

168
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2
TM
1942

RESTRICTED

TM 11-250

U.S. Dept. of Army

WAR DEPARTMENT

TECHNICAL MANUAL

RADIO SET SCR-288

October 28, 1942

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STAFF DIVISION

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TECHNICAL MANUAL
RADIO SET SCR-288

TM 11-250
1942
★ ★

CHANGES }
No. 1 }

WAR DEPARTMENT,
WASHINGTON 25, D. C., 22 May 1944.

TM 11-250, 28 October 1942, is changed as follows:

The classification **RESTRICTED** is removed from the manual.

17. Receiver unit.

* * * * *

h. (Added.) Elimination of fringe howl (output stage oscillation).—

(1) *Equipment required.*—Tube Shield, Stock No. 2Z8308, with accompanying ground clip, less grid cap, for Tube VT-148, which may be obtained by requisition through the usual supply channels.

(2) *Procedure.*—Ground the No. 1 pin of VT-148 through its socket to the chassis, using the shortest possible connection. This will result in the tube shield being grounded through its clip to Tube Pin No. 1 and through the corresponding socket connection to the chassis.

18. Generator GN-44-A.

a. Regulator adjustment.

* * * * *

(2) Loosen setscrew that holds B. Loosen B sufficiently to allow the $\frac{1}{64}$ -inch end of Gauge TL-127 to pass between vibrator contact and B.

* * * * *

b. Lubrication.—(1) Maintenance will consist of inspection and application of oil engine, U. S. Army Specification 2-104B, at the oilcan points at 4-hour intervals of operation. These oilcan points are the hand-crank bearings and tripod hinges.

(2) Every 1,024 hours of operation, or every 6 calendar months, whichever occurs first, covers should be removed from both the right and the left ends, and the exposed parts cleaned *only* with Solvent, Dry-cleaning (Federal Spec. No. P-S-661a.) or oil fuel, Diesel, U. S. Army, Specification 2-104 B. For this periodic maintenance do not remove bearings. *Caution: Do not allow fluid to enter the generator case. After parts are dried and inspection has been completed, WB-Grease, General Purpose No. 2 (U. S. Army Spec. No. 2-108) is applied. Do not use petrolatum.* There are six * * * C205. Replace cover.

* * * * *

M558376

21. Tables of replaceable parts.—For list of component parts, see paragraph 6.

a. Generator GN-44-A.

Reference No.	Stock No.	Name of part	Description	Function	Manufacturer's symbol	Drawing No.
17	6L7032-16Z	Screw	*	*	*	*
19	3H2335/5	Ball bearing	*	*	*	*
20	3H2335/6	Ball bearing	*	*	*	*
21	3H2335/4	Ball bearing	*	*	*	*
22	3H4574/M1/1	Ball bearing	*	*	*	*
23	3H2335/40	Pinion	*	*	*	*
23a	3H2335/30	Gear	*	*	*	*
24	3H2335/29	Gear	*	*	*	*
25	3H2335/12	Cap	*	*	*	*
31	3H2335/19	Coil	*	*	*	*
32	3H2335/19	Coil	*	*	*	*
36	3H2344A/B36H	Brush and spring	*	*	*	*
37a	3H2335/10	Brush	*	*	*	*
37b	3H2335/9	Brush	*	*	*	*
41	3H2335/58	Strap	*	*	*	*
42	3H2335/56	Spacer	*	*	*	*
43	3H2335/8	Bracket	*	*	*	*
44	3H2335/17	Catch	*	*	*	*
45	3H2335/36	Link	*	*	*	*
52	3H2344A/S52	Spring contact	*	*	*	*
A201	3H2344A/R1	Regulator	*	*	*	*
C201	3D170	Capacitor	*	*	*	*
R202	3Z4525	Resistor	*	*	*	*
R203	3Z4525	Resistor	*	*	*	*

b. Transmitter.

C8	3K2047114	Capacitor	*	*	*	*
C14	3DA100-76	Capacitor	*	*	*	*
C18	3D9343A7	Capacitor	*	*	*	*
L2	3C326-100	Choke coil	*	*	*	*
M2	3F1001-25	Meter	*	*	*	*
R4	3Z6627-1	Resistor	*	*	*	*
R6	3Z6618-17	Resistor	*	*	*	*
R13	3Z6033-4	Resistor	*	*	*	*
V1	2Z8657.1	Socket	*	*	*	*
V2	2Z8657.1	Socket	*	*	*	*

Refer- ence No.	Stock No.	Name of part	Descrip- tion	Func- tion	Manu- fac- turer's symbol	Draw- ing No.
V3-----	2Z8657.1-----	Socket-----	*	*	*	*
75-----	3Z737-4-----	Binding post-----	*	*	*	*
76-----	3Z737-4.1-----	Binding post-----	*	*	*	*
81-----	2Z7258.1-----	Pointer-----	*	*	*	*

c. Receiver.

J2-----	2Z5598-1-----	Jack-----	*	*	*	*
R3-----	2Z7300-----	Resistor-----	*	*	*	*
R5-----	3Z4534-----	Resistor-----	*	*	*	*
R8-----	3ZK6747-22-----	Resistor-----	*	*	*	*
R9-----	3Z6756-1-----	Resistor-----	*	*	*	*
R13-----	3Z6756-1-----	Resistor-----	*	*	*	*
R15-----	3Z6620-34-----	Resistor-----	*	*	*	*
R17-----	3Z6756-1-----	Resistor-----	*	*	*	*
R19-----	3Z6801-53-----	Resistor-----	*	*	*	*
R20-----	3ZK6747-22-----	Resistor-----	*	*	*	*
R22-----	3Z4534-----	Resistor-----	*	*	*	*
R24-----	3Z6802A2-6-----	Resistor-----	*	*	*	*
R25-----	3Z6802-1-----	Resistor-----	*	*	*	*
R27-----	3Z6610-38-----	Resistor-----	*	*	*	*
T2-----	2ZK9642.1-----	Transformer-----	*	*	*	*
T4-----	2C5344-474A/C2-----	Coil assembly-----	*	*	*	*
T5-----	2C5344-474A/C3-----	Coil assembly-----	*	*	*	*
V1-----	2Z8657.1-----	Socket-----	*	*	*	*
V2-----	2Z8657.1-----	Socket-----	*	*	*	*
V4-----	2Z8657.1-----	Socket-----	*	*	*	*
102-----	2Z9402.37-----	Terminal board-----	*	*	*	*
105-----	2C5344-474/C5-----	Cable assembly-----	*	*	*	*
-----	2Z8308-----	Tube shield-----	No. 1727	Shield for Tube VT- 148	*	*
115-----	2C5344-474A/S1-----	Shield can-----	*	*	*	*

d. Miscellaneous.

Reference No.	Stock No.	Name of part	Description	Function	Manufacturer's symbol	Drawing No.
127	6Z1907-1	Clamp				
183	6Z1907	Clamp				

[A. G. 300.7 (1 Apr 44).]

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 paragraph 9a, FM 21-6: Armies (2); Corps (2); Sv C (1); Depts (1); Def Comds (1); D (2); R 6, 7 (5); Bn 6, 7 (5); C6 (3); IC 11 (5).

IC 11: T/O 11-107, Sig Dep Co; 11-127, Sig Rep Co; 11-327, Sig Port Sv Co; T/O & E 11-587, Sig Base Maint Co.; 11-592, Hq & Hq Co, Sig Base Dep; 11-597, Sig Base Dep Co.

For explanation of symbols, see FM 21-6.

TECHNICAL MANUAL

RADIO SET SCR-288

CHANGES
No. 2

WAR DEPARTMENT
WASHINGTON 25, D. C., 17 March 1945

TM 11-250, 28 October 1942, is changed as follows:

SAFETY NOTICE

The maximum voltage * * * is being operated. It is to be noted that no interlocks are provided, as no high-potential parts are exposed or accessible during operation except the ungrounded side of the telegraph key.

1. General.—Radio set SCR-288 (fig. 1) * * * approximately 71 pounds. Three water-repellant carrying cases are provided into which the equipment may be packed for transportation or storage. (See figs. 2 and 3.)

2. Weights.—The weights of * * * are as follows:

Radio receiver and transmitter BC-474-A with bag, four legs, two headsets, key, microphone, filter FL-10, and one battery pack (filter and battery pack in their compartments) (fig. 2)-----

pounds — 37

Generator GN-44-A with bag and Cord CD-125 (figs. 3 and 4)-----

pounds— 24

* * * * *

8. Installation.—See figures 5 * * * personnel must improvise.

* * * * *

d. Open radio receiver-transmitter * * * the generator socket. Plug microphone, headset, and key into their respective jacks, as marked on the panel, and attach the key to the cabinet lid by screwing the thumbscrew (attached to key) into the nut-provided near right-hand side of cover. (The key microphone, * * * to the right.)

* * * * *

9. Operation.

* * * * *

b. Receiver operation by means of batteries (see figs. 5 and 6).

* * * * *

*These changes supersede TB 11-250-1, 12 October 1944.

AGO 244C—Mar. 622803°—45—1

(5) Turn **receiver tuning control** slowly until pointer rests over scale graduation indicating approximate frequency of the desired signal. If the latter * * * most comfortable reception.

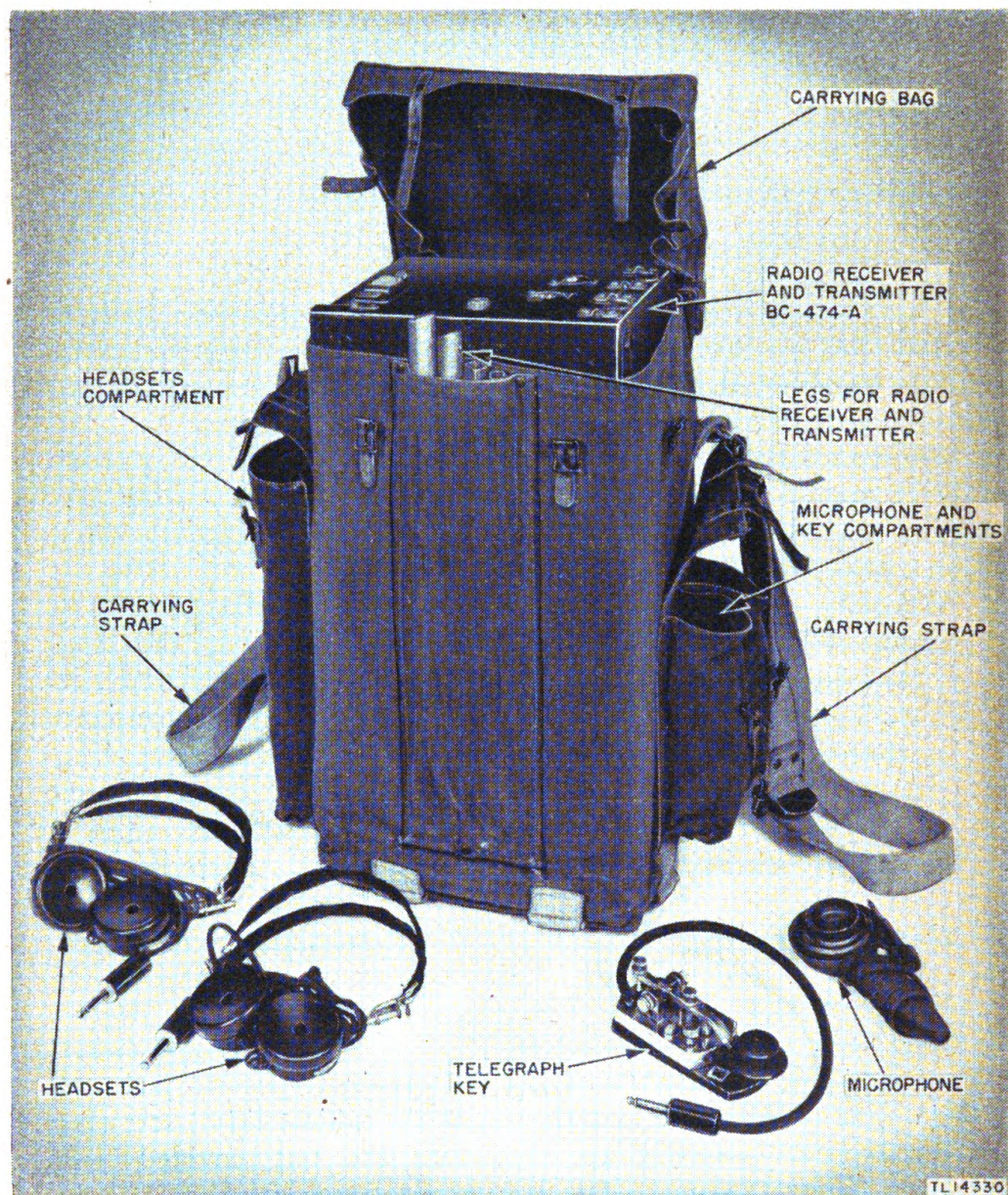


FIGURE 2.—Radio receiver and transmitter BC-474-A and component parts.

(6) If the desired * * * with a varying tone. Push **PHONE-C. W.** switch to **PHONE**, and turn **receiver tuning control** back and forth very slightly for maximum signal strength and clarity. Adjust the **VOLUME** control knob as desired.

* * * * *

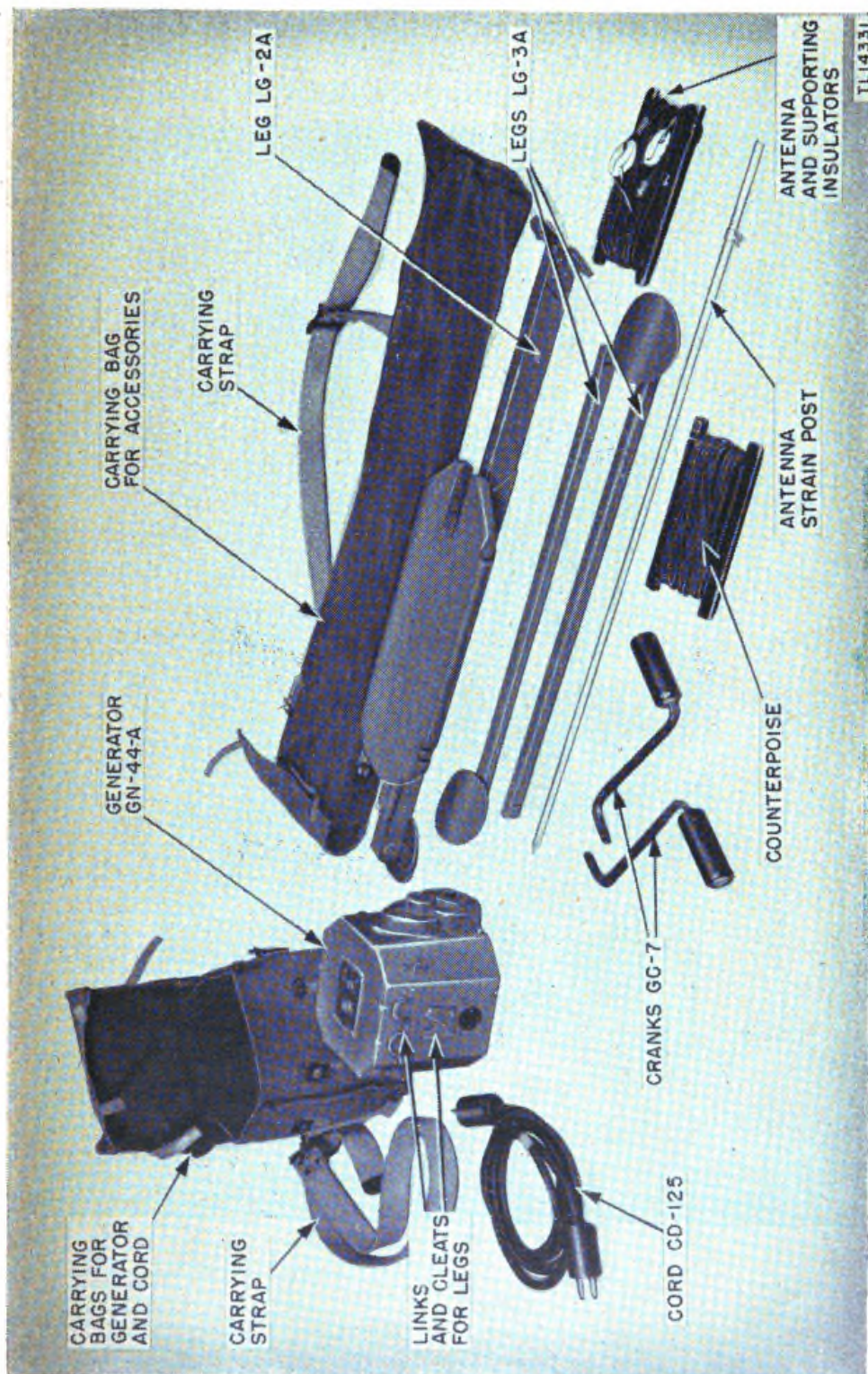


FIGURE 3.—Generator GN-44-A and accessories.

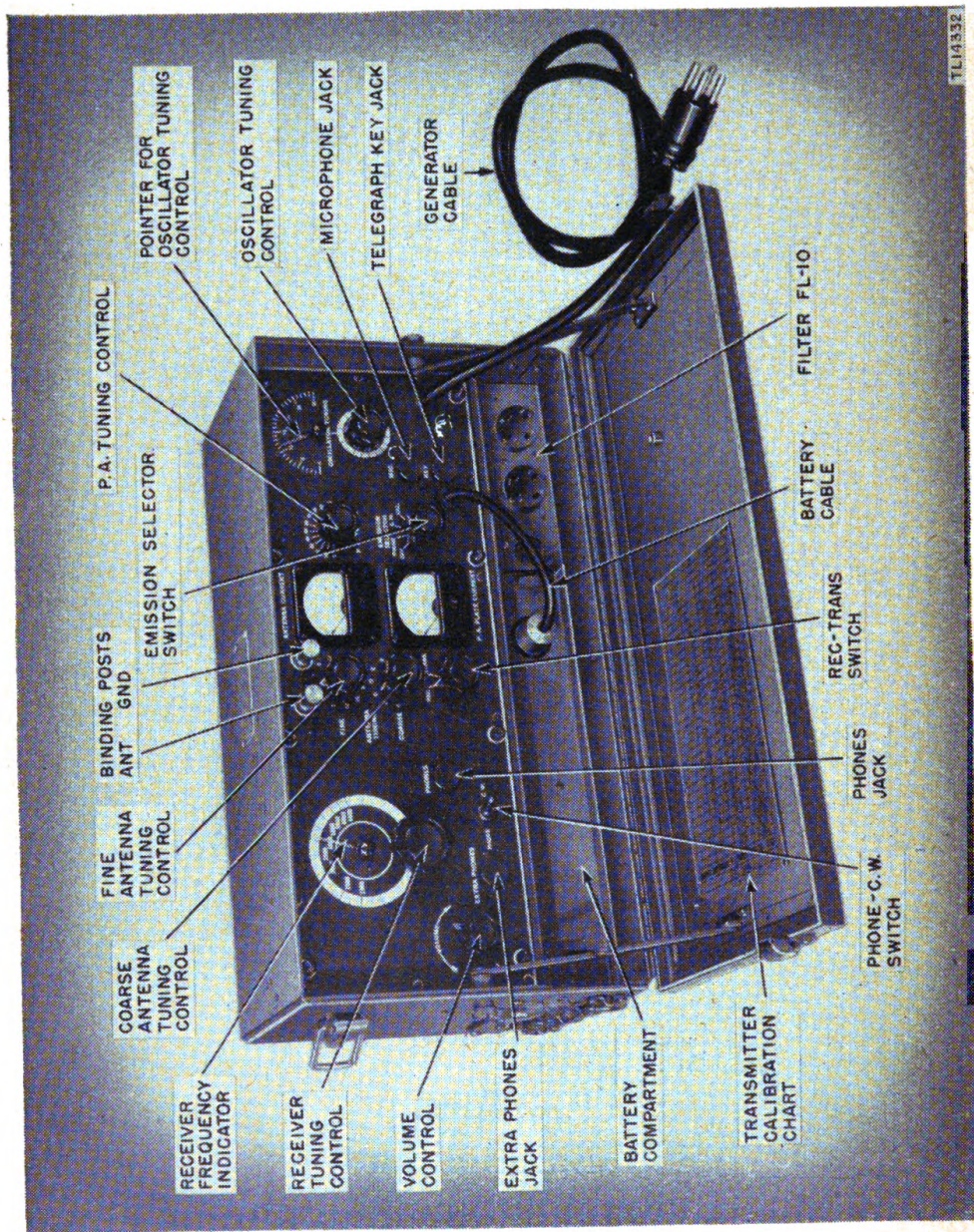


FIGURE 6.—Radio receiver and transmitter BC-474-A—front view.

d. Transmitter operation (see fig. 6).—After the equipment * * * operation as follows:

(1) Determine (directly or * * * **OSCILLATOR TUNING** control. (The digits on the left of the hyphen refer to the setting of the **OSCILLATOR TUNING** control pointer; those on the right refer to the setting of the dial attached to the **OSCILLATOR TUNING** control knob.) Adjust **OSCILLATOR TUNING** control to required setting by turning the **OSCILLATOR TUNING** control knob.

* * * * *
(3) Place **FINE** antenna control on 5 and **COARSE** antenna control on A. As soon as * * * dip is obtained.

* * * * *
(5) If c-w transmission * * * operate the key. No sidetone will be heard in the receiver when using c-w transmission.

(6) To place transmitter * * * to OFF position. When receiving, the transmitting tubes may be kept heated by continuing to crank the generator slowly.

f. Net control station operations.—For net control station operation, proceed as follows:

(1) Set transmitter to the desired frequency as outlined in *d* (1) above.

(2) Place the **EMISSION SELECTOR** switch in the **CAL** position and crank the generator.

(3) With the receiver **PHONE-C. W.** switch in the **C. W.** position, tune the receiver for a zero beat with the transmitter by rotating the receiver tuning control. (See *b* (5), (6), and (7) above.)

g. Generator operation.—The generator operator * * * speed is reached.

15. Characteristics of vacuum tubes.

Signal Corps type		VT-107-A (6V6-GT)	VT-146 (1N5-GT)	VT-147 (1A7-GT)	VT-148 (1D8-GT)		VT-149 (3A8-GT)	
		Amplifier Oscillator	Amplifier	Converter	Triode	Penode	Triode	Penode
Transconductance.....	Micromhos.....	3,750	750	250	575	925	325	750
Conversion transconductance.....	Micromhos.....			250				
Total cathode current.....	Ma.....			2.4				
Amplification factor.....					25		65	

*The heaters of * * * 1.4-volt operation.

SECTION IV MAINTENANCE

Note: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on WD AGO Form 468 (Unsatisfactory Equipment Report); by Army Air Forces, on Army Air Forces Form 54 (Unsatisfactory Report). If either form is not available, prepare the data according to the sample form reproduced in figure 21.1.

WAR DEPARTMENT UNSATISFACTORY EQUIPMENT REPORT

FOR <i>Signal Corps</i>		DATE <i>29 January 45</i>	
FROM <i>579 Sig Repair Co. APO 101</i>	MATERIAL <i>San Francisco, Cal.</i>		
TO <i>Signal Officer Ninth Army</i>			
COMPLETE MAJOR ITEM			
NOMENCLATURE <i>Radio Receiver BC-312-N</i>		TYPE <i>Ground</i>	
MODEL <i>N</i>	MANUFACTURER <i>Farnsworth Television and Radio Corp.</i>		
U. S. A. REG. NO. <i>Order No. 18993-Phila - 44</i>	SERIAL NO. <i>359</i>	DATE RECEIVED <i>5 Dec 44</i>	
EQUIPMENT WITH WHICH USED (IF APPLICABLE) <i>Radio Set SCR-399</i>			
NOMENCLATURE OF DEFECTIVE COMPONENT			
PART NO. <i>S.C. stock No. 3D281</i>	TYPE <i>Capacitor (ref. symbol C81); fixed, 0.01 mfd.; 100 vdc (working)</i>		
MANUFACTURER <i>Farnsworth Television and Radio Corp.</i>	DATE INSTALLED <i>17 Dec 44</i>		
LENGTH OF SERVICE			
DATE OF INITIAL TROUBLE <i>24 Dec 44</i>	TOTAL PERIOD OF OPERATION BEFORE FAILURE (FILL IN WHERE APPLICABLE)		
TOTAL YEARS MONTHS DAYS	YEARS	MONTHS	DAYS HOURS MINUTES SECONDS
TIME INSTALLED <i>0 0 7</i>	<i>-</i>	<i>-</i>	<i>50 - -</i>
DESCRIPTION OF TROUBLE AND PROBABLE CAUSE			
<i>Capacitor C81 shorts out due to humid operating conditions</i>			
UNUSUAL SERVICE CONDITIONS			
<i>Operation in tropics</i>			
TRAINING OR SKILL OF USING PERSONNEL (CHECK ONE)			
POOR FAIR GOOD			
DESCRIPTION OF ANY REMEDIAL ACTION TAKEN <i>Radio set has been given moistureproofing and fungiproofing treatment, 15 January 45</i>			
RECOMMENDATIONS <i>Substitution of capacitor designed for tropical operation</i>			
OFFICE	STATION	DATE	SIGNATURE
			<i>E. A. Wilson</i>
TO CHIEF <i>Signal Officer, Washington 25, DC</i>	NAME <i>E. A. WILSON</i>		
NAME	RANK AND TITLE <i>Capt., Sig C</i>		
STATION	ORGANIZATION <i>579 Sig Repair Co.</i>		

INSTRUCTIONS

1. It is imperative that the Chief of Technical Service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in material. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.
2. This form will be used for reporting manufacturing, design or operational defects in material with a view to improving and correcting such defects, and for use in recommending modifications of material.
3. This form will not be used for reporting failures, isolated material defects or malfunctions of material resulting from fair-weather-and-tor or accidental damage nor for the replacement, repair, or the issue of parts and equipment. It does not replace currently authorized operational or performance records.
4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 700-10 (Change No. 3).

W. D., A. G. O. Form No. 468
1 December 1944

5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches or other illustrative material are highly desirable.
6. When cases arise where it is necessary to communicate with a chief of service in order to ensure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.
7. This form will be made out by using or service organizations and forwarded to duplicate through command channels to the chief of technical service. The office of the chief of technical service receiving the report will forward an information copy to the Commanding General, Army Ground Forces or Army Air Forces, whichever is applicable, and to the Commanding General, Army Service Forces.
8. Necessity for using this form will be determined by the using or service troops.

16-57700-1

TL17466

FIGURE 21.1.—Unsatisfactory equipment report with sample entries.

17. Receiver unit.

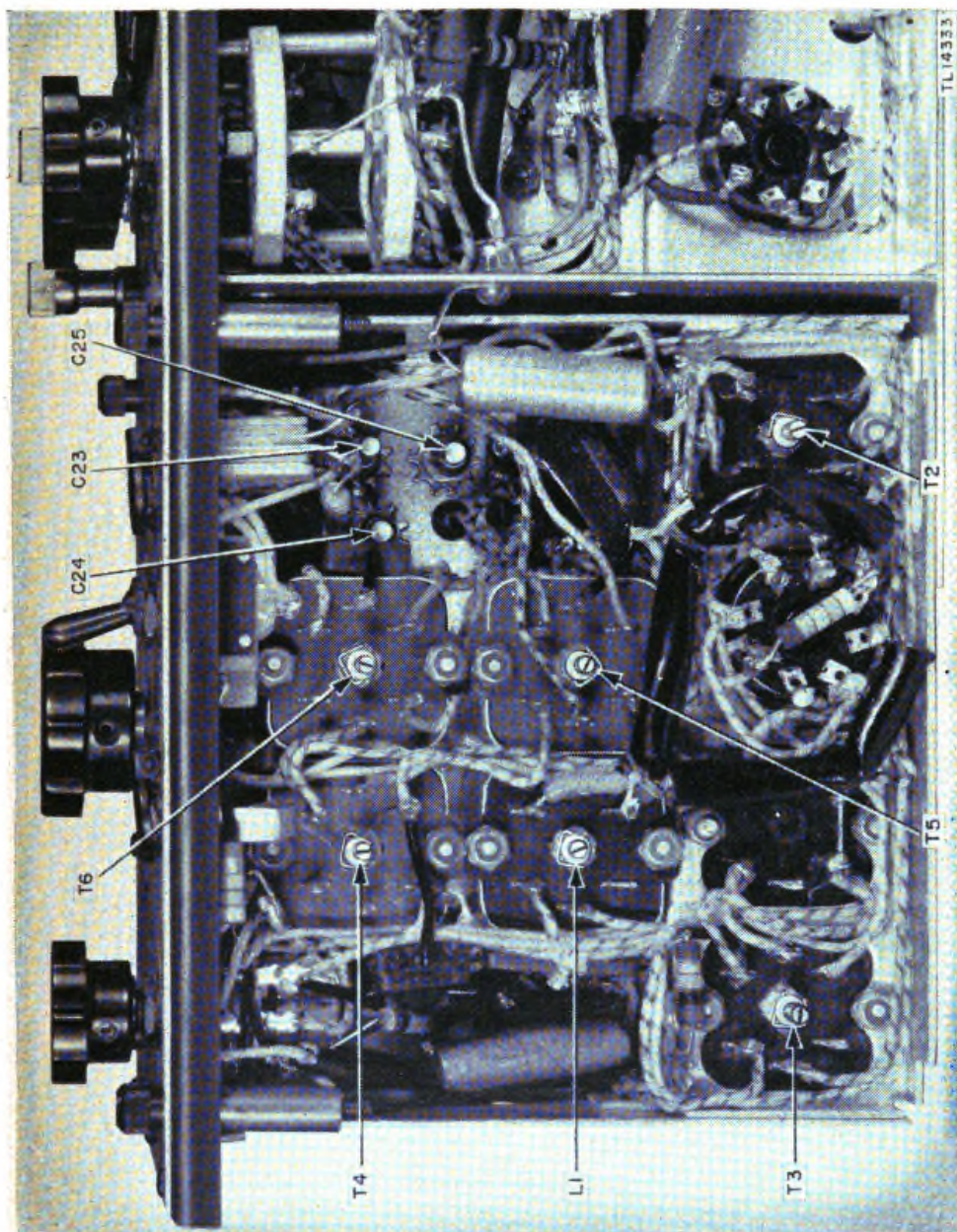


FIGURE 27.1.—Radio receiver and transmitter BC-474-A, chassis—bottom view showing location of receiver alignment parts.

h. Elimination of fringe howl (output stage oscillation) (As added by C 1) (Superseded).—Information has been received from the field concerning the output stage oscillations or fringe howl in radio receiver and transmitter BC-474-A after a relatively short period of service. To remedy this situation it is suggested that the metal outer shell of an exhausted battery BA-30, Ray-O-Vac Leak Proof type, be adapted as a shield for tube VT-148. Proceed as follows:

(1) Remove the crimped-over bottom portion of the outer casing of battery BA-30. Use an emery wheel, file, or any appropriate tool available.

(2) Remove and discard the inner zinc cell and cardboard separator which is between the cell and the outer casing.

(3) Clean the outside of the casing down to the bare metal using a wire wheel, paint remover, sandpaper, or other means. This is necessary to insure good electrical connection between the shield and the ground clip.

(4) Push the shield down over tube VT-148 until the bottom of the shield is flush with the bottom of the tube base.

(5) Using tinner's shears or a hacksaw, cut a ground clip spring strip approximately $\frac{3}{8}$ inch by $1\frac{1}{2}$ inches from any available piece of copper or brass. (See fig. 27.2.) The material used should retain some spring when bent.

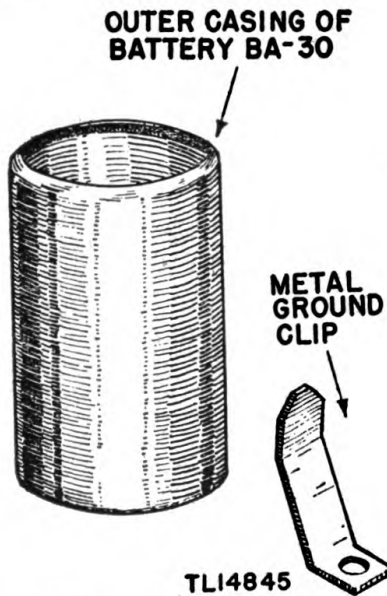


FIGURE 27.2.—Shield and clip for VT-148.

(6) Drill a hole or cut a slot in one end of the clip just large enough to allow fitting under the head of the screw located on the chassis between the socket of tube VT-148 and the coil shield facing the front panel.

(7) Clean the strip with sandpaper and smooth the edges with a file to remove burrs.

(8) Loosen the screw on the chassis and scrape the area under and adjacent to the screw to insure good electrical contact.

(9) Bend the ground clip as shown in figure 27.2 and fasten the clip under the head of the screw on the chassis.

(10) Insert VT-148 and the shield into the socket.

(11) Adjust the spring tension of the ground clip so that it makes firm electrical contact with the side of shield.

ALINEMENT PROCEDURE (page 38)

Order of alinement	Connection to receiver	Artificial ant. series capacitor	Frequency setting	Tuning dial setting	Circuits to adjust	Adjustment symbols	Adjust to obtain—
1	VT-149 i-t grid cap.	*	*	*	*	*	*
2	VT-147 converter cap.	*	*	*	*	*	
3	VT-147 converter cap.	*	*	*	*	*	
*		*	*	*	*	*	

¹ For this adjustment * * * steps 4 to 9. inclusive.

18. Generator GN-44-A.—See figures 10, 11, 28, 29, and 30.

* * * * *

b. Lubrication (Superseded).—Refer to figure 27.3.

WAR DEPARTMENT LUBRICATION ORDER No. 3050

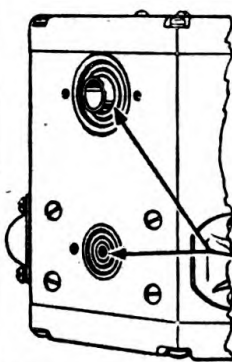
SIGNAL CORPS



HAND GENERATORS (Radio) GN-35, 37, 44, 45, 53, 54 AND 57



Operating Hours • Lubricant



LEFT END, Covers Removed

Lubricant • Operating Hours

Drive Gear **WB 1024**

Clean and coat teeth

Cranking Shaft Bearing & **WB 1024**

Intermediate Pinion Brgs.

Remove intermediate pinion, wash the two bearings and cranking shaft bearing. Clean bearing outer races in cover and magnet frame. Fill bearing retainers and coat outer races sparingly with lubricant.

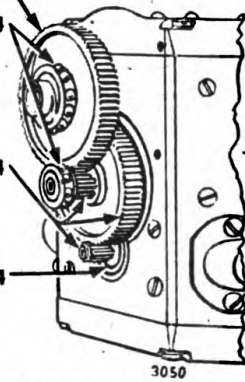
Intermediate Gear & Pinion **WB 1024**

& Armature Drive Pinion

Clean and coat teeth. When reinstalling cover, place small amount of lubricant in recess for armature drive pinion.

1024 WB Armature and Cranking Shaft Bearings

Wash old lubricant from bearing with generator inverted to prevent flow of fluid into case. Allow bearing to dry, then knead lubricant sparingly into recess between races. CAUTION: Do not remove bearings.



RIGHT END, Cover Removed

KEY: WB—GREASE, general purpose No. 2. All temperatures

CLEAN parts with SOLVENT, dry-cleaning, or OIL, fuel, Diesel. Allow parts to dry thoroughly before lubricating. CAUTION: Do not allow fluid to enter

Requisition LUBRICATION ORDER from Philadelphia Signal Depot, or Utah ASF Depot, Ogden, Utah, by Signal Corps Stock No. 6G10113-50

Generator Case.

OIL CAN POINTS—Every 64 hours, lubricate Hand Crank Bearings, Tripod Hinges with OE SAE 10.

REFERENCE—Technical Manual.

By Order of the Secretary of War:
G. C. Marshall, Chief of Staff.

1 Apr 1944

Supersedes all previous lubrication instructions.

FIGURE 27.3.—War Department Lubrication Order No. 3050.

TL14329

23. Maintenance parts for radio set SCR-288 (Added).—For maintenance parts information, see appropriate sections in the following:

Army Service Forces Signal Supply Catalog sections	Date
SIG 7-SCR-288.....	3 January 1945.
SIG 7-HS-30, Organizational Spare Parts.....	15 December 1944.
SIG 8-SCR-288, revised.....	When printed.
SIG 8-BC-474, revised.....	When printed.
SIG 8-FL-10.....	1 July 1944.
SIG 8-GN-44.....	15 December 1944.
SIG 8-HS-30, Higher Echelon Spare Parts.....	15 December 1944.

SECTION VI (ADDED)

PREVENTIVE MAINTENANCE

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

Note.—The operations in paragraphs 39 to 53 are first and second echelon (organization operators and repairmen) maintenance.

25. Description of preventive maintenance techniques.—*a. General.*—Most of the electrical parts used in radio set SCR-288 require routine preventive maintenance. Those requiring maintenance differ in the amount and kind required. Because hit-or-miss maintenance techniques cannot be applied, definite and specific instructions are needed. This section of the manual contains these specific instructions and serves as a guide for personnel assigned to perform the six basic maintenance operations, namely: FEEL, INSPECT, TIGHTEN,

CLEAN, ADJUST, and LUBRICATE. Throughout this manual the lettering system for the six operations will be as follows:

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

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

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

Note.—It is important that the feel operation be performed for signs of overheating as soon as possible after shut-down and always before any other maintenance is done.

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

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

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

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

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

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

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

Whenever a loose connection is tightened, it should be moisture-proofed and fungiproofed again by applying the varnish with a small brush. See appendix I for moistureproofing and fungiproofing details.

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

26. Vacuum tubes.—*a. General.*—Preventive maintenance work on the vacuum tubes includes inspection and cleaning. Work on the tube sockets and mountings involves inspecting, tightening, adjusting, and cleaning. Each of these operations will be discussed in detail below.

Note.—*Avoid doing work on the tubes immediately after shut-down. Severe burns may result from contact with the envelopes of hot tubes.*

b. Inspect (I).—(1) Examine the glass envelopes, tube caps, and tube connector clips for accumulations of dirt, corrosion, or moisture. Tubes with loose grid caps or envelopes should be replaced if possible.

(2) The spring clips that make contact with the grid caps must be examined for corrosion and for loss of tension with resulting looseness. Also, check the condition of the wires soldered to the spring clips. The wires should be free of frayed insulation or broken strands. The removal of connecting clips from loose grid caps must be done with great care, particularly if there are signs of corrosion. Never turn a clip if it is on a loose cap.

(3) Inspect the firmness of tubes in their sockets. Make the inspection by pressing the tubes down in the sockets and testing them in that position, *not* by partially withdrawing the tubes and jiggling them

from side to side. Movement of a tube tends to weaken the pins in the base and unnecessarily spread the contacts in the socket. It is desirable to inspect the sockets of the tubes at the time the tubes are removed.

c. Tighten (T).—Tighten all loose connections to the tube sockets or to the tubes. If the connections are dirty or corroded, clean them before tightening. When tightening locknuts that hold the sockets to the insulated bushings, do not apply excessive pressure. Too much pressure will crack the insulation. Socket mountings must be tight at all times; otherwise the tubes may be damaged during transit.

d. Adjust (A).—Adjust loose tube connections. Adjustments of tube socket contact springs must not be made unless inspection indicates that they are necessary. Tube connector clips must not be flattened during adjustment. Flattened clips do not make adequate contact with the surface of the tube cap. If the clip is made of thin metal, it can be adjusted by gently compressing it with the fingers. If it is made of heavy gauge metal, suitable pressure can be applied with a pair of long-nose pliers.

e. Clean (C).—Clean the tubes only if inspection shows cleaning to be necessary. Tubes must not be removed from their sockets for cleaning except in special cases. The danger of breakage is great. The scarcity of replacement parts justifies every precaution. Cleaning of tubes calls for removal of dust, dirt, and moisture accumulations from the glass envelopes, grid caps, and socket connections. Use clean, lint-free, dry cloth. If proper care is exercised, the grid caps may be cleaned with a piece of #0000 sandpaper. The sandpaper should be wrapped around the cap and gently run along the surface. Do not use excessive pressure; do not grip the cap tightly. Wipe with a clean dry cloth. Sandpaper may be used to remove corrosion, oxidation, and dirt from tube socket contacts if necessary. Use sandpaper sparingly.

27. Capacitors.—*a. General.*—Preventive maintenance work on capacitors includes inspecting, tightening, cleaning, and lubricating. Each of these operations will be discussed in detail below.

b. Inspect (I).—Inspect the terminals of fixed capacitors for corrosion and loose connections. Carefully inspect the mountings to discover loose mounting screws, studs, or brackets. Examine the leads for poor insulation, cracks, broken strands, and evidences of rot. Cut away frayed strands. If the wire is exposed, wrap it with friction tape. Inspect the plates of variable capacitors for dirt, dust, lint, or moisture. Examine the movable set of plates for signs of damage or misalignment that would cause them to touch the fixed plates

during tuning. Rotate the movable plates, using the panel tuning control and check for proper operation of the capacitor.

c. Tighten (T).—Tighten loose terminals, mountings, and connections on capacitors, when necessary. Carefully tighten the mounting screws that secure the variable tuning capacitors.

d. Clean (C).—Clean all fixed capacitors carefully with a small brush or clean dry cloth. Use care to see that capacitor leads are not broken during cleaning. Moisture may be removed with a dry cloth. Clean the plates of variable capacitors with a small brush or pipe cleaner, removing all dust and lint. If dry compressed air is available, it may be used to blow out the dust in inaccessible capacitors.

e. Lubricate (L).—The bearings of variable capacitors are usually of the ball-bearing type. They are lubricated and sealed at the factory and will not need relubrication during the life of the equipment. The bearing surface of the dial drive gears may require lubrication occasionally. Use only a drop of oil, lubricating, preservative, special, U. S. Army Spec. No. 2-120 for each bearing. Do not allow any excess oil to run or drip on near-by wires or parts. Keep oil off rubber surfaces as oil deteriorates rubber rapidly.

28. Resistors.—*a. General.*—Various types of resistors are used in radio set SCR-288. One common type is the insulated carbon type with pigtail ends. A second type is wire wound with solder lug connections. A third type is a variable resistor which requires very little attention. Preventive maintenance work on resistors includes inspecting, tightening, and cleaning.

b. Inspect (I).—Inspect the ceramic insulators on the carbon resistors for cracks which will allow moisture to enter. If cracked resistors are found they should be replaced at the earliest opportunity. Look for discoloration of the resistors. Any resistors which show discoloration have been overloaded. Examination will often disclose what has caused the overload so that corrective measures may be taken to prevent future breakdown. Inspect for dust, dirt, and corrosion. Look for loose connections or broken strands and frayed insulation. Resistors with pigtail connections should not be moved unnecessarily as the connecting ends break easily. Resistors so damaged are beyond repair.

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

d. Clean (C).—Clean all carbon resistors with a small brush. Exercise care during the cleaning of carbon resistors with copper-coated ends. If there is any evidence of corrosion, clean it off with crocus cloth, because the use of sandpaper on this copper plating will remove

the plating from the carbon and permanently destroy the usefulness of the resistor. Clean all dirt or moisture from wire-wound resistors with a brush or dry clean cloth. Discoloration is caused by overheating and cannot be removed.

29. Switches.—*a. General.*—There are two types of switches used in radio set SCR-288; rotary switches and the filament switch built in as part of the PHONE jack. The latter will be discussed in paragraph 30. Preventive maintenance work on switches includes inspecting, tightening, cleaning, and lubricating.

b. Inspect (I).—Inspect the mechanical action of each switch. During inspection, especially watch for signs of dirt, moisture, or corrosion. Do not pry the leaves of the rotary switches apart as this will damage the switch. Rotary switches have silver-plated contacts. Brown or black stains on the surface of silver-plated contacts should not be confused with dirt or corrosion. The stains are silver oxide which is a satisfactory conductor. The wiping action of the contacts usually removes the silver oxide at the point of contact.

c. Clean (C).—Clean the exterior surfaces of switches with a stiff brush moistened with dry-cleaning solvent. Clean corroded connections with #0000 sandpaper. When switch contacts have deep pits caused by arcing or burning, use the burnishing tool or crocus cloth to resurface them.

d. Tighten (T).—Tighten the locknuts securing the switch to the panel. If the switch mounting is allowed to remain loose, the connecting wires to the switch may become loose or frayed and cause short circuits.

e. Lubricate (L).—Lubricate, if necessary, the bearing surfaces of the rotary switch shaft. Use a special, preservative, lubricating oil. The contacts of the rotary switches may be lubricated sparingly with the same lubricant. Use a pipe cleaner or small brush for this purpose. Do not allow excess oil to run or drip off the point being lubricated. Avoid getting oil on other parts or wires.

30. Jacks.—Jacks require very little attention, and then only at infrequent intervals. Occasionally it will be necessary to tighten the mounting nut, clean the contacts, or increase the spring tension. Remove dirt with a brush and carbon tetrachloride or dry-cleaning solvent. Corrosion may be removed with a piece of crocus cloth. Increase spring tension, when necessary. It is recommended that the action of the jack be tried after adjustment. Be careful to keep all soldered connections intact.

31. Meters.—Meters very seldom require attention. Broken meter glass should be replaced as soon as possible. Meter mounting bolts

should be kept tight as well as the connector nuts on the back of the meter. A meter movement must never be adjusted except by a qualified technician. If it is noted that the meter needle is apparently registering current when the radio set is turned off, especially if this occurs after the meter glass has been cleaned, make no attempt to adjust it. This condition is caused by a static charge on the meter glass caused by the friction of cleaning. This static charge will drain off in a short time, leaving the meter normal.

32. Batteries.—*a. General.*—Batteries require attention frequently. The battery pack used with radio set SCR-288 is designed so that the A and B sections will discharge equally. It is usually found however, that the A section will show discharge more readily than the B section. The condition of the battery should be known each day to insure uninterrupted service of the radio set. Preventive maintenance work on batteries includes inspecting and cleaning.

b. Inspect (I).—Inspect the battery for signs of moisture or swelling. Examine for dirt or other foreign matter. See that the battery compartment is dry and free of dirt that may cause the battery to stick in the compartment. Test the voltage with Model 564, type 3C volt-ohmmeter, or equivalent. The volt-ohmmeter used must have a sensitivity of 1,000 ohms per volt or higher. Replace the battery if the voltage is below 1.1 volts on the A section or 66 volts on the B section.

c. Clean (C).—Clean the interior of the battery compartment with a stiff brush. If moisture is found within the compartment, wipe it away with a clean dry cloth. Remove dirt or other foreign matter from the battery especially around the battery connector. If a sticky paste is found on the sides, top, or bottom of the battery, the battery should be discarded and a new battery installed.

33. Multiple connectors.—*a. General.*—Multiple connectors and plugs are used to connect radio receiver and transmitter BC-474-A to the battery, filter FL-10, and generator GN-44-A. Preventive maintenance work on connectors and plugs includes inspecting, tightening, and cleaning.

b. Inspect (I).—Inspect the connectors and plugs for dirt, moisture, corrosion, or fungus. Examine the male connectors for bent pins. Examine both male and female connectors for frayed wires connecting to the connector.

c. Tighten (T).—Tighten mounting screws that secure the fixed connectors to their respective panels. Inspect interconnecting plugs and connectors for tightness. Be sure to see that the threaded connectors fit correctly and that they are not cross-threaded.

d. Clean (C).—Clean connections on cables when they are dirty or corroded. Clean corroded connectors with #0000 sandpaper. It

is important to clean the entire surface of the connector. Do not remove the individual prongs from the cable plugs.

34. Cables and cords.—*a. General.*—Cords and cables are subjected to severe abuse because they are not inclosed within the case of the radio set. Unless preventive maintenance is applied frequently, trouble may exist and equipment failure will result. Preventive maintenance work on cords and cables includes inspection and cleaning.

b. Inspect (I).—Inspect the cables for cracked, deteriorated, frayed, or cut insulation at the connecting and supporting points, and improper placement which puts the cables or connectors under strain. Do not permit the cords or cables to become kinked.

c. Clean (C).—Clean the connections on the cables when they are dirty or corroded. Clean corroded connectors with #0000 sandpaper. It is important that the entire surface of the connector be cleaned. If oil or grease is noticed on rubber insulation, it should be cleaned off with dry-cleaning solvent. Grease or oil will deteriorate rubber rapidly.

35. Exterior of radio set SCR-288.—*a. General.*—Preventive maintenance work on the complete radio set SCR-288 exterior includes inspection, tightening, and cleaning.

b. Inspect (I).—Inspect the exterior of the radio receiver and transmitter BC-474-A and generator GN-44-A for loose screws and nuts. See if any knobs or controls are loose on their respective shafts. Inspect for dirt accumulations, rust, or corrosion.

c. Tighten (T).—Tighten any loose knobs or controls. Use the Allen set-screw wrench supplied with the equipment. Tighten any loose screws or nuts which have become loosened.

d. Clean (C).—Clean the exterior of radio set SCR-288, removing all dust, dirt, foreign matter, corrosion, and rust. Remove corrosion and rust with #0000 sandpaper. After cleaning, touch up all bare spots on the radio set with paint.

36. Generator GN-44-A.—*a. General.*—The generator supplies all the power for the transmitter of radio set SCR-288, therefore, it is important that this component be kept free from trouble. Although the generator bearings seldom require lubrication oftener than 6-month intervals, it is recommended that they be checked for lubrication requirements monthly. The preventive maintenance work on the generator includes inspecting, cleaning, adjusting, and lubricating.

b. Inspect (I).—Inspect for dust and dirt accumulations around the armature, brushes, and commutator bars. If the brushes are worn to the extent that their fit is loose and their contact is poor, they should

be replaced in accordance with instructions in paragraph 18c. Check the bearings for lubrication requirements. Check the voltage output of the generator. The output voltage should be 295 volts.

c. Clean (C).—Remove dust accumulations with a soft brush. If dry compressed air is available, it may be used to blow out the dust. Most dirt accumulations on the commutator bars may be removed with a piece of clean dry canvas stretched tightly over a thin flat stick, and held against the commutator while the generator crank is being revolved.

d. Adjust (A).—If inspection shows the voltage is incorrect, adjust the generator in accordance with instructions given in paragraph 18a.

e. Lubricate (L).—If inspection shows that lubrication is required, proceed in accordance with the instructions given in figure 27.1.

37. Antenna.—*a. Inspect (I).*—Inspect the antenna and counterpoise connections to the radio set to see that there is no short to ground. Look for loose strands of wire at the connections. Examine the antenna insulators for cracks which might become filled with dirt or carbon, thus making the insulator inoperative. Replace these insulators. See that the antenna is clear of trees or other foliage which will reduce the effective range of the radio set.

b. Clean (C).—Clean dirty insulators with a clean dry cloth. Be sure the wire connection at the antenna and counterpoise binding posts is clean and making good connection. Remove any rust or corrosion from the strain post. Use touch-up paint to cover the bare spots.

38. Microphone, headset, and key.—*a. General.*—Maintenance work on the microphone, headset, and key includes inspecting, cleaning, and adjusting.

b. Inspect (I).—Inspect the microphone, headset, and key for dirt accumulations and for corrosion on the connecting plugs. Look for cracks in the molded cases of the headset and microphone.

c. Clean (C).—Remove all dust, dirt, and foreign matter from the microphone, headset, and key. Use #0000 sandpaper to remove rust or corrosion from the key. Use a clean dry cloth to clean dirt accumulations from the connecting plugs. Crocus cloth may be used to remove corrosion from the plugs.

d. Adjust (A).—Adjust the key for ease in operation.

39. Itemized preventive maintenance.—*a. General.*—For ease and efficiency of performance preventive maintenance on radio set SCR-288 will be broken down into operations that can be performed at different time intervals. In this section the preventive maintenance work to be performed on the radio set at the specified time intervals is broken down into units of work called items. The general techniques

involved, and the application of FEEL, INSPECT, TIGHTEN, CLEAN, ADJUST, and LUBRICATE are covered in the preceding paragraphs. The persons performing preventive maintenance should refer to these paragraphs for detailed information. The following paragraphs summarize preventive maintenance into item form for simplicity.

b. Materials needed.—The following materials must be on hand before performing preventive maintenance.

Common hand tools (TE-41 or equivalent).

Clean cloth.

#0000 sandpaper.

Crocus cloth.

Fine file or burnishing tool.

Small inspection mirror.

Oil, lubricating, preservative, special, U. S. Army Specification No. 2-120.

Solvent, dry cleaning, Federal specification No. P-S-661A.

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

40. Item 1, exterior of radio set SCR-288.

OPERATIONS.

ITC Radio receiver and transmitter BC-474-A.

ITC Generator GN-44-A.

IT Knobs and Controls.

41. Item 2, antenna.

OPERATIONS.

IC Insulators.

IC Strain post.

IC Antenna and counterpoise.

42. Item 3, battery.

OPERATIONS.

IC Battery compartment.

IC Battery.

43. Item 4, multiple connectors.

OPERATIONS.

ITC Connectors.

44. Item 5, cords and cables.

OPERATIONS.

IC Cords and cables.

45. Item 6, microphone, headset, and key.

OPERATIONS.

IC Microphone.

IC Headset.

ICA Key.

46. Item 7, vacuum tubes.

OPERATIONS.

IC Vacuum tubes.

ITCA Tube sockets.

47. Item 8, capacitors.

OPERATIONS.

IC Fixed capacitors.

ITCL Variable capacitors.

48. Item 9, resistors.

OPERATIONS.

IC Carbon resistors.

ITC Wire-wound resistors.

49. Item 10, switches.

OPERATIONS.

ITCL Rotary switches.

50. Item 11, jacks.

OPERATIONS.

ITCA Jacks.

51. Item 12, meters.

OPERATIONS.

ITC Meters.

52. Item 13, generator GN-44-A.

OPERATIONS.

ICL Generator armature.

IC Commutator and brushes.

ICA Generator GN-44-A.

53. Preventive maintenance check list.—The following check list is a summary of the preventive maintenance operations to be performed on radio set SCR-288. The time intervals shown on the check list may be reduced at any time by the local commander. For best performance of the equipment, perform operations at least as

frequently as called for in the check list. The echelon column indicates which operations are first echelon maintenance and which operations are second echelon maintenance.

Item No.	Operations	Item	When performed—							Echelon
			Before operation	After operation	Daily	Weekly	Monthly	Semi-Annually	Yearly	
1	ITC	Exterior of radio set SCR-288.	X	-----	X	-----	-----	-----	-----	1
2	IC	Antenna-----	X	-----	X	-----	-----	-----	-----	1
3	IC	Battery-----	-----	X	X	-----	-----	-----	-----	1
4	ITC	Multiple connectors-----	X	-----	X	-----	-----	-----	-----	1
5	IC	Cords and cables-----	X	-----	-----	X	-----	-----	-----	1
6	ICA	Microphone, headset, and key.	X	-----	-----	X	-----	-----	-----	1
7	ITCA	Vacuum tubes-----	-----	X	-----	-----	X	-----	-----	2
8	ITCL	Capacitors-----	-----	X	-----	-----	X	-----	-----	2
9	ITC	Resistors-----	-----	X	-----	-----	X	-----	-----	2
10	ITCL	Switches-----	-----	X	-----	-----	X	-----	-----	2
11	ITCA	Jacks-----	-----	X	-----	-----	X	-----	-----	2
12	ITC	Meters-----	-----	X	-----	-----	X	-----	-----	2
13	ICAL	Generator GN-44-A-----	-----	X	-----	-----	X	-----	-----	2

F

I

T

C

A

L

Fee.

Inspect

Tighten

Clean

Adjust

Lubricate

APPENDIX I (ADDED)

MOISTUREPROOFING AND FUNGIPROOFING
RADIO SET SCR-288

- General.—The operation of Signal Corps equipment in tropical areas where temperature and relative humidity are extremely high requires special attention. The following items represent problems which may be encountered in operation:
 - Resistors, capacitors, coils, chokes, transformer windings, etc., fail.
 - Electrolytic action takes place in resistors, coils, chokes, transformer windings, etc., causing eventual break-down.
 - Hook-up wire and cable insulation break-down. Fungus growth accelerates deterioration.
 - Moisture forms electrical leakage paths on terminal boards and insulating strips, causing flash-overs and crosstalk.
 - 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- and fungus-resistant lacquer applied with a spray gun or brush. Refer to TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment, for a detailed description of the varnish-spray method of moistureproofing and fungiproofing.

Caution.—*Varnish spray may have poisonous effects if inhaled. To avoid inhaling spray, use respirator if available; otherwise, fasten cheesecloth or other cloth material over nose and mouth.*

3. Step-by-step instructions for treating radio receiver and transmitter BC-474-().—*a. Preparation.*—Make all repairs and adjustments necessary for proper operation of the equipment.

Note.—All parts marked † are not to be treated.

b. Disassembly.—(1) Release the catches and open the cover.

(2) Loosen the two knurled nuts holding the stays to the case.

(3) Loosen the eight captive screws holding the front panel to the case; remove the radio set from the case.†

(4) Remove the six screws from the transmitter power plug and slide the bakelite shell back on the cord.

(5) Clean all dirt, oil, dust, rust, grease, fungus, etc., from the equipment to be processed.

c. Masking.—Cover the following parts with masking tape as shown in figures 36 and 37.

(1) EXTRA PHONES jack (fig. 36).

(2) Sleeve opening and contacts of PHONES jack (fig. 36).

(3) Wafers on REC-TRANS switch (fig. 36).

(4) EMISSION SELECTOR switch (fig. 36).

(5) Microphone and key jacks (fig. 36).

(6) Gears of oscillator tuning capacitor (fig. 36).

(7) Contact pins of battery plug and transmitter power plug (fig. 37).

(8) Gears and plates of oscillator tuning capacitor (fig. 37).

(9) Plates of p-a tuning capacitor (fig. 37).

(10) Contacts of COARSE antenna tuning wafer switch (fig. 37).

(Removal of adjacent tubes facilitate masking.)

(11) Openings in casing of FINE antenna tuning switch (fig. 37).

(12) Drive gears and plates of main tuning capacitor (fig. 37).

Note.—Antenna and ground terminals on the front panel may be either masked or tightened securely.

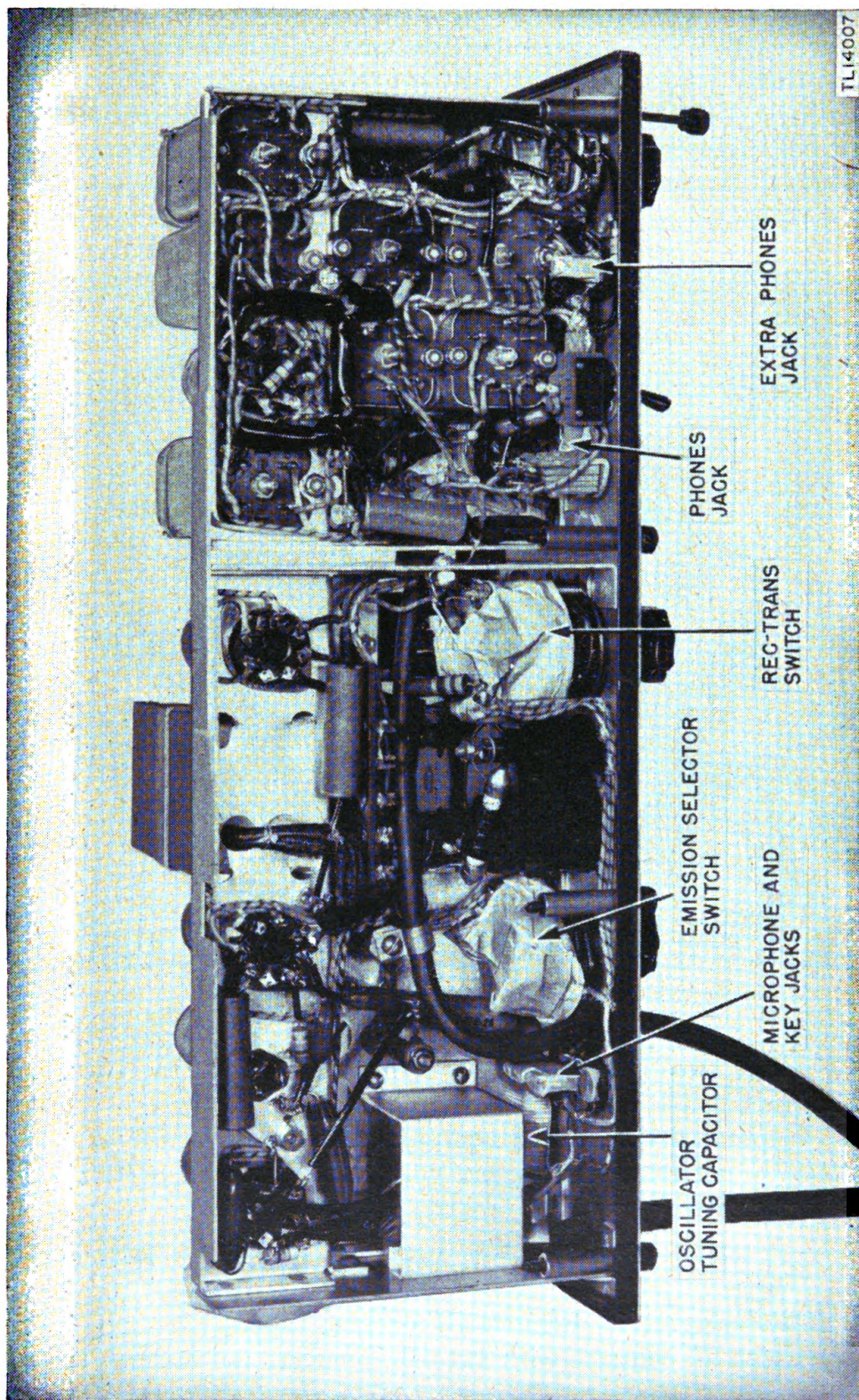


FIGURE 36.—Radio receiver and transmitter BC-474-()—bottom interior view of chassis showing method of masking parts.

d. Drying.—(1) Place all equipment to be treated in baking oven and dry from 2 to 3 hours at 160° F. *Do not exceed 160° F.*

(2) If wax should begin to melt on any of the components, lower the temperature and increase the baking time 1 hour for 10° drop in temperature.

e. Varnishing.—(1) Apply three coats of lacquer, fungus-resistant, Spec. No. 71-2202 (Stock No. 6G1005.3), or equal, with a spray gun to all parts to be treated. Allow a 15- to 20-minute drying period after each coat.

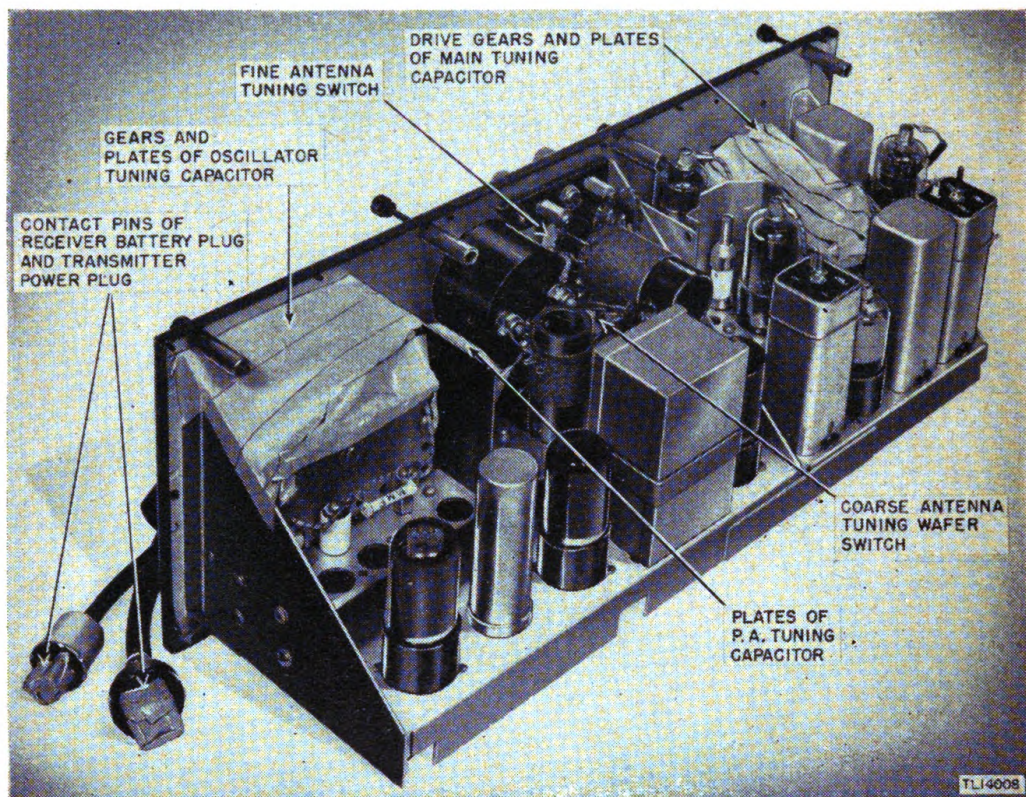


FIGURE 37.—Radio receiver and transmitter BC-474-()—top view of chassis showing method of masking parts.

(2) Spray two light even coats across the faces of the two meters on the front panel.

(3) Inspect all the treated equipment and use a brush to retouch any portion not reached by spray gun. Make sure all parts are adequately protected by varnish.

Note.—Be careful not to apply varnish to contact area of pins, jacks, switches, etc.

f. Reassembly.—(1) Remove all masking tape.

(2) Clean all contacts with varnish remover, and burnish the contacts.

(3) Reassemble equipment.

(4) Check the over-all performance of treated equipment.

g. Marking.—Mark the set with “MFP” and the date of treatment.

Example.—MFP—12 September 1944.

4. Step-by-step instructions for treating filter FL-10.—a.

Preparations.—See paragraph 3a.

b. Disassembly.—(1) Remove the two screws holding the cover to the case and remove cover.†

(2) Clean all dirt, oil, dust, rust, grease, fungus, etc., from the equipment to be processed.

c. Masking.—Cover the following parts with masking tape as shown in figure 38.

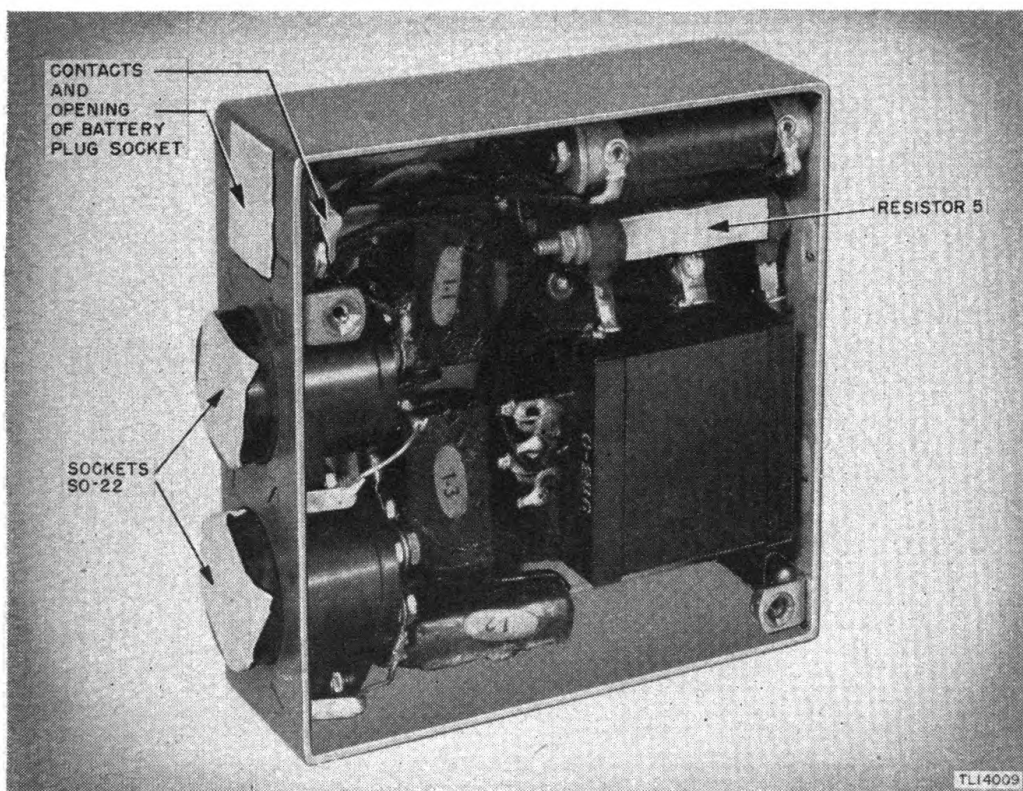


FIGURE 38.—Filter FL-10—interior view showing method of masking parts.

(1) Contact area of resistor 5.

(2) Sockets SO-22.

(3) Contacts and opening of receiver battery plug socket.

d. Drying.—See paragraph 3d.

e. Varnishing.—See paragraph 3e.

f. Reassembly.—See paragraph 3f.

g. Marking.—See paragraph 3g.

5. Step-by-step instructions for treating generator GN-44-().—*a. Preparation.*—See paragraph 3*a*.

b. Disassembly.—(1) Remove the six screws holding the top cover of generator to case; remove the top cover†.

(2) Remove the seven screws holding the bottom cover of the generator to the case; remove the bottom cover†.

(3) Clean all dirt, oil, dust, rust, grease, fungus, etc., from the equipment to be processed.

c. Masking.—Cover the following parts with masking tape as shown in figures 39 and 40.

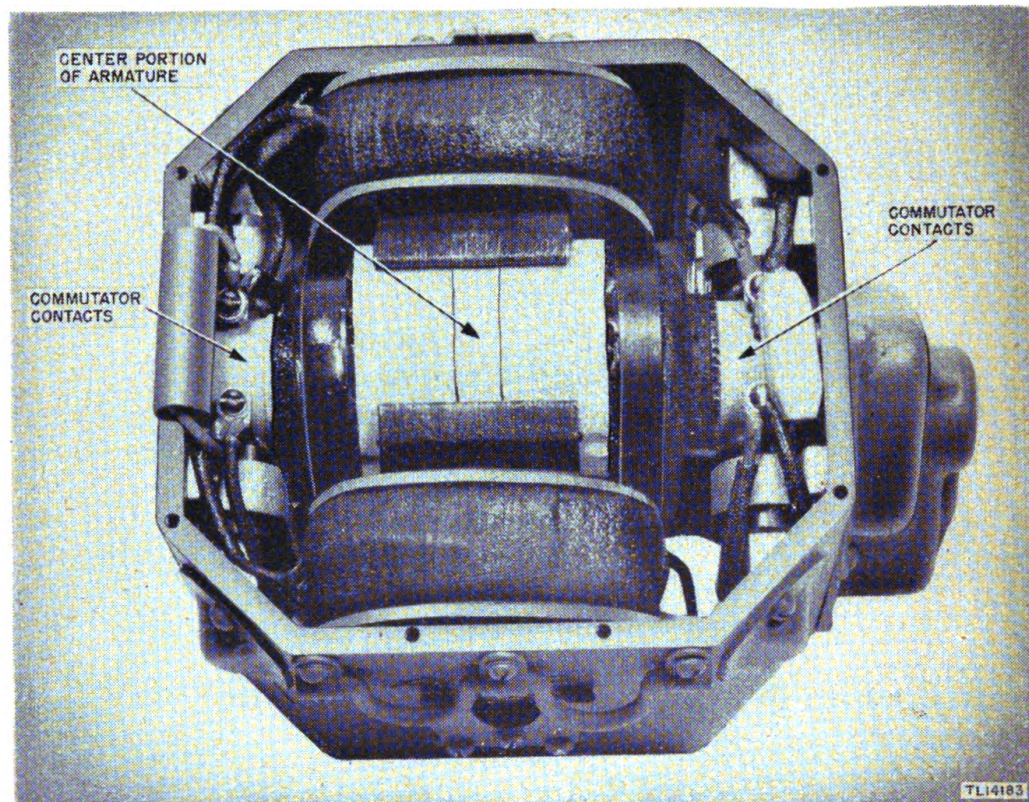


FIGURE 39.—Generator GN-44-()—view with bottom cover removed showing method of masking parts.

- (1) Commutator contacts (fig. 39).
 - (2) Center portion of armature (fig. 39).
 - (3) Adjustment and contacts of regulator (fig. 40).
 - (4) Grounding area of drive shaft (fig. 40).
- d. Drying.*—See paragraph 3*d*.
- e. Varnishing.*—See paragraph 3*e*.
- f. Reassembly.*—See paragraph 3*f*.
- g. Marking.*—See paragraph 3*g*.

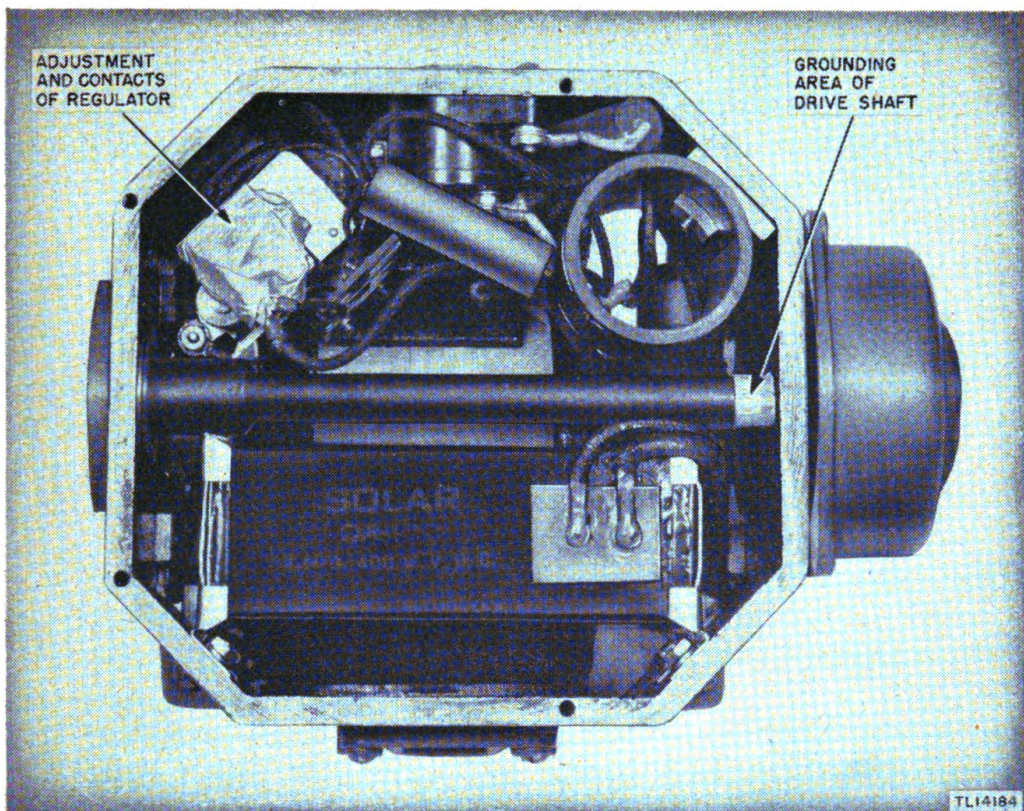


FIGURE 40.—Generator GN-44- ()—view with top cover removed showing method of masking parts.

[AG 300.7 (16 Nov 44)]

BY ORDER OF THE SECRETARY OF WAR:

OFFICIAL:

J. A. ULIO

Major General

The Adjutant General

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Refer to FM 21-6 for explanation of distribution formula.

AGO 244C

27

U. S. GOVERNMENT PRINTING OFFICE: 1945

TECHNICAL MANUAL }
No. 11-250 }

WAR DEPARTMENT,
WASHINGTON, October 28, 1942.

RADIO SET SCR-288

DEMOLITION NOTICE

Depending upon the time and materials available, when the capture of this equipment by the enemy is certain, completely destroy it by one or more of the following means:

1. Explosives such as grenades or TNT.
2. Incendiaries such as wood, oil, and gasoline.
3. Axes, hammers, large rocks, or other hard heavy instruments such as hand generators, dynamotors, etc.
4. Shots from rifles, carbines, or pistols may be used on such parts as generators and dynamotors.
5. Removal of the chassis from the cabinet and covers from generators will facilitate the above means of destruction. When this is done be sure to smash all variable capacitors, tubes, and tuning coils.

SAFETY NOTICE

The maximum voltage available in this equipment is less than 300 volts. Such voltages are not usually regarded as dangerous to human life, but may be the source of considerable discomfort or even injury to a person coming in contact with them. Care should be taken not to touch those components carrying transmitter plate potentials, especially the ungrounded side of the telegraph key, while the generator is being operated. It is to be noted that no interlocks are provided, as no high-potential parts are exposed or accessible during operation.

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*This manual supersedes TM 11-250, April 19, 1942.

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SECTION I

DESCRIPTION

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Radio receiver and transmitter BC-474-A	3
Generator GN-44-A	4
Filter FL-10	5
Component parts	6

1. General.—Radio set SCR-288 (fig. 1) is a portable amplitude-modulated transmitting and receiving set. The transmitter is designed to operate within the frequency range of 3,500 to 6,300 kilocycles and to deliver 4 watts of power into the antenna for either voice-modulated (phone) or continuous-wave (c-w) operation. The receiver is designed to operate within the frequency range of 2,300 to 6,500 kilocycles on either voice-modulated, tone-modulated, or continuous-wave operation. The approximate reliable communication range is 15 miles for continuous-wave operation and 8 miles for voice-

modulated operation. The transmitter power is derived from a hand-operated generator and the receiver power may be obtained either from a dry cell battery pack or from the hand-operated gener-

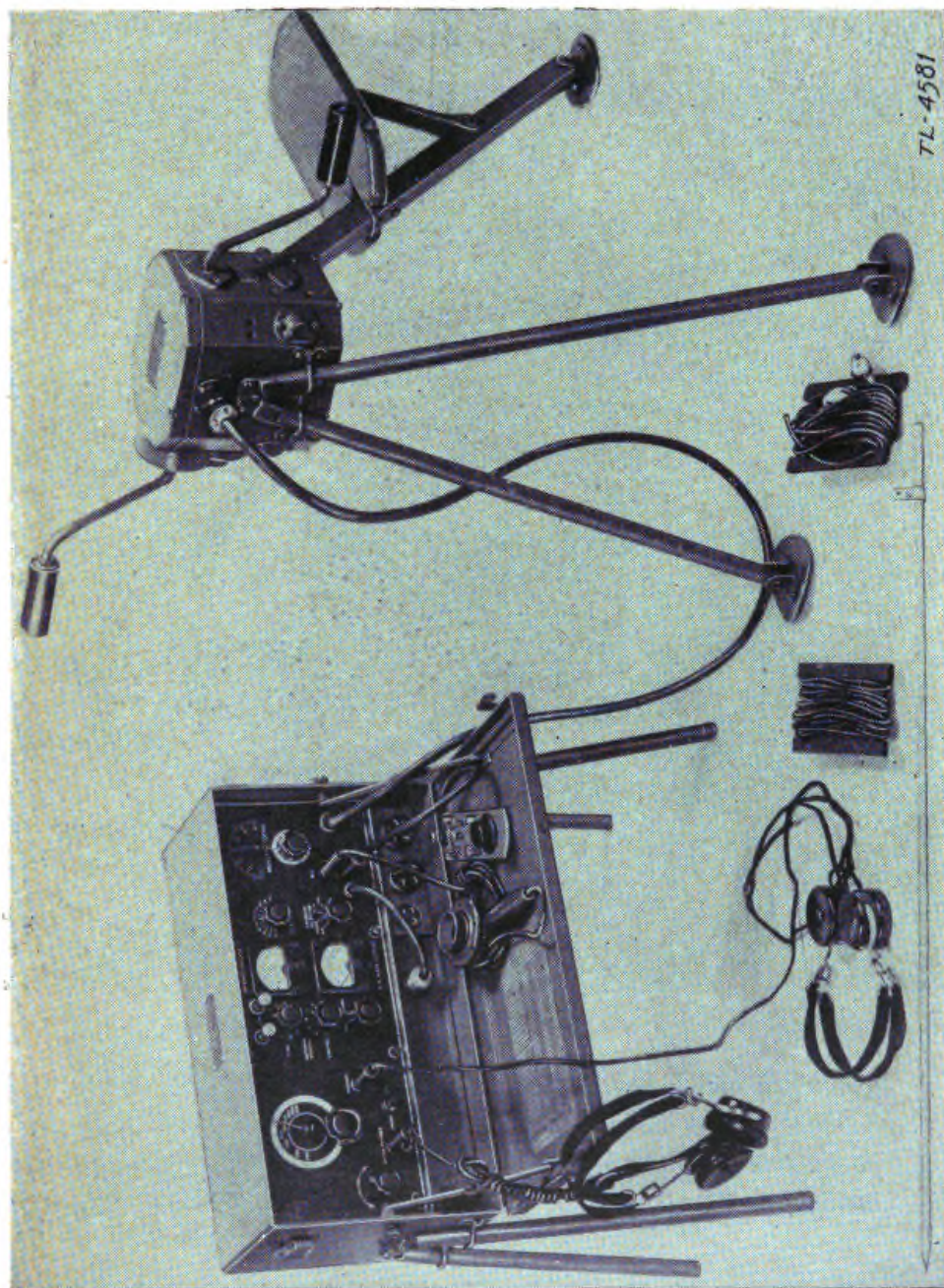


Figure 1.—Radio set SCR-288.

ator. The complete equipment weighs approximately 71 pounds. Three waterproof carrying cases are provided into which the equipment may be packed for transportation or storage. (See figs. 2 and 3.)

2. Weights.—The weights of the various units of equipment assembled for carrying are as follows:

Radio receiver and transmitter BC-474-A with bag, four legs, two headsets, key, microphone, and one battery pack (fig. 2).....pounds.. 37

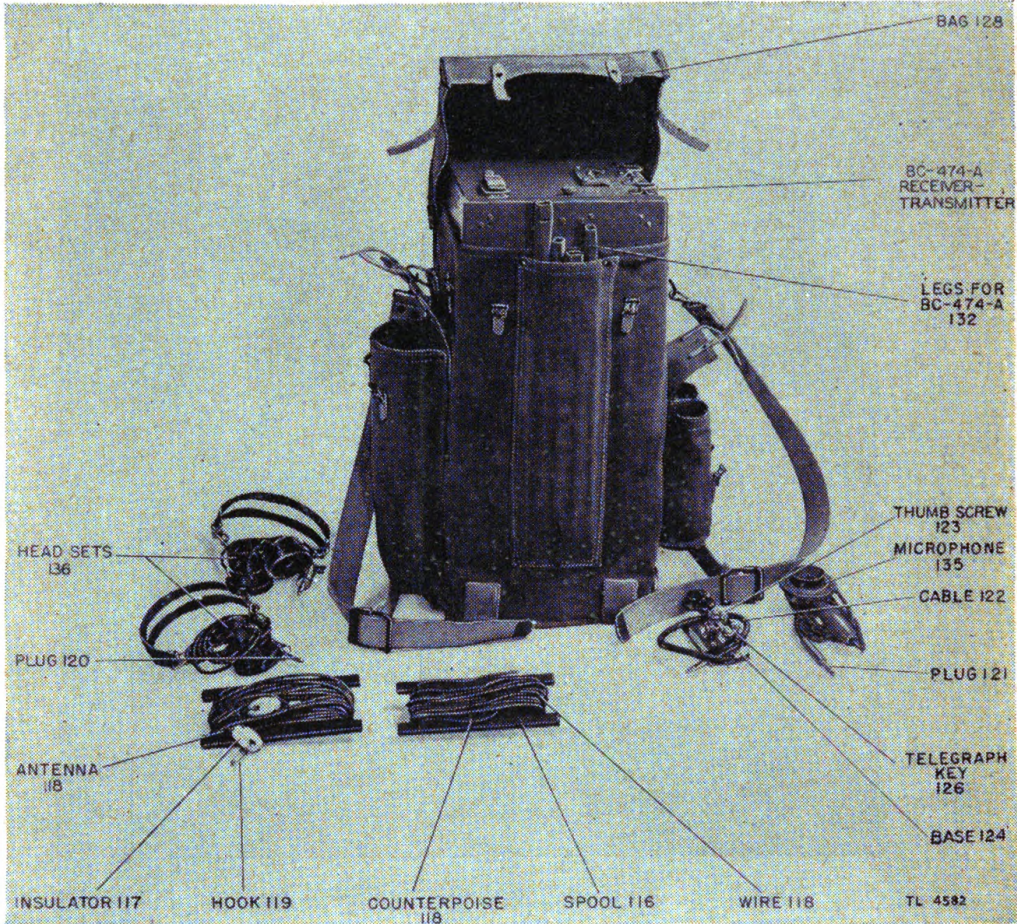


FIGURE 2.—Radio receiver and transmitter BC-474-A and component parts.

Generator GN-44-A with bag, filter FL-10, and cord CD-125 (figs. 3 and 4).....pounds.. 24

Accessories bag with seat, legs and crank for generator, antenna strain post, antenna, and counterpoise (fig. 3).....pounds.. 8

Spare parts (radio tubes and generator brushes—no carrying bag is provided).....pounds.. 1.5

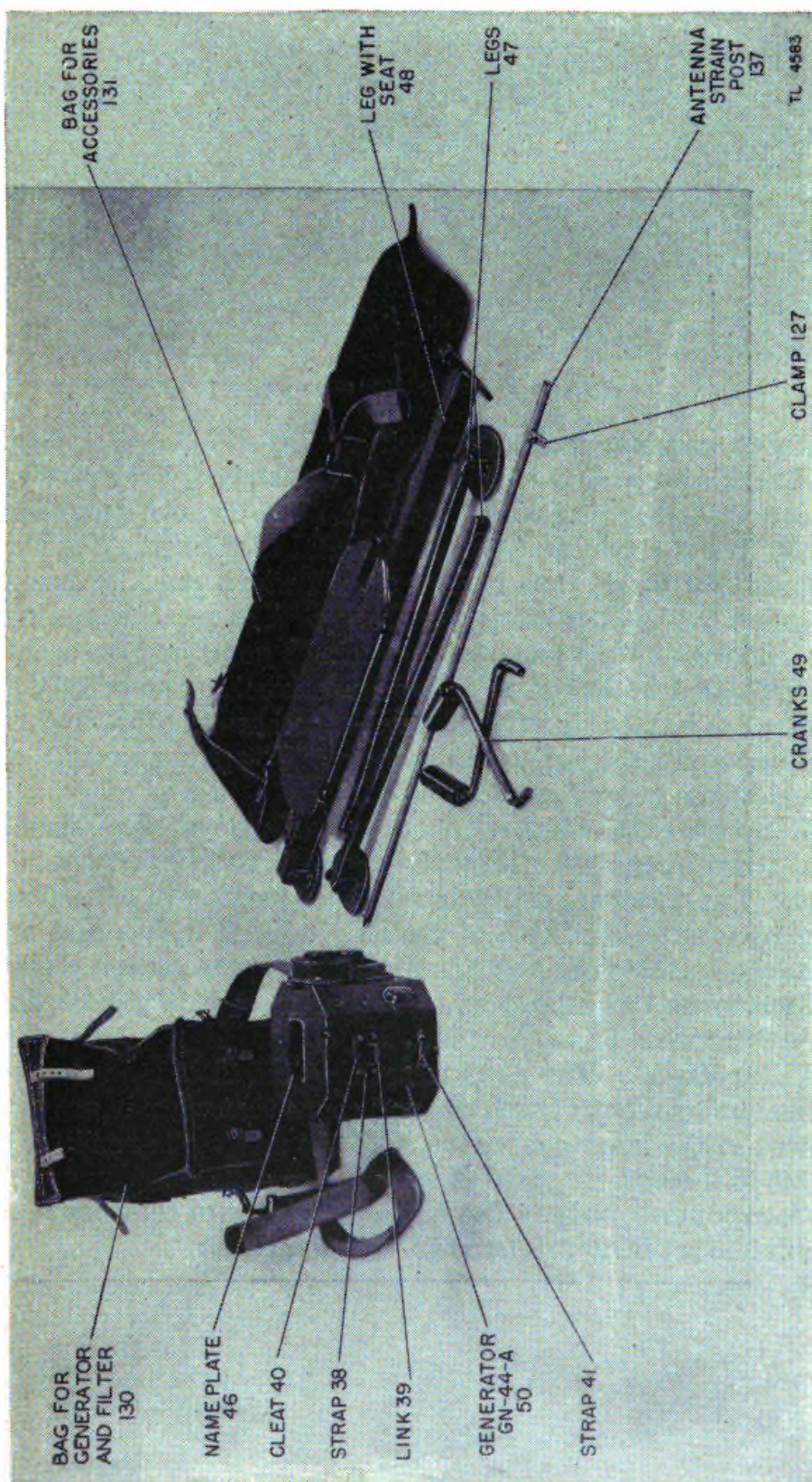


FIGURE 3.—Generator GN-44-A and accessories.

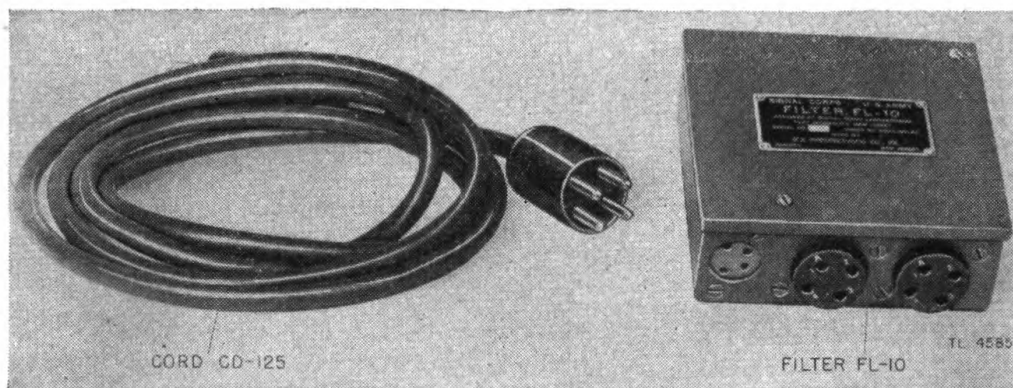


FIGURE 4.—Filter FL-10 and cord CD-125.

3. Radio receiver and transmitter BC-474-A.—This unit is housed in a spot-welded aluminum alloy cabinet. Four removable legs are provided so that when set up for operation the equipment is about 12 inches above the ground. The lid of the cabinet is hinged and opens downward, thus making a shelf which provides space for writing and for holding the telegraph key. The receiver and transmitter components are mounted on a single panel and on a chassis which is located in the upper part of the cabinet. The battery pack and filter are located directly under the receiver-transmitter chassis. The filter permits the receiver to be operated by power received from the hand-driven generator. (See fig. 1.)

4. Generator GN-44-A.—The generator is mounted on three legs so that when in operation it stands approximately 2 feet above the ground. These legs are easily detached for packing in a small space during transportation. One of the legs is fitted with a seat which permits the operator to sit astride while turning the generator cranks. The cranks may be snapped into place in the sockets at each end of the generator main drive gearshaft.

5. Filter FL-10.—The parts comprising the filter are mounted in a small aluminum box of such size and shape that when in use it may be placed in the lower compartment of the receiver-transmitter case adjacent to the battery pack. (See figs. 1 and 4.)

6. Component parts.—The following is a list of component parts used in radio set SCR-288 (see figs. 1, 2, 3, and 4):

RADIO SET SCR-288

Quantity	Article	Stock No.	Size (inches)	Weight unit	Specification or drawing
1	Antenna. (Spool, strain insulators, antenna conductor, 35 feet; suspension wire, 15 feet.)	----	7 by 3½ by 2½ (spool).	0.75	71-1030.
1	Antenna strain post, galvanized.	----	31 by ⅝-----	0.7	71-1030.
1	Bag, canvas, carrying, for radio receiver and transmitter BC-474-A.	----	18 by 9½ by 7½ (minimum inside).	3.8	71-1030.
1	Bag, canvas, carrying, for generator GN-44-A.	----	6 by 6½ by 8 (minimum inside).	1.8	71-1030.
1	Bag, canvas, carrying, for accessories.	----	35⅝ by 7¾-----	1.5	71-1030.
2	Battery, pack, Burgess 6TA60 or equal, 1 in use, 1 spare.	----	4⅞ by 2⅜ by 9⅞-	5.0	71-1030.
2 sets	Brushes, L. V., spare, for generator GN-44-A.	----	1⅜ by ¼ by ⅝ ₂ ----	-----	Commercial.
2 sets	Brushes, H. V., spare, for generator GN-44-A.	----	1⅜ by ¼ by ⅝ ₂ ----	-----	Commercial.
1	Cord, CD-125-----	----	84-----	0.9	SC-D-1339.
1	Counterpoise (35 feet of copper wire, consisting of 16 strands, 0.01 inch diameter wound on a plywood reel.	----	7½ by 3½ by 2½--	0.5	71-1030.
2	Crank for generator GN-44-A.	----	1 by 6 by 7½----	0.5	Per model.
1	Filter FL-10-----	----	1¼ by 4¼ by 4¼--	1.75	71-1049.
1	Generator GN-44-A-----	----	6 by 6½ by 8-----	19.5	71-1030.
2	Headset, RCA type MI-5803-5 or equal.	----	-----	0.7	Commercial.
1	Key, telegraph, with cord and plug, RCA type MI-8136-2 or equal.	----	-----	0.8	Commercial.
4	Leg, for radio receiver and transmitter BC-474-A.	----	15 by ¾-----	0.25	71-1030.
2	Legs for generator GN-44-A.	----	23 by ¾-----	0.5	71-1030.
1	Microphone with cord and plug, RCA type MI-7929-2.	----	-----	0.7	71-1030.
1	Radio receiver and transmitter BC-474-A.	----	18 by 9½ by 7½--	23.75	71-1030.
1	Seat and leg assembly for generator GN-44-A.	----	33½ by 6 by 2½--	3.0	71-1030.

Quantity	Article	Stock No.	Size (inches)	Weight unit	Specification or drawing
2	Technical manuals for radio set SCR-288.	-----	-----	0.7	Per model.
9	Tube VT-107-A (6V6-GT) (3 in use; 6 spares).	-----	3¼ by 1¼-----	0.1	71-1207.
3	Tube VT-146 (1N5-GT) (1 in use; 2 spares).	-----	3½ by 1¼-----	0.1	71-1246.
3	Tube VT-147 (1A7-GT) (1 in use; 2 spares).	-----	3½ by 1¼-----	0.1	71-1247.
3	Tube VT-148 (1D8-GT) (1 in use; 2 spares).	-----	3½ by 1¼-----	0.1	71-1248.
3	Tube VT-149 (3A8-GT) (1 in use; 2 spares).	-----	3½ by 1¼-----	0.1	71-1249.
1	Wrench, Allen type, for removing control knobs, RCA No. 14991 or equal.	-----	1½ by ½-----	-----	Commercial.

SECTION II

EMPLOYMENT

	Paragraph
Initial procedure-----	7
Installation-----	8
Operation-----	9

7. Initial procedure.—Unstrap covers of carrying cases and and remove all parts. (See figs. 2 and 3.) For the method of packing see paragraph 2.

8. Installation.—See figures 5 and 6 and see FM 24-5 as a guide in selection of a site. The exact location of the set must be such that the outer end of the 35-foot antenna can be suspended from some convenient object by the 15-foot suspension cord. Where there are no convenient objects the using personnel must improvise.

a. Insert generator legs in leg sockets, taking care to place the seat and leg in the special socket provided, and then set up the seat, snapping seat support into its socket. Insert cranks in proper sockets.

b. Insert the four legs of radio receiver-transmitter into their sockets, placing the legs so that flat surfaces on the lower ends are parallel to the ground.

c. Set the generator up about 4 feet from the transmitter, so that generator operator will be facing and to the right of the transmitter.

d. Open radio receiver-transmitter cover. Remove generator cable from its compartment and plug it into the generator socket. Plug microphone and key into their respective jacks, as marked on the panel, and attach the key to the cabinet lid by screwing thumbscrew (attached to key) into the nut provided near right-hand side of cover.

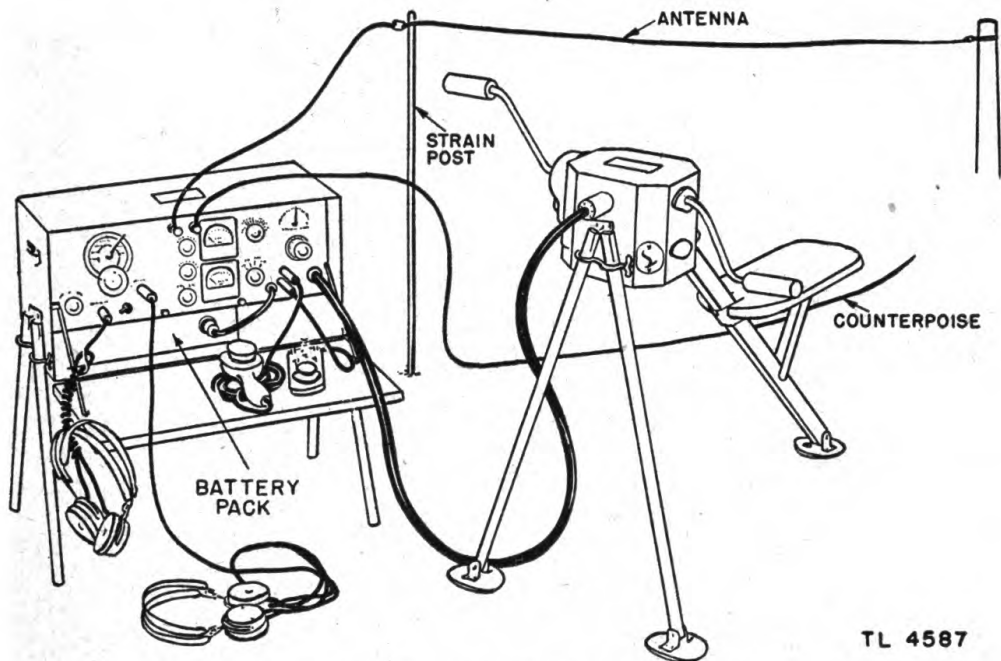


FIGURE 5.—Radio set SCR-288 set up for operation (receiver employing battery pack).

(The key, microphone, and phone jacks are protected by small hinged covers which open to the right.)

e. Drive antenna strain post into the ground about 1 foot from the transmitter. Attach antenna (identified by two strain insulators) to the strain post by means of the hook which is provided, and string the antenna to some object that will support the outer end 15 or 20 feet above the ground. (Short-range communication may be obtained with antenna only 5 or 6 feet above the ground.) Clamp lead-in end firmly in ANT binding post. The counterpoise should next be clamped in the GND binding post and laid out on the ground under the antenna.

9. Operation.—a. *Preliminary tests.*—After setting up the complete equipment as explained in paragraph 8, make sure that antenna and counterpoise are properly connected and that battery cable is plugged into receptacle of battery pack.

b. *Receiver operation by means of batteries* (see figs. 5 and 6).—(1) Turn switch marked REC-TRANS (located at bottom of panel underneath ANT and GND binding posts) to the REC position.

(2) Insert the phone plug in the jack marked PHONES. (This is a filament switching jack and the receiver is inoperative unless headphones are plugged into this jack.)

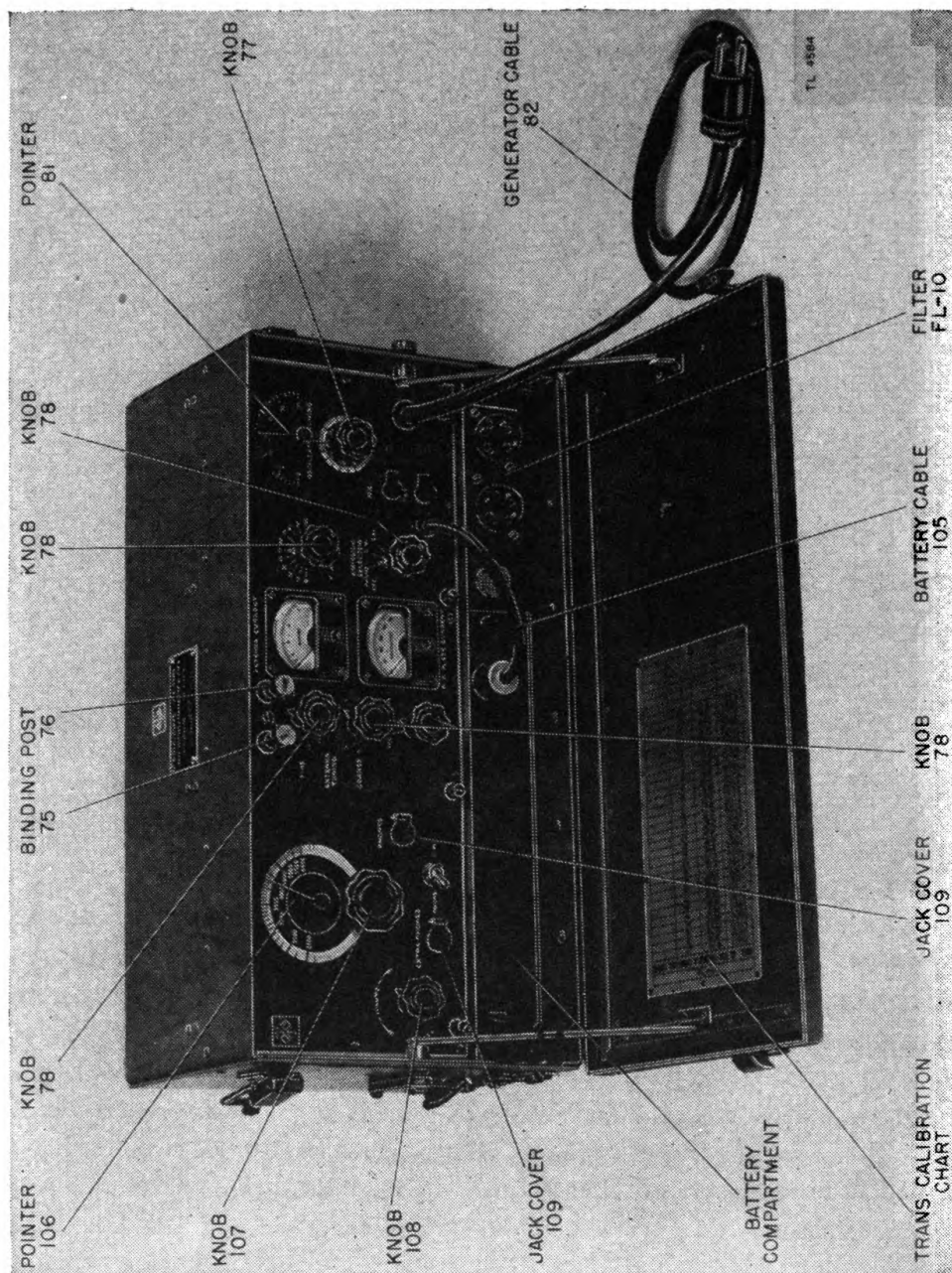


FIGURE 6.—Radio receiver and transmitter BC-474-A—front view.

(3) Turn the VOLUME control knob clockwise to about three quarters of maximum.

(4) Set the PHONE-C.W. switch to the C.W. position.

(5) Turn main tuning knob 107 slowly until pointer rests over scale graduation indicating approximate frequency of the desired signal.

If the latter is a c-w signal, it will be heard as a tone which should diminish in pitch as the receiver tuning approaches the frequency of the incoming signal. The correct setting of the tuning dial is obtained by approaching the desired signal from a lower frequency setting, passing through zero beat, and continuing until the beat note is of pleasing pitch. Adjust the VOLUME control knob for the most comfortable reception.

(6) If the desired signals are voice signals, they will be heard in somewhat distorted form, mixed with a varying tone. Push PHONE-C.W. switch to PHONE, and turn tuning knob 107 back and forth very slightly for maximum signal strength and clarity. Adjust the VOLUME control knob as desired.

(7) If the desired signals are modulated c-w signals, leave PHONE-C.W. switch in the C.W. position until they are heard. Then push the switch to the PHONE position and turn tuning dial slightly for best results. Adjust VOLUME control knob as desired.

(8) An extra pair of headphones may be plugged into the jack marked EXTRA PHONES. *When only one pair of phones is used, it must be plugged into the right-hand jack (marked PHONES) as the filament circuit is open when there is no plug in this jack.*

(9) To turn off the receiver, rotate VOLUME control knob to the extreme counterclockwise position. To avoid disturbing the sensitivity or audio output setting by turning the receiver off in the manner just described, it may be desirable to turn off the filaments by removing the plug from the PHONES jack. Monitoring of phone transmission will still be possible by plugging the phones into the EXTRA PHONES jack.

c. Receiver operation by means of generator GN-44-A and filter FL-10 (see fig. 7).—(1) When the receiver is to be operated from the power generated by the hand-driven generator a filter must be used. (See fig. 4.) The three sockets located on the filter case are connected to the receiver battery cable, to the transmitter power cable, and to the hand generator as indicated in (a), (b), and (c) below and in figure 7. Power from the hand generator is supplied to the filter unit by means of the extra cord CD-125. To install the filter, proceed as follows:

(a) Remove receiver battery plug from battery pack and insert it in left-hand socket of the filter.

(b) Remove transmitter power plug from generator and insert it in either one of the sockets which are located on the filter unit and marked SO-22.

(c) Use cord CD-125 to connect generator to filter, making use of remaining socket SO-22 in the filter unit.

(2) Operation of the equipment when using the filter is identical to that outlined in *b* above except that the generator must be operated when receiving as well as when transmitting. During long stand-by periods, when only the receiver is in use, the transmitter filaments should be turned off by turning the EMISSION SELECTOR switch to the OFF position. Less effort will then be needed to operate the generator.

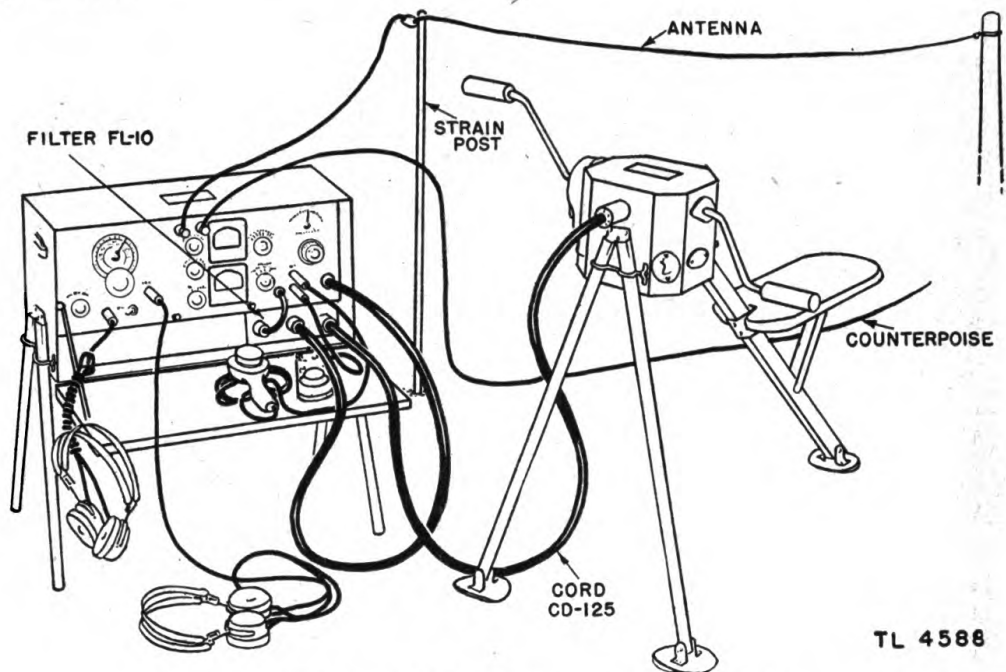


FIGURE 7.—Radio set SCR-288 (receiver operated by generator).

d. Transmitter operation (see fig. 6).—After the equipment is set up the transmitter is placed in operation as follows:

(1) Determine (directly or by interpolation) from calibration chart which is inside the lid of the receiver-transmitter the setting of the OSCILLATOR TUNING control. (The digits on the left of the hyphen refer to the setting of the pointer 81; those on the right refer to the setting of the dial attached to knob 77.) Adjust OSCILLATOR TUNING control to required setting by turning knob 77.

(2) Place EMISSION SELECTOR switch (marked OFF, PHONE, C. W., CAL.) to PHONE position, and REC-TRANS switch to TRANS position. Have an assistant operate the generator as described in *f* below.

(3) As soon as the tubes are warmed up (indicated by a deflection of the P. A. PLATE CURRENT meter), tune power amplifier plate

circuit to resonance by means of P. A. TUNING control. The correct adjustment will result in a minimum or dip in the power amplifier plate current as read on the P. A. PLATE CURRENT meter. The approximate setting of the power amplifier tuning control is shown on the calibration chart. If the oscillator is tuned to the lower frequencies, it is possible to obtain two dips in the power amplifier plate current. The dip that indicates the correct setting of the power amplifier tuning control may be determined by a check against the calibration chart. If no sharp dip can be found, detune antenna by changing setting of the COARSE antenna tuning control (A to G) or possibly the FINE antenna tuning control and again adjust the P. A. TUNING control; repeat the process until a resonance dip is obtained.

(4) The antenna circuit should now be adjusted as follows: With FINE antenna control set at approximately position 5, tune COARSE antenna control until maximum antenna current is indicated on ANTENNA CURRENT meter. Now retune the P. A. TUNING control to resonance (minimum plate current) and adjust FINE antenna tuning control for maximum antenna current. At resonance, a plate current of approximately 35 milliamperes is obtained. At this value, the power amplifier is correctly loaded for best modulation. The ANTENNA CURRENT meter will show a deflection of from 0.3 ampere to 0.7 ampere, depending on frequency and antenna height. The equipment is now ready for phone transmission which is accomplished by "talking into" the microphone.

(5) If c-w transmission is desired, place EMISSION SELECTOR switch to C. W. position and operate the key.

(6) To place transmitter in the stand-by position, turn REC-TRANS switch to REC position. To shut down the transmitter, turn EMISSION SELECTOR switch to OFF position.

e. Netting.—To set carrier frequency of transmitter to the frequency of a received signal, proceed as follows:

(1) Turn REC-TRANS switch to REC position.

(2) With receiver PHONE-C. W. switch in the C. W. position, tune receiver for zero beat with the incoming signal.

(3) Now place EMISSION SELECTOR switch in the CAL position, crank generator, and tune transmitter oscillator (by means of OSCILLATOR TUNING control) for zero beat with the receiver.

f. Generator operation.—The generator operator will normally sit astride the generator seat and operate the cranks at a speed of approximately 50 to 70 rpm in the direction indicated by arrow on the gear housing. Experience will soon permit the operator to "find"

the correct rotational speed. Due to action of the voltage regulator, the generator will turn noticeably easier when this speed is reached.

SECTION III

DETAILED FUNCTIONING OF PARTS

	Paragraph
Over-all equipment.....	10
Transmitter unit.....	11
Receiver unit.....	12
Filter FL-10.....	13
Generator GN-44-A.....	14
Characteristics of vacuum tubes.....	15

10. Over-all equipment.—*a.* The top and bottom views of radio receiver and transmitter BC-474-A, removed from the case, are shown in figures 8 and 9.

b. The top and bottom views of generator GN-44-A are shown in figures 10 and 11.

c. The inside view of filter FL-10 is shown in figure 12.

11. Transmitter unit.—*a. Electrical characteristics.*—The transmitter unit is designed to operate within the frequency range of 3,500 to 6,300 kilocycles and to deliver into the antenna 4 watts of power for either voice-modulated emission or c-w emission. The schematic and wiring diagrams of the transmitter unit are given in figures 13 and 31, respectively.

b. Stages.—Electrically, the transmitter comprises a master oscillator stage, a power amplifier stage, and a modulator stage. Each stage employs one tube VT-107-A.

c. Master oscillator.—The master oscillator consists of a temperature compensated electron-coupled oscillator circuit which employs a tube VT-107-A. The frequency of oscillation is determined by the grid tank circuit consisting of inductor L1 tuning capacitor C18, and the compensating capacitor C2. The output of the oscillator is coupled to the power amplifier stage by capacitor C5 and is loaded by resistor R3. Screen-grid voltage is supplied through resistor R2 and plate voltage is supplied through R3.

d. Power amplifier.—The power amplifier stage is tuned to the oscillator frequency in its plate circuit by the tank circuit consisting of inductance coil L3 in parallel with tuning capacitor C17. R4 is the grid-biasing resistor. Plate voltage is supplied through choke coil L2 and plate current is indicated on meter M1. Screen-grid voltage is supplied through resistor R6. A jack J2 makes it possible to insert the telegraph key in series with the cathode circuit of this

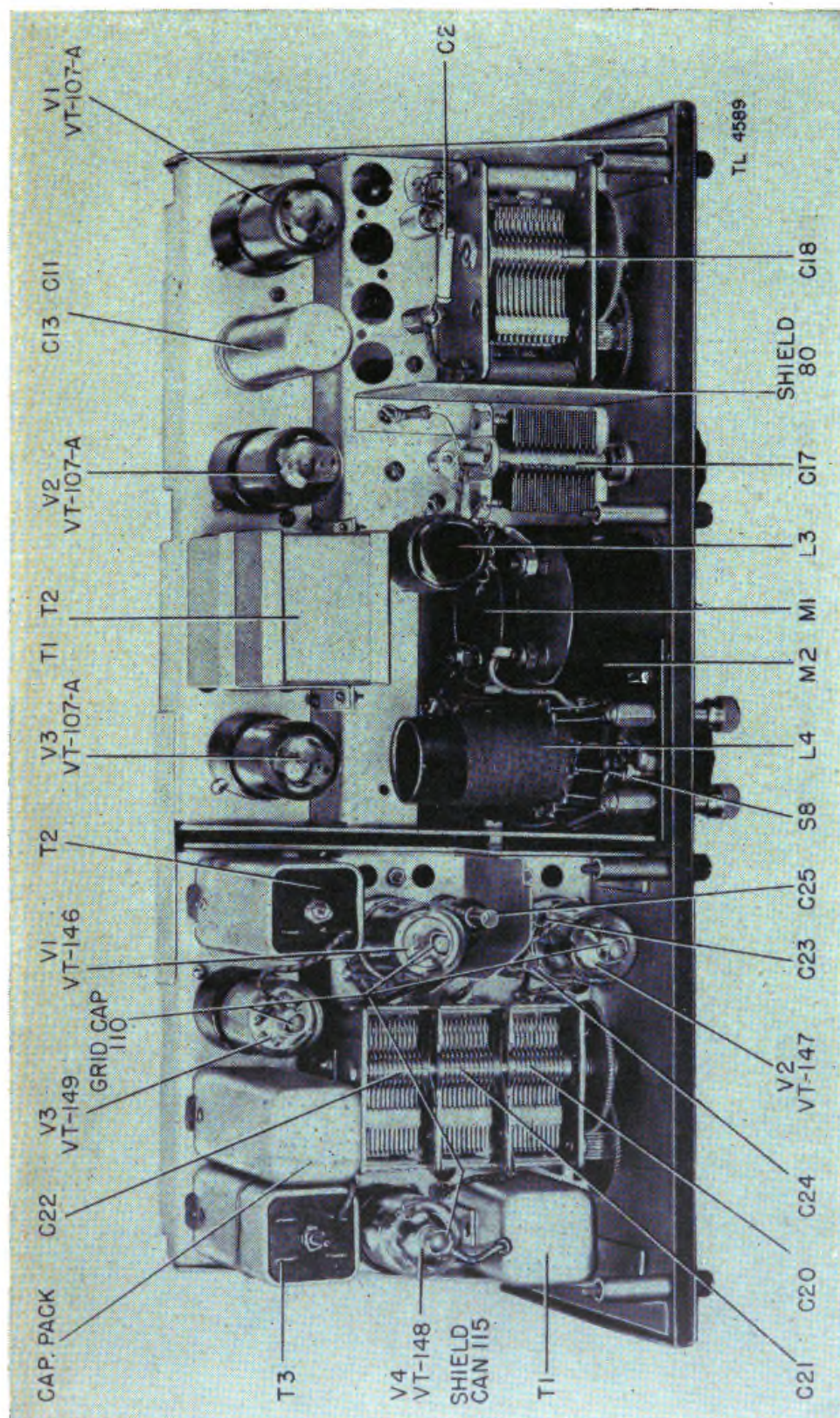


Figure 8.—Radio receiver and transmitter BC-474-A, chassis—top view.

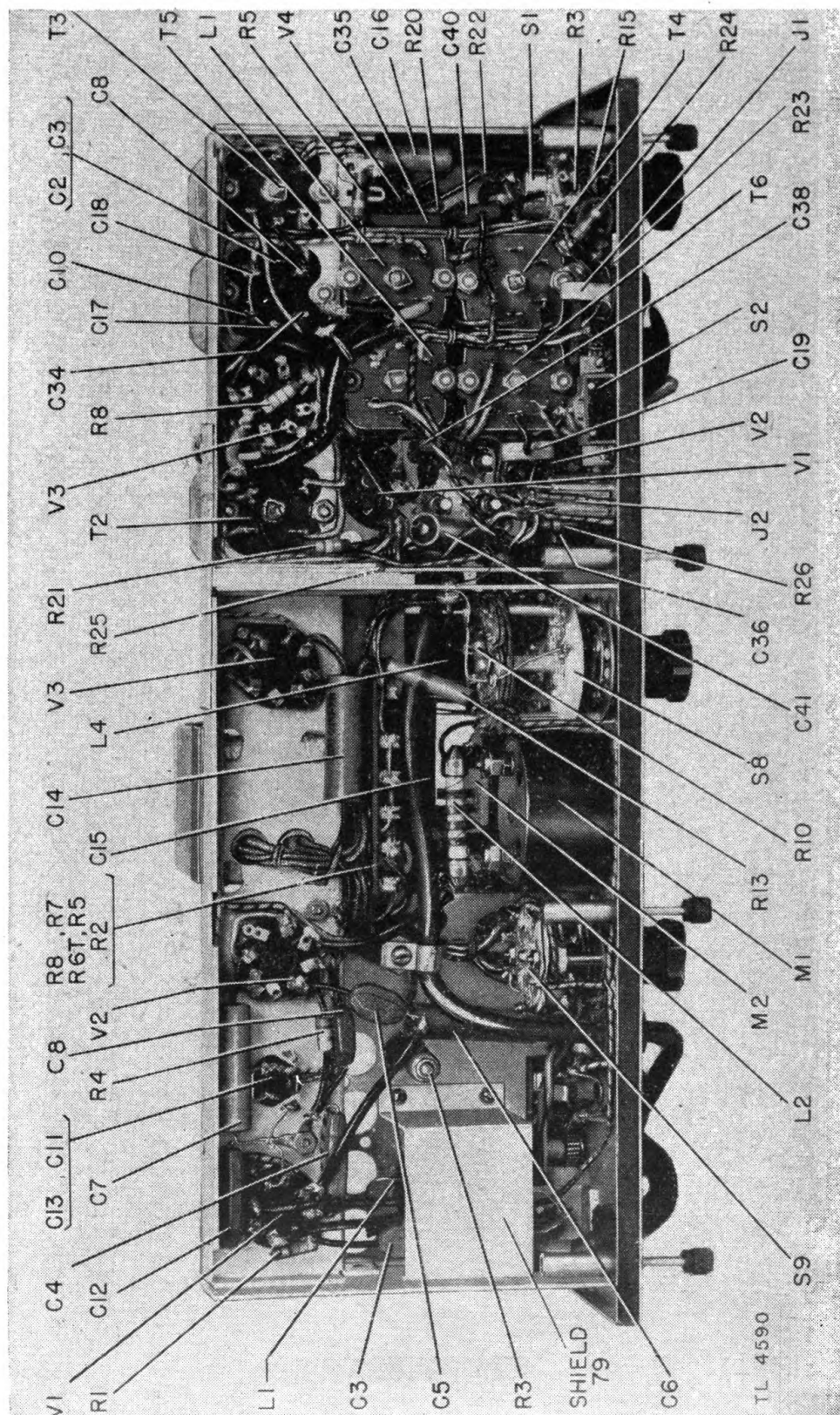


FIGURE 9.—Radio receiver and transmitter BC-474-A, chassis—bottom view.

stage. The key is not at ground potential. Observe high-voltage precautions. When the key is closed, the power amplifier cathode

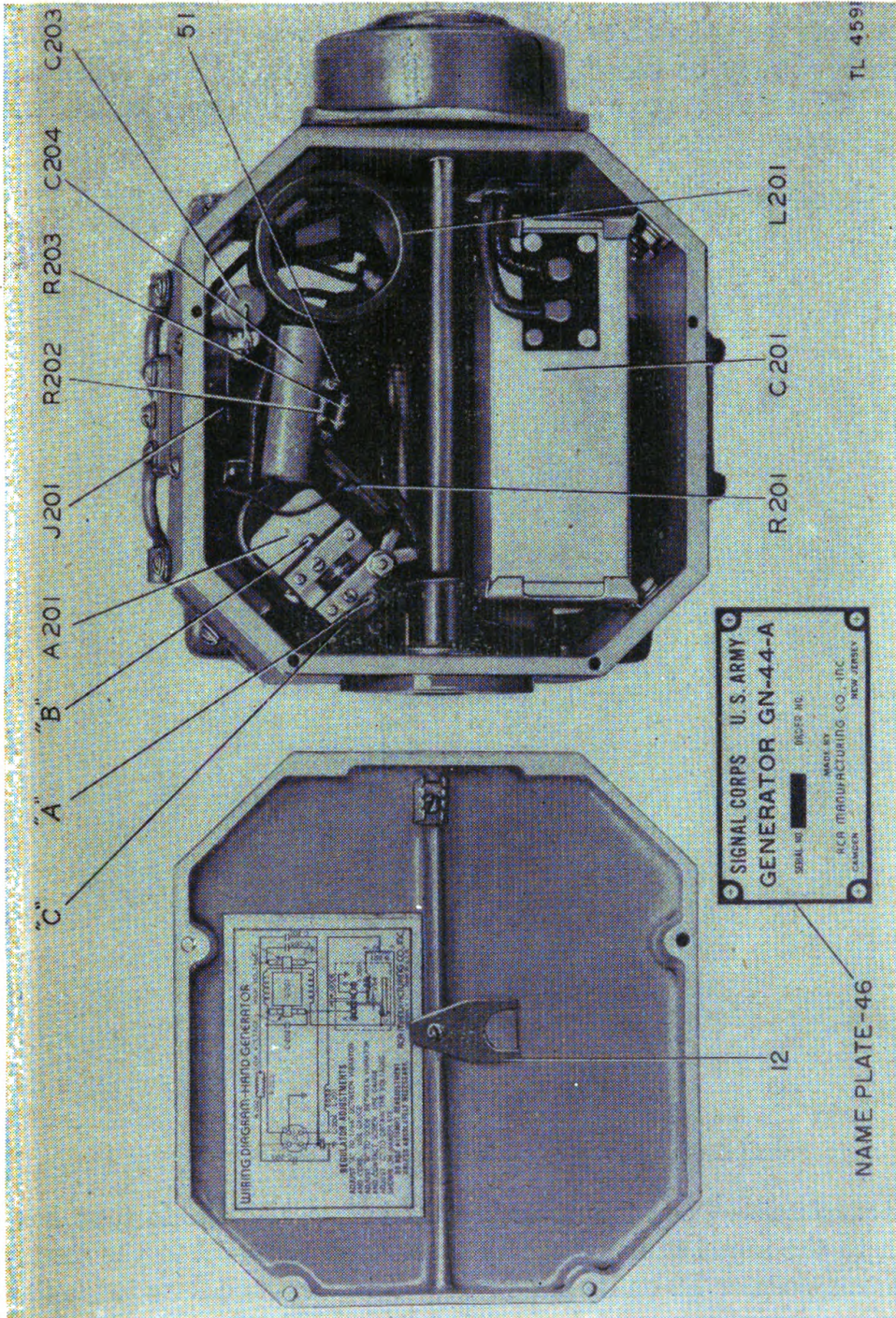


FIGURE 10.—Generator GN-44-A, cover removed—top view.

current is permitted to flow and thus permits the transmitter to operate.

e. Output coupling.—Output coupling is accomplished by tapping the tank coil L3 and connecting this tap through the antenna current meter M2 and switch S6 to multiple taps on coil L4. A second switch S7 connects the antenna to a second set of contacts on coil L4. Thus the antenna may be tuned by changing the setting of S6, called the FINE adjustment, or by changing the setting of S7, called the COARSE adjustment.

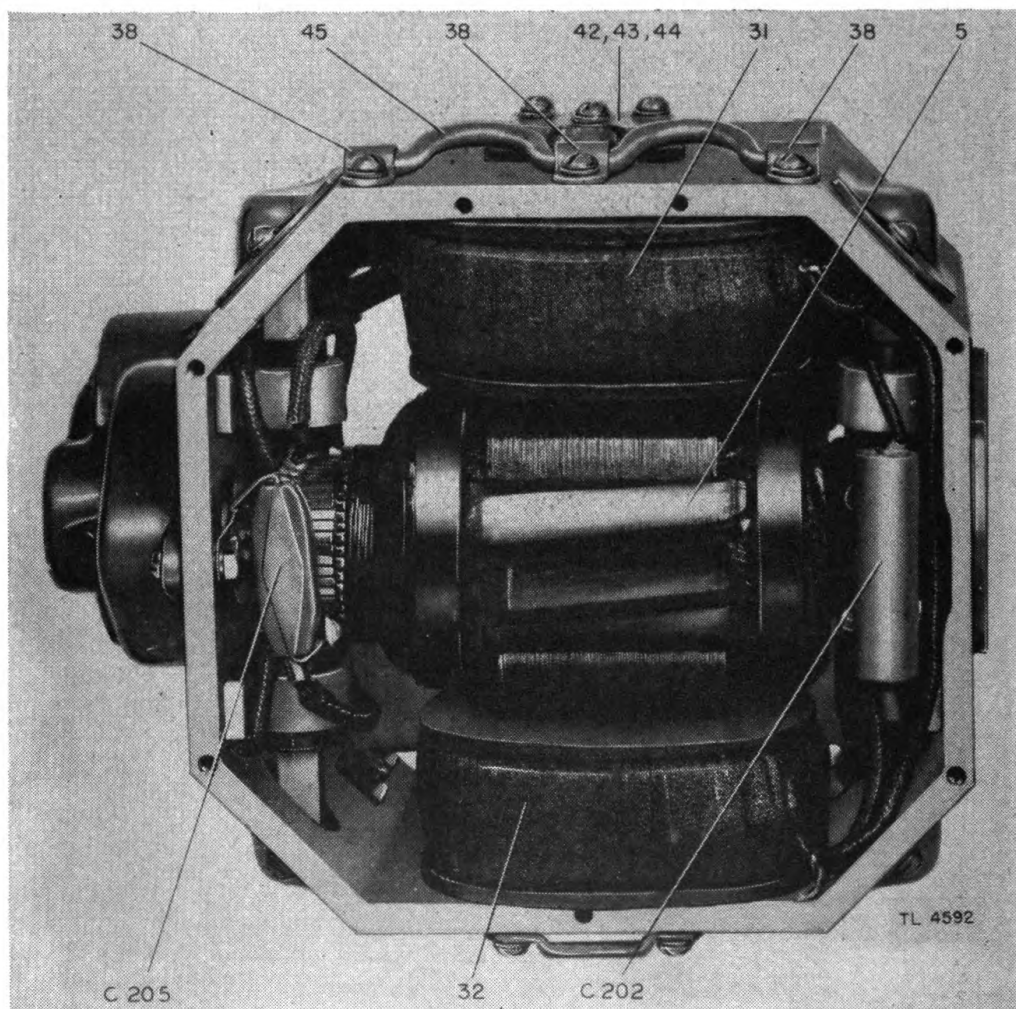


FIGURE 11.—Generator GN-44-A, bottom plate removed—bottom view.

f. Modulator.—The modulator stage consists of a single tube connected to the input transformer T1 on its grid side and to the modulation transformer T2 on its plate side. To voice-modulate the transmitter, a microphone must be inserted in jack J4 which is connected directly across the primary of transformer T1 and the cathode resistor R8. The drop across this resistor supplies energizing voltage to the microphone. The screen-grid voltage is supplied through resistor R5

and plate voltage is supplied through the primary winding of transformer T2. The audio-frequency output of the modulation transformer T2 is applied to the plate and screen grid of the power amplifier

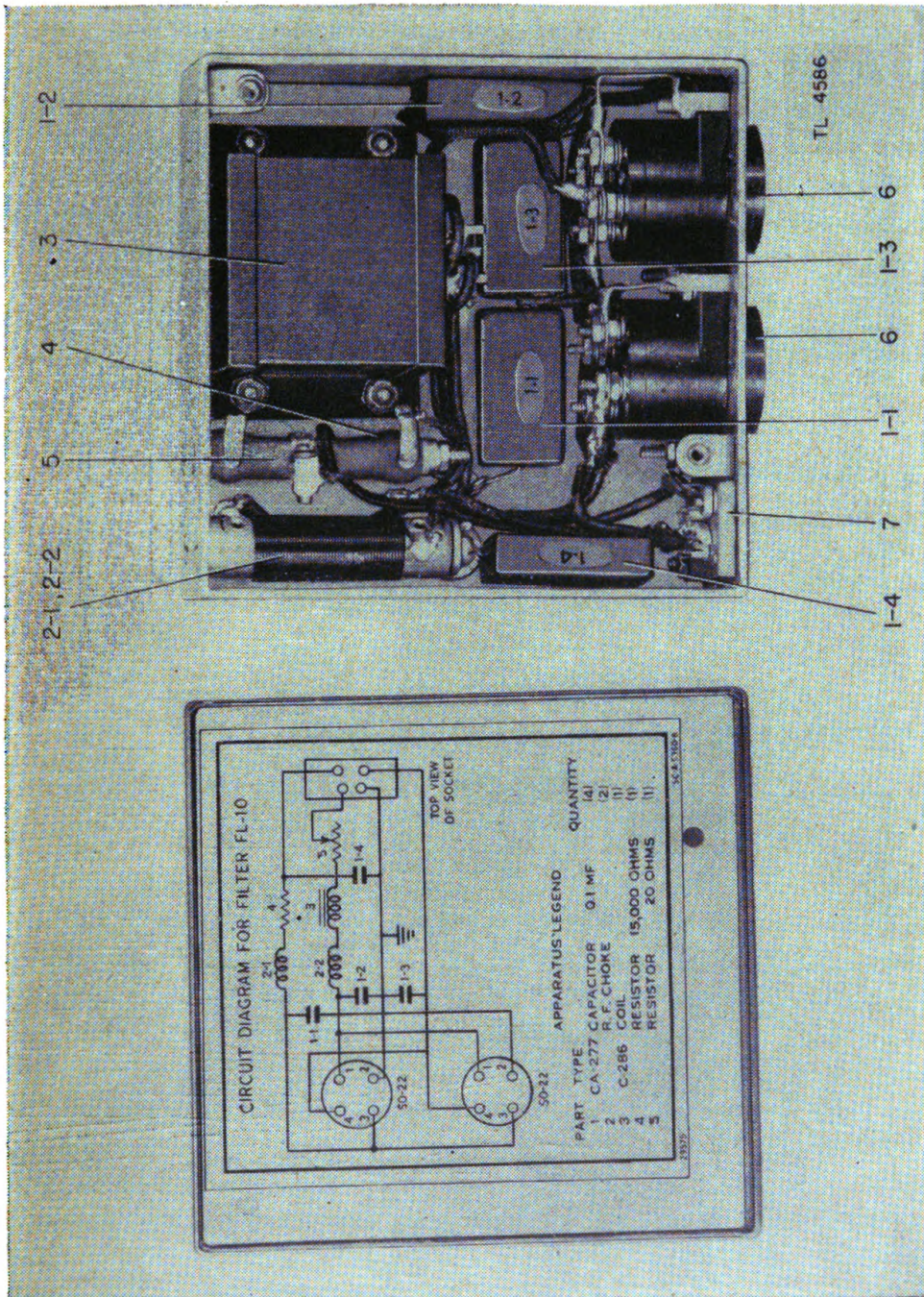


FIGURE 12.—Filter FL-10, cover removed.

tube through a section of switch S9 when it is in the PHONE position. In all other positions the secondary of T2 is disconnected and the cathode circuit of the modulator tube is open and therefore the modu-

lator stage and microphone are then inoperative. Another small winding of transformer T2 supplies sidetone to the receiver headphones.

*g. Receive-transmit switch (fig. 14).—*The REC-TRANS switch S8 has six sections of two positions each. Switch S8 serves to switch the antenna and counterpoise from receiver to transmitter. In the transmit position, it opens the receiver plate circuit, completes the transmitter plate circuit, and connects the sidetone voltage to the receiver headphones.

*h. Emission selector switch (fig. 15).—*The EMISSION SELECTOR switch S9 has five sections of four positions each. Switch S9 serves

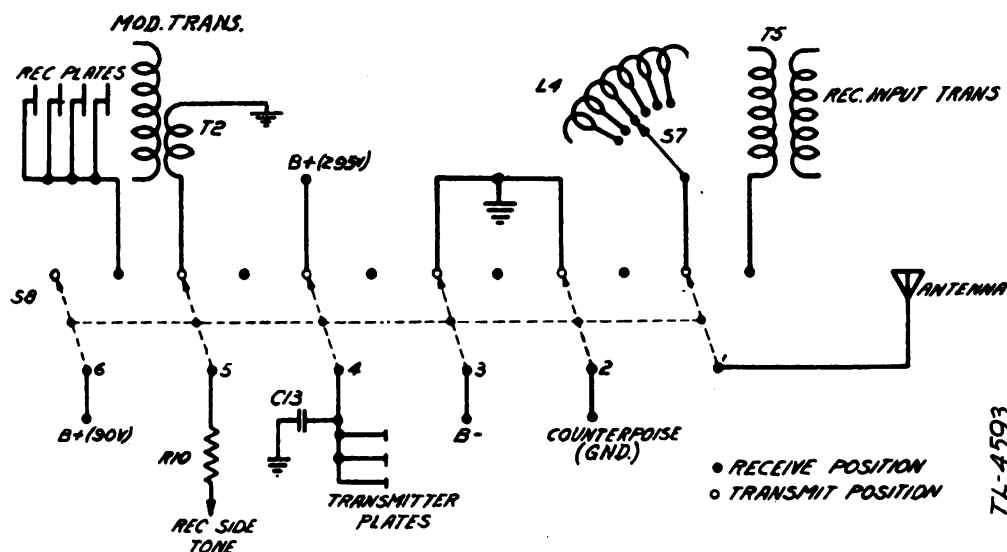


FIGURE 14.—REC-TRANS switch—functional diagram.

to select the type of emission desired. In the first (counterclockwise) position, the heater circuits for all transmitter tubes are open, while in all other positions the heater circuits are closed. In the second (phone) position the secondary of the modulation transformer is connected in series with the power amplifier plate supply lead and the cathode circuit is completed to ground. In the third (c-w) position, the telegraph jack is inserted in series with the power amplifier cathode circuit, the modulator cathode circuit is opened, and the secondary of the modulation transformer is disconnected. In the fourth (calibrate) position switching is provided so that the transmitter oscillator may be operated at the same time as the receiver, thus enabling the operator to set the transmitter frequency to the frequency of a received signal.

*i. Operating power.—*Power to operate the transmitter is generated by a hand-driven generator. Power enters the transmitter circuits through a plug J3 which is connected by a cable to the generator.

Provision is also made to apply this same source of generator power through a filter to the receiver.

12. Receiver unit.—*a. Electrical characteristics.*—The receiver is designed for either battery or hand-driven generator operation. It is mounted on the same chassis and panel with the transmitter and is intended for reception of phone or continuous-wave reception within the frequency range of 2,300 to 6,500 kilocycles. Its superheterodyne circuit employs four tubes: a VT-146 as a radio-frequency amplifier, a VT-147 as a converter, a VT-149 as a combination intermediate frequency amplifier, c-w beat oscillator, and automatic volume control detector, and a VT-148 as a combination signal detector and first

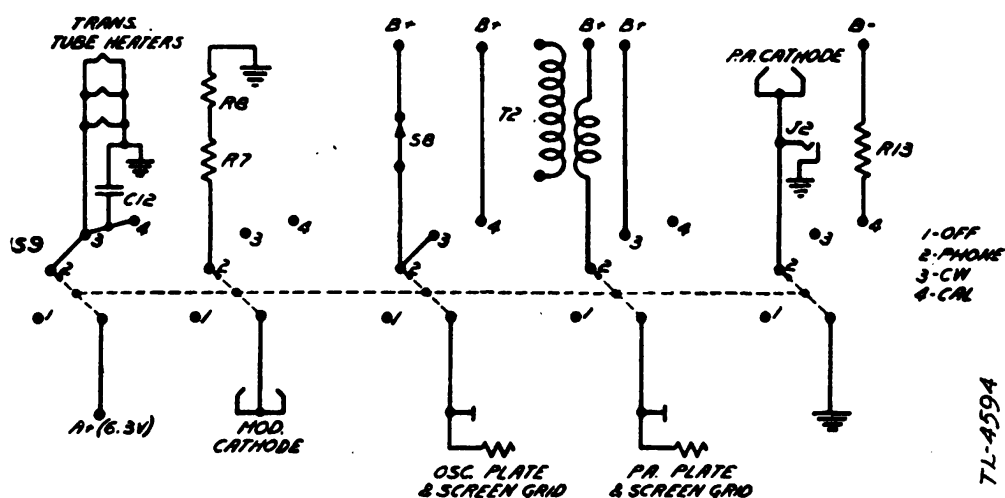
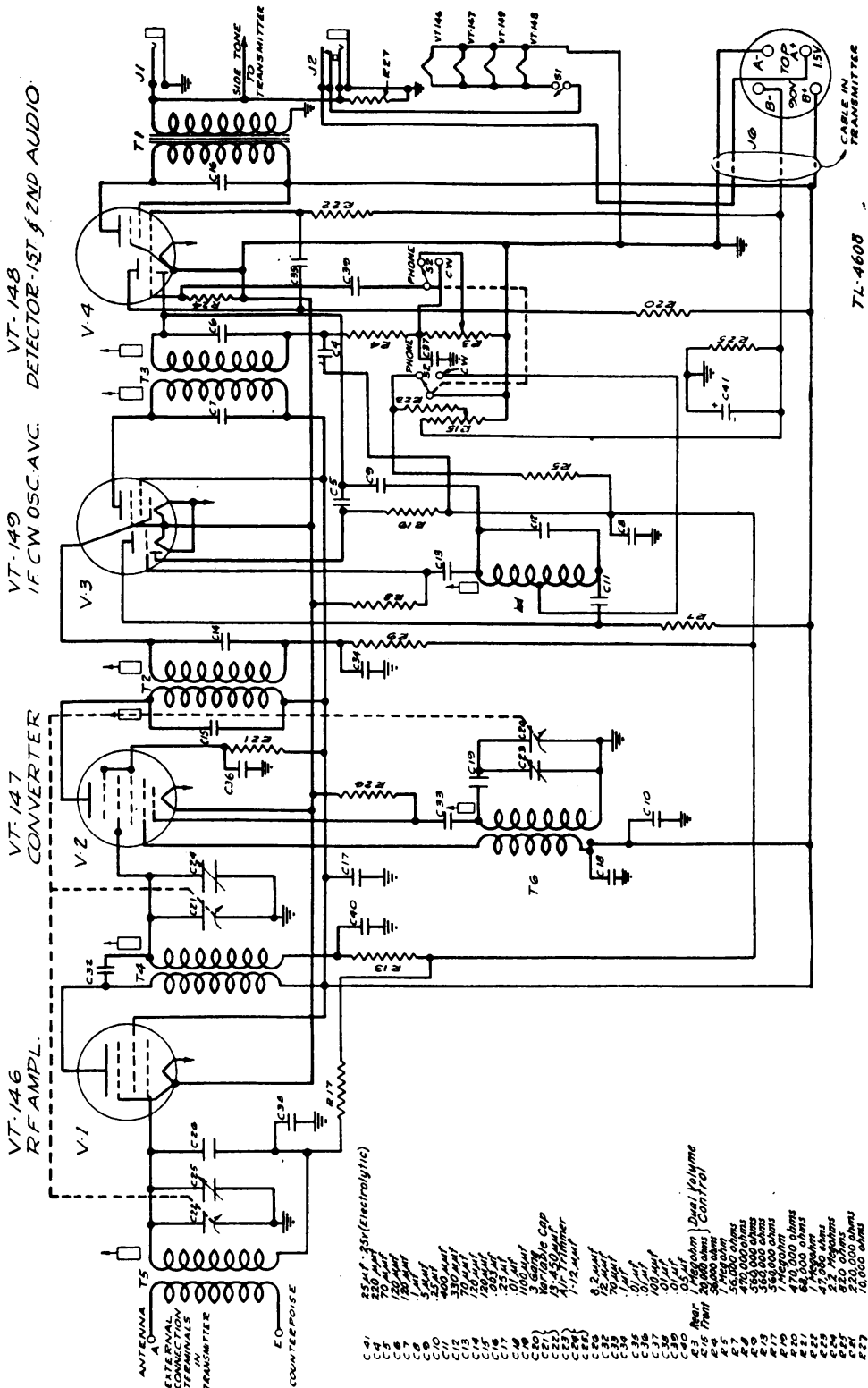


FIGURE 15.—EMISSION SELECTOR switch—functional diagram.

and second audio amplifiers. The receiver schematic diagram is shown in figure 16 and the wiring diagram in figure 32.

b. R-f amplifier.—The r-f (radio-frequency) amplifier stage is coupled to the antenna and counterpoise by input coil assembly T5, the secondary of which is in the tuned grid circuit of the radio-frequency stage which employs a VT-146. The tuned grid circuit consists of a fixed capacitor C26, a trimmer capacitor C25, one section C22, of the ganged tuning capacitor, and the coil assembly secondary. The output of this stage is coupled to the converter stage by a coil assembly T4.

c. Converter.—The converter stage combines in one VT-147 the functions of the heterodyne oscillator and mixer. The control grid circuit is tuned by section C21 of the ganged tuning capacitor and the trimmer capacitor C24. The grid circuit of the oscillator section of the tube is tuned by section C20 of the ganged tuning capacitor and the trimmer capacitor C23 which are connected across one winding of the oscillator feed-back coil assembly T6 through whose secondary



the 90-volt B+ potential is applied to the anode grid (grid No. 2 of the VT-147). This stage is coupled to the next stage by the i-f transformer T2.

d. I-f-c-w osc-arc tube.—This tube combines in one VT-149 the functions of an intermediate-frequency (i-f) amplifier, a continuous-wave beat oscillator, and an automatic volume control (ave) detector. The intermediate-frequency amplifier is composed primarily of the pentode

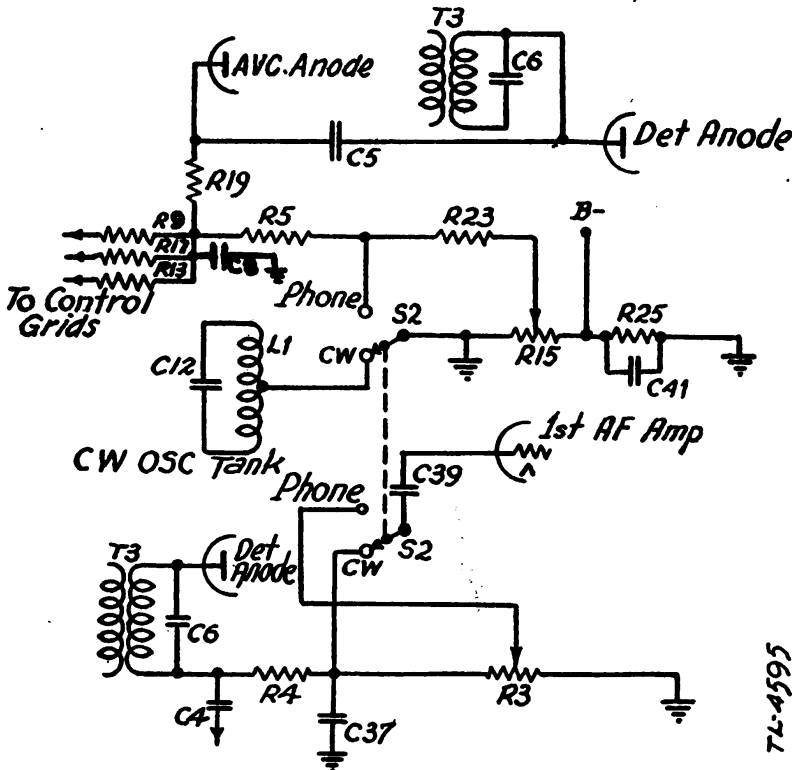


FIGURE 17.—Receiver volume control—functional diagram.

section of the tube and the primary circuit of the i-f transformer T3. The continuous-wave beat oscillator is composed primarily of the triode section of the tube and the tuned circuit L1-C12, and is coupled to the signal detector by C9. Intermediate-frequency signal voltage from T3 is fed through capacitor C5 to the diode section of the tube where it is rectified. Resistors R19 and R5 are the diode load. For PHONE operation an automatic volume control biasing voltage which is applied to the control-grid circuits of the radio and intermediate-frequency amplifiers and the converter is obtained from the voltage drop developed across the diode load resistor R5 and C8.

e. Detector—first and second audio tube.—Three functions are combined in one tube, VT-148. A detector section causes rectified current to flow through fixed resistor R4 and variable resistor R3. Volt-

age from R3 is applied to the first audio-amplifier grid. The amplified signal is next applied through the coupling capacitor C35 to the grid of the second amplifier section, the plate circuit of which is connected to the output transformer T1. Two jacks J1 and J2 are provided for plugging in headphones to the output of the receiver. Contacts on jack J2 are connected in series with the filaments of all the tubes so that a plug must be inserted in this jack before filament current will flow.

f. Sensitivity and volume.—When switch S2 is in the PHONE position, sensitivity of the receiver is controlled by the avc circuit and audio volume is controlled by section R3 of the volume control potentiometer. When switch S2 is in the c-w position, sensitivity is adjusted manually by means of the volume control potentiometer R15. This control permits adjustment of the negative bias on the grids of the r-f, i-f, and converter tubes.

g. Operating power.—Power to operate the receiver is ordinarily supplied by batteries through the power input plug J6. However, power may be supplied by the hand-driven generator. In this case, filter FL-10 must be inserted between the generator and the power input plug J6. (See pars. 9c and 13.)

h. I-f transformers and r-f and c-w coil assemblies.—See figures 18 and 19.

13. Filter FL-10.—The circuit of filter FL-10 (figs. 20 and 35) is essentially that of two low-pass filters which provide smoothing of the receiver filament and plate supply voltages so that objectionable hum and noise from the hand generator may be eliminated. R-f choke coils 2-1 and 2-2 tend to block the radio-frequency component of this noise from reaching the receiver plate and filament circuits, respectively. Capacitors 1-1, 1-2, 1-3, and 1-4 tend to further reduce this noise by bypassing it. Audio choke coil 3 is included to reduce the audio-frequency component of the generator ripple on the receiver filaments. Resistor 4 in series with the plate supply of the receiver drops the hand generator high voltage to approximately 90 volts. Another resistor, 5, in the filament circuit is used to reduce the voltage on the receiver filaments to $1\frac{1}{2}$ volts.

14. Generator GN-44-A.—*a. Function.*—The hand-driven generator is designed to supply the required output of d-c power for the transmitter and the receiver. Its circuits are shown in figures 21 and 34.

b. Armature and drive (see figs. 28 and 29).—The armature has two windings and two commutators. One winding supplies the high-voltage power for the plates and the second supplies the low-voltage

power for the tube heaters and filaments. The armature shaft is supported by two bearings 19 and 20 and is connected through a train of gears (35 to 1 ratio) to the crankshaft. When this crankshaft is turned at a speed of 60 rpm the armature rotates between the two pole pieces 14 at a speed of 2,100 rpm.

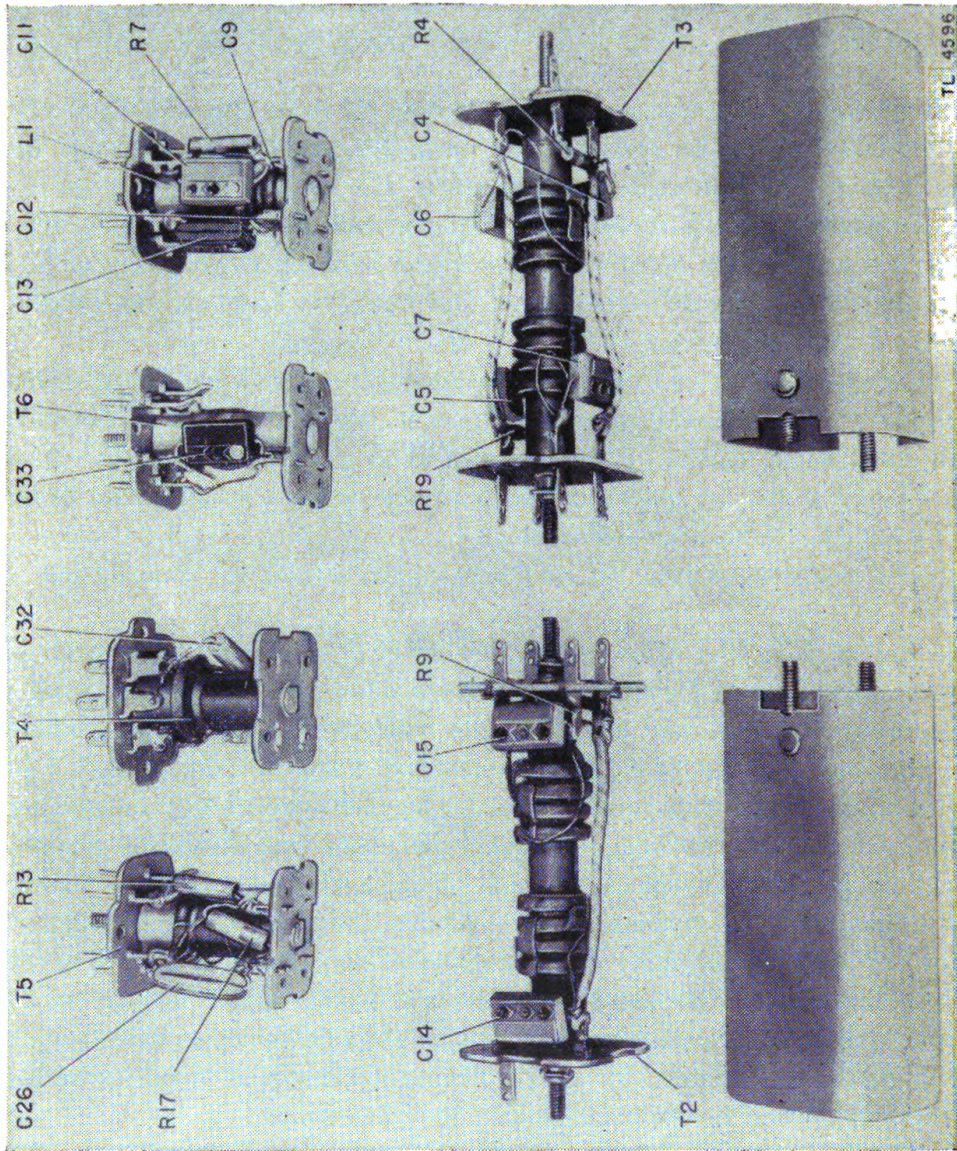


FIGURE 18.—I-f transformers and r-f and c-w coil assemblies.

c. *Field* (see figs. 21, 28, 29, and 30).—The two field windings 31 and 32 are in series and are connected across the low-voltage brushes. When the armature is rotated, a small residual flux in the pole pieces causes a voltage to be built up across the brushes. This voltage supplies current for the field winding which in turn adds to the flux in the pole pieces. *It is essential that the generator crank be turned in the*

correct direction, otherwise the flux resulting from the field coil will cancel the residual flux in the pole pieces and the voltage will not build up.

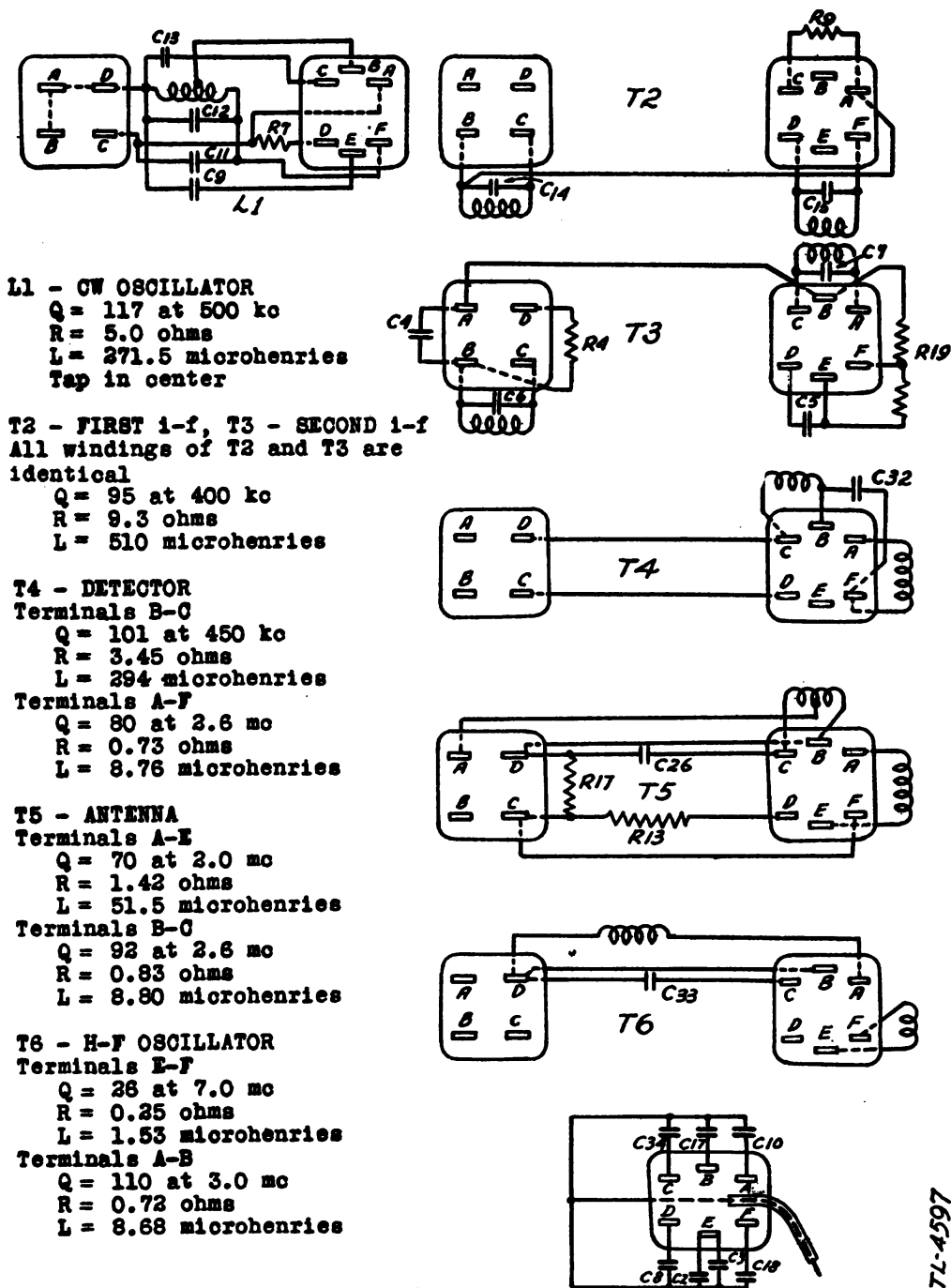


FIGURE 19.—I-f transformers and r-f and c-w coil assemblies—schematic diagrams.

d. *Voltage regulator.*—The voltage regulator is the vibrator type and its function is to keep the output voltages essentially constant

for normal variations in the speed of cranking the generator. The regulator coil is connected, through a part of resistor R201, across the low-voltage brushes. When the voltage has built up to a certain point, the circuit between A and C on the regulator will open. This inserts the second part of resistor R201 in series with the generator field windings, thus reducing the flux in the generator field and in turn reducing the output voltages. When the generator is operated

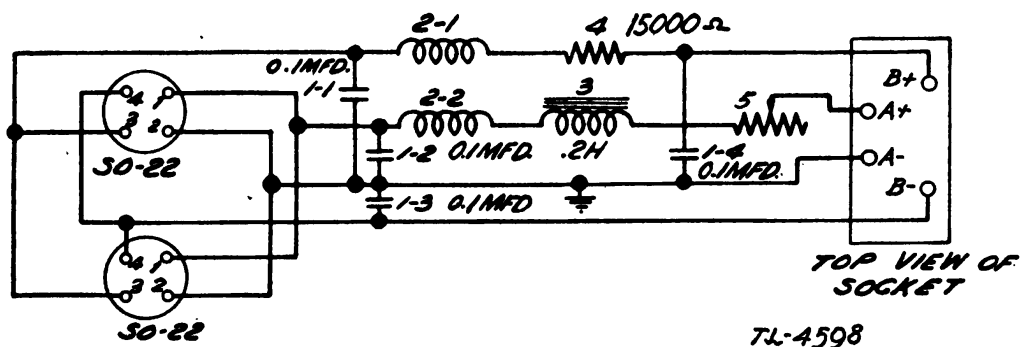


FIGURE 20.—Filter FL-10—schematic diagram.

at its normal speed the movable arm of the regulator will alternately open and close the circuit between A and C. The higher the speed of cranking, the greater will be the percentage of the time that this circuit will be open and thus the average output voltage remains essentially constant.

e. Filter circuits (see fig. 21).—A filter system is provided within the generator in both the high- and low-voltage output circuits. This filter provides filtering in such a manner that the output voltage may be applied directly to the transmitter. However, if the receiver is to be operated from the generator, filter FL-10 must be used to supply further filtering. The generator filter in the low-voltage circuit consists of capacitor C202 directly across the low-voltage brushes and coil L201 in series with the A+ lead. In the high-voltage circuit the filter consists of capacitors C203 and C204 from the B+ and B- terminals, respectively, to ground; capacitor C205 from the positive brush to ground, parallel resistors R202 and R203 in series with the B+ lead, and capacitor C201 across the high-voltage brushes.

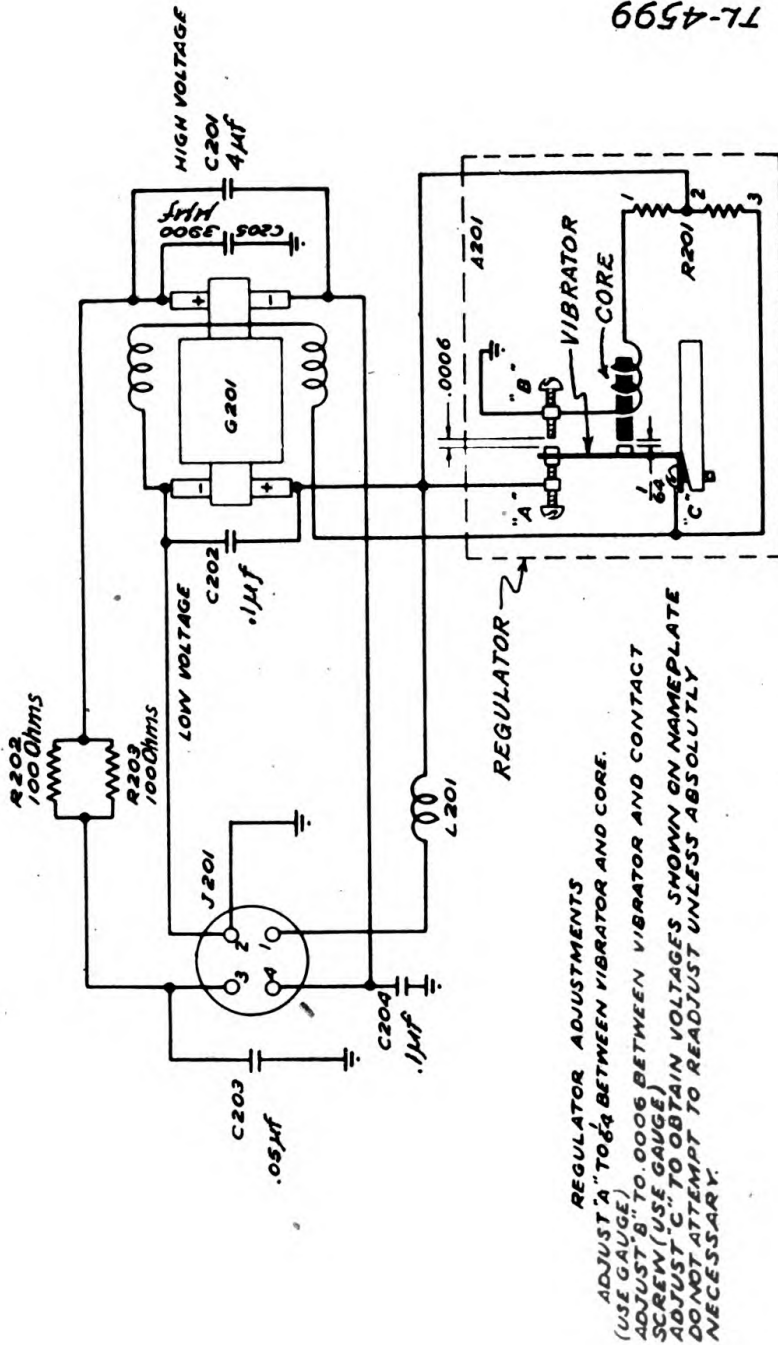


FIGURE 21.—Generator GN-44-A—schematic diagram.

15. Characteristics of vacuum tubes.

Signal Corps type		VT-107-A (6V6-GT)	VT-146 (1N5-GT)	VT-147 (1A7-GT)	VT-148 (1D8-GT)		VT-149 (3A8-GT)	
		Amperes	Am- peres	Converter	Triode	Pen- tode	Triode	Pen tode
Filament voltage.....	Volts.....	0.3	1.4	1.4	1.4		*1.4	*1.4
Filament current.....	Amperes.....	0.45	0.05	0.05	0.1		0.05	0.05
Plate voltage.....	Volts.....	315	90	90	90	90	90	90
Screen voltage.....	Volts.....	225	90	45	90		90	
Control-grid voltage.....	Volts.....	-13	0	0	0	-9	0	0
Plate res. (approx.).....	Megohm.....	0.077	1.5	0.6	0.04	0.2	0.2	0.8
Transconductance.....	Umhos.....	3,750	750	575		925	325	750
Plate current.....	Ma.....	35	1.2	0.55	1.1	5	0.2	1.5
Screen current.....	Ma.....	6	0.3	.6	1.0		0.5	
Anode-grid current.....	Ma.....			1.2				
Anode-grid voltage.....	Volts.....			90				
Osc.-grid resistor.....	Ohms.....			200,000				
Conversion transcond.....	Umhos.....			250				
Osc.-grid current.....	Ma.....			0.035				
Total cathode cur.....	Ma.....			2.4				
Amp factor.....				25		65		
Load resistance.....	Ohms.....	8,500			12,000			
Power output.....	MW.....	5,500			.200			

*The heaters of VT-149 may be connected in series for 2.8-volt operation or in parallel for 1.4-volt operation

SECTION IV
MAINTENANCE

	Paragraph
Transmitter unit.....	16
Receiver unit.....	17
Generator GN-44-A.....	18
Typical performance characteristics.....	19
Wiring diagrams.....	20

16. Transmitter unit.—a. Preliminary check.—The following checks and tests are recommended if the transmitter does not operate properly:

(1) See that antenna is properly connected and that REC-TRANS switch is placed in the TRANS position.

(2) See that EMISSION SELECTOR switch is set at either the C. W. or the PHONE position.

b. To remove receiver and transmitter from cabinet.—If the trouble is not located by the preliminary checks, remove receiver-transmitter from the cabinet as outlined in (1) to (4), inclusive, below, and then make the checks indicated in c and d below.

(1) Remove antenna and counterpoise; withdraw key, microphone, and battery cable plugs.

(2) Detach stay-joint from cabinet sides and lower the lid out of the way.

(3) Loosen the eight knurled-head panel screws until they clear their threaded seats in the cabinet. Do not withdraw screws completely.

(4) Slide panel forward, withdrawing chassis from the cabinet. Place chassis on top of the cabinet or on some other flat surface.

c. To check tubes.—Tubes VT-107-A are used in the transmitter. These tubes may be checked in any suitable tube checker. If no tube checker is available, a faulty tube may be located by substituting new tubes. Replace only one tube at a time then test to ascertain whether the transmitter operates properly. Repeat this procedure until the faulty tube is located.

d. Circuit checks.—Defective components can be located by voltage and continuity checks. For voltage checks refer to schematic diagram (fig. 13), wiring diagram (fig. 31), and (1) below. For continuity checks, refer to figures 13 and 31 and (2) below.

(1) *Transmitter tube socket pin-to-ground voltages.*—The pin-to-ground (chassis) voltages should be within plus or minus 10 percent of the values indicated in figure 22, when the conditions given below exist.

(a) Use either a model 666-SC volt-ohm tester, a model 564 volt-ohmmeter, or any other 1,000-ohms-per-volt meter which has corresponding volt ranges. Read all voltages on lowest suitable meter scale.

(b) REC-TRANS switch in TRANS position.

(c) EMISSION SELECTOR switch in PHONE position.

(d) Antenna and counterpoise disconnected.

(e) OSCILLATOR TUNING control set for 3,500 kc and P. A. TUNING control adjusted so that P. A. PLATE CURRENT meter indicates 35 ma (resonance).

(f) Generator voltage adjusted so that voltage between B+ and B- (fig. 13) is 295 volts when the conditions given above exist. For the method of adjusting the generator voltage see paragraph 18a.

(2) *Transmitter tube socket pin-to-ground resistances.*—The pin-to-ground (chassis) resistances should be as indicated in the following table when the conditions given below exist.

(a) Generator plug removed from generator.

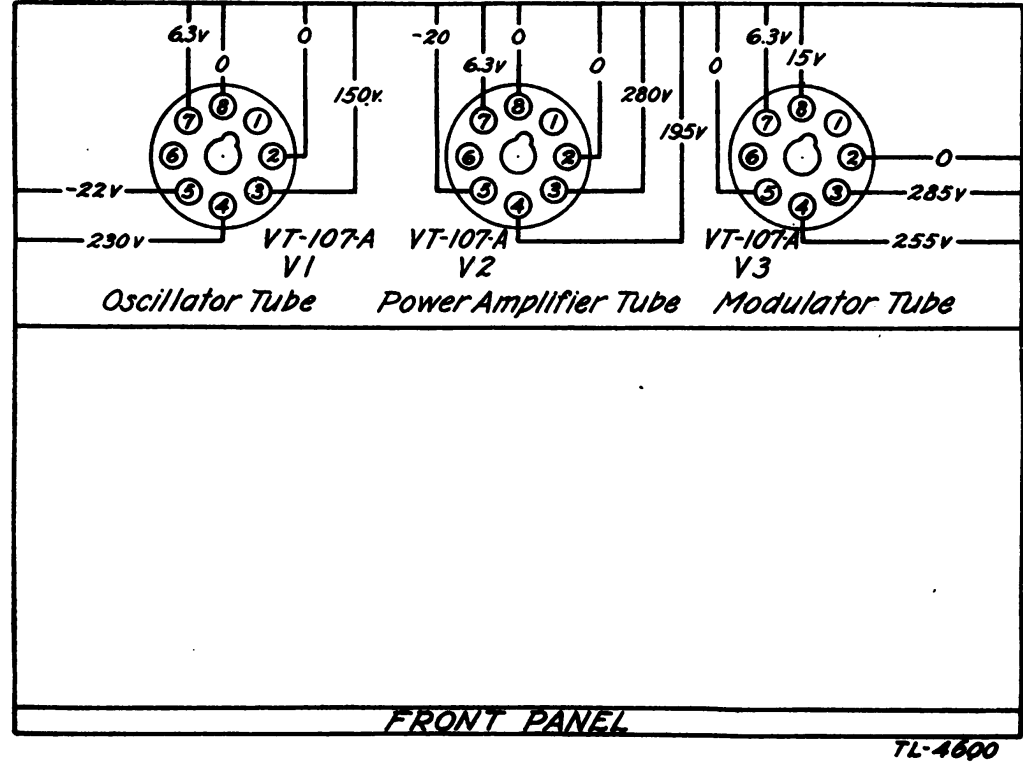
(b) REC-TRANS switch in TRANS position.

(c) Emission selector switch as shown in second column of table.

(d) Tubes in sockets.

(e) Key plugged in (open except as indicated).

Tube	Position of emission selector switch	Pin-resistance							
		Pin	1	2	3	4	5	6	7
VT-107-A V1 (osc.).	Phone, o-w, or cal.	Resistance..	0	0	1 meg	1 meg	470,000	0	1 0.
VT-107-A V2 (P. A.).	Phone, o-w, or cal.	Resistance..	Inf	0	1 meg	1 meg	27,000	Inf	1 0.
		Resistance..	Inf	0	1 meg	1 meg	27,000	Inf	1 {0 (Key closed). Inf. (Key open).
VT-107-A V3 (mod.).	Phone, o-w, or cal.	Resistance..	Inf	0	1 meg	1 meg	3,000	Inf	1 450.
		Resistance..	Inf	0	1 meg	1 meg	3,000	Inf	1 Inf.



TL-4600

FIGURE 22.—Transmitter socket voltage diagram (transmitter viewed as in fig. 9.)

e. Filter resistances.—See figure 23.

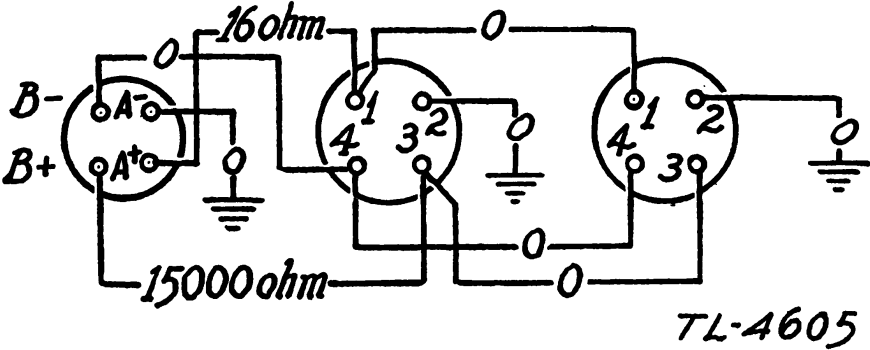


FIGURE 23.—Point-to-point resistance values, filter FI-10—outside view.

f. Generator cable plug-to-ground resistances.—See figure 24.

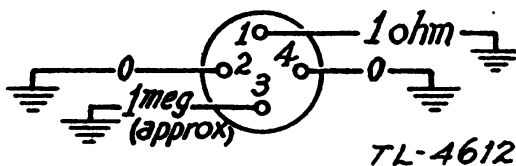


FIGURE 24.—Pin-to-ground resistances, generator cable plug. (REC-TRANS switch in TRANS position.)

17. Receiver unit.—*a. Preliminary check.*—If the receiver is inoperative, check to insure that—

- (1) Antenna is properly connected.
- (2) REC-TRANS switch is in REC position.
- (3) VOLUME control is sufficiently advanced.
- (4) Headphones are plugged into right-hand jack.
- (5) Receiver cable is plugged into battery receptacle.

b. To remove receiver chassis.—If the trouble is not located by following the series of checks outlined in *a* above, remove the chassis from the case (see par. 16*b*), then proceed as indicated in *c* to *g*, inclusive, below.

c. Receiver battery check.—The batteries should be checked at regular intervals, using a 1,000 ohms-per-volt voltmeter.

(1) The A battery and B battery readings should *not be less* than 1.1 volts and 66 volts, respectively, when the battery pack is connected to the receiver and the filaments are turned on. Recheck voltages at the end of 5 minutes of operation; they should be almost the same as the readings taken after about 1 minute of operation.

(2) The battery pack may also be checked by using a 5-ohm resistor as the A battery load and a 10,000-ohm resistor as the B battery load. Voltages across these loads should not be less than those indicated in (1) above for operation with the receiver.

(3) To replace the battery pack, remove battery cable plug and retainer clamp. Tip receiver-transmitter forward until the battery slides out of its compartment far enough to be removed. Insert a fresh battery pack and replace retainer clamp and battery cable plug.

d. To check tubes.—Remove tubes and test each in a suitable tube tester. Note that tubes VT-149 and VT-148 are of three-purpose type; therefore, an independent check of the triode, pentode, and diode sections will be necessary. If no satisfactory tube checker is available, insert a complete set of tubes that has been previously tested. If normal operation is restored on insertion of the new tubes, the old ones may now be reinserted, one at a time, until the defective tube or tubes are located, as indicated by failure of the receiver to operate satisfactorily.

e. Instability.—Several sets were supplied without resistor R27. If the receiver does not have resistor R27 and is found to be unstable, the receiver may require the addition of this resistor across jack J2 as indicated in figures 16 and 31.

f. Circuit checks.—Defective components can be located by voltage and continuity checks. For voltage checks, refer to schematic diagram (fig. 16), wiring diagram (fig. 32), and (1) below. For resistance checks, refer to figures 16 and 32 and (2) below.

(1) The pin-to-ground (chassis) voltages should be within plus or minus 5 to 10 percent of the values indicated in figure 25 when the conditions given below exist.

(a) Volume control maximum clockwise direction.

(b) PHONE-C. W. switch in either position.

(c) Headset plug in jack marked PHONES.

(d) Battery voltages (receiver turned on): A, 1.45 volts; B, 85 volts.

(e) No signal input (antenna and ground binding posts connected together) with receiver tuned to 2,300 kilocycles.

(f) REC-TRANS switch in REC position.

(g) Meter used is either a model 666-SC volt-ohm tester, a model 564 volt-ohmmeter, or any other 1,000 ohms-per-volt meter which has corresponding ranges. Read all voltages on lowest suitable meter scale.

Note.—There should be a potential drop of 8 volts across R25, measured from chassis (— A) to terminal board 1, terminal No. 1 (— B). (See fig. 32.)

(2) To make a continuity check, proceed as follows:

(a) Remove the battery plug and check the continuity of all circuits containing inductances. (See fig. 19.)

(b) Check the resistance of R17, R13, and R9 and the resistance to chassis from the low potential side of each grid coil as indicated in figure 16 or 32.

(c) Check all a-f coupling capacitors for leakage (with consequent loss of grid bias on amplifier tubes).

(d) Bypass capacitors can be checked by momentarily shunting a large capacitor (0.1 μ f) across the unit in question while the receiver is in operation. A marked improvement in operation indicates an open or a defective capacitor. Any shorted capacitors will be discovered in the resistance-continuity checks.

(e) Tube socket pin-to-ground (chassis) resistances should be as indicated in the following table when the conditions given below exist.

1. Volume control maximum clockwise direction.

2. Phone plug in jack marked PHONES.

- FIGURE 25.—Receiver voltage diagram. (Receiver viewed as in fig. 9.)

Tube	Function	Pin-resistance									
		Pin	1	2	3	4	5	6	7	8	Grid capacity
V1 VT-146	R-f amp	Resistance	0	3	Inf ¹	Inf	0	Inf	0	Inf	1 meg. + ²
V2 VT-147	Converter	Resistance	0	3	Inf	Inf	220,000	Inf	0	Inf	1 meg. +
V4 VT-148	A-f 2d det	Resistance	Inf	3	Inf	Inf	1 meg.	Inf	0	1 meg. +	1 meg. +
V3 VT-149	I-f bfo-avc	Resistance	0	3	Inf	Inf	470,000	Inf	3	1 meg. +	1 meg. +

¹ Inf. signifies no readings on models 666-SC tester.
² 1 meg. + signifies resistance greater than 1 megohm.

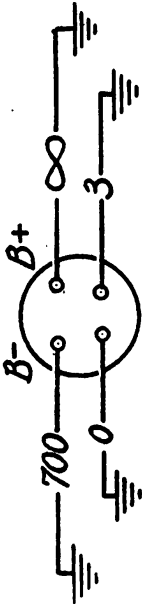


FIGURE 26.—Pin-to-ground resistances, battery cable plug (VOLUME switch on and headset plugged in PHONES jack).

(f) For battery plug to ground resistances see figure 26.

g. *Alinement of receiver.*—Alinement should not be attempted until batteries and tubes have been tested and all necessary circuit checks have been completed. The complete alinement procedure should be adhered to and no attempt should be made to aline one or two circuits in a random manner.

(1) *Equipment required.*—(a) Signal generator such as I-72-().

(b) Output meter or an a-c voltmeter such as is part of test set I-56-().

(c) Neutralizing screw driver and wrench such as are part of tool equipment TE-45.

(d) RCA 12, 636 air trimmer wrench or a substitute such as shown in figure 27.

(e) A 0.1- μ f capacitor and a 150- μ f capacitor.

(f) Frequency meter SCR-211-(), if available.

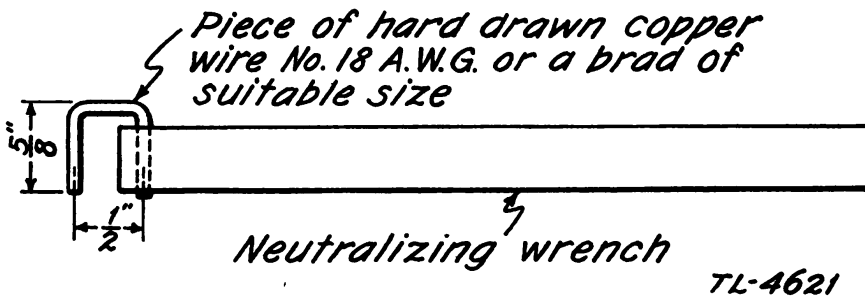


FIGURE 27.—Substitute air trimmer wrench.

(2) *Preliminary set-up.*—(a) Turn on signal generator, frequency meter, and receiver and allow all to warm up for $\frac{1}{2}$ hour.

(b) Plug output meter into the EXTRA PHONES jack.

(c) Set VOLUME control knob to its maximum position.

(d) Turn PHONE-C. W. switch to the PHONE position.

(e) Using a 3-inch length of wire with small battery clips on both ends, ground terminal B of coil assembly T6.

(f) Connect low output terminal of signal generator to radio set ground binding post, to chassis of the receiver, and to ground.

(3) *Alinement procedure.*—After setting up the equipment as in (2) above, follow procedure in table below, connecting the high lead of signal generator through artificial antenna series capacitor indicated in the table to the point in the receiver indicated for each step of alinement. The following suggestions will be found helpful in performing the alinement procedure:

(a) Before proceeding with step 1 check signal generator frequency with frequency meter. Do likewise before performing steps 4, 6, and 8.

(b) Regulate signal generator output so that at all times the minimum signal necessary to produce an observable output is applied to the receiver.

(c) Use modulated signal generator output in all alinement steps except step 3. (See note ¹.)

(d) The i-f transformers T2 and T3 must be adjusted at both ends with the neutralizing screw driver. (See figs. 8, 9, and 18.)

(e) Coil assemblies L1, T4, T5, and T6 must be adjusted at only one end with the neutralizing screw driver. (See figs. 9 and 18.)

(f) Air trimmer capacitors C23, C24, and C25 are adjusted from under the chassis by loosening the friction sleeve with the neutralizing wrench. Loosen friction sleeve only enough to allow plunger to be moved in and out when rotating and pushing or pulling on the plunger with air trimmer wrench. In order to do this, the hook of the air trimmer wrench must be inserted in the eye of the plunger. In making this adjustment the plunger should be pulled out until it hits the stop and then gradually pushed in until a maximum output is obtained. Care must be exercised to keep the tool as far as possible from padding capacitor C19.

ALINEMENT PROCEDURE

Order of alinement	Connection to receiver	Artificial ant. series capacitor	Frequency setting	Tuning dial setting	Circuits to adjust	Adjustment symbols	Adjust to obtain—
1	VT-149 i-f grid capacitor.	0.1 μ f.	455 kc.	2,500 kc.	2d i-f trans.	T3.....	Maximum output.
2	VT-147 converter grid capacitor.	0.1 μ f.	455 kc.	2,500 kc.	1st i-f trans.	T2.....	Maximum output.
3 ¹	VT-147 converter grid capacitor.	0.1 μ f.	455 kc.	2,500 kc.	C-w osc.	L1 ¹	1,000-cycle ² beat note.
4	Ant. post.....	150 μ f.	6,300 kc.	6,300 kc.	Osc.....	C23 ³	Maximum output.
5	Ant. post.....	150 μ f.	6,300 kc.	6,300 kc.	Det.; r-f.....	C24, C25..	Maximum output.
6	Ant. post.....	150 μ f.	2,500 kc.	2,500 kc.	Osc.....	T6.....	Maximum output.
7	Ant. post.....	150 μ f.	2,500 kc.	2,500 kc.	Det.; r-f.....	T4; T5.....	Maximum output.
8	Ant. post.....	150 μ f.	6,300 kc.	6,300 kc.	Osc.....	C23 ³	Maximum output.
9	Ant. post.....	150 μ f.	6,300 kc.	6,300 kc.	Det.; r-f.....	C24, C25..	Maximum output.

¹ For this adjustment only, turn the PHONE-C.W. switch to C.W. position and use headphones instead of the output meter. Use unmodulated signal generator output.

² The c-w oscillator must be tuned to a frequency approximately 1,000 cycles below the intermediate frequency. To do this, tune the c-w oscillator to zero beat with the intermediate frequency. Then turn the adjustment on L1 in a *clockwise* direction until approximately a 1,000-cycle note is obtained in the headset.

³ Use minimum capacitor peak (adjustment plunger pulled out farthest) if two peaks can be obtained. Be sure to remove the ground from terminal B of T6 before proceeding with steps 4 to 9, inclusive.

18. Generator GN-44-A.—See figures 10, 11, 28, 29, and 30.

a. Regulator adjustment.—The generator output voltage should be maintained essentially constant at the value shown on the name plate (attached to the bottom cover) for cranking speeds of 50 to 70 rpm. The output voltage may be adjusted, and is maintained essentially constant by the regulator A201. To adjust the regulator, proceed as indicated below. (See figs. 10 and 21.)

(1) Remove top cover from generator.

(2) Loosen setscrew that holds B. Loosen B sufficiently to allow gage 12 to pass between vibrator contact and B.

(3) Loosen setscrew that holds A and adjust A until spacing (determined with gage) between vibrator and core is $\frac{3}{64}$ inch.

(4) Adjust B until spacing (determined with gage) between vibrator contact and B is 0.0006 inch.

(5) Tighten setscrew that holds A and B.

(6) Adjust C until the output voltage is 295, as shown on the name plate, when the generator is connected to the radio set and the conditions required in paragraph 16*d* (1) (b) to (e), inclusive, exist.

b. Lubrication.—Maintenance will consist of inspection and lubrication of the bearings at 6-month intervals. Use S-58 nonfluid oil from the New York and New Jersey Lubricant Company, New York City, or ANDOK C grease from the Standard Oil Company of New Jersey or an equivalent lubricant. *Do not use petrolatum.* There are six bearings requiring this service and just enough grease should be used to keep the ball bearings from rusting. To apply the grease, proceed as follows: Remove legs from generator and place generator so that it stands up on the gear case. Unscrew caps 9 and 10 (see figs. 28 and 29) and insert grease between the inner and outer ball races. Replace caps. Remove nut and washer which ground capacitor C205, and stand generator so that gear case is at the top. Remove gear case 4 and intermediate pinion 23. Apply grease to ball races in gear case and to ball races 21 in magnet frame and armature bearing 20. Add grease to the gears, filling up between the gear teeth. Replace gear case, making certain that screws retaining it to the frame are tightened evenly. Replace nut and washer which ground capacitor C205. Replace cover.

c. Brush replacement.—Prolonged usage will wear away the active surface of the brushes. (See figs. 29 and 30.) There are two types of brushes used and replacement should be made with Morganite Brush Company's brushes or equivalent. For the low-voltage side, the type link CM3 soft metallic copper brush should be used; for the high-voltage side, the type link B6 hard black carbon brush should be used. To replace the brushes, remove caps 25 on either side of gear

housing, thereby exposing screw 35 (fig. 30) holding brush spring block to the holder. Withdraw spring and block; if the brush does not come out easily, push block toward holder and pull again. If the brush

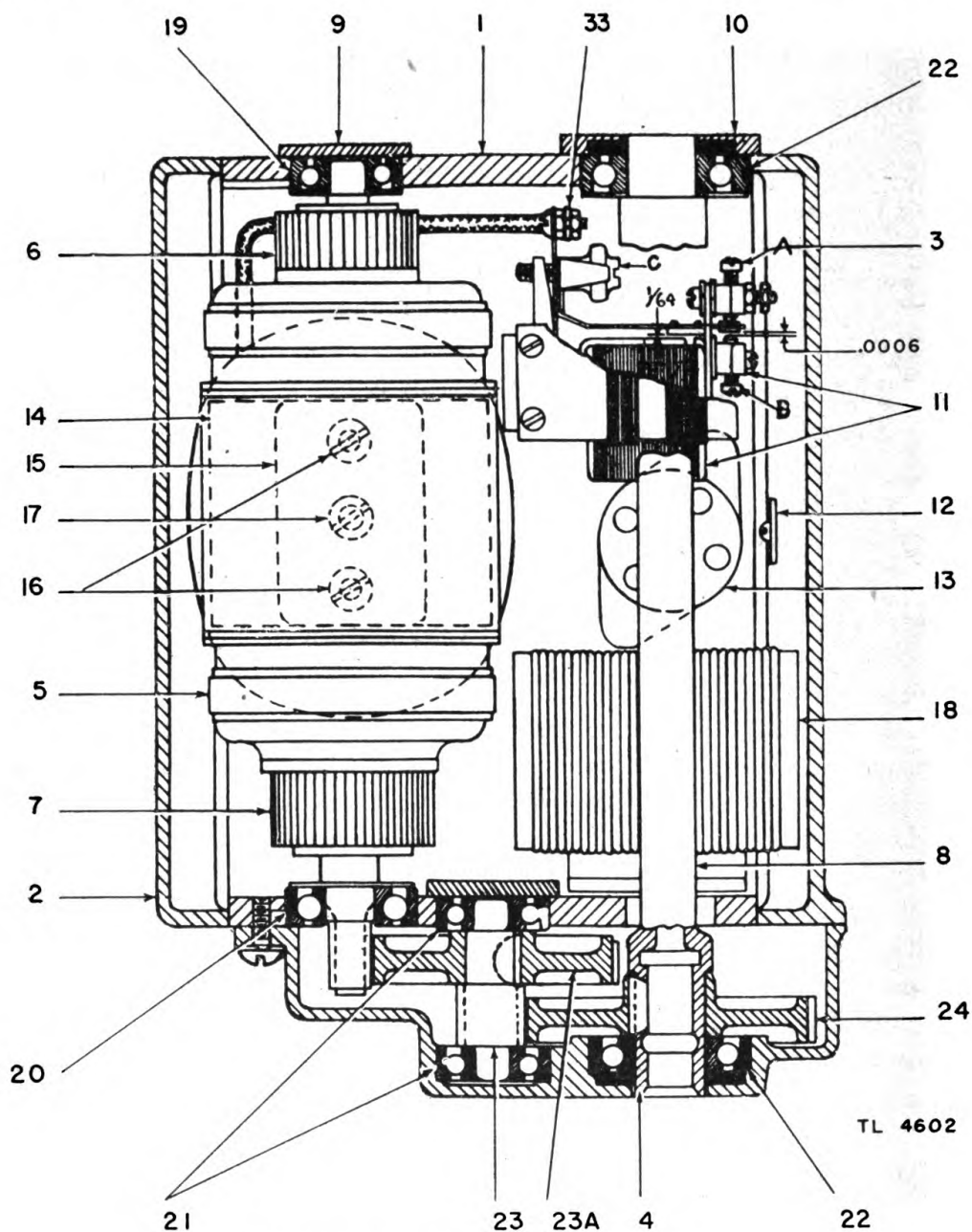


FIGURE 28.—Generator GN-44-A—section view.

does not then come out, it is due to a slight bur formed by the friction and pressure of the brush on the commutator. This particular condition is common where soft brushes are used and when encountered, it will be necessary to remove the brush holder from the frame. To

accomplish this, open lower cover, disconnect leads, and remove two screws fastening brush holders to magnet frame. Scrape bur and make certain that the brush slides easily in the holder. Then fasten brush holder to frame, reconnecting leads and inserting brushes. If new brushes are to be used, they must be scraped to fit the commutator.

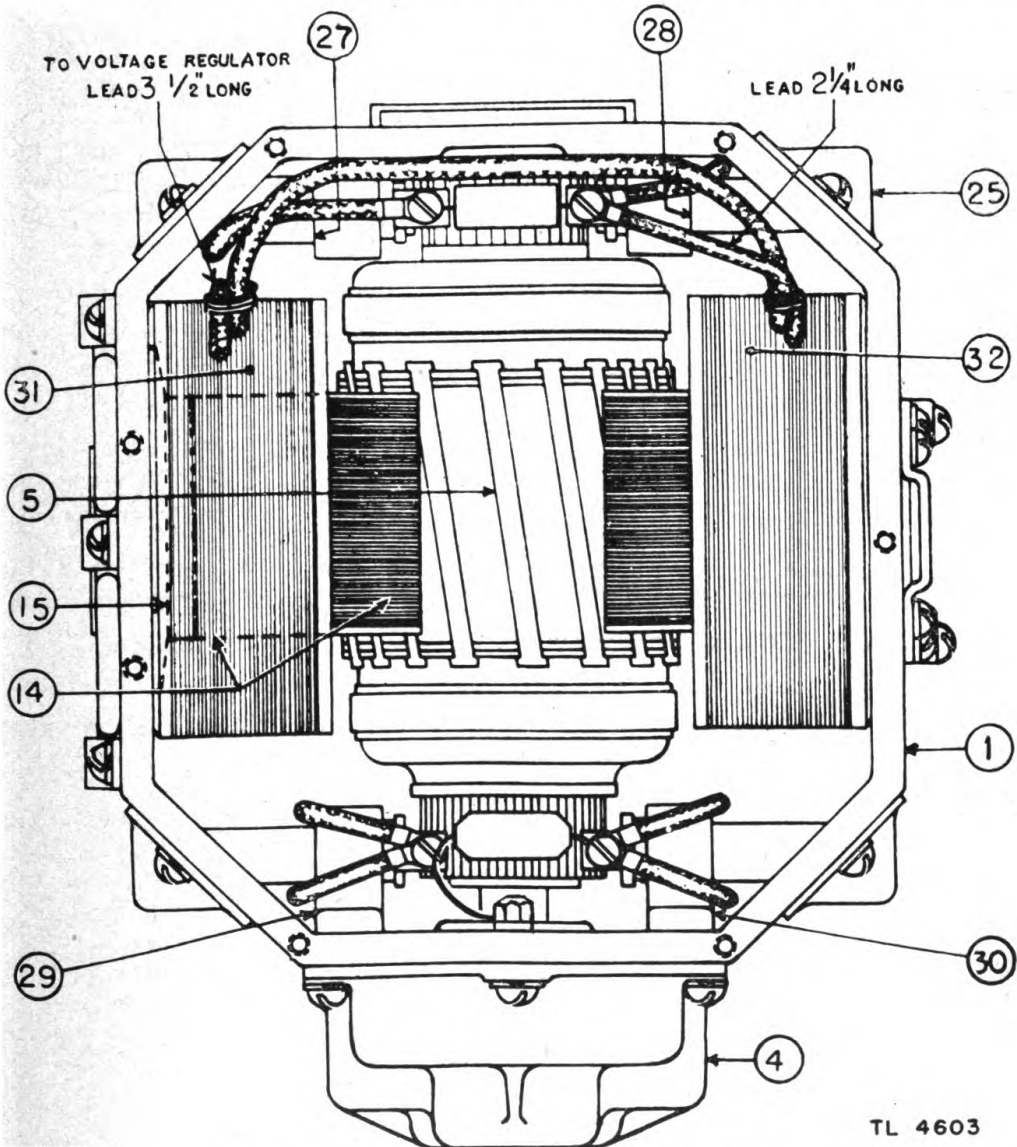


FIGURE 29.—Generator GN-44-A—bottom interior view.

At least two-thirds of the brush face should ride the commutator. Any drop of voltage after the installation of new brushes can generally be attributed to faulty fitting of the brushes. In replacing caps 25 be certain that they are put back as they were, that is, so that screw 35 cannot touch them.

d. *Armature and field coil replacements* (see figs. 28, 29, and 30).—The replacement procedure for armature and field coils is as follows:

(1) Because of the construction of the generator, the armature and the pole pieces must of necessity be handled together. The upper cover 3 of the generator frame must be opened and the regulator unfastened from the magnet frame in order to disconnect the lead of the

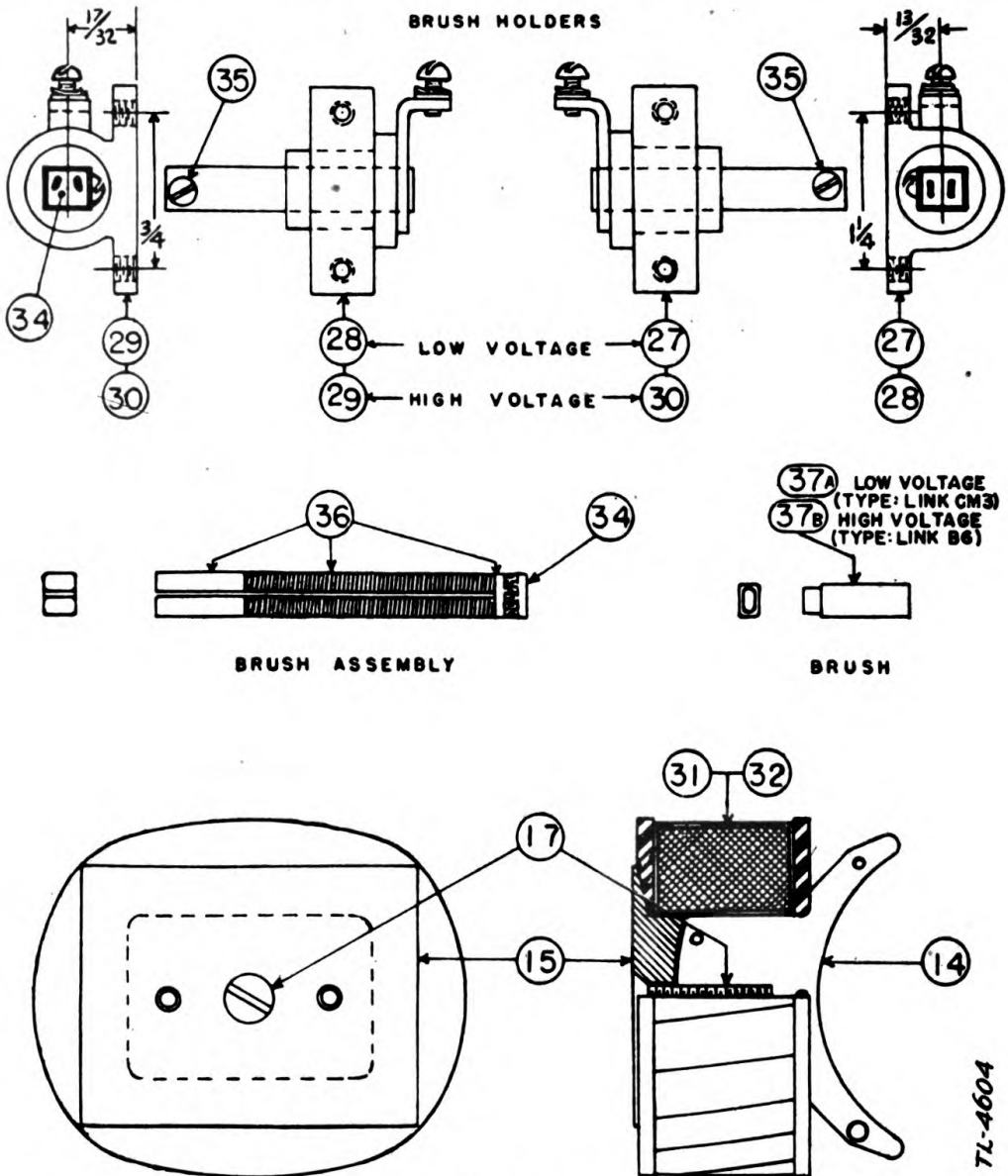


FIGURE 30.—Generator GN-44-A, field coil and brush assemblies.

field coil 31 at terminal 33. Replace upper cover, using only two screws to fasten it to the frame. Place generator on its upper cover, then remove lower cover 2 and disconnect leads to the four brush holders. Remove brush holder caps 25 and screws 35 which hold spring block 34 to the brush holders. Remove spring block and brushes. Remove brush holders 27 to 30. Remove screws 16 holding the pole pieces to

the frame and remove cap 9. Remove nut which grounds capacitor C205. Remove gear case 4. Keep intermediate gear 23 in the gear case, covering it to prevent infiltration of dirt. To remove the armature, slide armature first one way and then the other in order to push the outside ball races out of magnet frame. Now slide armature toward gear case end until ball bearing at the opposite end clears the magnet frame. Holding the pole pieces, take them out of the frame with the armature between.

(2) If necessary to replace the field windings, remove screw 17 which holds pad 15 to pole piece 14. Remove field coils and replace them with spare ones. Make certain that no foreign matter is between the pole piece and pad, and that the pad is screwed tight against the pole piece. Insert armature and pole pieces in magnet frame. Place outside ball races in the frame, being careful not to force the races. Screw on ball cap 9. Before tightening pole piece screws, insert between the armature and pole pieces the 0.010-inch card which is wrapped around the spare armature (a piece of good quality hard writing paper will do). This will insure proper clearance between armature and pole pieces. Then tighten screws 16. Remove 0.010-inch card and be certain that the armature does not drag before replacing brush holders. Replace gear housing.

(3) Reassemble remainder of generator by proceeding in the reverse order to that described for its disassembly.

19. Typical performance characteristics.—a. *Transmitter.*

Power output (20 ohms, 100 $\mu\mu$ f dummy antenna):

Continuous wave, watts.....	5.5 average	4 minimum.
Phone, watts.....	5.0 average	4 minimum.
Percent modulation (35 ma P. A. plate current).....	90 average	75 minimum.
Frequency drift (first 5 minutes), cycles.....	750 average	1,500 maximum.

b. *Receiver (under standard test conditions).*

Sensitivity, microvolts.....	10 average	25 minimum.
Selectivity (band width at 60 db down), kilocycles.....	42 average	48 maximum
Image ratio (at 6,300 kc).....	250 average	170 minimum.
Maximum power output, milliwatts.....	100 average	70 minimum.
Calibration error, percent.....	1.0 average	1.2 maximum.

c. *Generator GN-44-A.*

High-voltage output (0.1 amp. load), volts.....	290 average	280 to 201 range
Low-voltage output (1.65 amp. load), volts.....	6.6 average	5.9 to 7.1 range.

20. Wiring diagrams.

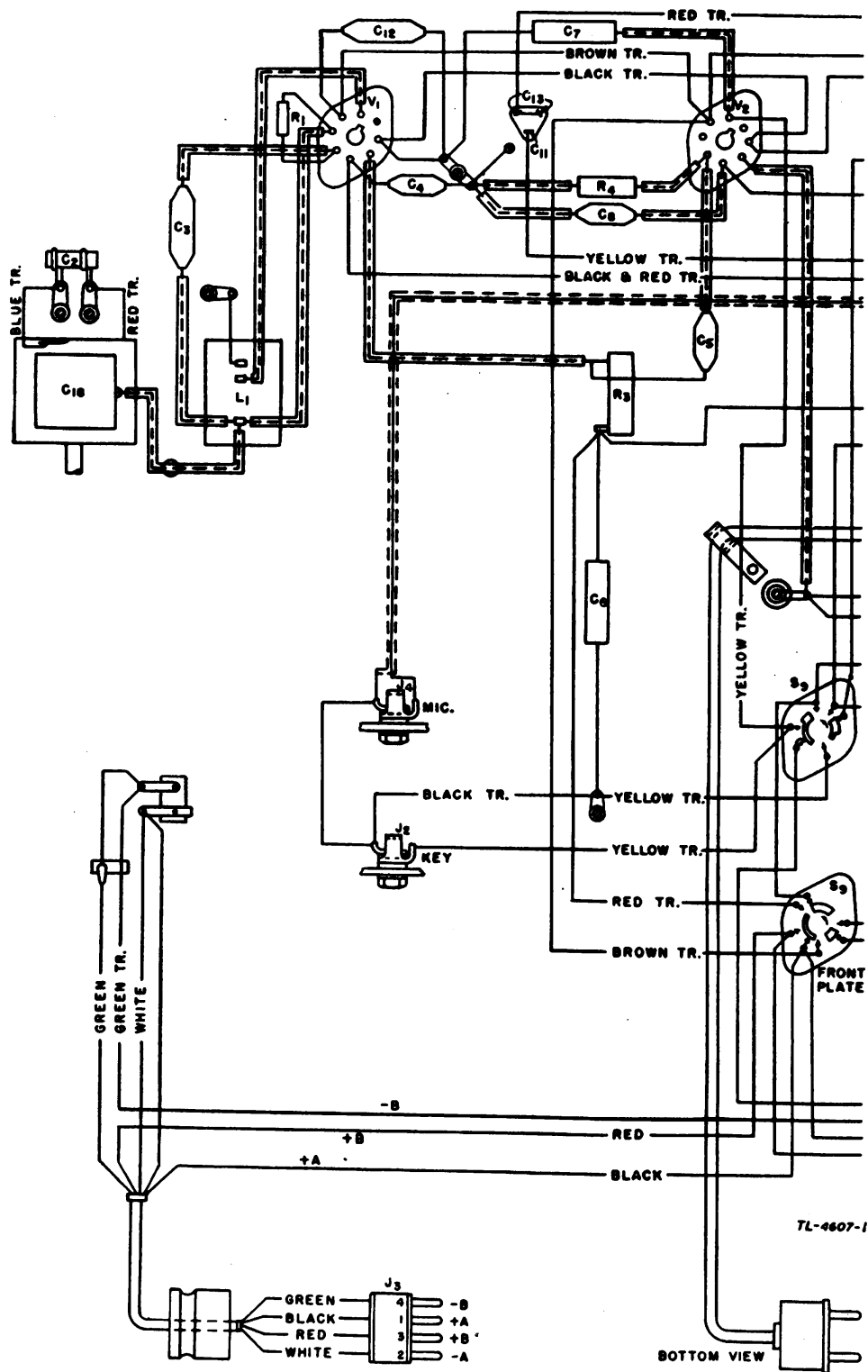
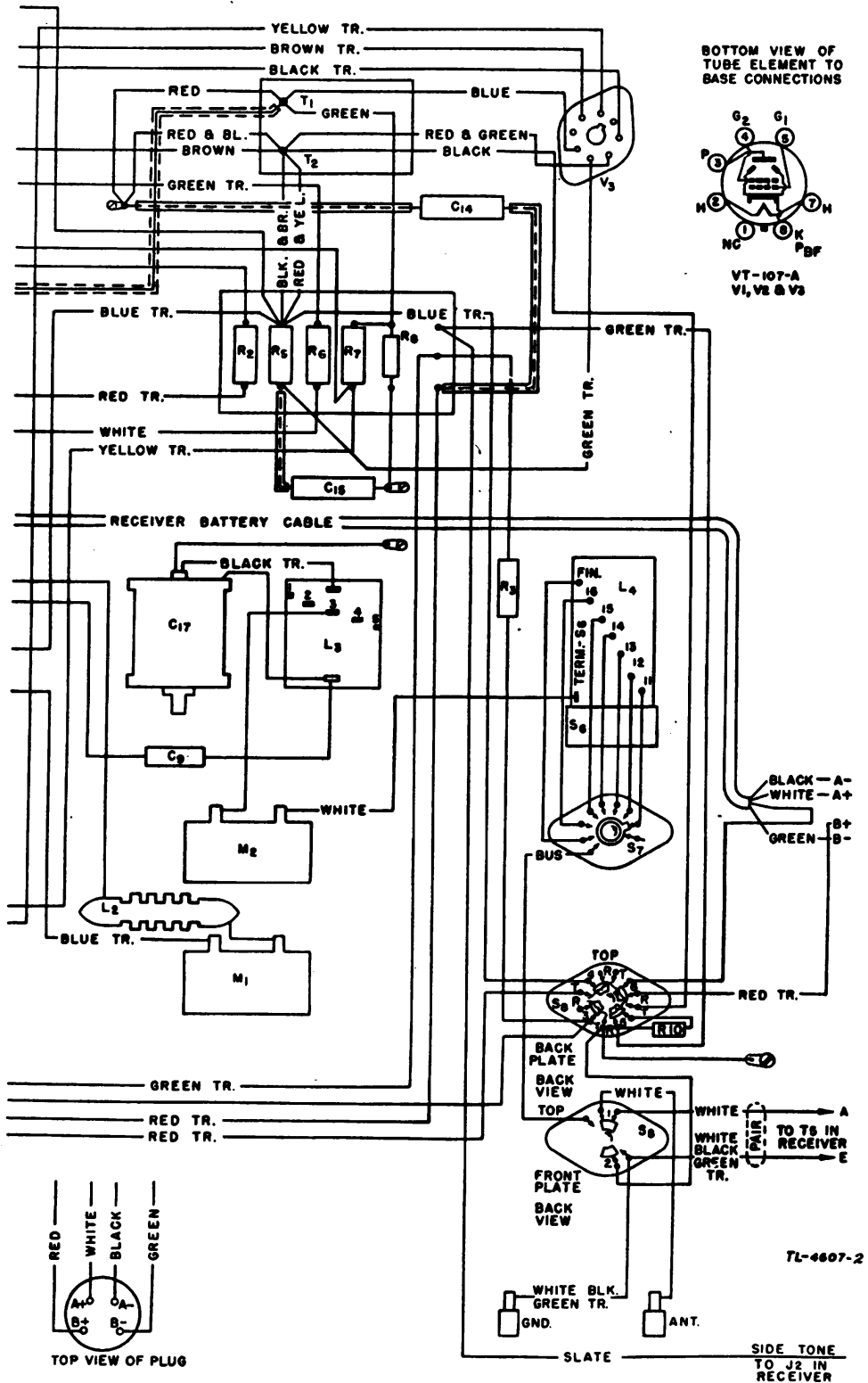


FIGURE 31.—Transmitter—



wiring diagram.

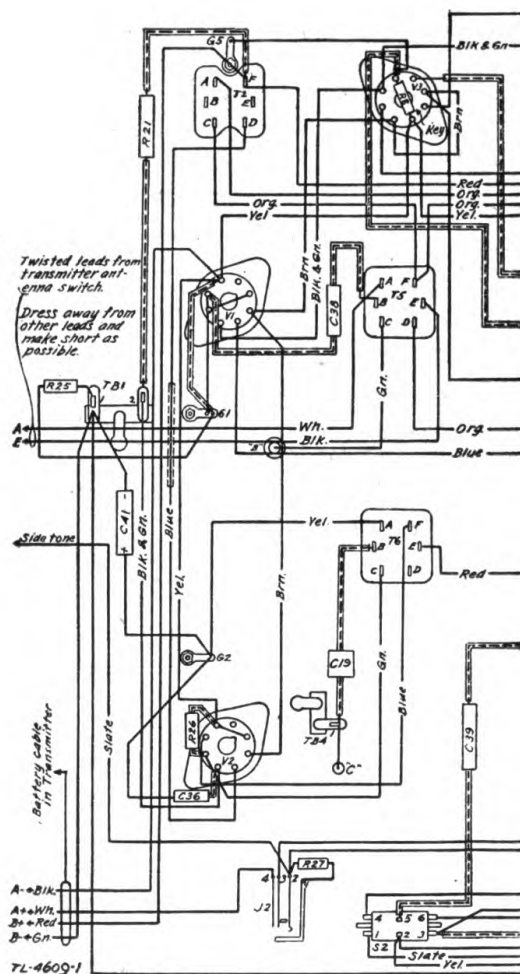
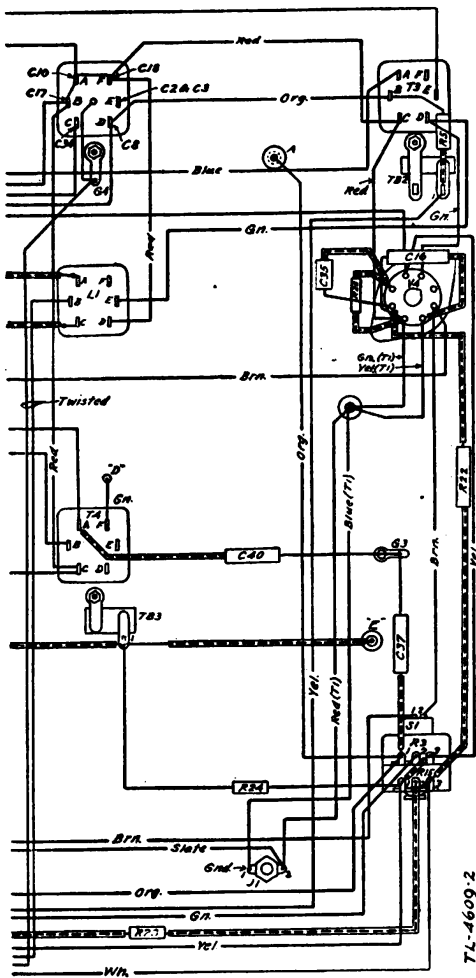


FIGURE 32.—Receiver—



wiring diagram.

**BOTTOM VIEWS OF TUBE ELEMENT
TO BASE CONNECTIONS**

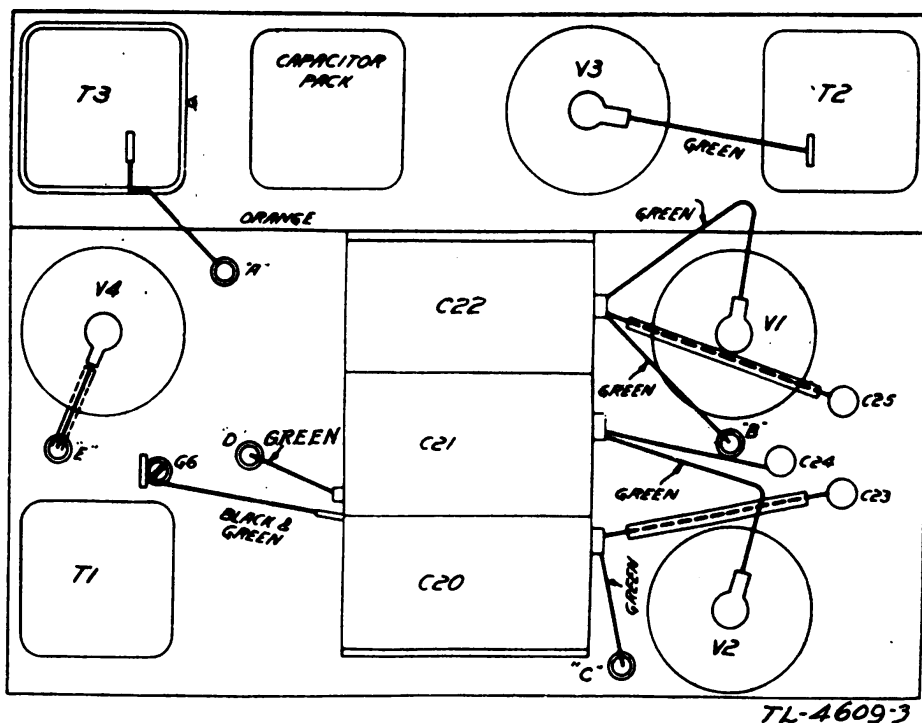
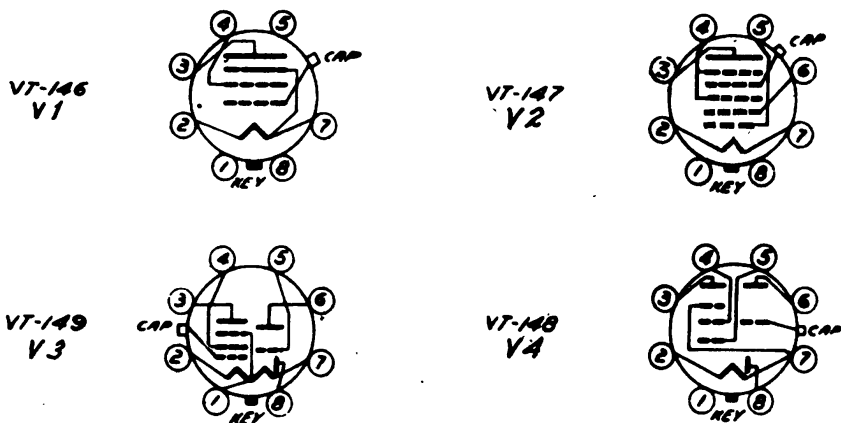


FIGURE 33.—Receiver lay-out.

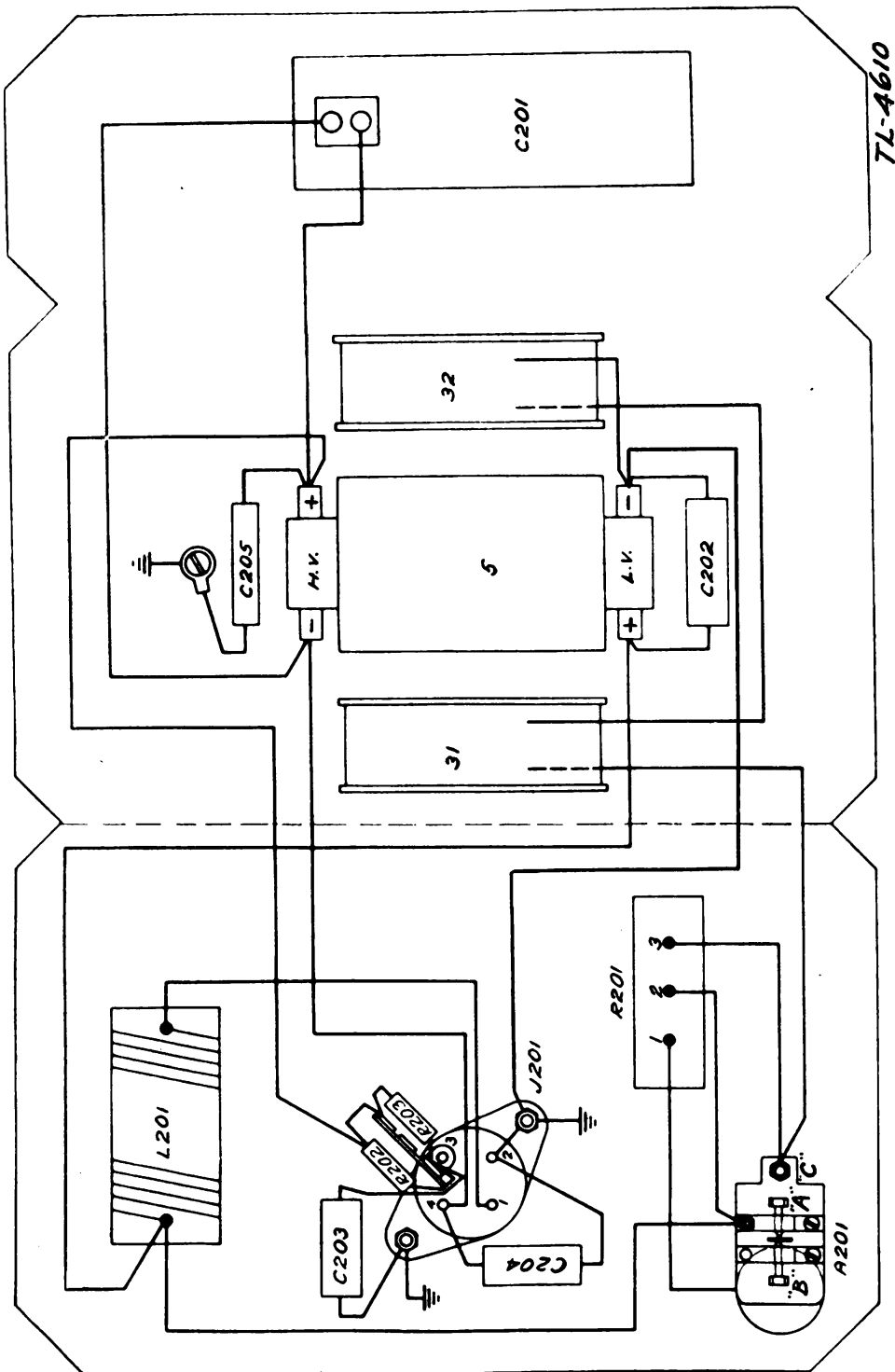


FIGURE 34.—Generator GN-44-A—wiring diagram.

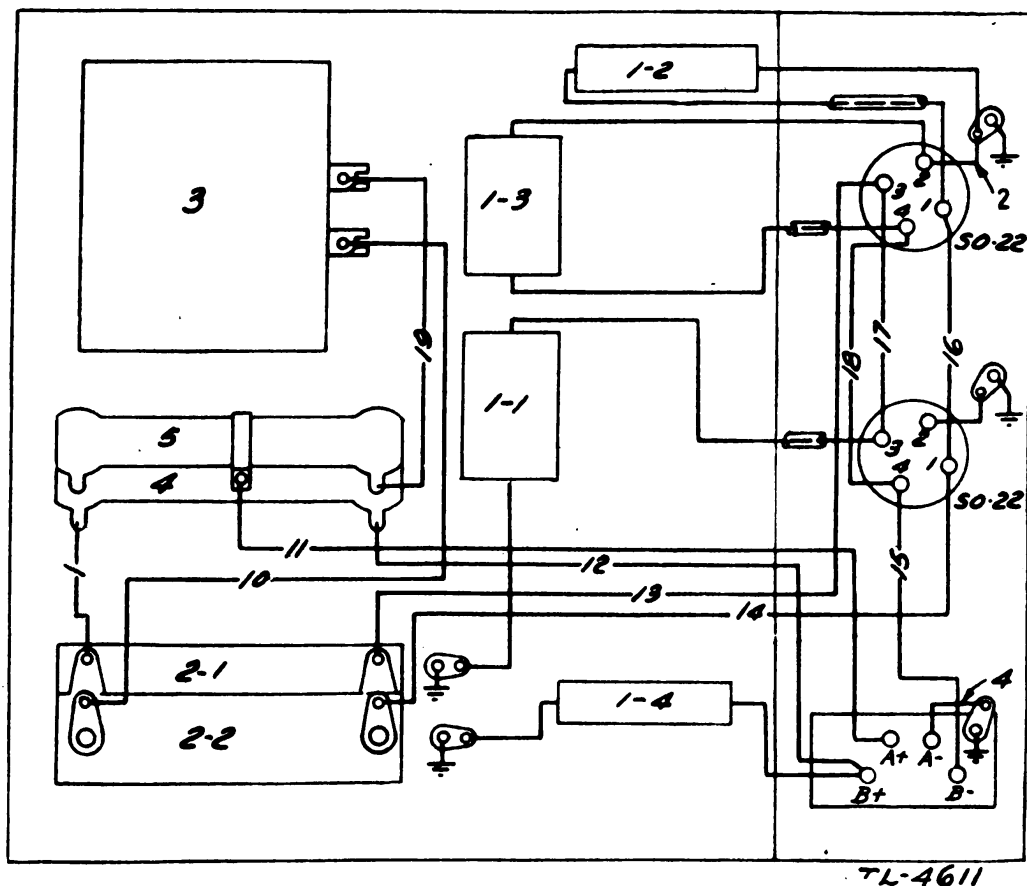


FIGURE 35.—Filter FL-10—wiring diagram.

SECTION V

REPLACEABLE PARTS

	Paragraph
Tables of replaceable parts.....	21
List of manufacturers.....	22

21. Tables of replaceable parts.—For list of component parts see paragraph 6.

a. Generator GN-44-A.

Reference No.	Stock No.	Name of part	Description	Function	Manufacturer's symbol	Drawing No.
1	3H2344A/F1	Frame	Magnet frame	Holds generator	BE	RL-D-6204-D-1.
2	3H2344A/O10	Cover	Lower cover	Cover for generator	BE	RL-D-6205-H-2.
3	3H2344A/O11	Cover	Upper cover	Cover for generator	BE	RL-D-6205-H-3.
4	3H2344A/O4	Case	Gear case	Cover for gears	BE	RL-D-6206-F-8.
5	3H2344A/A1	Armature	Rotor, double winding	Generator armature	BE	RL-D-6206-H.
6	3H2344A/O9	Commutator	Part of rotor	Low voltage	BE	RL-D-6209-H-8.
7	3H2344A/O12	Commutator	Part of rotor	High voltage	BE	RL-D-6209-H-7.
8	3H2344A/S1	Shaft	Crankshaft	Rotates armature	BE	RL-D-6206-F-12.
9	3H2344A/C2	Cap	Armature bearing cap	Cover for armature bearing	BE	RL-D-6207-K-28.
10	3H2344A/C3	Cap	Crankshaft bearing cap	Cover for crankshaft bearing	BE	RL-D-6207-K-27.
12	6Q45127	Gage, TL-127	Steel gage	For setting voltage regulator air gap	BE	SC-A-331-O.
14	3H2344A/P14	Pole piece	Shaded type, laminated	Generator field	BE	RL-D-6210-F.
15	3H2344A/P15	Pad	Pole piece pad	Base for pole piece	BE	RL-D-6210-F-6.
16	6L7032-208	Screw	Flathead, No. 10-32, 1 1/4 inches long	Holds pole piece to magnet frame	BE	RL-6203-J-43.
17	6L7032-168	Screw	Flathead, No. 10-32, 1 inch long	Holds pad to pole piece	BE	RL-D-6210-F-8.
19	3H2344A/B5	Ball bearing	Norma E-8	Armature shaft bearing, low-voltage, commutator end.	NH	RL-D-6209-H-10.
20	3H2344A/B6	Ball bearing	Norma E-10	Armature shaft bearing, high-voltage, commutator end.	NH	RL-D-6209-H-11.
21	3H2344A/B7	Ball bearing	Norma E-8-7	Intermediate pinion and gear bearing	NH	RL-D-6203-J-40.
22	3H2344A/B8	Ball bearing	Norma E-15	Crankshaft bearing	NH	RL-D-6203-J-39.
23	3H2344A/P1	Pinion	Intermediate	Pinion for armature drive	BE	RL-D-6206-F-10.
23a	3H2344A/G1	Gear	Intermediate	Gear for armature drive	BE	RL-D-6206-F-11.
24	3H2344A/G2	Gear	Driving	Gear for armature drive	BE	RL-D-6206-F-9.
25	3H2344A/O1	Cap	Brush holder	Holder for low- and high-voltage brushes.	BE	RL-D-6205-H-7.
27	3H2344A/H1	Holder	Brush holder	For low-voltage brush	BE	RL-D-6002-F.
28	3H2344A/H3	Holder	Brush holder	For low-voltage brush	BE	RL-D-6002-F.
29	3H2344A/H2	Holder	Brush holder	For high-voltage brush	BE	RL-D-6002-F.
30	3H2344A/H2	Holder	Brush holder	For high-voltage brush	BE	RL-D-6002-F.
31	3H2344A/C6	Coil	Field coil	Generator field winding	BE	RL-D-6210-F.
32	3H2344A/C6	Coil	Field coil	Generator field winding	BE	RL-D-6210-F.
33	3Z10112	Terminal, TM-112	Closed	For regulator lead connections	BE	RL-D-6003-K-27.

a. Generator GN-44-A—Continued.

Reference No.	Stock No.	Name of part	Description	Function	Manufacturer's symbol	Drawing No.
34	3H2344A/B34	Block	Brush spring block.	Block for brush assembly.	BE	RL-D-6002-F-10.
35	6L6440-4.1S	Screw	Roundhead, No. 4-40, ¼ inches long.	Setscrew for brush spring block.	BE	RL-D-6002-F-13.
36	3H2344A/B36	Brush and spring.	Assembly.	Brush mounting.	BE	RL-D-6002-F.
37a	3H2344A/B9	Brush.	Type: Link CM3.	For low-voltage commutator.	MC	RL-D-6002-F-1.
37b	3H2344A/B10	Brush.	Type: Link B6.	For high-voltage commutator.	MC	RL-D-6002-F-2.
38	3H2344A/S38	Strap.	Link strap.	Support for links.	BE	RL-D-6207-K-19.
39	3H2344A/L39	Link.	Rectangular link.	Secures leg with seat.	BE	RL-D-6207-K-17.
40	3G240	Cleat.	Horizontal cleat.	Stop for leg with seat.	BE	RL-D-6207-K-24.
41	3H2344A/S41	Strap.	Horizontal strap.	Support for leg with seat.	BE	RL-D-6207-K-18.
42	3H2344A/S42	Spacer.	Metal.	To space bracket.	BE	RL-D-6207-K-23.
43	3H2344A/B43	Bracket.	Horizontal bracket.	For securing small leg.	BE	RL-D-6207-K-22.
44	3H2344A/B44	Catch.	Spring catch.	For securing small leg.	BE	RL-D-6207-K-21.
45	3H2344A/B45	Link.	Semicircular links.	Secures small legs.	BE	RL-D-6207-K-20.
46	3H2344A/N46	Name plate.	Reversed etched nickel-silver.	To identify unit.	RA	K-29515-2.
47	2Z6103 A	Leg, LG-3A.	Small peg.	Generator support.	BE	RL-D-6009-E.
48	2Z6102A	Leg, LG-2A.	Leg with seat.	Generator support.	BE	RL-D-6006-L.
49	3H1407	Crank, GC-7.	Hand crank.	For rotating armature of generator.	BE	RL-D-6213-F.
50	3H2344A/G50	Hand generator unit, GN-44-A.	Rating: Low voltage, 6.6 v, 1.65 amp, high voltage, 295 v, 0.1 amp.	Power supply.	BE	M-428370-502. RCA Spec. AS-5624-G4.
51	3Z12526-1	Terminal board.	2-lug terminal strip.	For mounting R202G and R203G.	CM	M-81641-26.
52	3H2344A/S52	Spring contact.	Phosphor bronze.	Static collector.	RA	K-861238-1.
53	6G1035	Lubricant.	S-58 nonfluid oil.	For lubricating generator bearings.	NLC	
A201	3H2344A/R1	Regulator.	Vibrating type.	Regulates high and low voltage for speed variations.	BE	RL-D-6003-K (Modified). RCA Spec. AS-5624-G4.
C201	3DB4-15	Capacitor.	Fixed, 4μf, 500 v d-c, working.	High-voltage filter.	BE	SC-D-512-V-11.
C202	3DA100-76	Capacitor.	Paper, shell type, 0.100 μf ±20 percent, 200 v d-c working.	Low voltage, r-f filter.	RA	P-72017-527.
C203	3DA50-28	Capacitor.	Paper, shell type, 0.05 μf ±20 percent, 500 v d-c working.	High voltage, r-f filter.	RA	P-72043-507.
C204	3DA100-76	Capacitor.	Same as C202.	High voltage, r-f filter.	RA	P-72017-527.

C205	3DA3.900	Capacitor.....	Molded type, 3,900 μf ± 20 percent, maximum operating voltage 400 v d-c, peak 500 v, maximum operating temperature 75° C.	High voltage, r-f filter.....	RA	M-86013-516.
J201	2Z8722	Socket, SO-22.....	4-contact bakelite.	Power output connector.....	BE	RL-D-6212-F.
L201	3C340	Coil.....	Choke, 26 turns on 1 $\frac{1}{4}$ -inch bakelite form.	Low voltage, r-f filter.....	BE	RL-D-6211-E.
R201	3Z8003A1	Resistor.....	Wound with No. 32 advance wire 31.5 ohms, tapped at 23 ohms.	Voltage divider.....	BE	RL-D-6003 (Modified) RCA Spec. #6624-G4.
R202	3Z6010-35	Resistor.....	Insulated carbon type, $\frac{1}{2}$ w, 100 ohms ± 10 percent, maximum d-c or r. m. s. 350 v a-c peak 500 v.	High voltage, r-f filter.....	IRC	K-78727-50.
R203	3Z6010-35	Resistor.....	Same as R202.	High voltage, r-f filter.....	IRC	K-78727-50.

b. Transmitter.

C2	3D9100-53	Capacitor.....	Ceramic, 500 v d-c 100 μf ± 5 percent.	Temperature compensating.....	ER	K-85509-12.
C3	3D9100-52	Capacitor.....	Molded type, 100 μf ± 10 percent, operating voltage 400 v d-c, 500 v peak, maximum operating temperature 75° C.	Oscillator grid coupling.....	RA	M-86012-547.
C4	3DA3.900	Capacitor.....	Molded type, 3900 μf ± 20 percent, maximum operating voltage 400 v d-c, 500 v peak, maximum operating temperature 75° C.	Oscillator screen bypass.....	RA	M-86013-516.
C5	3D9100-52	Capacitor.....	Same as C3.	Power amplifier grid coupling.....	RA	M-86012-547.
C6	3DA50-27	Capacitor.....	Paper, shell type, 0.05 μf ± 20 percent, 400 v d-c working.	Oscillator plate supply filter.....	RA	P-72017-523.
C7	3DA50-27	Capacitor.....	Same as C6.	Power amplifier cathode bypass.....	RA	P-72017-523.
C8	3D9470	Capacitor.....	Molded type, 470 μf ± 20 percent, maximum operating voltage 400 v d-c, 500 v peak, maximum operating temperature 75° C.	Power amplifier screen bypass.....	RA	M-86012-526.
C9	3DA1-57	Capacitor.....	Molded type, 1,000 μf ± 20 percent, maximum operating voltage 400 v d-c, 500 v peak, maximum operating temperature 75° C.	Power amplifier plate coupling.....	RA	M-86013-509.
C11	3DEB20	Capacitor.....	{ Dry electrolytic 20 μf ± 40 —10 percent, operating voltage 25 v.	Modulator cathode bypass.....	RA	M-86027-4.
C13	3DEB20		{ Dry electrolytic 20 μf ± 40 —10 percent, operating voltage 450 v, part of C11.	High-voltage filter.....		
C12	3DA3.900	Capacitor.....	Same as C4.	Heater bypass.....	RA	M-86013-516.

b. Transmitter.—Continued.

Refer- ence No.	Stock No.	Name of part	Description	Function	Manu- fac- turer's symbol	Drawing No.
C14	3DA100-77	Capacitor	Paper, shell type, 0.100 μ f $\pm$ 20 percent, 200 v d-c working.	Heater bypass	RA	P-72017-527.
C15	3DA100-75	Capacitor	Paper, shell type, 0.100 μ f $\pm$ 20 percent, 400 v d-c working.	Modulator screen bypass	RA	P-72017-531.
C17	3D9200V	Capacitor	Variable, 200 μ f MC-2008, Midget type, semi-circular plates, maximum capacity counter-clockwise.	Power amplifier tuning	HM	K-845229-9.
C18	3D343A	Capacitor	Variable, series No. 117, maximum effective capacity 343.7 μ f $\pm$ 1 percent, minimum capacity 10.2 $\pm$ 1 percent μ f.	Oscillator tuning	RO	M-428323-2.
J2	2Z5534	Jack, JK-34	Single circuit	Key jack	CR	K-818711-4.
J3	2Z7150A	Plug, PL-50A	Equivalent to that of Molded Insulation Co.	Power cable plug	RA	K-861209-36.
J4	2Z5533	Jack, JK-33	2-circuit	Microphone jack	PRM	K-850654-3.
L1	3C1998	Coil	Single layer, close wound	Oscillator tank inductance	RA	M-428329-501.
L2	3C364	Choke coil	Type R-100, distributed capacity 1 μ f d-c resistance 50 ohms, current 125 ma.	Power amplifier plate choke	N	K-861209-51.
L3	3C1998-1	Coil	Single layer, close wound	Power amplifier tank coil	RA	M-428304-501.
L4	3C1998-2	Coil	Single layer, close wound, includes S1 or S6	Antenna loading coil	RA	M-428328-502.
M1	3F3329	Meter	Model 127 S, scale 0-100 ma d-c 2-inch rectangular bakelite case.	Power amplifier plate current meter	SC	K-861225-1.
M2	3F3329-1	Meter	Model 137 S, scale 0-1 amp r-f, 2-inch rectangular bakelite case.	Antenna current meter	SO	K-861225-2.
R1	3Z6647-1	Resistor	Type BT-1/2, insulated carbon type, 1/4 w, 47,000 ohms $\pm$ 10 percent.	Oscillator grid resistor	IRO	K-78727-82.
R2	3Z6615-14	Resistor	Type BT-1, insulated carbon type, 1 w, 15,000 ohms $\pm$ 10 percent.	Oscillator screen resistor	IRO	K-78728-76.
R3	3Z6600-59	Resistor	Type AB, 5,000 ohms, 4 w, coating "C", type No. 2, terminals.	Oscillator plate resistor	IRO	K-861209-73.
R4	3Z6627	Resistor	Type BT-1/2, insulated carbon type, 1/4 w, 27,000 ohms $\pm$ 10 percent.	Power amplifier grid resistor	IRO	K-78727-79.

R5	3Z6612-3	Resistor	Type BT-1, insulated carbon type, 1 w, 12,000 ohms±10 percent.	Modulator screen resistor	IRO	K-78728-75.
R6	3Z6618-2	Resistor	Type BT-1, insulated carbon type, 1 w, 18,000 ohms±10 percent.	Power amplifier screen resistor	IRO	K-78728-77.
R7	3Z6033-4	Resistor	Type BT-1, insulated carbon type, 1 w, 330 ohms±10 percent.	Modulator cathode resistor	IRO	K-78728-56.
R8	3Z6012-1	Resistor	Type BT-1½, insulated carbon type, ½ w, 120 ohms±10 percent.	Modulator cathode resistor	IRO	K-78727-51.
R10	3Z6180-1	Resistor	Type BT-½, insulated carbon type, ½ w, 1,800 ohms±10 percent.	Side tone resistor	IRC	K-78727-65.
R13	3Z6033-3	Resistor	Same as R7	Bias equalizing resistor	IRC	K-78728-56.
S6	3Z8312-6	Switch	Similar to Yaxley type 31112-J, 12 position	Antenna tuning (fine)	PRM	K-844019-4.
S7	3Z8312-7	Switch	Type H, 7 position, 1 ceramic section	Antenna tuning (coarse)	OM	M-428340-2.
S8	3Z8312-8	Switch	Type H, 2 position, 2 ceramic section	Antenna and power transfer switch	OM	M-428342-2.
S9	3Z8312-9	Switch	Type H, 4 position, 1 ceramic section	Emission selector	OM	M-428343-2.
T1	2Z9971	Transformer pack	Microphone transformer (T2 and T1 form 1 unit)	Microphone to modulator grid coupling transformer.	RA	K-900518-502.
T2	2Z9971		Modulation transformer	Modulator to power amplifier coupling transformer.	APH	K-844690-1.
V1	2Z8795.1	Socket	Catalog No. 88-8, molded-in-plate, octal socket	For oscillator tube	APH	K-844690-1.
V2	2Z8795.1	Socket	Same as V1	For power amplifier tube	APH	K-844690-1.
V3	2Z8795.1	Socket	Same as V1	For modulator tube	EC	K-865218-1.
75	2C5344-474A/B2	Binding post	Type "Sergeant SS"	Antenna connector	EC	K-865218-2.
77	2Z5842	Knob	With graduated escutcheon	Counterpoise connector	RA	K-861194-501.
78	2Z5845	Knob	Octagonal knob with pointer	For oscillator tuning control	RA	K-833668-502.
79	2C5344-474A/S4	Shield	Aluminum, ¼e-inch thick	C17, S6, S7, S8, and S9	RA	K-833668-502.
80	2C5344-474A/S2	Shield	Aluminum, ¼e-inch thick	Oscillator coil shield	RA	K-861073-1.
81	2Z7258	Pointer	Aluminum, ¼e-inch thick	Oscillator condenser shield	RA	K-861068-1.
82	2Z1584-6	Cable	Dial pointer assembly	Oscillator tuning indicator	RA	K-844368-503.
83	3G1250-11	Insulator	4 conductors, shielded, rubber covered	Transmitter power cable	RA	K-819962-6.
			Isolanite or equivalent, ½ inch outside diameter by 1½ inch long.	Mounting for L2 and C9	I	K-802900-18.
84	2C5344-474A/G1	Grommet	Rubber	Wiring accessory	RT	K-57421-26.
85	2C5344-474A/G3	Grommet	Rubber	Wiring accessory	WR	K-865295-1.

c. Receiver.

Reference No.	Stock No.	Name of part	Description	Function	Manufacturer's symbol	Drawing No.
C4	3D9220	Capacitor.....	Part of T3, type 5W, 220 $\mu\text{f} \pm 10$ percent, 500 v d-c working.	Audio diode, r-f filter.....	OD	K-844867-5.
C5	3D9070-2	Capacitor.....	Part of T3, type 5W, 70 $\mu\text{f} \pm 10$ percent, 500 v d-c working.	Avc diode, coupling.....	OD	K-844612-16.
C6	3D9120-1	Capacitor.....	Part of T3, type 5R, 120 $\mu\text{f} \pm 5$ percent, 500 v d-c working.	2d i-f secondary tuning.....	OD	K-844867-4.
C7	3D9120-1	Capacitor.....	Part of T3, same as C6.	2d i-f primary tuning.....	OD	K-844867-4.
C9	2C5344-474A/C8	Capacitor.....	Part of L1, 5 $\mu\text{f} \pm 10$ percent, style N350L.	C-w oscillator to diode coupling.....	ER	K-845976-3.
C11	2C5344-474A/C9	Capacitor.....	Part of L1, 400 $\mu\text{f} \pm 5$ percent, type 5R.	C-w oscillator (shunt feed) plate coupling.....	OD	K-844867-7.
C12	3D9330-1	Capacitor.....	Part of L1, 330 $\mu\text{f} \pm 5$ percent, 400 v d-c, peak a-c 500 v.	C-w oscillator tuning.....	RA	M-86012-583.
C13	3D9070-2	Capacitor.....	Part of L1, same as C5.	C-w oscillator grid coupling.....	OD	K-844612-16.
C8	3DE100	Capacitor pack.....	0.1 $\mu\text{f} \pm 10$ percent, 300 v d-c working.	Avc filter.....	RA	K-85594-501.
C10	3DE100		0.25 $\mu\text{f} \pm 10$ percent, 200 v d-c working.	+B bypass.....		
C17	3DE100		0.25 $\mu\text{f} \pm 10$ percent, 300 v d-c working.	+B bypass.....		
C18	3DE100		0.01 $\mu\text{f} \pm 10$ percent, 1,000 v d-c.	+B bypass.....		
C94	3DE100		Same as C8.	Avc filter.....		
C14	3D9120-1	Capacitor.....	Part of T2, same as C6.	1st i-f secondary tuning.....	OD	K-844867-4.
C15	3D9120-1	Capacitor.....	Part of T2, same as C6.	1st i-f primary tuning.....	OD	K-844867-4.
C16	3DA3-21	Capacitor.....	Shell type, 0.003 $\mu\text{f} \pm 20$ percent, 700 v d-c working.	Output pentode (impedance limiting).....	RA	P-72050-575.
C19	3DA1.100	Capacitor.....	Type 1R, molded, 1,100 $\mu\text{f} \pm 2\frac{1}{2}$ percent, 500 v d-c working.	Oscillator series tuning (padding).....	OD	M-420394-38.
C20	3D9013V	Capacitor.....	Variable, model No. 320, minimum capacity less than 13.0 μf , effective maximum capacity 441.7 μf .	Oscillator variable tuning.....	RO	M-428041-2.
C21	3D9013V	Capacitor.....	Same as C20.	Detector variable tuning..... Antenna variable tuning..... Oscillator adjustable trimming..... Detector adjustable trimming..... Antenna adjustable trimming.....	RO	M-428041-2.
C22	3D9013V	Capacitor.....	Same as C20.		RO	M-428041-2.
C23	2C5344-474A/C10	Capacitor.....	Air trimmer, 1 to 12 μf .		RA	M-80832-503.
C24	2C5344-474A/C10	Capacitor.....	Same as C23.		RA	M-80832-503.
C25	2C5344-474A/C10	Capacitor.....	Same as C23.		RA	M-80832-503.

C26	3D9008A2	Capacitor	Part of T5, molded type, 8.2 μ f $\pm$ 10 percent, 400 v d-c working, 500 v peak, maximum working temperature 75° C.	Antenna (fixed)	RA	M-86012-534.
C32	3DA12-1	Capacitor	Part of T4, style N60L, 12 μ f $\pm$ 10 percent.	Detector coil coupling	ER	K-845976-2.
C33	3D9070-2	Capacitor	Part of T6, same as C5.	Oscillator grid coupling	CD	K-844612-16.
C35	3D281	Capacitor, CA-281	Molded type, 0.01 μ f $\pm$ 10 percent, 400 v d-c working.	1st audio coupling	MR or SM	KX-381901-1.
C36	3D281	Capacitor	Same as C35.	Converter screen filter	MR or SM	KX-381901-1.
C37	3D286	Capacitor, CA-286	Molded type, 100 μ f $\pm$ 14 percent, -6 percent, 250 v d-c working.	Audio diode, r-f filter	SM	K-849261-41.
C38	3D281	Capacitor	Same as C35.	Avc filter	RA	K-849261-41.
C39	3D281	Capacitor	Same as C35.	Avc filter	MR	KX-381901-1.
C40	3D284	Capacitor, CA-284	Molded type, 0.05 μ f $\pm$ 10 percent, 400 v d-c working.	Audio input coupling	MR or SM	KX-381901-1.
C41	3D310	Capacitor	Electrolytic, type 8-4135-E, 25 μ f -25 v d-c working.	Avc filter	MR or SM	KX-381594-2.
J1	2Z5595	Jack	"Imp." No. 1.	Fixed bias bypass	MR	K-865412-1.
J2	2Z5580	Jack	"Junior Jack," type No. 703.	"Extra phones"	CR	K-818711-4.
J6	2Z7227-12	Plug	Part No. 41, shell No. 700.	Phone	PRM	K-865193-1.
L1	2C5344-474A/C1	Coil assembly	Assembled in part No. 115, includes: C9, C11, C12, C13, R7, coil assembly and terminal board assembly.	Battery cable plug	CM	K-865199-1.
R3	3Z6801-17	Resistor	Variable, 1 megohm $\pm$ 20 percent.	C-w oscillator coil	RA	P-714287-603.
R4	3Z6656-3	Resistor	Part of T3, type EB, insulated, 56,000 ohms $\pm$ 10 percent, $\frac{1}{2}$ w.	Audio volume control potentiometer	CTS	M-421283-1.
R5	3Z6801-1	Resistor	Type BT- $\frac{1}{2}$, insulated, 1 megohm $\pm$ 10 percent, $\frac{1}{2}$ w.	Audio diode, r-f filter	AB	K-82283-83.
R7	3Z6656-1	Resistor	Type BT- $\frac{1}{2}$, part of L1, insulated, 56,000 ohms $\pm$ 10 percent, $\frac{1}{2}$ w.	Avc diode load	IRC	K-850981-98.
R8	3Z6747	Resistor	Type BT- $\frac{1}{2}$, insulated, 470,000 ohms $\pm$ 10 percent, $\frac{1}{2}$ w.	C-w oscillator plate	IRC	K-850981-83.
R9	3Z6756	Resistor	Part of T2, type BT- $\frac{1}{2}$, insulated, 560,000 ohms $\pm$ 10 percent, $\frac{1}{2}$ w.	C-w oscillator grid	IRC	K-850981-94.
R13	3Z6756	Resistor	Part of T5, same as R9	Avc filter	IRC	K-850981-95.
R15	3Z6690-33	Resistor	Variable, 20,000 ohms $\pm$ 15 percent.	Avc filter	IRC	K-850981-95.
				R-f sensitivity (bias) control potentiometer.	CTS	M-421283-1.

c. Receiver—Continued.

Reference No.	Stock No.	Name of part	Description	F function	Manufacturer's symbol	Drawing No.
R17	3Z6756	Resistor	Part of T5, same as R9	Avc filter	IRO	K-850981-95.
R19	3Z6801-2	Resistor	Part of T3, type EB, insulated, 1 megohm ± 10 percent, $\frac{1}{2}$ w.	Avc diode load	AB	K-82283-98.
R20	3Z6747	Resistor	Same as R8	1st audio plate load	IRO	K-850981-94.
R21	3Z6668	Resistor	Type BT- $\frac{1}{2}$, insulated, 68,000 ohms ± 10 percent, $\frac{1}{2}$ w.	Converter screen dropping	IRO	K-850981-84.
R22	3Z6801-1	Resistor	Same as R5	2d audio grid	IRO	K-850981-98.
R23	3Z6647-1	Resistor	Type BT- $\frac{1}{2}$, insulated, 47,000 ohms ± 10 percent, $\frac{1}{2}$ w.	R-f sensitivity filter	IRO	K-850981-82.
R24	3Z6802A2	Resistor	Type BT- $\frac{1}{2}$, insulated, 2.2 megohms ± 10 percent, $\frac{1}{2}$ w.	1st audio grid	IRO	K-850981-102.
R25	3Z6802	Resistor	Type BT- $\frac{1}{2}$, insulated, 820 ohms ± 10 percent, $\frac{1}{2}$ w.	Fixed bias dropping	IRO	K-850981-61.
R26	3Z6722-1	Resistor	Type BT- $\frac{1}{2}$, insulated, 220,000 ohms ± 10 percent, $\frac{1}{2}$ w.	Oscillator grid	IRO	K-850981-90.
R27	3Z6610-7	Resistor	Type BT- $\frac{1}{2}$, insulated, 10,000 ohms ± 10 percent, $\frac{1}{2}$ w.	Output load	IRO	K-78727-74.
S1	3Z9948	Switch	S. P. S. T., 3 amp, 125 v; 1 amp, 250 v, (part of volume control R3 and R15).	"Off", "on"	OTS	M-421263-1.
S2	3Z9846-2	Switch	Toggle type, D. P. D. T.	"Phone", "c-w"	AHH	M-413702.
T1	2Z9999	Transformer	Ratio, primary to secondary 1.9 to 1 ± 3 percent.	Output (audio)	RA	K-401108-501.
T2	2Z9999-1	Transformer	Assembled in shield can, includes C14, C15, R9, coil assembly, and terminal board.	1st i-f	RA	P-714271-501.
T3	2Z9999-2	Transformer	Assembled in shield can, includes C4, C5, C6, C7, R4, R19 coil assembly, and terminal board.	2d i-f	RA	P-714271-502.
T4	2C5344-474A/C5	Coil assembly	Assembled in part 115, includes C32, coil assembly, and terminal board.	Detector coupling	RA	P-714267-502.
T5	2C5344-474A/C6	Coil assembly	Assembled in part No. 115, includes C26, R13, R17, coil assembly, and terminal board.	Antenna coupling	RA	P-714267-505.
T6	2C5344-474A/C7	Coil assembly	Assembled in part No. 115, includes C33, coil assembly, and terminal board.	Oscillator	RA	P-714267-501.

V1	2Z8795-1	Socket.....	Catalog No. 88-8, molded-in-plate octal socket.....	For r-f amplifier tube.....	APH	K-844690-1.
V2	2Z8795-1	Socket.....	Same as V1.....	For converter tube.....	APH	K-844690-1.
V3	2Z8659-6	Socket.....	Type MIP-8.....	For i-f amplifier, c-w oscillator, avc diode tube.....	APH	K-865567-1.
V4	2Z8795-1	Socket.....	Same as V1.....	For detector 1st and 2d audio tube.....	APH	K-844690-1.
101	2C5344-474A/T1	Terminal board.....	1 terminal lug.....	Resistor mounting.....	CM	M-86698-18.
102	2C5344-474A/T2	Terminal board.....	2 terminal lugs.....	Resistor mounting.....	CM	M-81641-3.
103	2C5344-474A/T3	Terminal board.....	1 terminal lug, mounting lug bent 90°.....	Resistor mounting.....	CM	M-81641-6.
104	2C5344-474A/T4	Terminal board.....	1 terminal lug.....	Resistor mounting.....	CM	M-428085-3.
105	2C5344-474A/C2	Cable assembly.....	4-conductor Latex Tires, each conductor 21 strands No. 36 (equivalent to No. 23 A W G).....	Battery connector.....	RA	K-865292-501.
106	2Z7258	Pointer.....	Dial pointer assembly.....	Tuning control indicator.....	RA	K-844368-502.
107	2Z5822-1	Knob.....	Catalog No. 8-309-3, black with white spot.....	Tuning control.....	KK	K-845958-4.
108	2Z5845	Knob.....	Octagonal knob with pointer.....	Volume control.....	RA	K-833668-504.
109	2Z5650-D	Jack cover.....	Dust cover assembly.....	For jack J1 and J2.....	RA	K-850656-502.
110	2C5344-474A/C11	Cap.....	Grid connector.....	Connects to tube grid.....	RA	K-77767-1.
112	2C5344-474A/E1	Escutcheon.....	Front of transmitter and receiver.....	Transmitter and receiver panel.....	RA	K-27757-1.
113	2C5344-474A/G2	Grommet.....	Rubber.....	Wiring accessory.....	RT	K-57421-21.
114	2C5344-474A/G3	Grommet.....	Rubber.....	Wiring accessory.....	WR	K-865295-1.
115	2C5344-474A/S3	Shield can.....	Container.....	Coil shields for T4, T5, T6, and L1.....	RA	K-844666-501.

d. Miscellaneous.

116	2Z88310	Spool.....	Waterproof plywood.....	For carrying antenna and counterpoise wire.....	RA	K-861132-1.
117	3G1250-16.3	Insulator.....	Catalog No. 474, ceramic, 1½-inches long.....	Insulates antenna.....	BOO	K-861353-2.
118	2S288/C2	Conductor.....	Wire, 35 feet long, P. S. No. 43-5, black.....	Antenna or counterpoise conductor.....	RA	K-861414-4.
119	2Z5045	Hook.....	Brass antenna hook.....	Antenna support.....	RA	K-861354-1.
120	2Z7227-13	Plug.....	Yaxley No. 75TC, 2-way phone plug, black bakelite shell.....	Connector for key and headpiece.....	PRM	K-7800252-2.
121	2Z7146	Plug.....	Type No. 109.....	Microphone connector.....	WE	K-865297-1.
122	2Z1584-7	Cable.....	2 conductors, unshielded, black rubber covered, outside diameter 0.295 to 0.310-inch, 18 inches long.....	Telegraph key connector.....	RA	K-819062-7.
123	2S288/T1	Thumbscrew.....	Brass, 1½ inches long, No. 8-32 threads.....	Key mounting.....	RA	K-964975-1.

d. Miscellaneous.—Continued.

Reference No.	Stock No.	Name of part	Description	Function	Manufacturer's symbol	Drawing No.
124	2Z560	Base	Waterproof plywood.	Base for mounting key assembly.	RA	K-861390-2.
125	2S288/T2	Thumbcrew	Brass, No. 8-32 threads, 1½ inches long.	Transmitter and receiver mounting.	RA	K-865510-1.
127	2S288.1/A2/C1	Clamp	Brass.	Part of antenna strain post.	RA	K-861135-1.
133	2S288/C1	Clamp	Aluminum.	For securing battery.	RA	M-421371-501.

e. Type FL-10 filter and unit.

1-1	3D277	Capacitor	Type No. 345, 0.1 μ $\pm$ 10 percent, 400 v d-c working.	Receiver plate filter.	MR	KX-381594-1.
1-2	3D277	Capacitor	Same as 1-1.	Receiver filament filter.	MR	KX-381594-1.
1-3	3D277	Capacitor	Same as 1-1.	Receiver bias filter.	MR	KX-381594-1.
1-4	3D277	Capacitor	Same as 1-1.	Receiver plate supply filter.	MR	KX-381594-1.
2-1	3C370	Coil	R-f choke, continuous close wound over bakelite form ½ inch outside diameter, 2 inches long.	Receiver plate supply filter.	RA	K-868025-501.
2-2	3C370	Coil	Same as 2-1.	Receiver filament filter.	RA	K-868025-501.
3	2C3710/R1	Reactor	Iron core, impedance at 30 v, 60 cycles a-c and 0.8 amp d-c 75 ohms minimum, d-c resistance 5.3 ohms $\pm$ 15 percent hi pot, 1000 v.	Receiver filament filter reactor.	RA	K-401343-501.
4	3Z6615-23	Resistor	5.3 ohms $\pm$ 15 percent hi pot, 1000 v.	Receiver plate dropping resistor.	IRO	K-868032-1.
5	3Z6002-10	Resistor	Type AB, 15,000 ohms 10 w, wire wound, type 2, terminals.	Receiver filament dropping resistor.	IRO	K-868032-2.
6	2Z8722	Socket 8023	Type ABA, variable, 20 ohms total 10 w, wire wound, resistance value varied by adjustable slide, type 2 terminal.	For generator and transmitter cable.	BE	K-868031-1.
7	2Z8671	Socket	4-pin type, bakelite.	For battery cable.	OM	K-868029-1.
8	3E1125	Cord and plug assembly CD-125	4-pin type, catalog No. F-121. Includes CO-132 cord (conductor shielded cable, 88 inches long) and 2 type PL-50-A plugs.	For connecting generator to filter unit.	RA	M-421808-501.

22. List of manufacturers.

<i>Manufacturer and address</i>	<i>Symbol</i>
Allen Bradley Co., 600 S. Delaware Ave., Philadelphia, Pa. . . .	AB
Arrow-Hart-Hegeman, Hartford, Conn.	AHH
American Phenolic Corp., 1250 W. Van Buren St., Chicago, Ill.	APH
Birnbach Ceramics Co., 145 Hudson St., New York, N. Y.	BCC
Burke Electric Co., Erie, Pa.	BE
Cornell-Dubilier Corp., 1000 Hamilton Blvd., South Plainfield, N. J.	CD
Cinch Mfg. Corp., 2335 W. Van Buren St., Chicago, Ill.	CM
Utah Radio Products Co., 812 Orleans Ave., Chicago, Ill.	CR
Chicago Telephone Supply Co., Elkhart, Ind.	CTS
H. H. Eby Co., 4700 Stenton Ave., Philadelphia, Pa.	EC
Erie Resistor Corp., Erie, Pa.	ER
Hammarlund Mfg. Co., 424-38 West 33d St., New York, N. Y.	HM
Isolantite, Inc., Belleville, N. J.	I
International Resistor Co., 401 N. Broad St., Philadelphia, Pa.	IRC
Kelley and Hueber, 4052 Haverford Ave., Philadelphia, Pa.	KH
Kurz-Kasch Co., Dayton, Ohio	KK
Les Logan Co., 646 Jessie St., San Francisco, Calif.	LLC
Morganite Brush Co., 3304 Forty-Eighth Ave., Long Island City, N. Y.	MC
Molded Insulation Co., 335 East Price St., Philadelphia, Pa.	MIC
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y.	MR
National Co., Malden, Mass.	N
Norma-Hoffman Bearings Corp., Stamford, Conn.	NH
New York-New Jersey Lubricant Co., New York, N. Y.	NLC
Oak Mfg. Co., 1260 Clybourn Ave., Chicago, Ill.	OM
P. R. Mallory Co. (Yaxley Division), 3029 E. Washington St., Indianapolis, Ind.	PRM
RCA Manufacturing Co., Inc., Front and Cooper Sts., Camden, N. J.	RA
Radio Condenser Co., Copewood and Thorne Sts., Camden, N. J.	RC
Pierce Roberts Co., Trenton, N. J.	RT
Simpson Electric Co., 5216-18 W. Kinzie St., Chicago, Ill.	SC
Solar Mfg. Corp., Bayonne, N. J.	SM
Western Electric Co., 195 Broadway, New York, N. Y.	WE
Western Rubber Co., Goshen, Ind.	WR

[A. G. 062.11 (9-2-42).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

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

DISTRIBUTION:

R and H 6(3); IR 7(10); IBn 6(7) and 7(10); IC 3, 4, 6(2) and
11(10).

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

