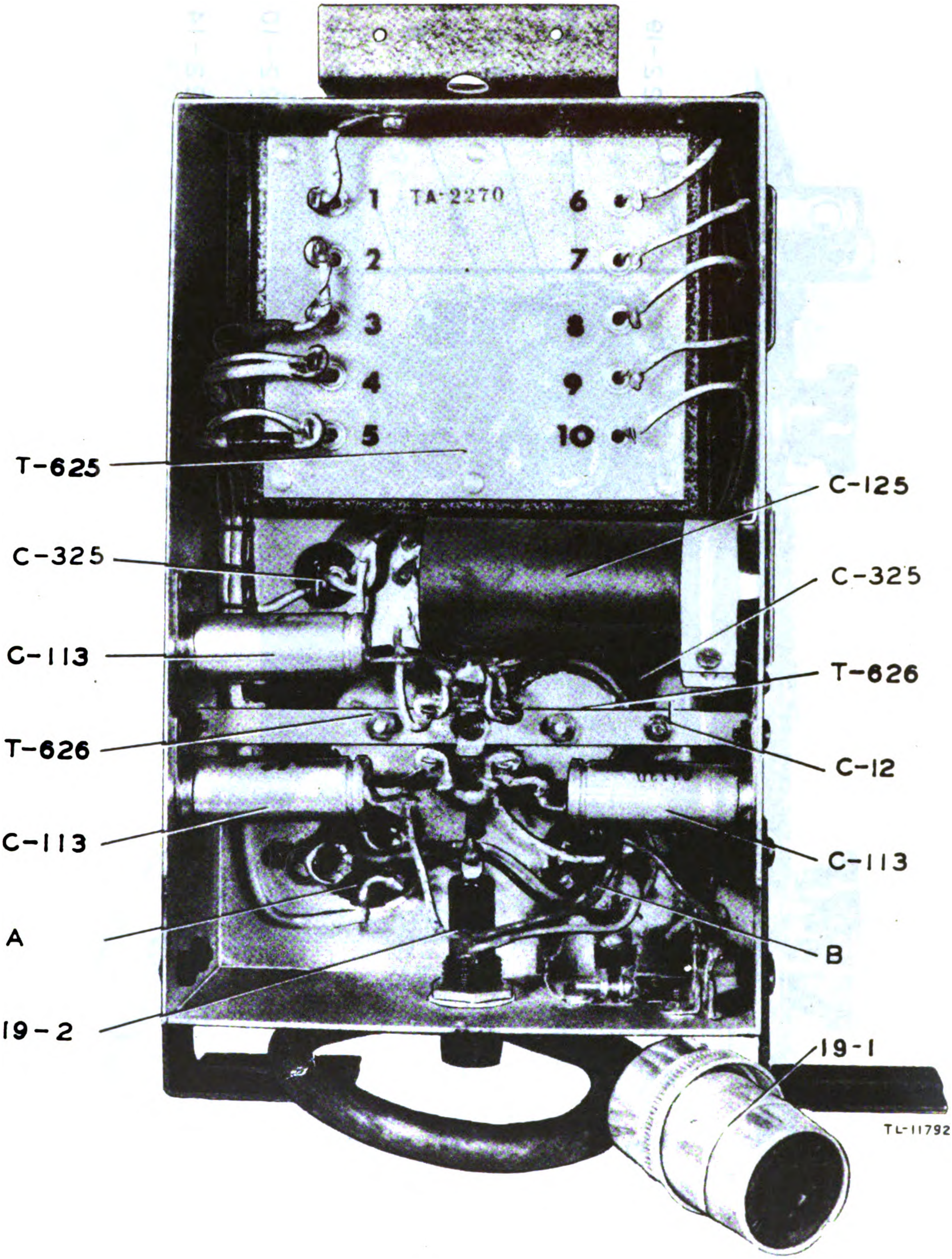


Figure 48. Vibrator Unit PE-151-B, bottom view.

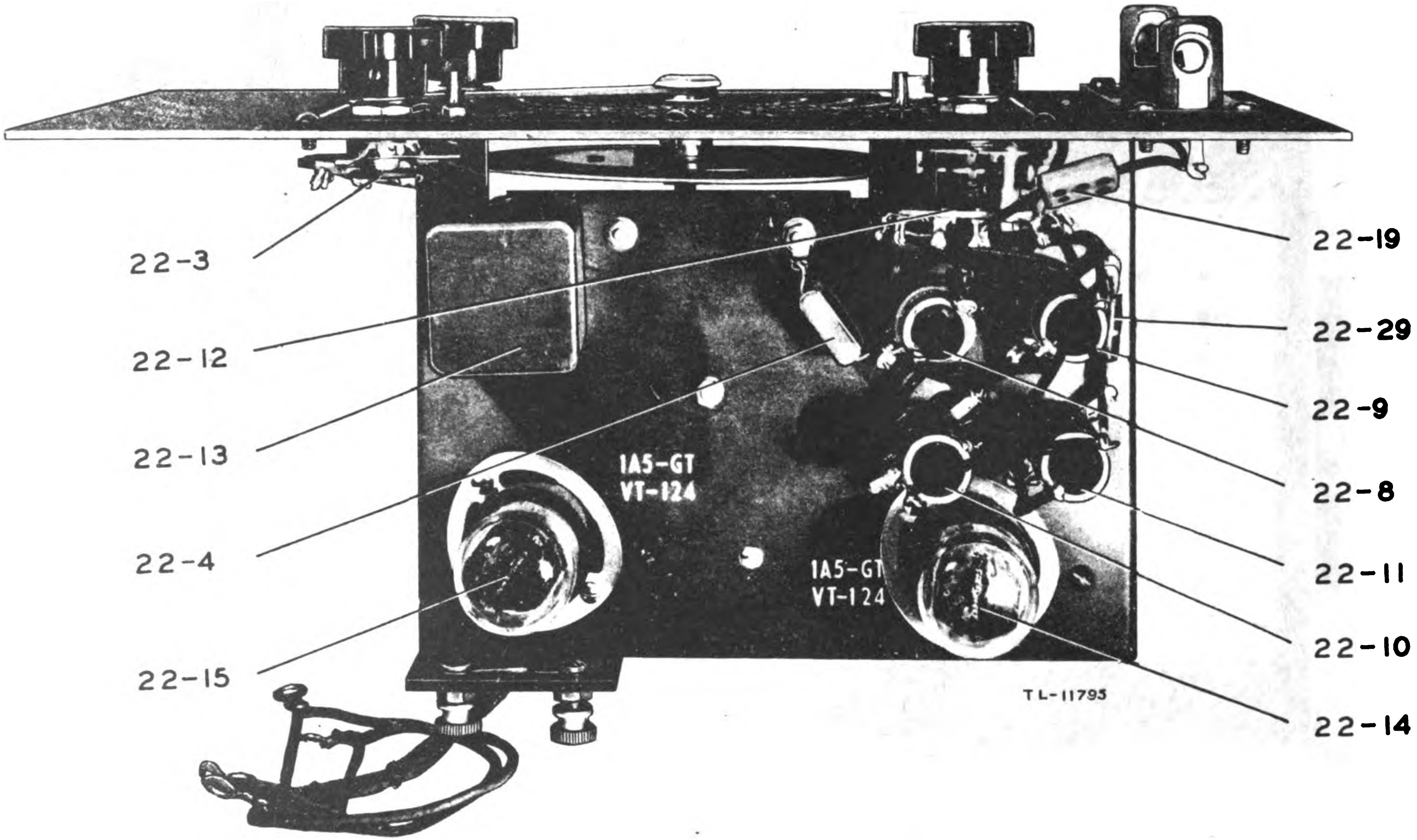


Figure 49. Radio Transmitter BC-978-A (Target), top view.

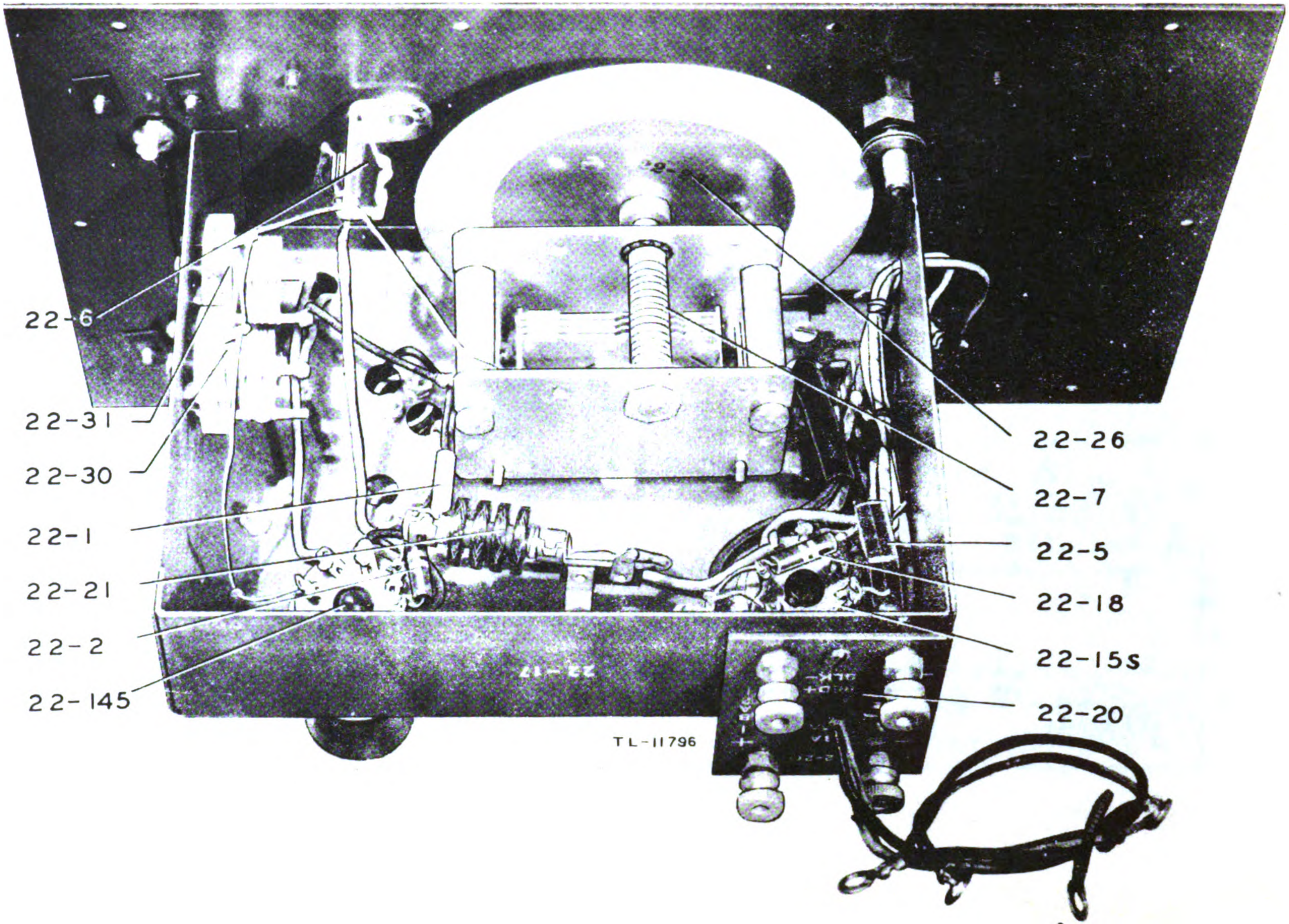
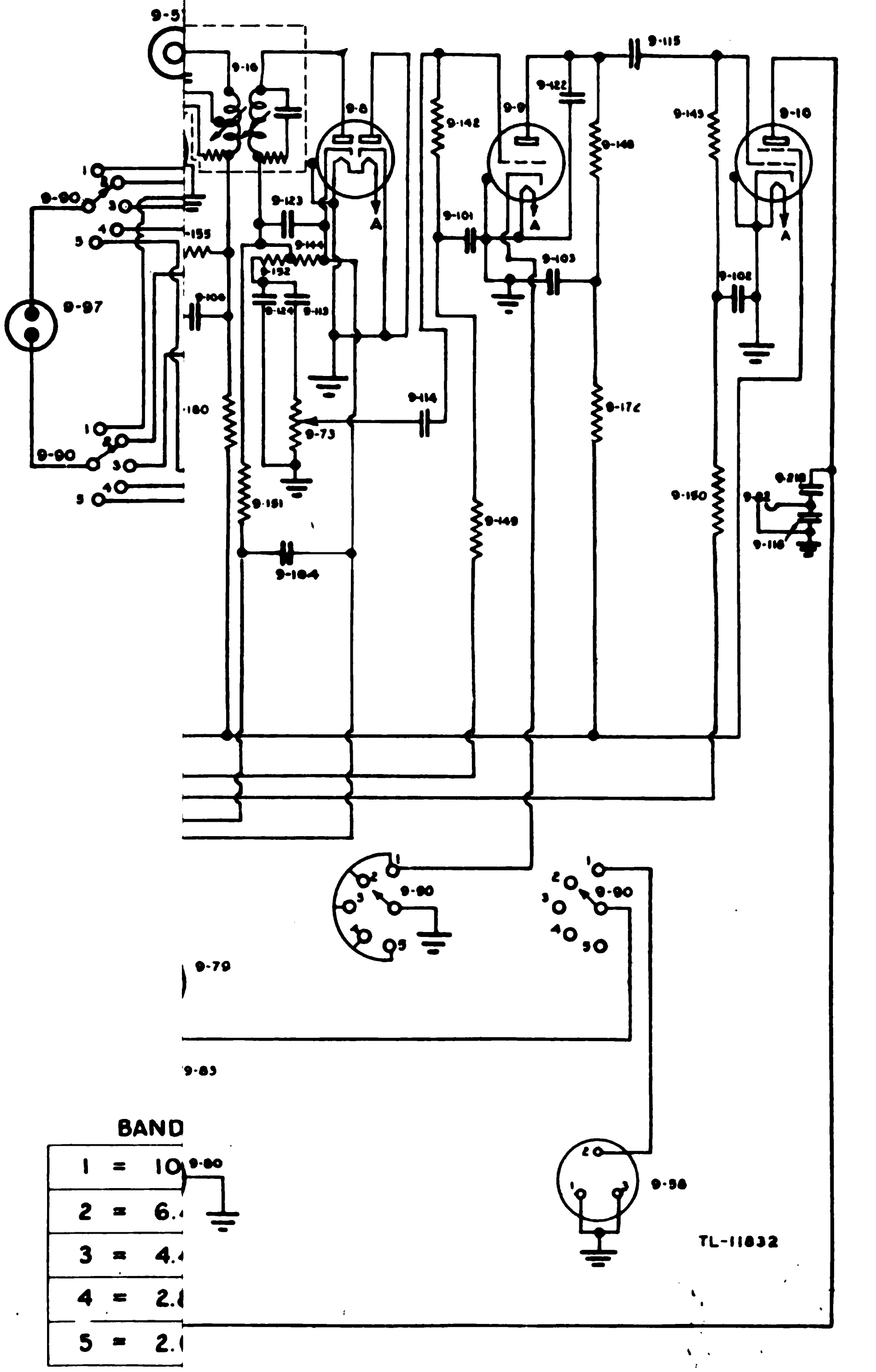


Figure 50. Radio Transmitter BC-978-A (Target), bottom view.


9-16
9-8
9-9
9-10
9-115
9-122
9-142
9-148
9-143
9-90
9-97
9-155
9-123
9-144
9-152
9-124
9-113
9-101
9-103
9-102
9-114
9-73
9-180
9-172
9-151
9-149
9-150
9-116
9-164
9-79
9-83
9-80
9-98
BAND
1 = 10
2 = 6.
3 = 4.
4 = 2.
5 = 2.
TL-11832

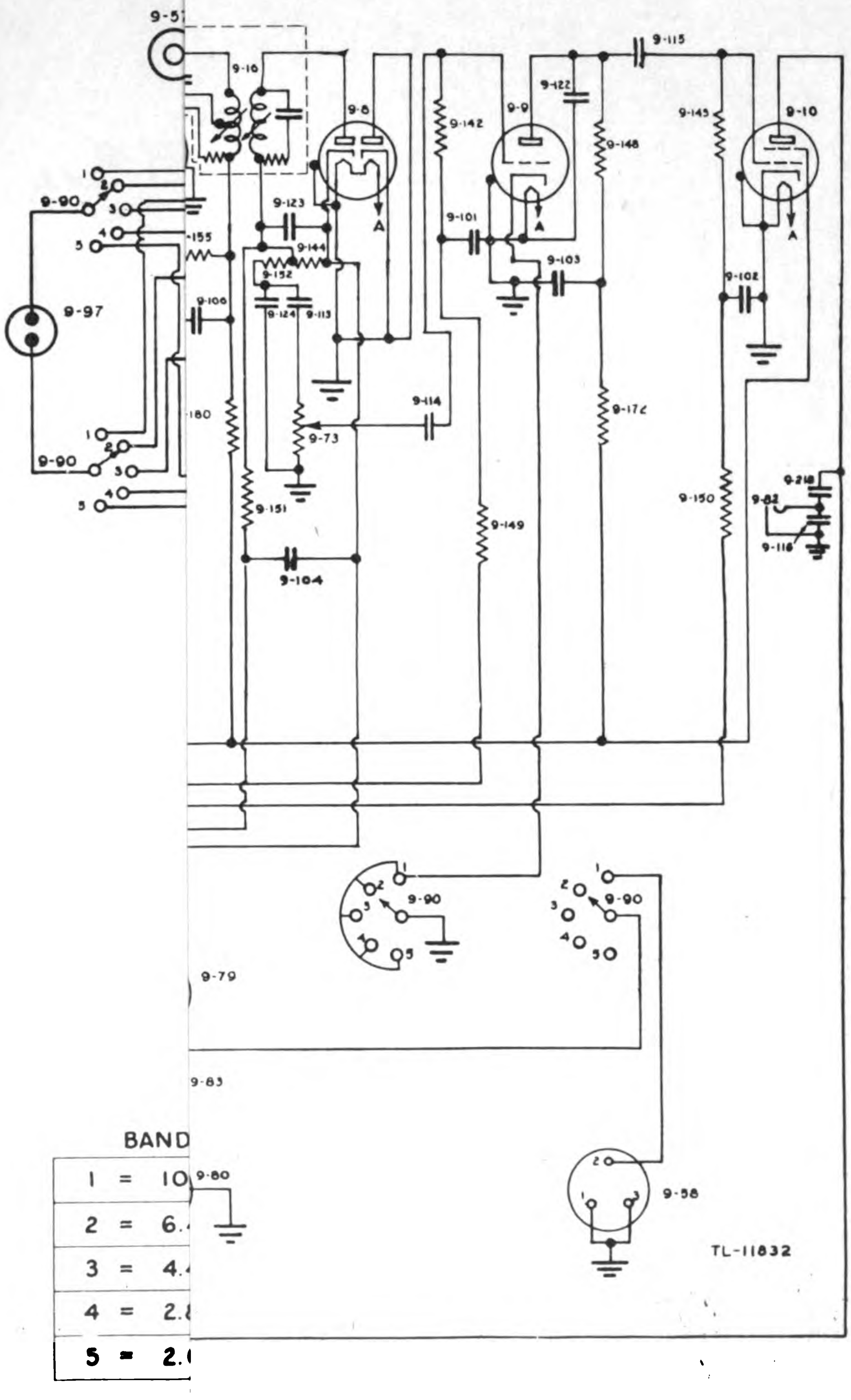


Figure 55. Telephone EE-8-A (modified), schematic diagram.

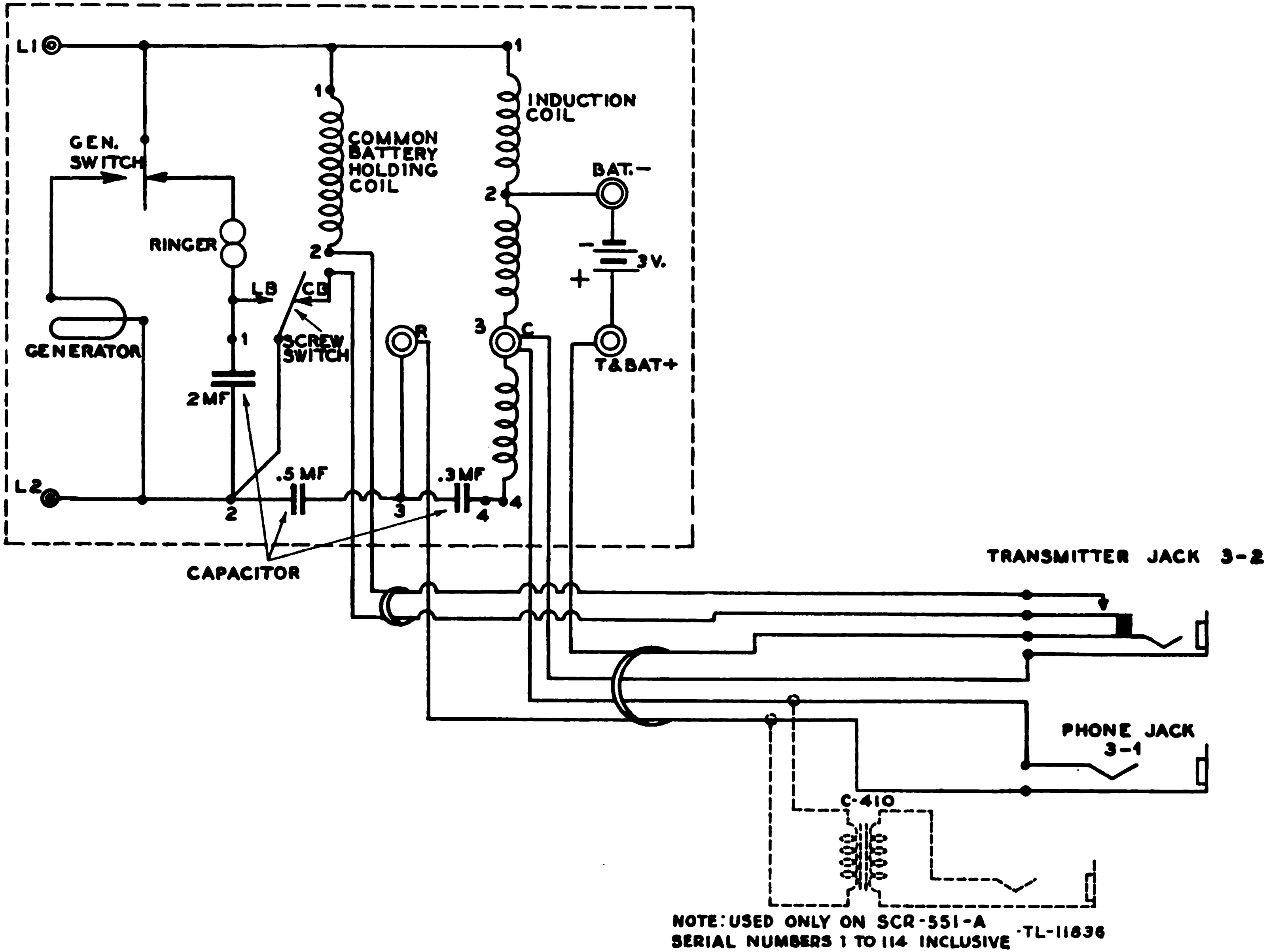


Figure 55. Telephone EE-8-A (modified), schematic diagram.

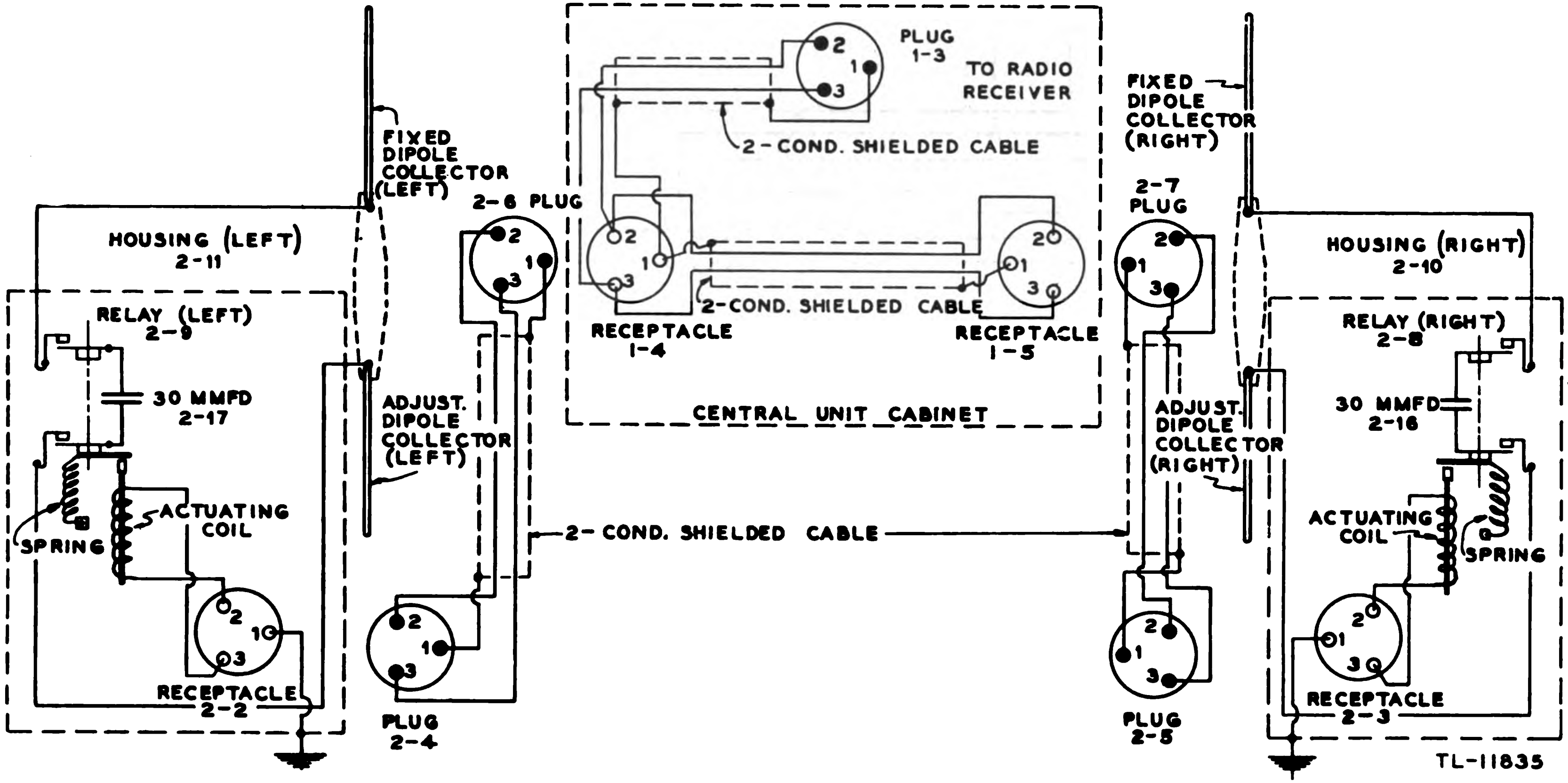


Figure 56. Antenna relays, wiring diagram.

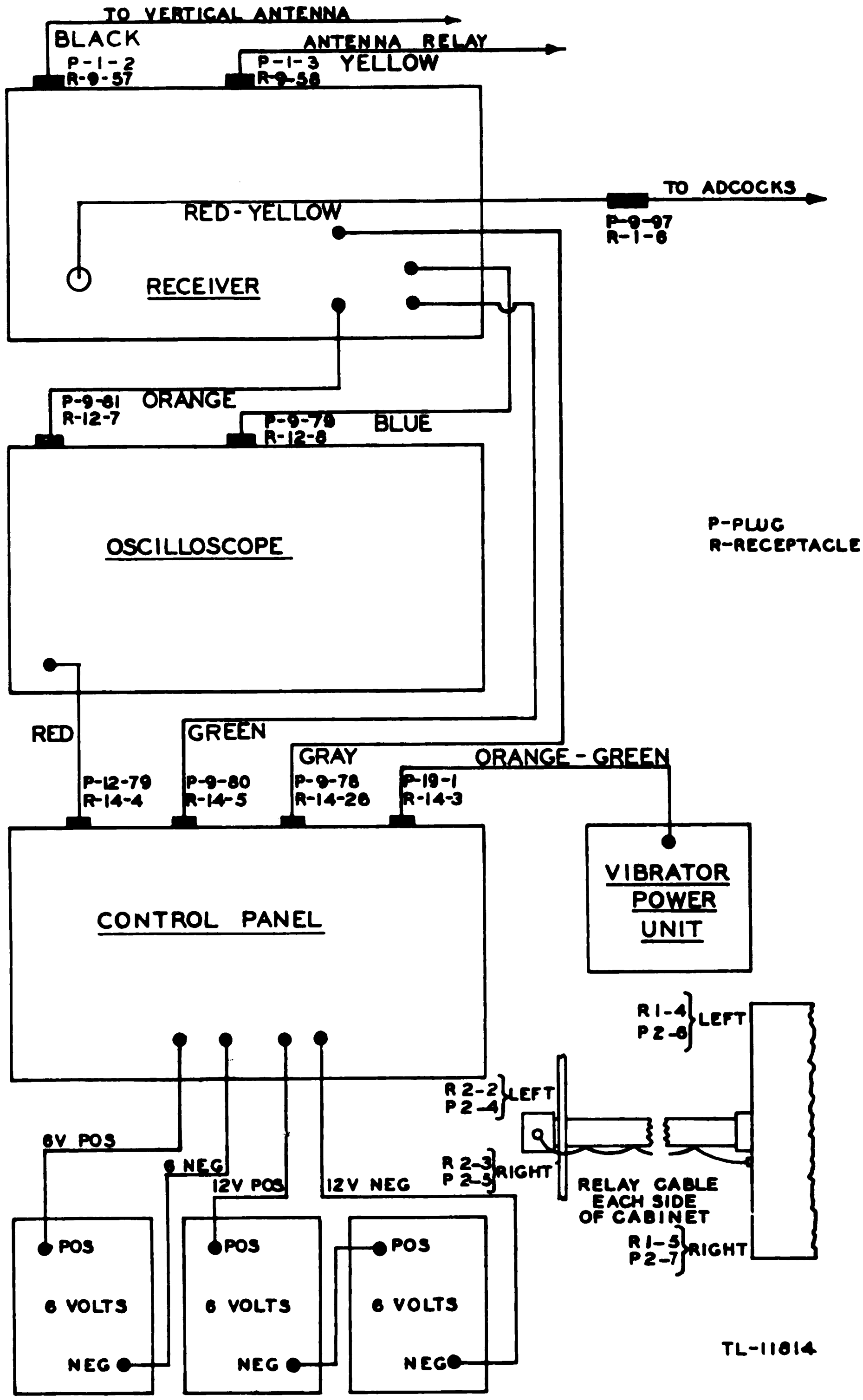


Figure 57. Radio Set SCR-551-B, cording diagram.

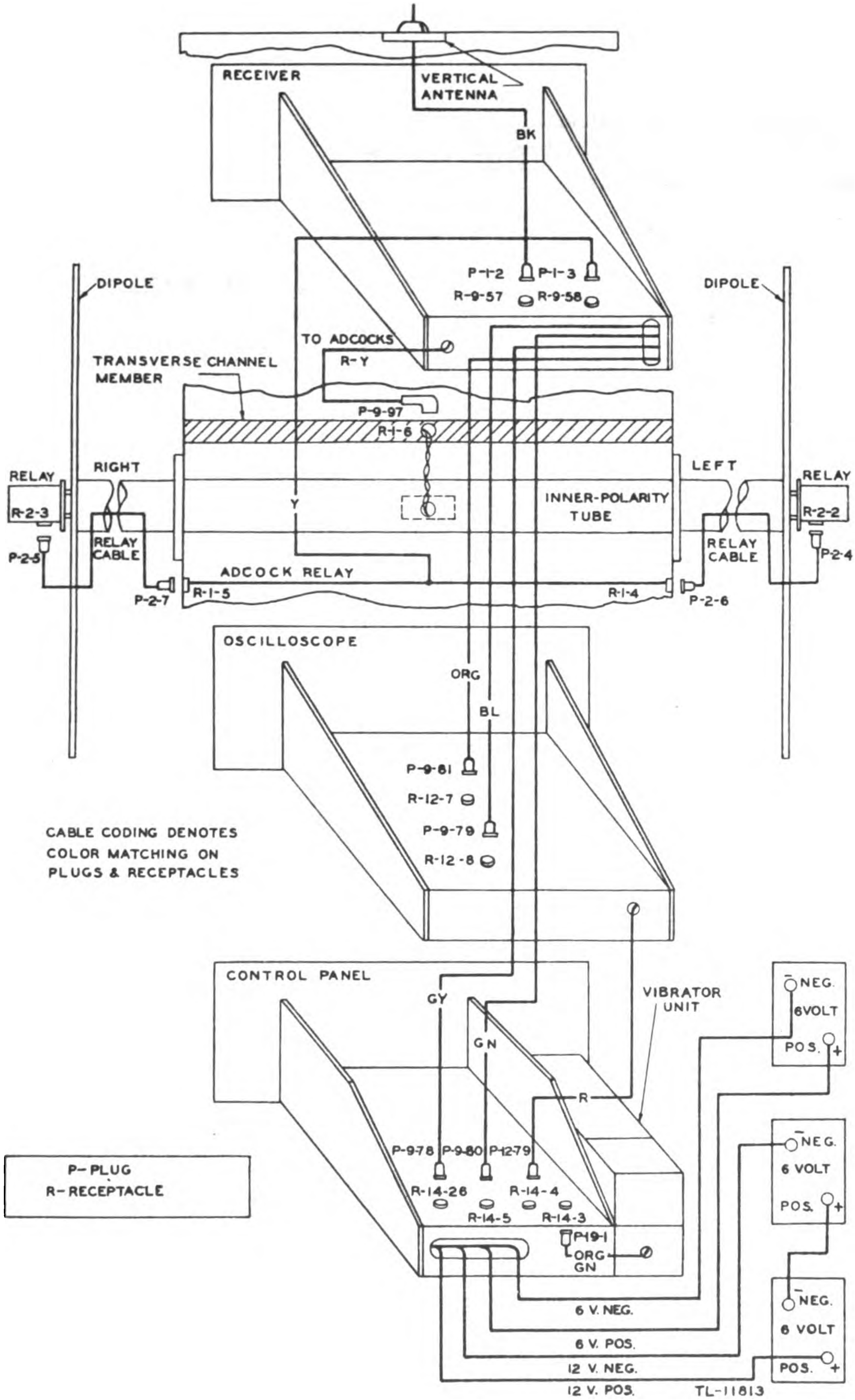


Figure 57①. *Radio Set SCR551-A, cording diagram*