TM 11-625

WAR DEPARTMENT

TECHNICAL MANUAL

RADIO SET SCR-543-A
RADIO SET SCR-543-B
RADIO SET SCR-543-C

12 JANUARY 1943

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WAR DEPARTMENT
Washington January 12, 1944

RADIO SET SCR-543-(*)

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RADIO SET SCR-543-(*)

POWER UNIT PE-108-(*)

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DESTRUCTION OF ABANDONED MATERIAL IN THE COMBAT ZONE

In case it should become necessary to prevent the capture of this equipment, and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED, OR USED BY THE ENEMY, BURN ALL PAPERS AND BOOKS.

BY:—

1. Explosives, when provided.
2. Hammers, axes, sledges, or whatever heavy objects are readily available.
3. Burning with gasoline, oil paper, or wood.
4. Grenades and shots from available arms.

PROCEDURE:—

1. Destroy all identifying marks, nameplates and circuit labels.
2. Demolish all panels, castings, switch and instrument boards.
3. Destroy all controls, switches, relays, connecting means and meters.
4. Rip out all wiring in electrical equipment. Smash gas and oil lines and water cooling systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part whether rotating, moving or fixed.
6. Break up all operating instruments such as keys, headsets, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.

DISPOSAL:—

1. Where possible, and time permits bury all debris or dispose of it in streams or other bodies water.

WARNING

This equipment uses **HIGH VOLTAGES** which will give **SEVERE SHOCK** or cause **DEATH** touched. The high r-f **VOLTAGES** can cause **PAINFUL BURNS.**

Don't touch the antenna or antenna connections while operating. The r-f voltage at the antenna the only exposed voltage.

When you have the top cover of the transmitter open, other r-f voltage points are exposed. Alw close the cover before turning on power to the transmitter.

When transmitter or power supply unit is removed from carrying chests for servicing, both r-f a d-c voltages are exposed. Don't try to make any service adjustments unless you know all about equipment.

REMEMBER THESE POINTS:

1. The operation of your transmitter and receiver is simple. Practice it a few times and it will become second nature.

2. Speak up into your microphone in a clear voice, close to it. Don't talk "across" your mike or away from it.

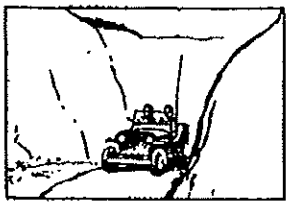
3. Keep your antenna vertical. It sends and receives better that way.

4. If you can do it, shut off your vehicle's motor when trying to get weak signals. You'll hear further.

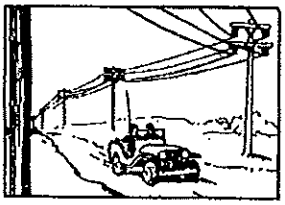
5. Try not to let the rain beat on your radio. Keep it dry.

6. Keep your transmissions short. The enemy can plot your location with a direction finder.

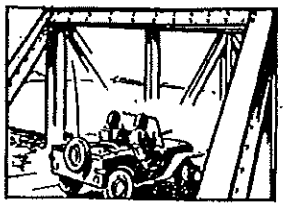
THESE PLACES ARE BAD FOR RADIO !



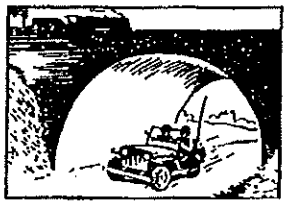
VALLEY



HIGH TENSION LINES

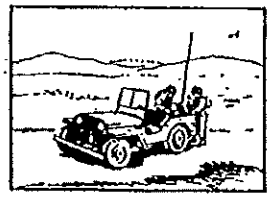


STEEL BRIDGE

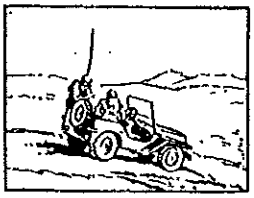


UNDERPASS

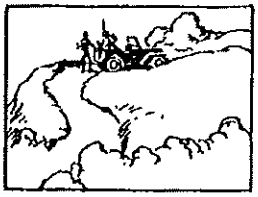
THESE PLACES ARE GOOD FOR RADIO !



LEVEL GROUND



SLIGHT RISE



HILL

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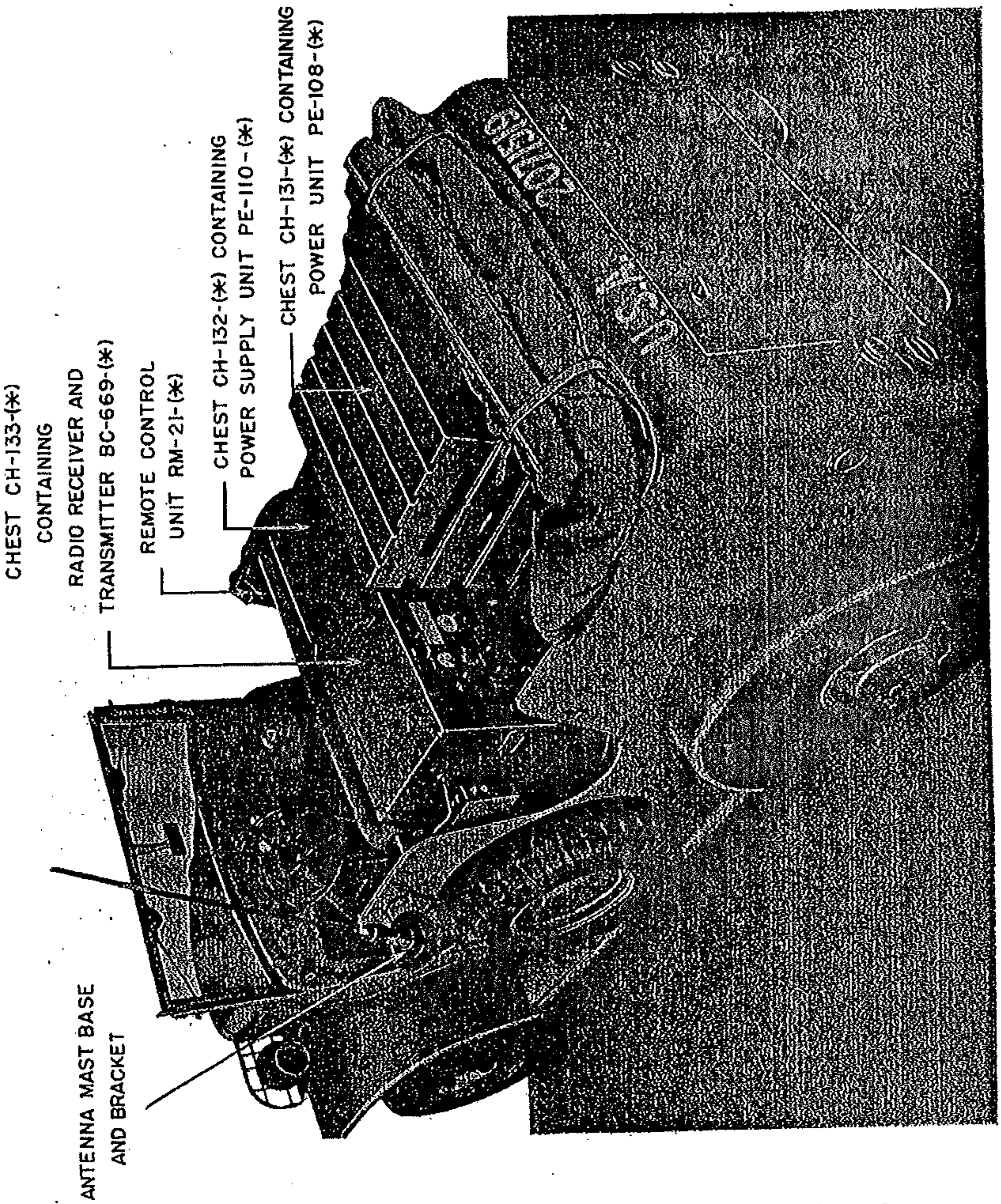


Fig. 1 – Radio Set SCR-543-(*) Installed in ¾ Ton Command and Reconnaisance Car.

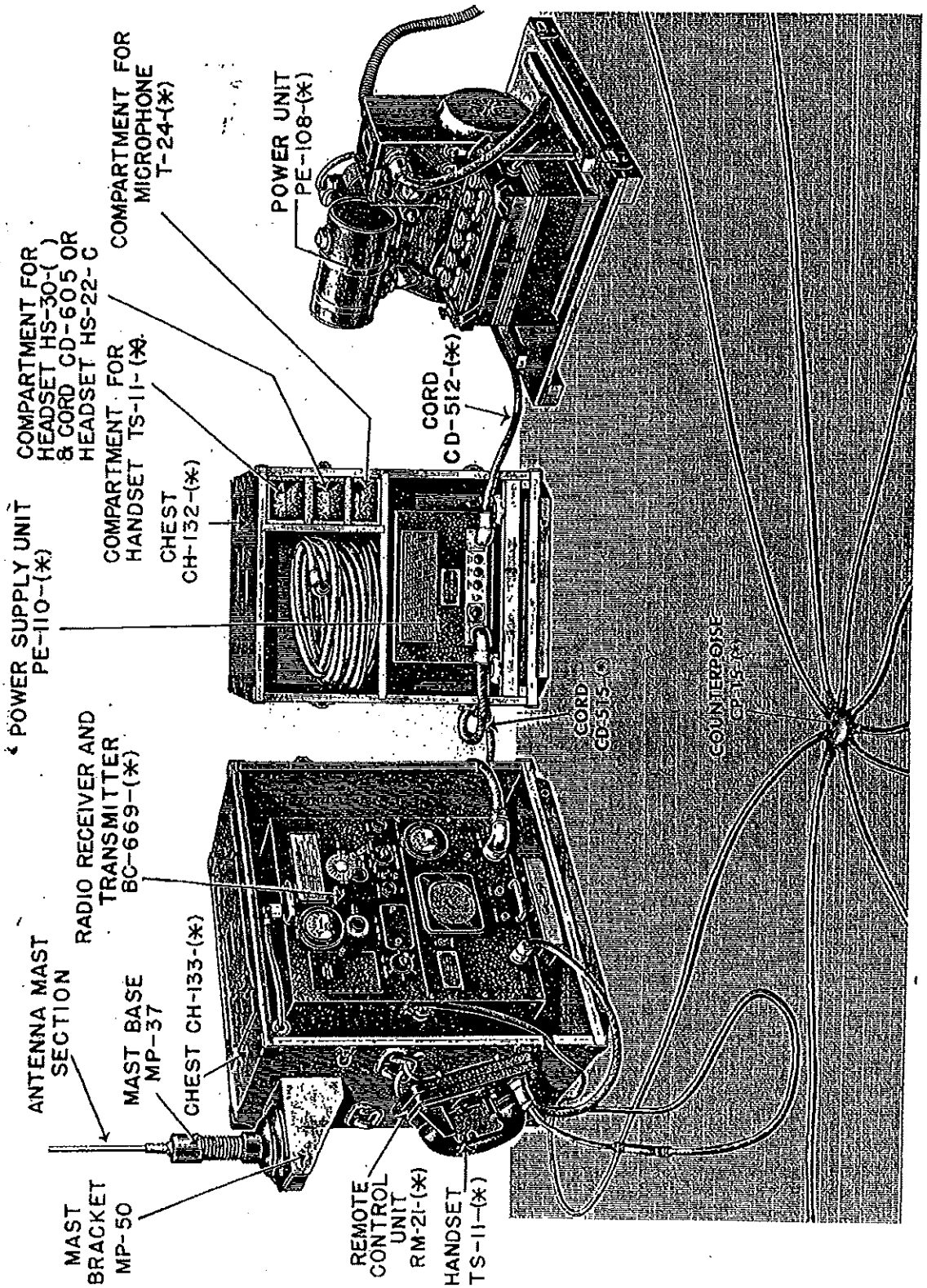


Fig. 2 — Radio Set SCR-543-(*), Operating Components.

RADIO SET SCR-543-(*)

SECTION I — DESCRIPTION

1. **USE.**—Radio Set SCR-543-(*) can be used as a field station or as a vehicular radio set to give radio-telephone communication for Anti-aircraft Artillery Regiments and Brigades. This radio set has its own gasoline-engine driven source of power. The various components may be readily set up and the radio station put in operation in the field in five minutes. It can be used in a ½ ton pick-up truck or in a ¾ ton Command and Reconnaissance Car and other vehicles.

Differences in Nomenclature of Component Parts of Radio Set SCR-543-C, SCR-543-B and SCR-543-A:—

	SCR-543-C	SCR-543-B	SCR-543-A
Chest	CH-73-C	CH-73-B	CH-73-A
Chest	CH-131-B	CH-131-A	†
	*CH-131-C	*CH-131-C	
Chest	CH-132-B	CH-132-A	†
Chest	CH-133-B	CH-133-A	†
Cord	CD-511-C	CD-511-B	CD-511-A
Cord	CD-512-C	CD-512-B	CD-512-A
Cord	CD-513-C	CD-513-B	CD-513-A
Cord	CD-514-C	CD-514-B	CD-514-A
Cord	CD-515-C	CD-515-B	CD-515-A
Counterpoise	CP-15-C	CP-15-B	CP-15-A
Cover	BG-67-A	BG-67-A	BG-67
Handset	TS-11-M	TS-11-J	TS-11-F
Headset	HS-30-(*)	HS-30-(*)	HS-22-C
Microphone	T-24-(*)	T-24-(*)	T-24-F
Power Unit	PE-108-C	PE-108-B	PE-108-A
	*PE-108-D	*PE-108-D	
Power Supply Unit	PE-110-C	PE-110-B	PE-110-A
Radio Receiver and Transmitter	BC-669-C	BC-669-B	BC-669-A
Remote Control Unit	RM-21-C	RM-21-B	RM-21-A

†No nomenclature assigned.
*Replaces component listed directly above on orders No. 32780-PHILA-43 and 32781-PHILA-43.
NOTE:—Hereafter throughout this book suffix letters in the above list are replaced by the symbol (*) indicating that these components are interchangeable.

2. **COMPONENTS, WEIGHTS AND DIMENSIONS.**—(See figures 2 and 6) Radio Set SCR-543-(*) is composed of four chests with contents. These are:

Component	Depth	Height	Width	Wgt. Lbs.
Chest CH-73-(*), containing Remote Control Unit RM-21-(*), accessories, tools and spare parts	26-1/4"	20"	46-1/2"	249
Chest CH-131-(*), containing Power Unit PE-108-(*)	24"	23-3/4"	28"	265
Chest CH-132-(*), containing Power Supply Unit PE-110-(*)	15-1/4"	26-3/4"	22-1/2"	168
Chest CH-133-(*), containing Radio Receiver and Transmitter BC-669-(*)	20-3/8"	29-3/4"	28-1/2"	182

This Technical Manual supersedes TM 11-625, dated Feb. 25, 1943.

3. TOTAL WEIGHTS.—Radio Set SCR-543-(*), packed for shipment, weighs 1175 lbs. When unpacked weighs 864 lbs.

4. SOURCE OF POWER AND POWER REQUIREMENTS.—
   a. Input.—The primary source of power required to operate Radio Receiver and Transmitter BC-669-(*) and its rectifier power supply, Power Supply Unit PE-110-(*), is 115 volts, 60 cycles, single phase alternating current. This power is usually supplied by gasoline-engine driven Power Unit PE-108-(*). The a-c power drain is 220 watts while receiving, 550 watts while transmitting. During stand-by periods the receiver will operate from 12 volts direct current supplied by the storage battery in Power Unit PE-108-(*). The d-c power drain is 5.5 amperes.
   b. Output.—The transmitter has a nominal output rating of 45 watts.

5. DISTANCE RANGE.—In general, two Radio Sets SCR-543-(*) may be used for communication when separated by distances up to 20 or 30 miles if operating as fixed stations; and up to 15 or more miles when operating in vehicles in motion. The actual distances will vary with differences in weather, height or location of stations and the operating frequency used.

6. FREQUENCY COVERAGE.—Radio Set SCR-543-(*) operates in the frequency range from 1680 to 4450 kc.

7. WAYS OF TRANSMISSION AND RECEPTION.—
   a. The transmitter sends voice-modulated signals, (in the usual way).
   b. The receiver is of the superheterodyne type and it detects both voice-modulated signals and tone-modulated c-w telegraph signals.

8. CHANNELS.—Six crystal controlled frequencies within the operating range may be preset and instantly selected for both reception and transmission. Hand control of receiver tuning is also provided.

9. DESCRIPTION OF COMPONENTS.—
   a. Radio Receiver and Transmitter BC-669-(*) in Chest CH-133-(*). (See Figure 3).—
      (1) This unit consists of Chest CH-133-(*) containing the following:
         (a) Receiver and Transmitter BC-669-(*)
         (b) One set of tubes installed
         (c) Two sets of crystals in Crystal Holders FT-171-B
         (d) One 2 ft. length Wire W-128 for antenna connection
      (2) *Size of chest.*—28½" wide x 20⅜" deep x 29¾" high.
      (3) *Total weight.*—182 lbs.
      (4) The receiver and transmitter are in a sheet steel cabinet which is shock-mounted in the chest. The front of the chest is removable so you can get at the equipment; the front may be put back on while operating, with cords connected, as a protection from rain. A door in the top of the chest is for making preliminary adjustments to the transmitter. For the same purpose, there is a door in the top of the steel cabinet containing the receiver and transmitter. A sliding tray in the bottom of the chest is for storage of spare crystals. Means for mounting the antenna mast bracket is on the side of the chest.
      (5) The following further details of construction may help you, should you ever need to remove the steel cabinet from the chest. The back section of the steel cabinet is permanently fastened to the shock-mounts, which are secured to the chest. The cabinet itself is quickly removable from the back section after turning Chest CH-133-(*) over on its back *(if you don't do this, it may result in damage to the banana plug on the back section which is shock-mounted to the back of Chest CH-133-(*)).* Unfasten the six rear snap latches (or draw bolt clamps). Two handles on the front panel permit lifting out for servicing. Radio Receiver and Transmitter BC-669-(*) consists of two chassis decks assembled into a sheet steel cabinet, separable into two sections, each section housing one of the chassis. The two sections are securely fastened together by means of four snap latches. All metal parts are adequately protected by plating or paint.
         (a) The upper section contains all radio frequency circuits of the transmitter and all receiver components except the output transformer and loudspeaker. Components of the top deck are shown in figure 13. On the front panel of the upper section are located a meter for indicating transmitter antenna current, a chart on which is listed transmitter channel frequencies to which the transmitter is pretuned and the following transmitter controls; a dial for resonating the antenna circuit, and a six position switch for selecting the desired operating channel. A door is provided to gain access to the antenna loading coil, and behind a removable plate, located below the antenna tuning dial, are mounted six variable capacitors for the purpose of tuning the radio frequency power amplifier plate circuit for each of the six operating channels. The following receiver controls also appear on the front panel: a dial for tuning the receiver, a control for varying the r-f gain (NOISE CONTROL), a four position switch for selecting the desired crystal or manual controlled

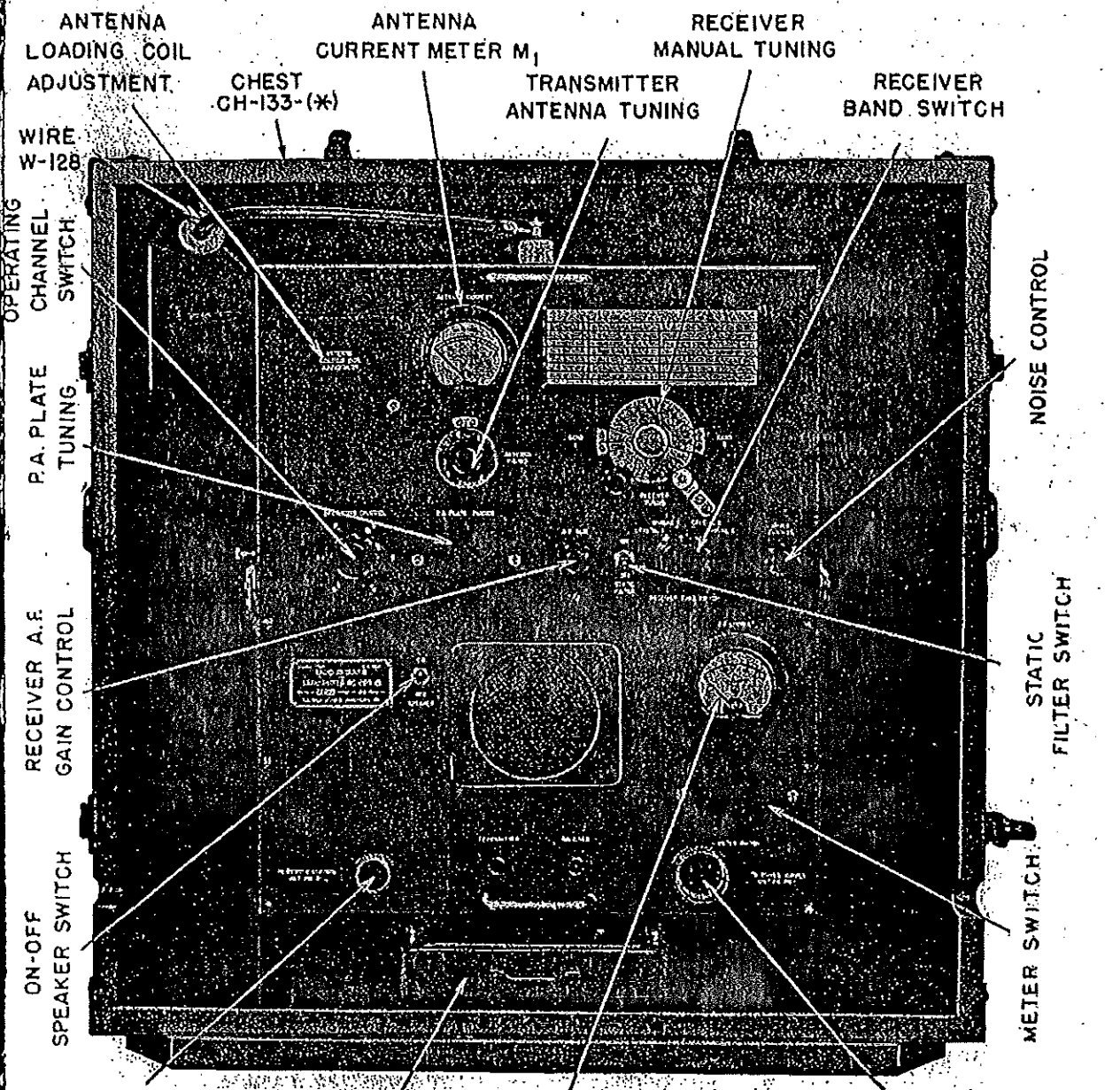


Fig. 3 — Radio and Transmitter BC-669-(*) in Chest CH-133-(*).

frequency band, a toggle switch for turning the STATIC FILTER on and off and a control for varying the audio gain. The antenna connection is made by means of a feed-through binding post located on top of the cabinet, and a binding post is also located on the left hand side of the cabinet for making the ground connection. The components on the front panel are shown in figure 3.

(b) The lower section contains the transmitter audio and modulator circuits, receiver output transformer and loudspeaker, as well as d-c metering and power entry circuits. On the front panel of this section are mounted the loudspeaker, the loudspeaker on-off switch and nameplate. Two pilot lights are provided on the panel, one for indicating receiver filament power and the other for indicating transmitter filament power. Receptacles are provided for making connection to Remote Control Unit RM-21-(*) and Power Supply Unit PE-110-(*). A meter is located on the front panel for indicating modulator plate current, radio frequency power amplifier plate current or grid current which may be selected with a three position switch recessed behind the panel below the meter. A removable plate is provided to cover the recess. A handle is provided on the upper and lower panels for lifting the unit. (See figures 2 and 3.)

(c) The upper section is reached through the open back or through the top by lifting the lid which is held closed by means of a spring latch. The lower section may be reached through the rear or by lifting off the top section after removing the twelve-prong plug, located in the rear, from its receptacle and unfastening the four snap latches. The steel cabinet can then be separated into two sections, the upper, containing all radio frequency circuits of the receiver and transmitter, and the lower section containing audio and modulator circuits, loudspeaker, d-c metering, and power entry circuits.

(6) *The set of operating tubes in Radio Receiver and Transmitter BC-669-A, BC-669-B, BC-669-C are:*

(a) Receiver

	BC-669-A	BC-669-B BC-669-C	BC-669-B* BC-669-C*
1 each Tube	VT-90	VT-90-A	JAN-( )-6H6GT VT-90-A
1 each Tube	VT-94	VT-94-D	JAN-( )-6J5GT VT-94-D
3 each Tube	VT-117	VT-117-A	JAN-( )-6SK7GT VT-117-A
1 each Tube	VT-150	VT-150-A	JAN-( )-6SA7GT VT-150-A
1 each Tube	VT-152	VT-152	JAN-( )-6K6GT VT-152
(b) Transmitter			
2 each Tube	VT-100	VT-100-A	JAN-( )-807 VT-100-A
1 each Tube	VT-115	VT-115-A	JAN-( )-6L6GA
4 each Tube	VT-115-A	VT-115-A	JAN-( )-6L6GA
1 each Tube	VT-135	VT-135	JAN-( )-12J5GT VT-135

(7) *Crystals and Crystal Holders FT-171-B.*— Two sets of 12 each (one set in use, one set spare), consisting of 6 transmitting and 6 receiving crystals are furnished. The frequencies supplied with the equipment are as follows:

Channel	Transmitter Crystal Frequency	Receiver Crystal Frequency
1	1746 kc.	2131 kc.
2	2082 kc.	2467 kc.
3	2280 kc.	2665 kc.
4	2340 kc.	2725 kc.
5	3422.5 kc.	3807.5 kc.
6	4255 kc.	3870 kc.

The receiver crystal frequencies differ from the corresponding transmitter crystal frequencies by 385 kc., (the receiver i-f frequency), but reception is on the same frequency as the transmitter frequency. On channels 1, 2, 3, 4 and 5 the receiver oscillator crystal frequency is higher by 385 kc. than the corresponding transmitter crystal frequency, and on channel 6 the receiver oscillator crystal frequency is lower by 385 kc.

b. Power Supply Unit PE-110-(*) in Chest CH-132-(*) (See Figure 4).—

(1) This power supply unit includes circuits for converting 115 volts a-c power to suitable filament and plate power for the receiver and transmitter. Also included are circuits for converting 12 volt d-c power to filament and plate power for the receiver only, (for stand-by recep-

**On order No. 32780-PHILA-43 and 32781-PHILA-43 only.*

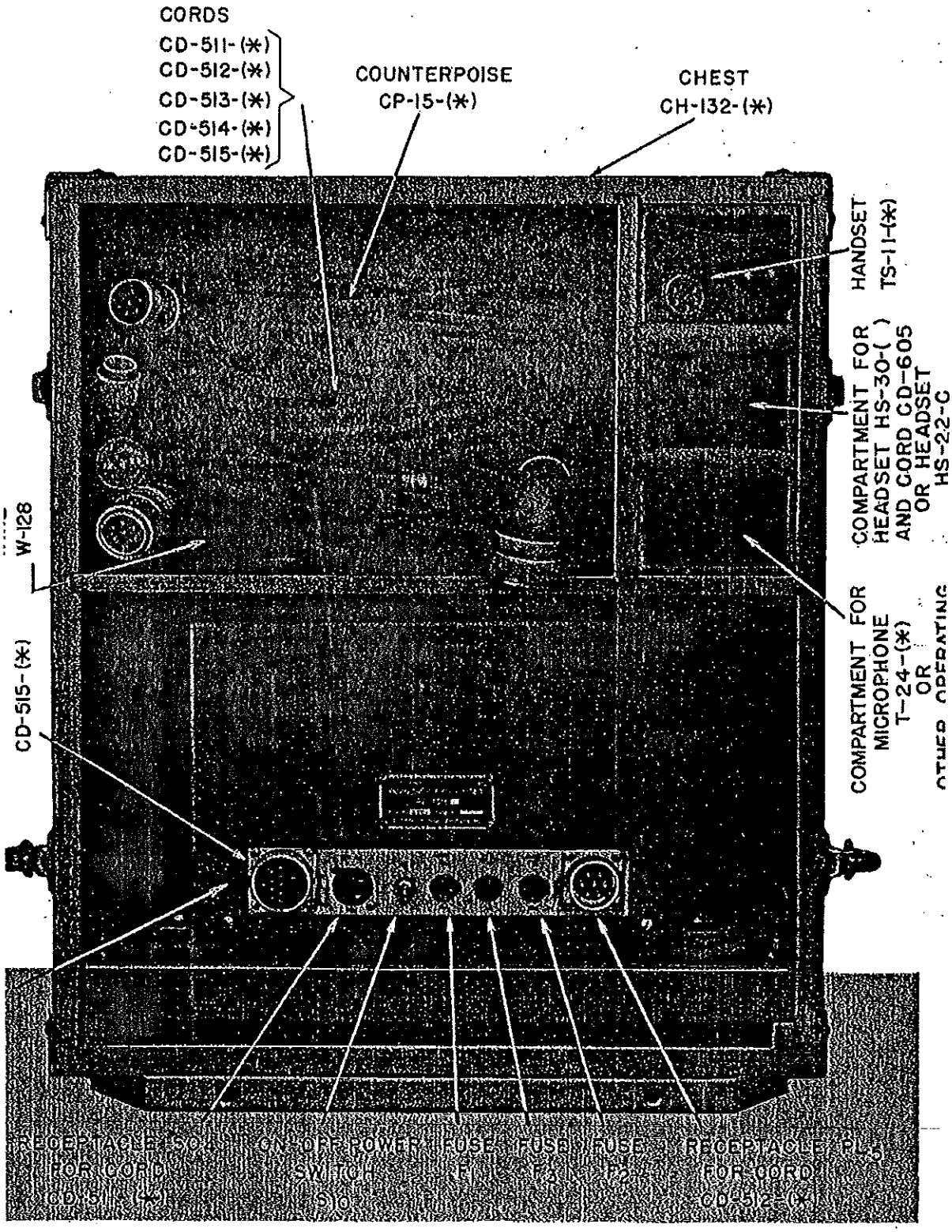


Fig. 4 — Power Supply Unit PE-110-(*) in Chest CH-132-(*)

tion). The power supply unit connects to the receiver and transmitter, and to the primary source of power, by suitable cords and plugs carried in Chest CH-132-(*). This chest is divided into compartments which contain the following:

(a) The shock-mounted metal cased power supply unit
(b) One set tubes (installed)
(c) One set cordage
(d) One 15 ft. length Wire W-128
(e) One Handset TS-11-(*)
(f) One Headset HS-22-C. (Supplied with SCR-543-A)
(g) One Headset HS-30-(*). (Supplied with SCR-543-B, C)
(h) One Cord CD-605. (Supplied with SCR-543-B, C)
(i) One Cord CD-307-A and one Cord CD-604. (Supplied with SCR-543-B, C, in some cases as a substitute for Cord CD-605)
(j) One spare compartment for Microphone T-24-(*) when supplied
(k) One Counterpoise CP-15-(*)

(2) *Size of chest.*—22½" wide x 15¼" deep x 26¾" high.

(3) *Total weight.*—168 lbs.

(4) Power Supply Unit PE-110-(*) is on a plated sheet steel chassis having a sheet steel cover and is shock-mounted on a shelf within Chest CH-132-(*). You can get at the main power switch, fuses, cords and plugs from the front. The shelf slides readily out of the carrying chest for servicing. The front of the chest is removable for getting at the interior, but may be replaced when operating with cords connected, for protection against rain.

(a) The dust cover is designed so as to expose the chassis front apron which mounts the following parts: receptacles for connection to Radio Receiver and Transmitter BC-669-(*), Remote Control Unit RM-21-(*) and a commercially available source of a-c power; on-off switch and fuse posts.

(b) The nameplate is mounted on the front of the dust cover. The base is constructed with extensions beyond the cabinet at each side to allow shock mounting of the unit.

(5) The set of operating tubes consists of the following:

	PE-110-A	PE-110-B PE-110-C	PE-110-B* PE-110-C*
1 each Tube	VT-80	VT-80	JAN-( )-80 VT-80
4 each Tube	VT-145	VT-145	JAN-( )-5Z3 VT-145

**On order No. 32780-PHILA-43 and 32781-PHILA-43.*

(6) The set of cordage consists of the following:
Cord CD-513-(*), length 15 ft., used as extension cord between RM-21-(*) and BC-669-(*)
Cord CD-515-(*), length 4 ft., for connecting BC-669-(*) to PE-110-(*)
Cord CD-512-(*), length 6 ft., for connecting PE-110-(*) to PE-108-(*)
Cord CD-514-(*), length 20 ft., for extension of CD-512-(*) between PE-110-(*) and PE-108-(*)
Cord CD-511-(*), length 25 ft., for connecting PE-110-(*) to a commercial power source when you can get to it.

(7) The fifteen foot length of Wire W-128 is used in vehicular installations to connect the antenna mast base to the antenna terminal on the receiver and transmitter.

(8) Handset TS-11-(*) is used with Remote Control Unit RM-21-(*) for listening to the receiver and for voice-modulating the transmitter.

(9) Headset HS-22-C (in Radio Set SCR-543-A) is used with Microphone T-24-(*) in place of Handset TS-11-(*) when so desired.

(10) Headset HS-30-(*) (in Radio Set SCR-543-B, C) connected to Cord CD-605 or to Cord CD-307-A with Cord CD-604 is used with Microphone T-24-(*) in place of Handset TS-11-(*) when so desired.

(11) Microphone T-24-(*) is used with Headset HS-30-(*) connected to Cord CD-605 or Headset HS-22-C in place of Handset TS-11-(*) when so desired.

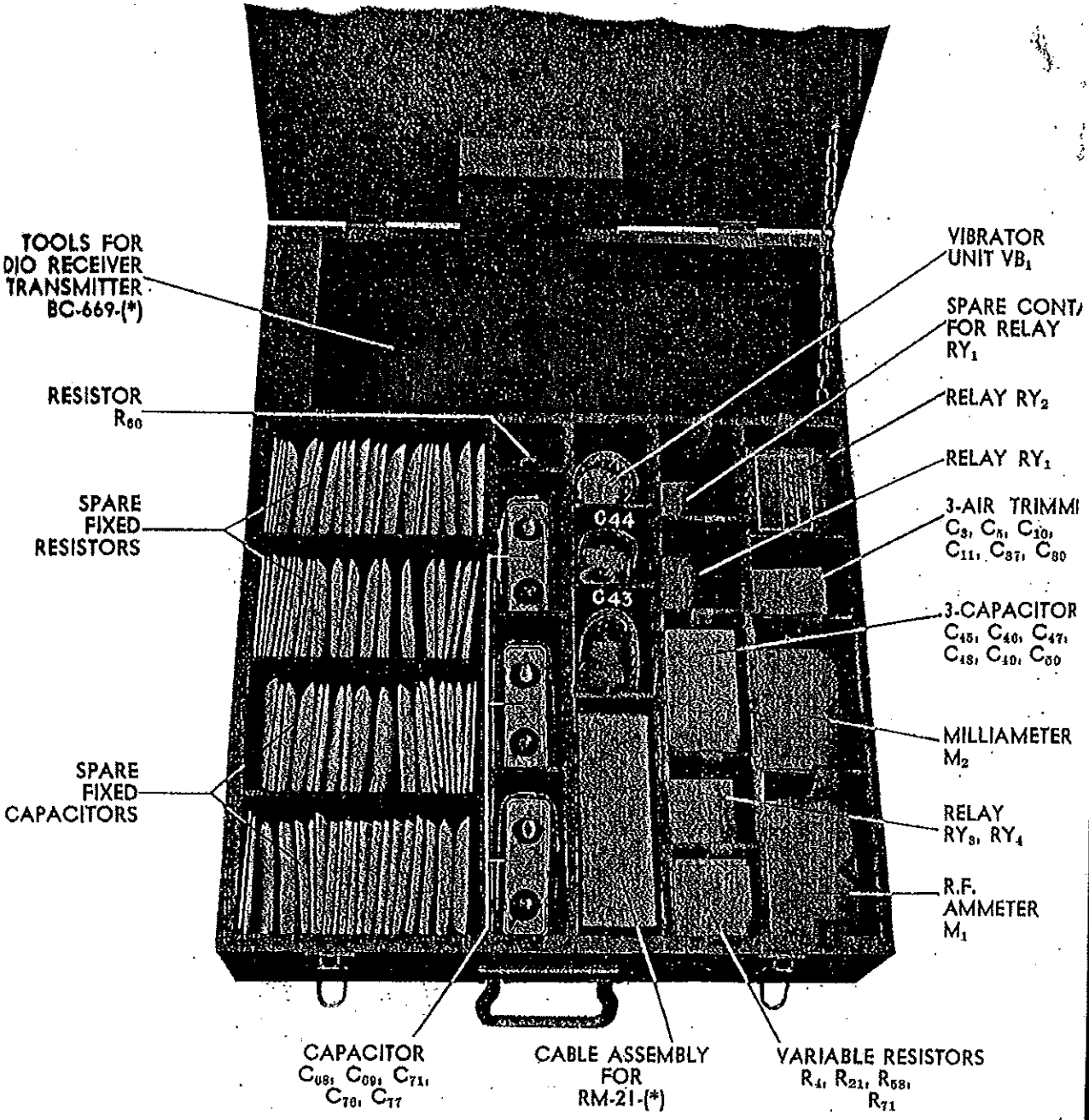
(12) Counterpoise CP-15-(*) replaces the use of a direct ground connection. It consists of 8 radial wires connected to a central point with a connecting lead for attaching to the radio set ground.

c. Chest CH-73-(*).—(See Figures 6 and 7.)—

(1) This chest is for storage of all component units or accessories not stored in Chests CH-131-(*), CH-132-(*) or CH-133-(*) together with service tools and spare parts. Chest CH-73-(*) is made of heavy plywood and has a hinged lid to get at the interior. A removable wooden tray as well as several compartments provide for storage of individual items, keeping them separated so that removal of one item will not cause the others to be loosened. Contained in this chest are:

Chest CH-73-A

(a) One Remote Control Unit RM-21-(*) in carrying case.
(b) One Microphone T-24-(*).
(c) One Handset TS-11-(*) (spare).
(d) One Headset HS-22-C (spare).
(e) One set cordage (spare).
(f) One set spare tubes.
(g) Three Insulators IN-101.
(h) One trouble lamp with 50 watt bulb.
(i) Two Mast Brackets MP-50, each with Mast Base MP-37.



NOTE: The following not supplied in tray from Chest CH-73-B, C:
3-air trimmers C_3, C_5, C_{10}, C_{11}, C_{37}, C_{80}.
One capacitor C_{44}.
3-capacitors C_{45}, C_{46}, C_{47}, C_{48}, C_{49}, C_{50}.

Fig. 5 — Tray from Chest CH-73-(*).

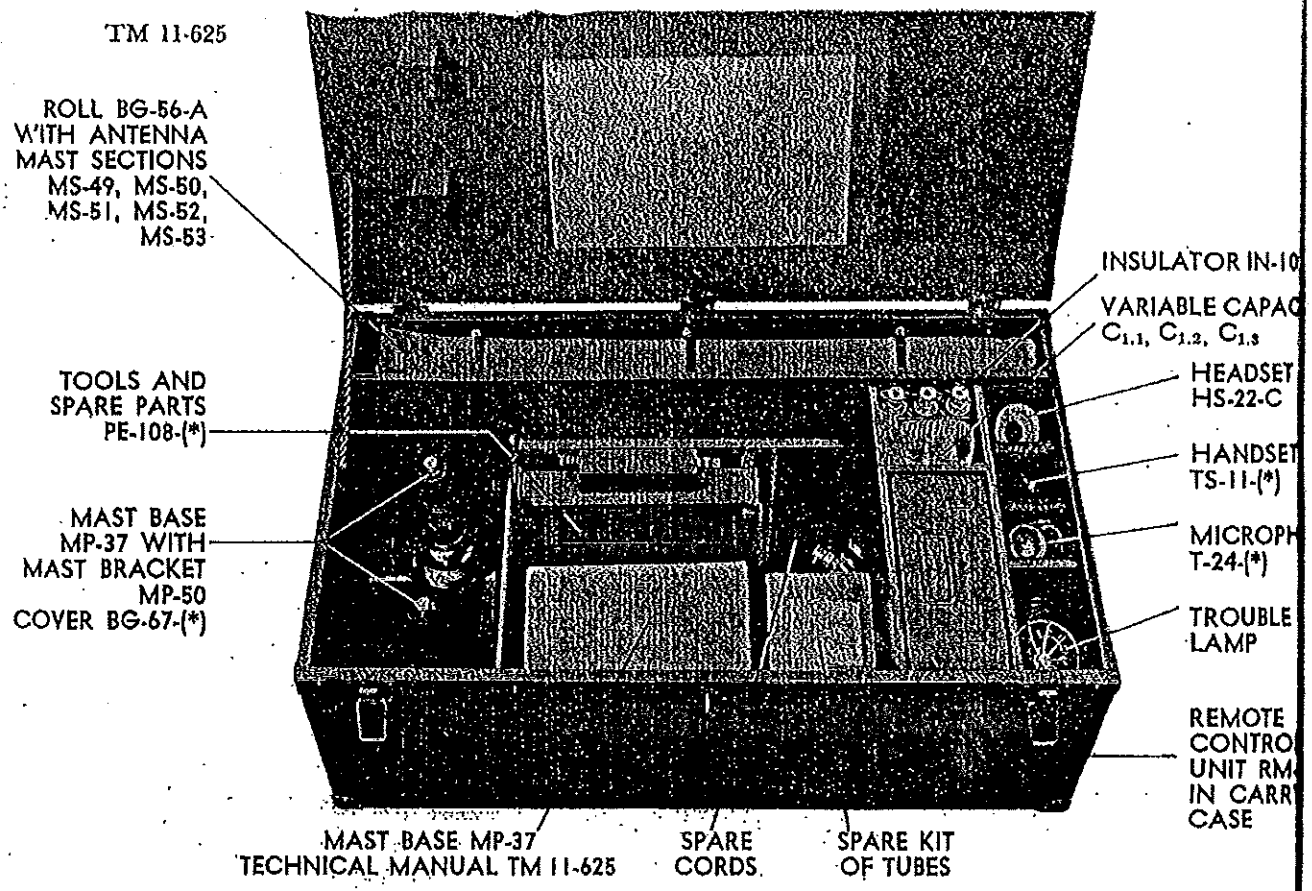


Fig. 6 — Chest CH-73-A, With Tray Removed.

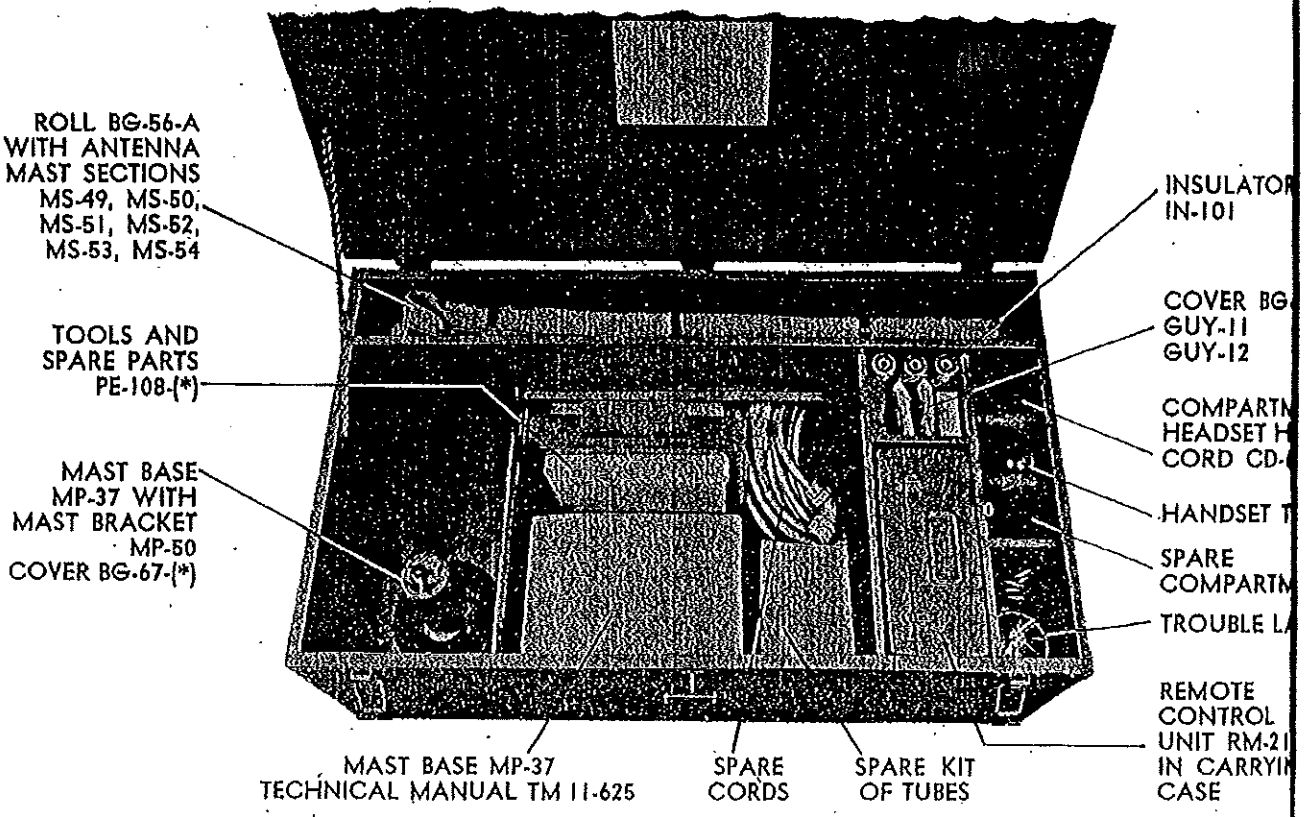


Fig. 7 — Chest CH-73-B, With Tray Removed.

Quantity	Description
24 ea.	Crystal Holder FT-171-B with crystal (2 sets of 12 each; 1 set consists of 6 transmitting crystals and 6 receiving crystals)
2 ea.	Handset TS-11-(*) (1 in use, 1 spare)
2 ea.	Headset HS-22-C (1 in use, 1 spare)
4 ea.	Insulator IN-101 (1 in use, 3 spare)
1 ea.	Lamp, trouble, with bulb
3 ea.	Mast Base MP-37 (2 in use, 1 spare)
2 ea.	Mast Bracket MP-50
8 ea.	Mast Sections MS-49, MS-50, MS-51, MS-52, MS-53, (1 each in use, 2 spare)
2 ea.	Microphone T-24-(*) (1 in use, 1 spare)
1 ea.	Power Unit PE-108-(*)
1 ea.	Power Supply Unit PE-110-(*)
1 ea.	Radio Receiver and Transmitter BC-669-(*)
1 ea.	Remote Control Unit RM-21-(*)
1 ea.	Roll BG-56-A
1 set	Tools and Spare Parts for BC-669-(*), PE-110-(*) and RM-21-(*)
1 set	Tools and Spare Parts for PE-108-(*)
2 sets	Vacuum Tubes
2 lengths	Wire W-128, one 15 ft. length, one 2 ft. length.

Radio Set SCR-543-B, C

Quantity	Description
1 ea.	Chest CH-73-(*)
1 ea.	Chest CH-131-(*)
1 ea.	Chest CH-132-(*)
1 ea.	Chest CH-133-(*)
2 ea.	Cord CD-511-(*) (1 in use, 1 spare)
2 ea.	Cord CD-512-(*) (1 in use, 1 spare)
2 ea.	Cord CD-513-(*) (1 in use, 1 spare)
2 ea.	Cord CD-514-(*) (1 in use, 1 spare)
2 ea.	Cord CD-515-(*) (1 in use, 1 spare)
2 ea.	Cord CD-605 (1 in use, 1 spare)
2 ea.	Cord CD-307-A with Cord CD-604 (1 in use, 1 spare) substitute for CD-605
1 ea.	Counterpoise CP-15-(*)
2 ea.	Cover BG-67-(*)
24 ea.	Crystal Holder FT-171-B with crystal (2 sets of 12 each; 1 set consists of 6 transmitting crystals and 6 receiving crystals)
1 ea.	Guy GY-11
1 ea.	Guy GY-12
2 ea.	Handset TS-11-(*) (1 in use, 1 spare)
2 ea.	Headset HS-30-(*) (1 in use, 1 spare)
4 ea.	Insulator IN-101 (1 in use, 3 spare)
1 ea.	Lamp, trouble, with bulb
2 ea.	Mast Base MP-37 (1 in use, 1 spare)
1 ea.	Mast Bracket MP-50
2 ea.	Mast Sections MS-49, MS-50, MS-51, MS-52, MS-53, MS-54 (1 each in use, 1 spare)
1 ea.	Power Unit PE-108-(*)
1 ea.	Power Supply Unit PE-110-(*)
1 ea.	Radio Receiver and Transmitter BC-669-(*)
1 ea.	Remote Control Unit RM-21-(*)
1 ea.	Roll BG-56-A
2 ea.	Technical Manual TM 11-625 for Radio Set SCR-543-(*)
1 set	Tools and Spare Parts for BC-669-(*), PE-110-(*) and RM-21-(*)
1 set	Tools and Spare Parts for PE-108-(*)
2 sets	Vacuum Tubes
2 lengths	Wire W-128, one 15 ft. length, one 2 ft. length

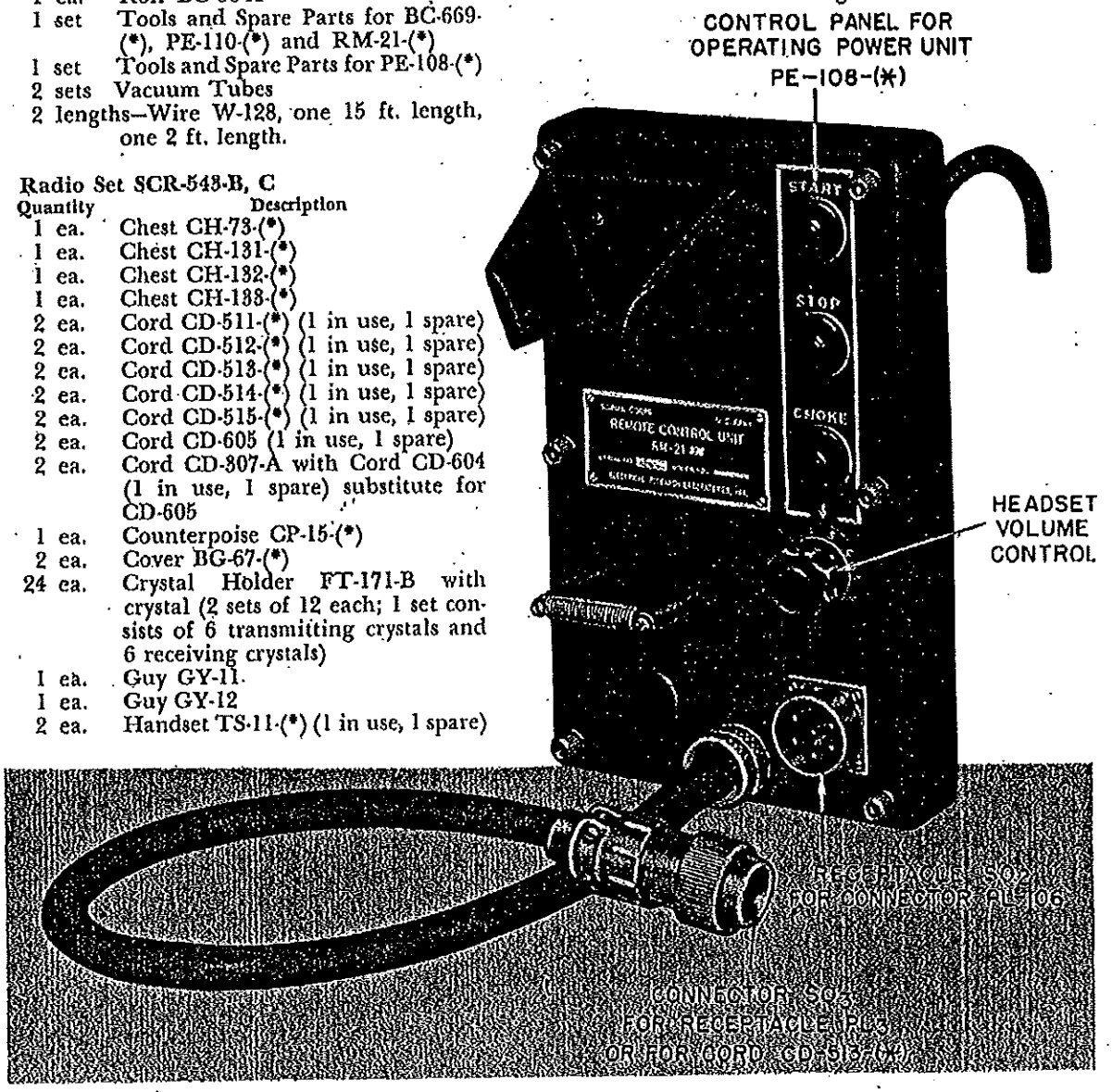
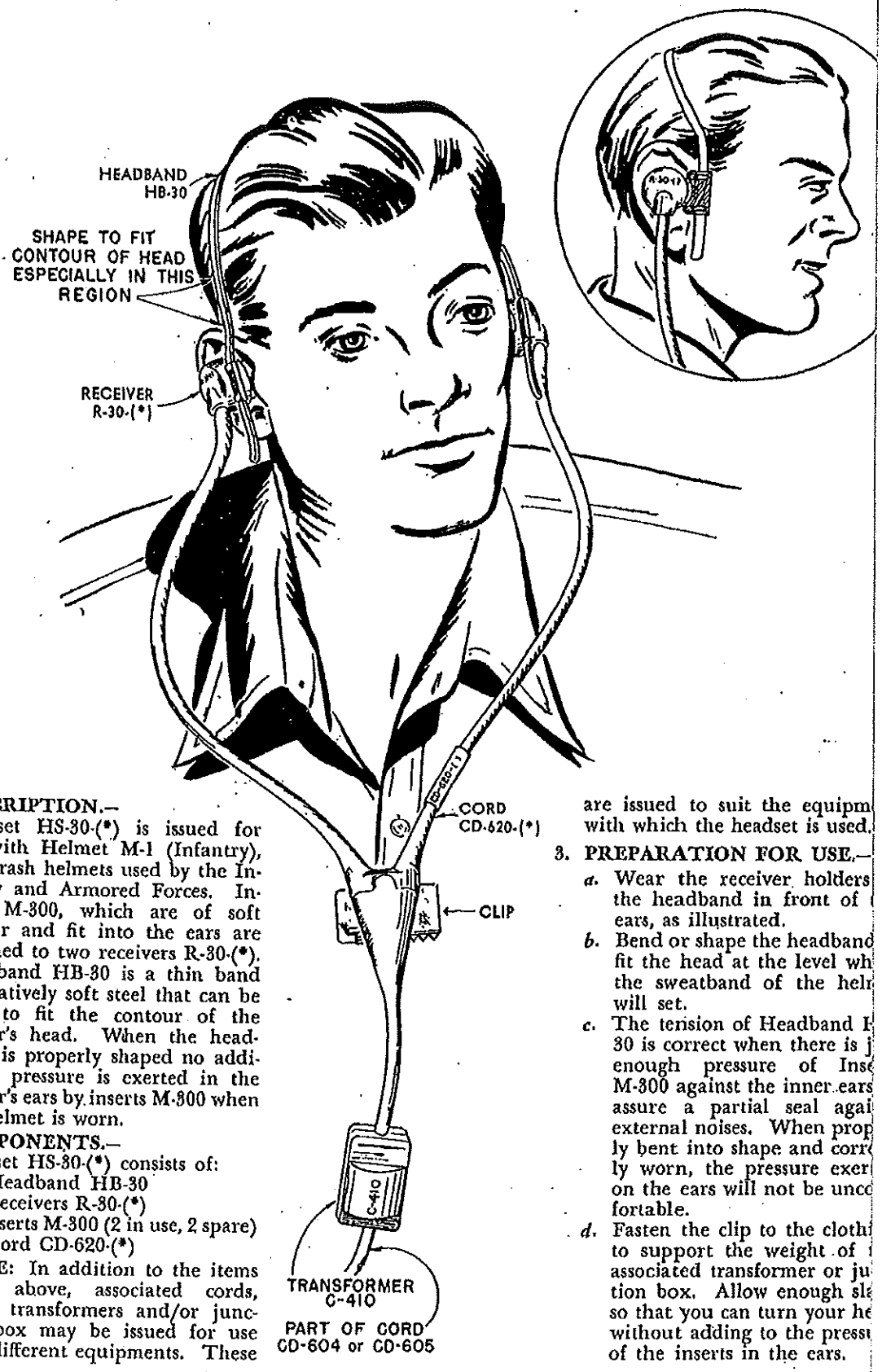


Fig. 8 — Remote Control Unit RM-21-(*).

10. INSTRUCTIONS FOR HEADSET HS-30-(*)



1. **DESCRIPTION.**—
Headset HS-30-(*) is issued for use with Helmet M-1 (Infantry), and crash helmets used by the Infantry and Armored Forces. Inserts M-300, which are of soft rubber and fit into the ears are attached to two receivers R-30-(*). Headband HB-30 is a thin band of relatively soft steel that can be bent to fit the contour of the wearer's head. When the headband is properly shaped no additional pressure is exerted in the wearer's ears by inserts M-300 when the helmet is worn.

2. **COMPONENTS.**—
Headset HS-30-(*) consists of:
1 Headband HB-30
2 Receivers R-30-(*)
4 Inserts M-300 (2 in use, 2 spare)
1 Cord CD-620-(*)

NOTE: In addition to the items listed above, associated cords, plugs, transformers and/or junction box may be issued for use with different equipments. These are issued to suit the equipm with which the headset is used.

3. **PREPARATION FOR USE.**—
a. Wear the receiver holders the headband in front of ears, as illustrated.
b. Bend or shape the headband fit the head at the level wh the sweatband of the helr will set.
c. The tension of Headband H 30 is correct when there is j enough pressure of Inse M-300 against the inner ears assure a partial seal agai external noises. When prop ly bent into shape and corr ly worn, the pressure exer on the ears will not be unc fortable.
d. Fasten the clip to the cloth to support the weight of associated transformer or ju tion box. Allow enough sla so that you can turn your he without adding to the press of the inserts in the ears.

Fig. 9 — Instructions for Headset HS-30-(*).

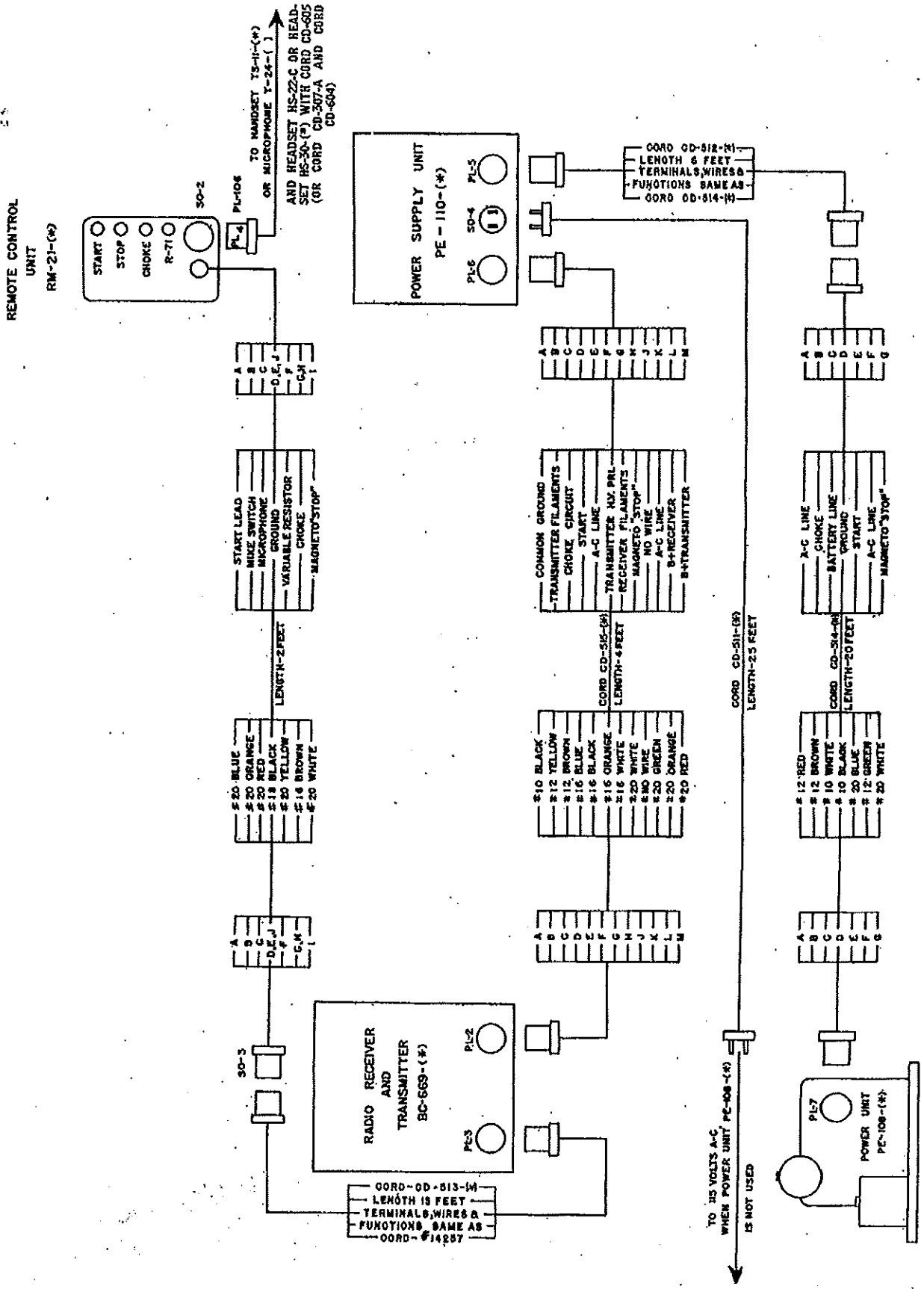


Fig. 10 — Radio Set SCR-543-(*), Cording Diagram.

SECTION II — INSTALLATION AND OPERATION

11. UNPACKING.—

a. Uncrate Chest CH-133-(*) containing Radio Receiver and Transmitter BC-669-(*) carefully and inspect for any possible damage during shipment. Do the same with Chest CH-132-(*) containing Power Supply Unit PE-110-(*), and Chest CH-131-(*) containing Power Unit PE-108-(*) and Chest CH-73-(*), and the box containing the bottles of electrolyte for the storage battery (see Sections VI to X).

CAUTION

Handle the bottles containing electrolyte very carefully. They contain sulphuric acid.

b. Other Considerations.—Radio Receiver and Transmitter BC-669-(*) has been equipped with crystals and pretuned to the frequency channels outlined in paragraph 9 *a* (7). No further adjustment is necessary unless operation on other channels is required. Procedure for pretuning channels is outlined under "Maintenance," par. 21.

12. INSTALLATION.—

a. Radio Set SCR-543-(*) may be used as a field radio station on the ground or as a vehicular radio station in any suitable vehicle. In paragraphs 13, 14 and 15, directions are given for the following installations:
(1) As a field station
(2) In a ½ ton Pick Up Truck
(3) In a ¾ ton Command and Reconnaissance car.

b. The simplest installation is the field station. For this reason, this type of installation is best for instructing new personnel until familiar with this set. In reading these instructions for the first time it is recommended that after covering par. 13, the reader skip paragraphs 14 and 15, continuing immediately with paragraphs 16 (Precautions before Operating) and 17 (Operation).

13. INSTALLATION AS A FIELD STATION.

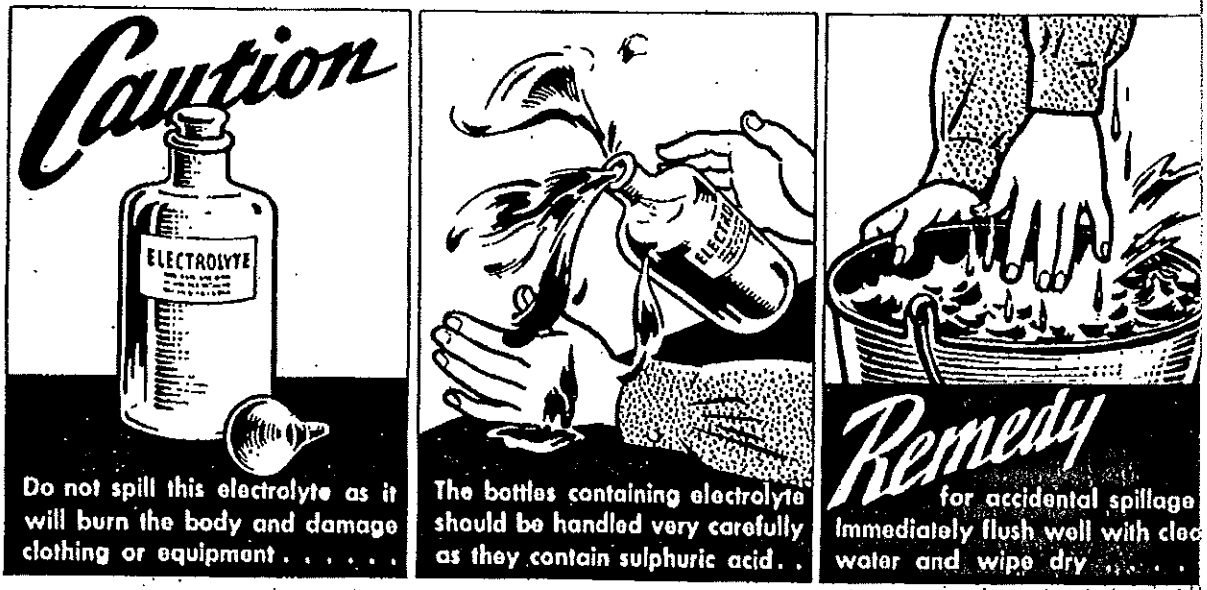
a. Set up Radio Receiver and Transmitt BC-669-(*), Power Supply Unit PE-110-(and Power Unit PE-108-(*) in operating po tion. Figure 2 shows a recommende arrangement.

b. Unlatch and remove all covers.

c. If it is not desired to carry Chest CH-73-(to this position, open lid and remove t following:
(1) Remote Control Unit RM-21-(*) in carr ing case.
(2) Mast Base MP-37 mounted on Ma Bracket MP-50.
(3) Roll BG-56-A containing Mast Sectio MS-49, MS-50, MS-51, MS-52, MS-53 an MS-54. (MS-54 included in Chest CH 73-B, CH-73-C only.)
(4) Guys GY-11 and GY-12 (if MS-54 is to b used. Guys GY-11 and GY-12 include in Chest CH-73-B, CH-73-C only).

d. Remove Remote Control Unit RM-21-(from carrying case and hang it on t carrying handle on left side of Chest CH 133-(*). Insert plug on cord of the remo control unit into receptacle PL_3 in front the transmitter and screw the plug lockin ring on by hand as far as it will turn.

e. (1) Remove from the upper compartme of Chest CH-132-(*) the following:—
Cord CD-515-(*)
Cord CD-512-(*)
(2) Insert the right-angle cord connector o one end of Cord CD-515-(*) into r ceptacle PL_2 on the front panel of Rad Receiver and Transmitter BC-669-(* and tighten the locking-ring. In t same way connect the other end wi receptacle PL_6 on the front panel Power Supply Unit PE-110-(*).
(3) Insert right-angle cord connector on o



end of Cord CD-512-(*) into receptacle PL_6 on the front panel of Power Supply Unit PE-110-(*) and the other end into receptacle PL_7 on Power Unit PE-108-(*) located on the side of the control box. Tighten the locking-rings.

f. (1) Select the Mast Base MP-37 which is mounted on Mast Bracket MP-50 having captive wing nuts (wing nuts supplied with SCR-543-C are not of the captive type). Attach this bracket to left side of Chest CH-133-(*), as follows:
(a) Insert bracket bolt heads thru keyholes in chest
(b) Drop bolts into keyhole slots
(c) Tighten wing nuts.
(2) Remove Cover BG-67-(*).
(3) Remove Mast Sections MS-49, 50, 51, 52 and 53 from Roll BG-56-A and screw them tightly together. Fit ends having the same colors to each other. Then screw Mast Section MS-53 tightly to the mast base.
(4) If you want a taller antenna to get greater range, use Mast Section MS-54 and Guys GY-11 and GY-12 (supplied with SCR-543-B, C only) besides the above antenna.
(5) Insert the clamping ring of Guy GY-11 between Mast Sections MS-52 and MS-53 and secure the ends of the clamp by the hook provided on Guy GY-12. Insert Mast Section MS-54 between Mast Section MS-53 and Mast Base MP-37. Secure the other ends of Guys GY-11 and GY-12 to some anchor point near the ground.

g. (1) Remove Counterpoise CP-15-(*) from Chest CH-132-(*) and attach the longest wire to the ground post on the left side of the metal cabinet of Radio Receiver and Transmitter BC-669-(*).
(2) Run the free end of the antenna lead (Wire W-128) thru Insulator IN-101, then thru the hole in the mast bracket and connect to the binding post at the bottom of Mast Base MP-37.

h. (1) Select from the right-hand compartments of Chest CH-132-(*) in SCR-543-A, Handset TS-11-(*) or the combination of Microphone T-24-(*) and Headset HS-22-C.
(2) Select from the right-hand compartments of Chest CH-132-(*) in SCR-543-B, C, Handset TS-11-(*) or the combination of Microphone T-24-(*) and Headset HS-30-(*) with Cord CD-605. (Use Cord CD-307-A with Cord CD-604 when supplied as a substitute for Cord CD-605.)
(3) Plug either handset or microphone into receptacle SO_2 on Remote Control Unit RM-21-(*).
(a) If Microphone T-24-(*) is used in SCR-543-A, plug Headset HS-22-C into the jack on the microphone cord.
(b) If Microphone T-24-(*) is used in SCR-543-B, C, plug Cord CD-605 (or Cord CD-307-A with Cord CD-604) connected to Headset HS-30-(*) into the jack on the microphone cord.

i. If you want to operate Power Unit PE-108-(*) at a greater distance from the operating position, remove Cord CD-514-(*) from Chest CH-132-(*) and insert it in series with Cord CD-512-(*) and Power Unit PE-108-(*). This reduces the noise from the power unit and can be further helped by extending the exhaust pipe as far away from the operating position as possible.

j. (1) If you want to operate Remote Control Unit RM-21-(*) at a distance from the transmitter, remove Cord CD-513-(*) from Chest CH-132-(*) and insert it between the cord attached to Remote Control Unit RM-21-(*) and receptacle PL_8 on Radio Receiver and Transmitter BC-669-(*).
(2) In the event that Radio Frequency potentials (indicated by sparks, shocks or burns) should appear on Remote Control Unit RM-21-(*) when Cord CD-513-(*) is used, ground the remote control unit as follows:—
(a) Attach one end of a wire to one of the captive thumb screws on the front panel of Remote Control Unit RM-21-(*).
(b) Attach the other end of the wire to the nearest external ground. ***Keep this ground wire as short as possible.***

k. In case of rain, replace and latch the covers on Chests CH-132-(*) and CH-133-(*) and bring the cords out thru the openings.

14. **INSTALLATION IN ½ TON PICK-UP TRUCK** (See Figure 11).—
a. Let down the rear platform of the truck.
b. Let down the right seat-bench inside the truck. Let the left seat-bench remain up.
c. Place Chest CH-133-(*) containing Radio Receiver and Transmitter BC-669-(*) on the floor inside the truck as far front as possible with the open face toward the rear.
d. Place Chest CH-132-(*) containing Power Supply Unit PE-110-(*) alongside Chest CH-133-(*) on the left seat-bench with the open face toward the right side and as far up front as possible.
e. Locate Chest CH-131-(*) containing Power Unit PE-108-(*) about two feet in back of Chest CH-133-(*) on the floor of the truck, and remove chest.
f. (1) Drill four holes in the seat-back rails directly behind Chest CH-132-(*). Use Mast Bracket MP-50 as template. In SCR-543-A use Mast Bracket MP-50 having removable wing nuts. This mast bracket is not supplied with SCR-543-B, C and will have to be obtained from the supply depot.
(2) Mount the mast base and bracket to this point. Assemble the antenna mast sections as described in par. 13, *f*, (1).
g. (1) Remove Wire W-128 from Chest CH-

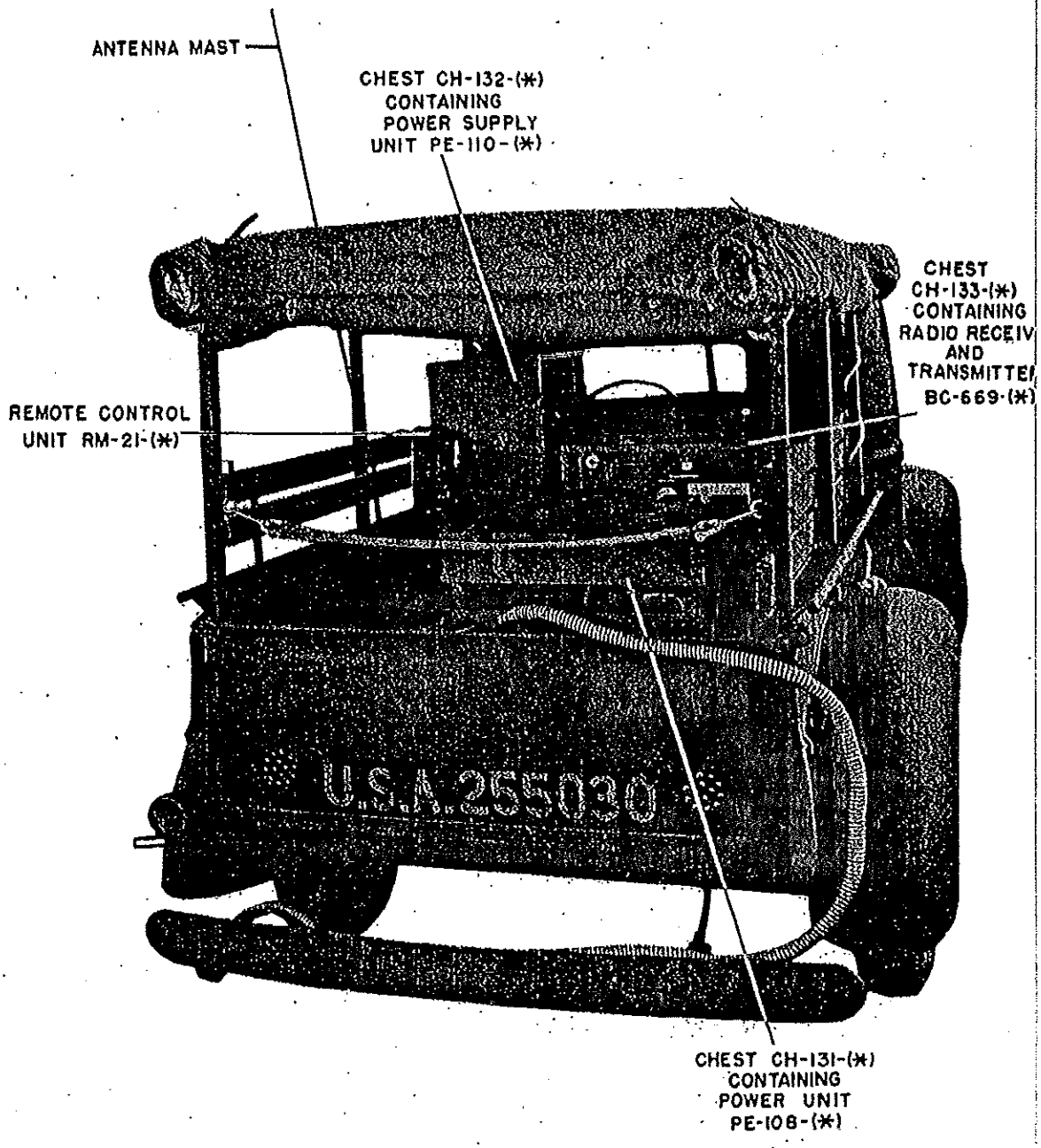


Fig. 11 — Radio Set SCR-543-(*) Installed in ½ Ton Pick-up Truck.

132-(*) and attach the terminal end to the antenna post on top of Radio Receiver and Transmitter BC-669-(*).

(2) Feed this wire thru the insulated eyebolt attached to the top of the chest and thru Insulator IN-101. Cut off all excess length. Connect to the terminal at the bottom of Mast Base MP-37. ***Do not let this wire rest on metal parts of the vehicle.***

(3) Connect a wire from the ground post of Radio Receiver and Transmitter BC-669-(*) to the metal body of the truck at any convenient point. For this purpose, use the wire furnished in the tools and spare parts box located in the tray of Chest CH-73-(*).

h. (1) Remove Remote Control Unit RM-21-(*) from carrying case and hang it on any support near the operator.

(2) Connect plug on cord of RM-21-(*) with receptacle PL_3 on front of BC-669-(*).

i. Install Cords CD-515-(*) and CD-512-(*) as described in par. 13. *e.* (2) and (3).

j. Tie Chest CH-132-(*) into place by rope or straps fastened around the seat-back, or other suitable means provided.

k. Install exhaust pipe extension as outlined in in par. 15. *a.* (2) thru (6).

(1) Put up truck rear platform and fasten in place.

15. INSTALLATION IN ¾ TON COMMAND AND RECONNAISSANCE CAR. (See Figure 1).—

a. (1) Place Chest CH-131-(*) containing Power Unit PE-108-(*) on top of rear seat as far to the right as possible and remove Chest CH-131-(*). If installation is to be anything but very temporary, a simple wood platform of 2 x 4 lumber should be built over the seat with two legs extending to the floor. The power unit may be placed on this.

(2) Remove the roll of asbestos tape and iron wire from the Tools and Spare Parts Box for PE-108-(*) in Chest CH-73-(*).

(3) Wrap the asbestos tape around the exhaust pipe extension, securing it with the iron wire.

(4) Remove the exhaust pipe extension and feed it thru the slots in Chest CH-131-(*), and replace exhaust pipe extension.

(5) Replace Chest CH-131-(*).

(6) Tie the exhaust pipe extension to the exterior of the vehicle with iron wire furnished.

(7) Tie Chest CH-131-(*) containing Power Unit PE-108-(*) down to the seat with straps or rope to prevent it from jump-out while the car is in motion.

b. Place Chest CH-132-(*) containing Power Supply Unit PE-110-(*) on the floor between front and rear seats of the command car as far to the right as you can.

c. Place Chest CH-133-(*) containing Radio Receiver and Transmitter BC-669-(*) on the floor at the left of Chest CH-132-(*).

d. Connect the cords as described in Paragraph 13. *e.* Cord CD-512-(*) should be fed thru a slot in Chest CH-131-(*).

e. Take the following units out of Chest CH-73-(*).

(1) Remote Control Unit RM-21-(*) in case.

(2) Roll BG-56-A with antenna mast sections.

f. (1) Locate the necessary holes on the left side of the command car in the space provided for the antenna mast base bracket.

(2) Attach the bracket supplied with the vehicle to this point.

(3) Assemble and attach antenna as described in Paragraph 13. *f.* (3).

g. (1) Remove Wire W-128 from Chest CH-132-(*) and attach the terminal end to the antenna post on top of Radio Receiver and Transmitter BC-669-(*).

(2) Feed this wire thru the insulated eyebolt attached to the top of the chest and thru Insulator IN-101. Cut off all excess length. Connect to the terminal at the bottom of Mast Base MP-37. Do not let this wire rest on metal parts of the vehicle.

(3) Using the remaining length of Wire W-128, connect the ground post located on the left side of Radio Receiver and Transmitter BC-669-(*) to any point on the metal frame of the car.

h. There is room for an operator at the left of Chest CH-131-(*) to operate the equipment.

16. PRECAUTIONS BEFORE OPERATING.—

a. In Radio Receiver and Transmitter BC-669-(*).

(1) Unlatch and lift open the top cover door of Chest CH-133-(*).

(2) Unlatch and lift open the top cover door of the metal cabinet within the chest.

(3) Make sure that all tubes and crystal holders are firmly seated in their sockets, and that the plate lead clips are in place on tubes V_8 and V_9.

(4) Close top cover doors.

(5) See that all cord connections are tight.

b. If the set is mounted in a vehicle, make sure that all components are sufficiently well fastened, so that they will not jar out of place or be damaged.

17. OPERATION.—Components of Radio Set SCR-543-(*) having been installed (as outlined in any one of paragraphs 13, 14 or 15) operation is accomplished as follows:

a. To Receive (Battery operation)

(1) *To Start Receiver*

(a) Set the ON-OFF (main power) switch, on the front of Power Supply Unit PE-110-(*), to ON. The RECEIVER

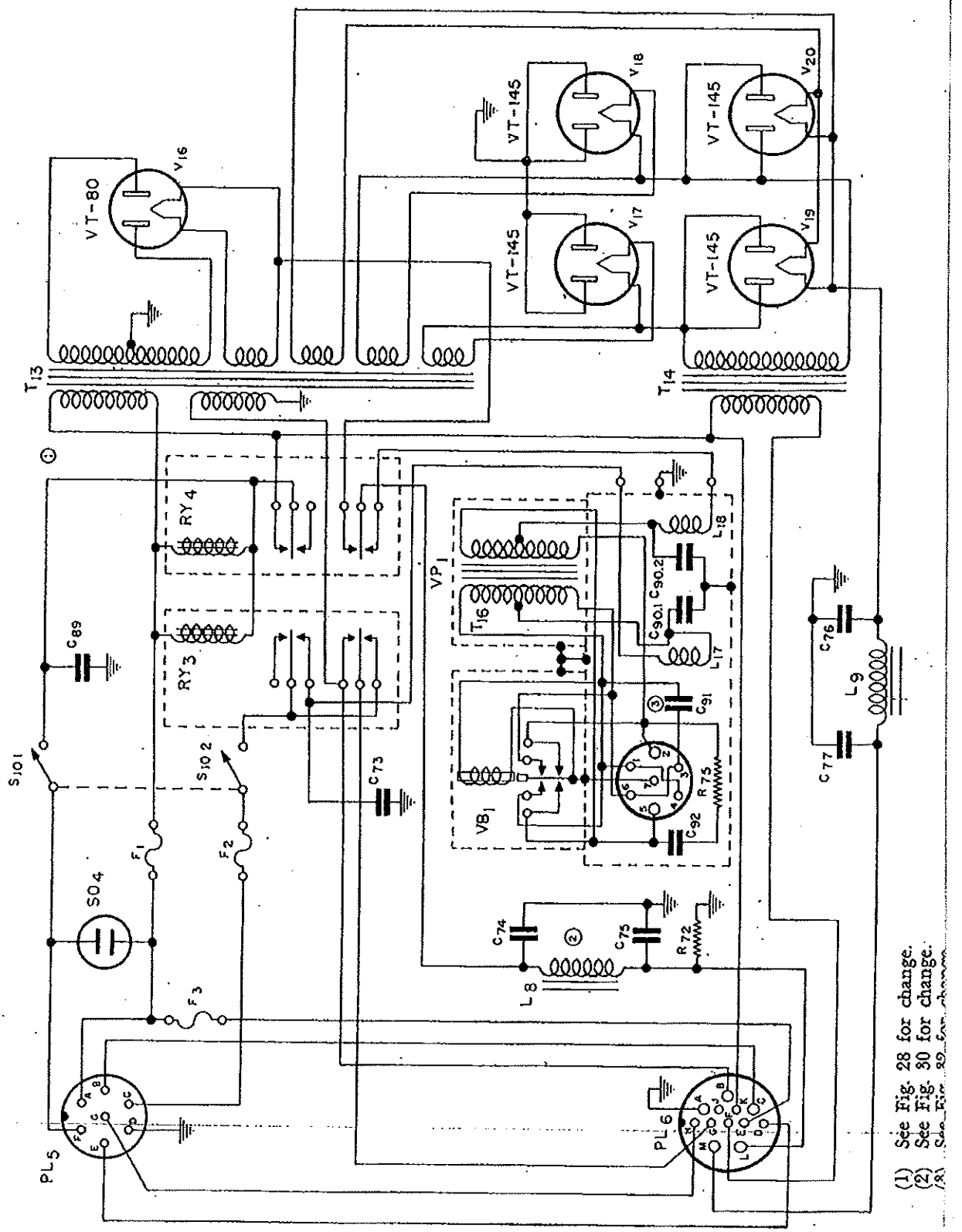


Fig. 12 — Power Supply Unit PE-110-A, Schematic Diagram.

pilot lamp on the front of the BC-669-(*) will light, and after about 15 seconds, during which the tube filaments heat up, the receiver will be ready for use.

(2) *To Tune Receiver* (Manual Control).

(a) Turn NOISE CONTROL to maximum (extreme right).

(b) Release RECEIVER TUNING dial lock.

(c) If signal to be received is in frequency range 1680 to 2750 kc.
Set RECEIVER BAND SWITCH to MANUAL 1.
Set RECEIVER TUNING dial to desired frequency, reading at indicator marked BAND 1.

(d) If signal to be received is in frequency range 2750 kc. to 4450 kc.
Set RECEIVER BAND SWITCH to MANUAL 2.
Set RECEIVER TUNING dial to desired frequency, reading at indicator marked BAND 2.

(e) Set ON-OFF SPEAKER switch to ON.

(f) Advance A.F. GAIN control to the right until the signal is heard in loudspeaker. *(If no signal is present, rush noise or static will be heard, indicating receiver is in operation).*

(g) Extremely noisy conditions may be relieved by adjusting the NOISE CONTROL (R.F. GAIN in SCR-543-A) as follows:
Set the RECEIVER TUNING dial to a position at which no signal is heard in the loudspeaker. Turn the NOISE CONTROL to a point at which the background noise is not too loud.

(h) Re-adjust RECEIVER TUNING dial until signal is heard clearest and with least background noise. This adjustment will be fairly sharp.

(i) Lock RECEIVER TUNING dial.

(3) *To Tune Receiver* (Crystal Control).

Note: Signal to be received must be one for which the proper frequency crystal has been installed. (This should be noted on chart on front panel.)

(a) Turn NOISE CONTROL to maximum (extreme right).

(b) Set OPERATING CHANNEL switch to number corresponding to frequency selected.

(c) Release RECEIVER TUNING dial lock.

(d) If signal to be received is in frequency range 1680 to 2750 kc.
Set RECEIVER BAND SWITCH to CRYSTAL 1.
Set RECEIVER TUNING dial to desired frequency, reading at indicator marked BAND 1.

(e) If signal to be received is in frequency range 2750 to 4450 kc.
Set RECEIVER BAND SWITCH to CRYSTAL 2.
Set RECEIVER TUNING dial to desired frequency, reading at indicator marked BAND 2.

(f) Advance A.F. GAIN control to the right until signal is heard in loudspeaker.

(g) If the background noise is too great when signal is heard, set RECEIVER BAND SWITCH to MANUAL and repeat paragraph 17. *a.* (2) (g).

NOTE: With crystal control, RECEIVER TUNING dial setting will be much less critical than in the case of manual control; however, it should be adjusted for the loudest signal and least background noise or interference.

(h) Lock the RECEIVER TUNING dial.

(i) To change frequency, set OPERATING CHANNEL switch to a different channel and repeat steps (c) thru (h).

(4) *Miscellaneous Controls*

(a) Handset or Headset Reception:—The above describes reception on the loudspeaker. It will be found that the signal will also be heard in the handset earpiece or headset (whichever is connected to Remote Control Unit RM-21-(*)). The signal volume in the handset or headset is controlled by the gain control located under the arrow below the CHOKE button on the remote control unit.

(b) The loudspeaker may be turned off by setting the ON-OFF SPEAKER switch to OFF. It is normally used for convenience in tuning the receiver. The loudspeaker should be turned off when the operator is transmitting from a position directly in front of the transmitter, to avoid audio feedback.
Note: The ON-OFF STATIC FILTER switch, when turned ON, operates a peak voltage limiter and a 1000 cycle tuned circuit which effectively reduces static and electrical disturbances outside of the 1000 cycle frequency band. It is very useful in receiving 1000 cycle code signals but is of little value for voice frequencies because these frequencies, not being near 1000 cycles, will be attenuated almost equally with static and electrical disturbances. When this switch is OFF the static filter has no effect on the received signal.

(5) *To Stop Receiver*

(a) Set the ON-OFF (main power) switch, located on the front of Power Supply Unit PE-110-(*), to OFF.

b. To Receive (a-c operation from Power Unit PE-108-(*)).

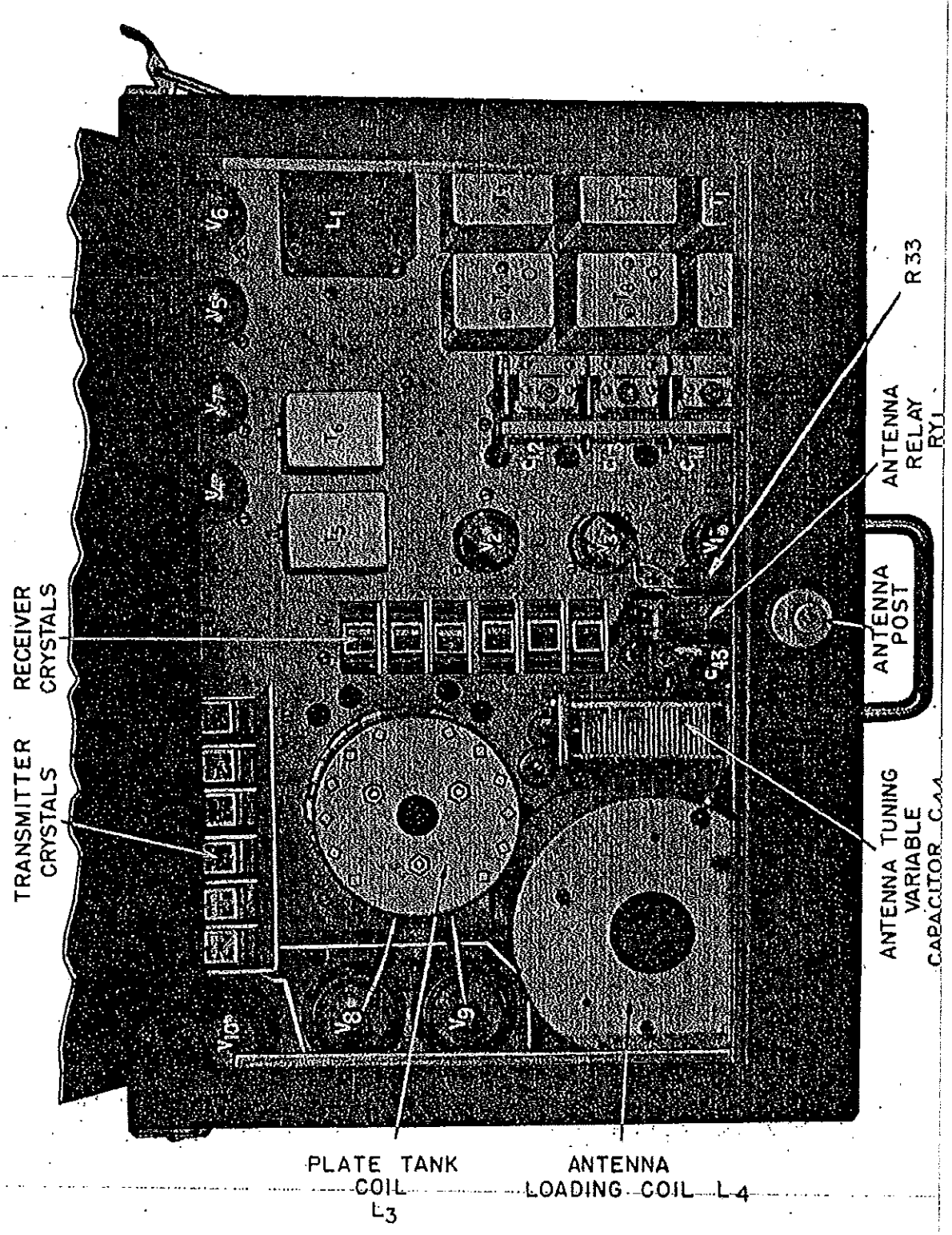


Fig. 13 – Radio Receiver and Transmitter BC-669-(*), Top View of Chassis.

(1) Place receiver in operation as in par. 17. *a.* (1), (Battery Operation).

(2) *To start Power Unit PE-108-(*).*

(a) Press the START button on Remote Control Unit RM-21-(*) and hold closed until Power Unit PE-108-(*) starts. The power unit should come up to an even speed and run smoothly, and both TRANSMITTER and RECEIVER pilot lamps on the modulator should light, indicating that both are ready for operation.

(b) Release START button.

NOTE: If the power unit is cold, it may be necessary to press CHOKE button on the remote control unit while pressing START button, until engine starts.

(3) *To Tune Receiver*

Follow same procedure as in paragraph 17. *a.* (2) or (3). Operation will be identical.

(4) *To Stop Power Unit*

(a) Press STOP button on Remote Control Unit RM-21-(*) until Power Unit PE-108-(*) has come to a complete stop. If ON-OFF switch on Power Supply Unit PE-110-(*) has been left ON, the receiver will continue to operate. *(The battery is automatically switched on and off as Power Unit PE-108-(*) is stopped or started).*

c. To Transmit

(1) Start Power Unit PE-108(*) as described in par. 17. *b.* and put receiver in operation.

(2) Make sure that OPERATING CHANNEL switch is set for desired crystal frequency.

(2) Press the press-to-talk switch on Handset TS-11-(*) (or Microphone T-24-(*) if used). An indication on the DC CURRENT meter will be noticed, as well as some indication on the ANTENNA CURRENT meter.

(4) Rotate ANTENNA TUNING dial until ANTENNA CURRENT meter reads at its maximum. The DC CURRENT meter should now read between 150 and 210 ma.

(5) Modulate the transmitter by speaking distinctly and in a normal tone of voice into the microphone or the mouthpiece of the handset.

(6) When finished speaking, release the press-to-talk switch on handset or microphone; this puts the transmitter off the air and switches the receiver on again.

d. To Change Transmitter Frequency. This is accomplished by setting the OPERATING CHANNEL switch to a different position and repeating the steps outlined in par. 17. *c.* (3) and (4). Caution: Do not change the position of the OPERATING CHANNEL switch while pressing the press-to-talk switch on either the handset or microphone.

e. Receiving and Transmitting Channels. Changing the position of the OPERATING CHANNEL switch changes the frequency of both transmitter and receiver. Unless specifically directed not to do so, the operator should tune both the receiver and the transmitter immediately after switching to a new operating channel.

f. Operation from a-c source of power other than Power Unit PE-108-(*).

(1) Radio Set SCR-543-(*) may be operated without Power Unit PE-108-(*) if a source of 115 volts, 60 cycle, single phase a-c power is available (within 25 feet), which can supply 600 watts. For this operation the components are connected in the usual way except as follows:

(a) **CAUTION:** Make no connection to PL_5 on Power Supply Unit PE-110-(*). **THIS IS DANGEROUS.**

(b) Use Cord CD-511-(*) (from Chest CH-73-(*)) to make the connection. Proceed as follows:

Plug one end of Cord CD-511-(*) into receptacle SO_4 (marked 115 v. a-c) on the power unit.

Plug the other end of this cord into a receptacle providing the a-c power.

(2) Operation of receiver and transmitter is similar to that already described for a-c operation; with the following exception:

(a) The ON-OFF switch on the power supply unit controls the power. Turning it OFF stops both receiver and transmitter.

(b) No battery operation of receiver for stand-by monitoring is provided when operating from an a-c source other than PE-108-(*).

(c) References to stopping and starting the power unit should be disregarded as this unit is not connected, in this case.

g. Power Unit PE-108-(*). When this unit is disconnected from the other components of Radio Set SCR-543-(*) it may be operated for test or other purposes. Once in operation it may be stopped by pressing the stop switch located on the magneto housing directly below the exhaust pipe outlet.

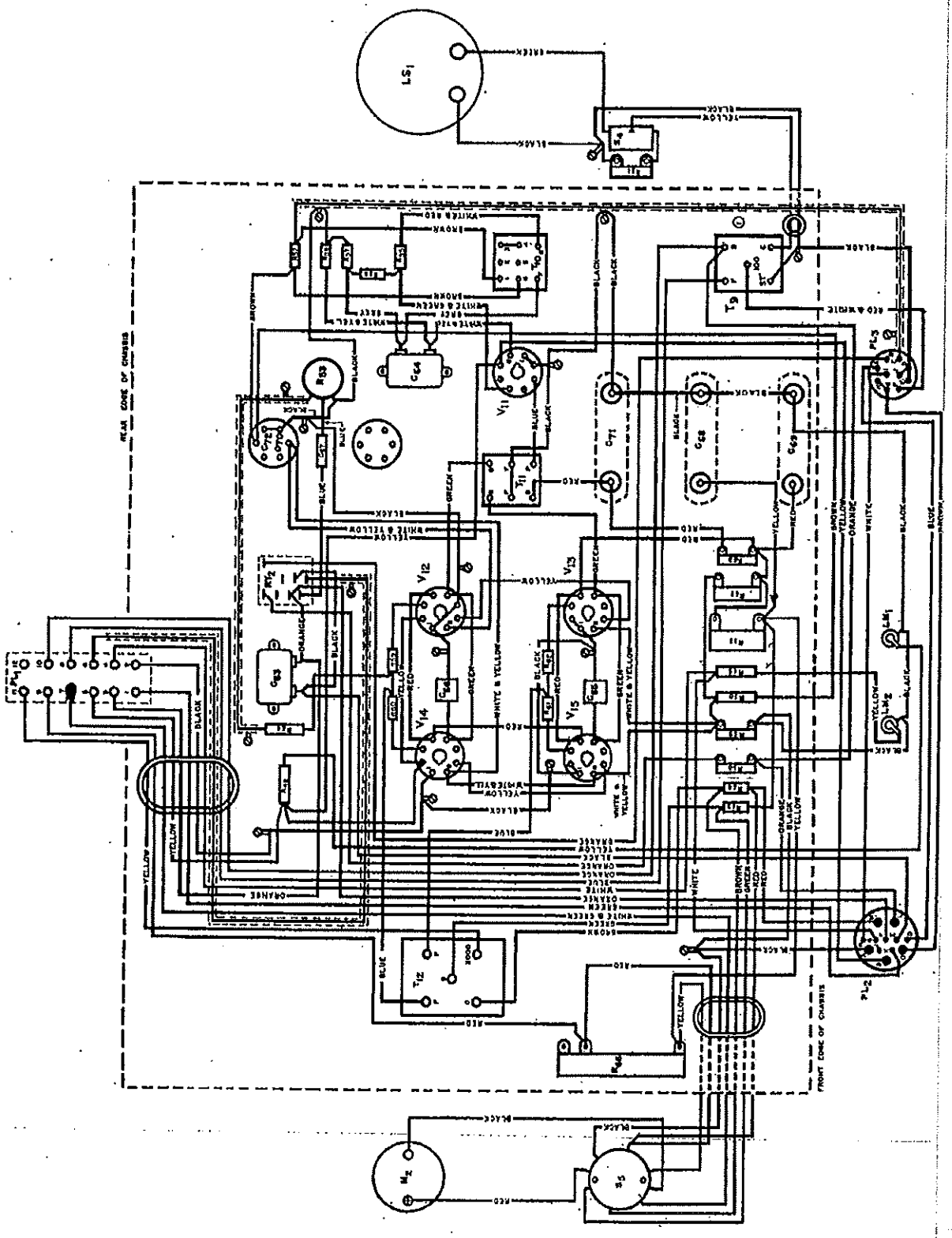
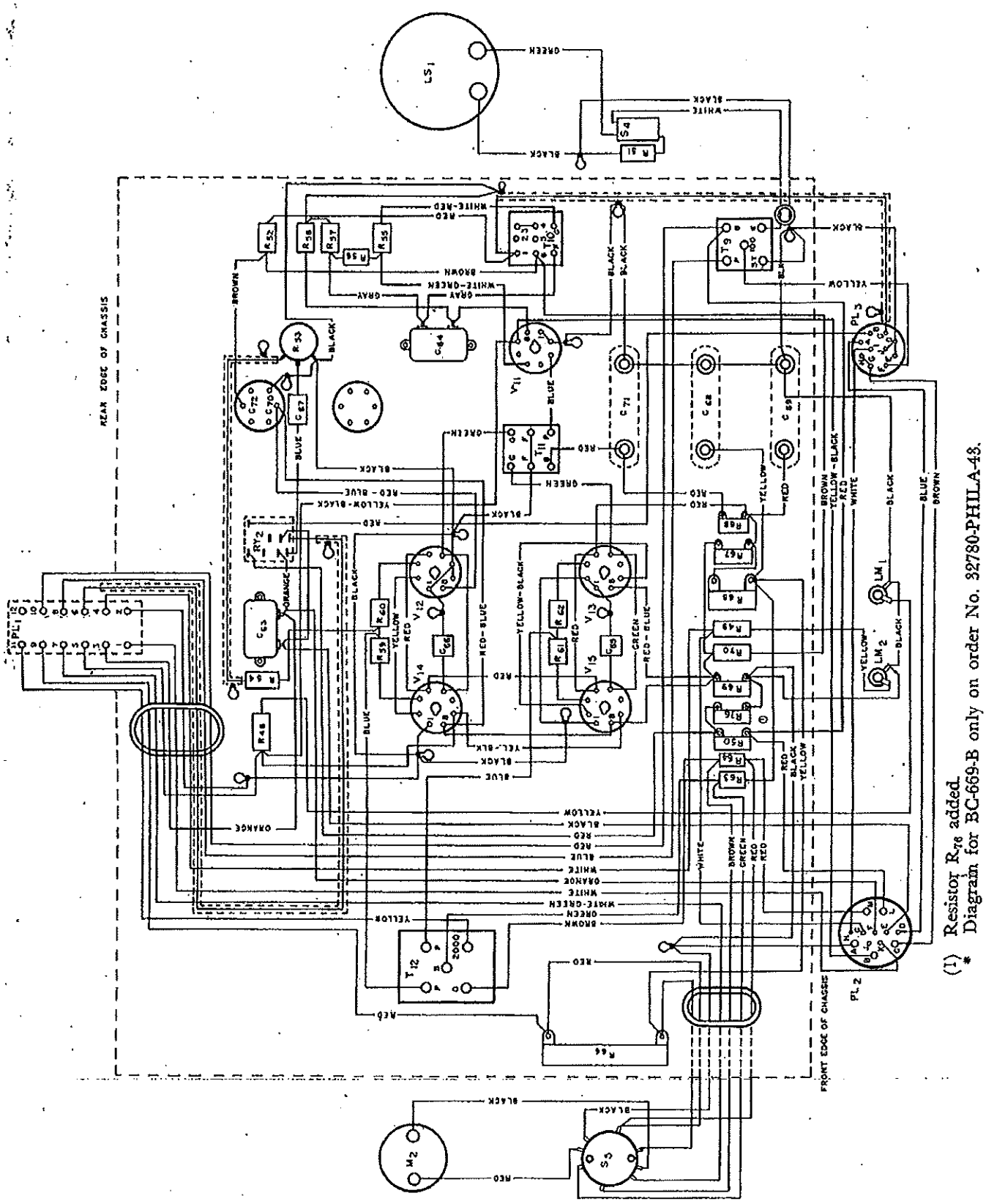


Fig. 14 — Radio Receiver and Transmitter BC-669-B Modulator Section, Practical Wiring Diagram.



(1) Resistor R_{78} added.

* Diagram for BC-669-B only on order No. 32780-PHILA-43.

Fig. 15 — Radio Receiver and Transmitter BC-669-B, and BC-669-C Modulator Section, Practical Wiring Diagram*

SECTION III — FUNCTIONING OF PARTS

18. RADIO RECEIVER AND TRANSMITTER BC-669-(*).—

a. Receiver — (Refer to figures 17 and 18) Electrically, the receiver consists of radio frequency amplifier tube V_1, mixer tube V_2, heterodyne oscillator tube V_3, intermediate frequency amplifier tube V_4, second detector, automatic noise limiter and A.V.C. tube V_7, audio frequency voltage amplifier tube V_5 and audio frequency power amplifier tube V_6 together with their associated circuits.

(1) Radio frequency amplifier tube V_1 is a Tube VT-117 (commercial type 6SK7), the function of which is to amplify signal voltages at radio frequencies and, together with the sharply tuned circuits of r-f transformers T_1 or T_2, greatly attenuate signals of undesired frequency. (BC-669-B, and BC-669-C use Tube VT-117-A, commercial type 6SK7 GT/G, as V_1.)

(a) Connection of the antenna to r-f transformer T_1 is made through a set of normally closed contacts in relay RY_1. The antenna is switched from T_1 primary to T_2 primary by switch section $S_{1.1}$.

(b) Signal voltages picked up by the antenna appear across the primary of transformer T_1 and are in turn induced into the secondary. The secondary together with capacitor section $C_{1.1}$ forms a tuned parallel resonant circuit which determines the frequency of the signal fed to the control grid of tube V_1. Switch section $S_{1.2}$ switches $C_{1.1}$ and the control grid of tube V_1 from T_1 secondary to T_2 secondary.

(c) The gain of tube V_1 is controlled by varying its cathode bias by means of variable resistor R_4, whose movable tap is connected to the cathode through cathode bias resister R_3. One end of R_4 is returned to ground through a set of normally closed contacts in relay RY_1. Capacitor C_6 is connected from the movable tap of R_4 to ground to by-pass any noise produced by R_4. (See Fig. 17.) The cathode is by-passed by capacitor C_7.

(d) In BC-669-B r-f choke L_{16} is connected between resistor R_4 and resistor R_3 to provide, in conjunction with capacitor C_6 (connected from the movable tap of R_4 to ground), additional filtering of noise produced by R_4. (See Fig. 16 *a*.)

(e) In BC-669-C (also BC-669-B on Order No. 32780-PHILA-43) C_6 is connected between r-f choke L_{16} and resistor R_3, for the same purpose. (See figure 16 *b*.)

(f) An A.V.C. voltage is applied to the control grid of tube V_1 through resistor R_2 and the r-f transformer secondary and filtered by capacitor

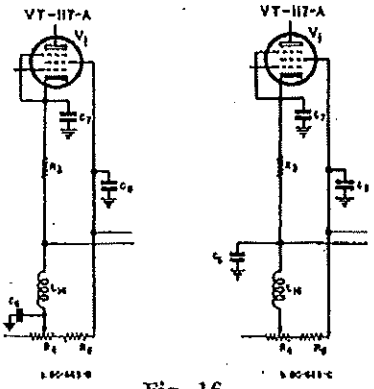


Fig. 16

C_4 to assist in maintaining the r
ceived signal voltage at a consta
level, thus preventing overloading
this tube by very strong signals.

(g) The plate of tube V_1 receives its vol
age through the primary of r-f tran
former T_3 directly from the receiv
plate voltage supply.

(h) The screen grid of tube V_1 receiv
its voltage directly from the receiv
screen voltage supply and is b
passed by capacitor C_8.

(i) A positive voltage is placed across th
fixed portion of variable resistor R
through resistor R_5 from the scree
supply. A portion of this voltag
the magnitude of which depends o
the setting of R_4, then appears o
the cathode in addition to the pos
tive voltage supplied by resistor R
with a corresponding negative vol
age appearing on the control gri
This then allows greater attenuatio
of signal voltages at a given settin
than if the voltage drop across R
and R_4 only is utilized to bias th
grid.

(2) Mixer tube V_2 is a Tube VT-150 (con
mercial type 6SA7). The function of th
tube is to heterodyne the amplified r
signal voltage supplied by tube V_1 wit
the high frequency r-f voltage provide
by oscillator tube V_3. (BC-669-B, an
BC-669-C use tube VT-150-A, commercia
type 6SA7 GT/G, as V_2.)

(a) Grid #3 of tube V_2 receives the signa
voltage amplified by tube V_1 throug
the inductive coupling provided b
r-f transformer T_3 and the capacitiv
coupling of capacitor C_9. T_3 an
T_4 primary switching is accomplish
ed by switch section $S_{1.3}$ and second
ary switching by switch section $S_{1.4}$
The tuned circuit formed by T
secondary and capacitor section C_1
determines the frequency of th
signal received by grid #3.

(b) Tube V_2 receives its plate voltag
through resistor R_{11}, primary of i

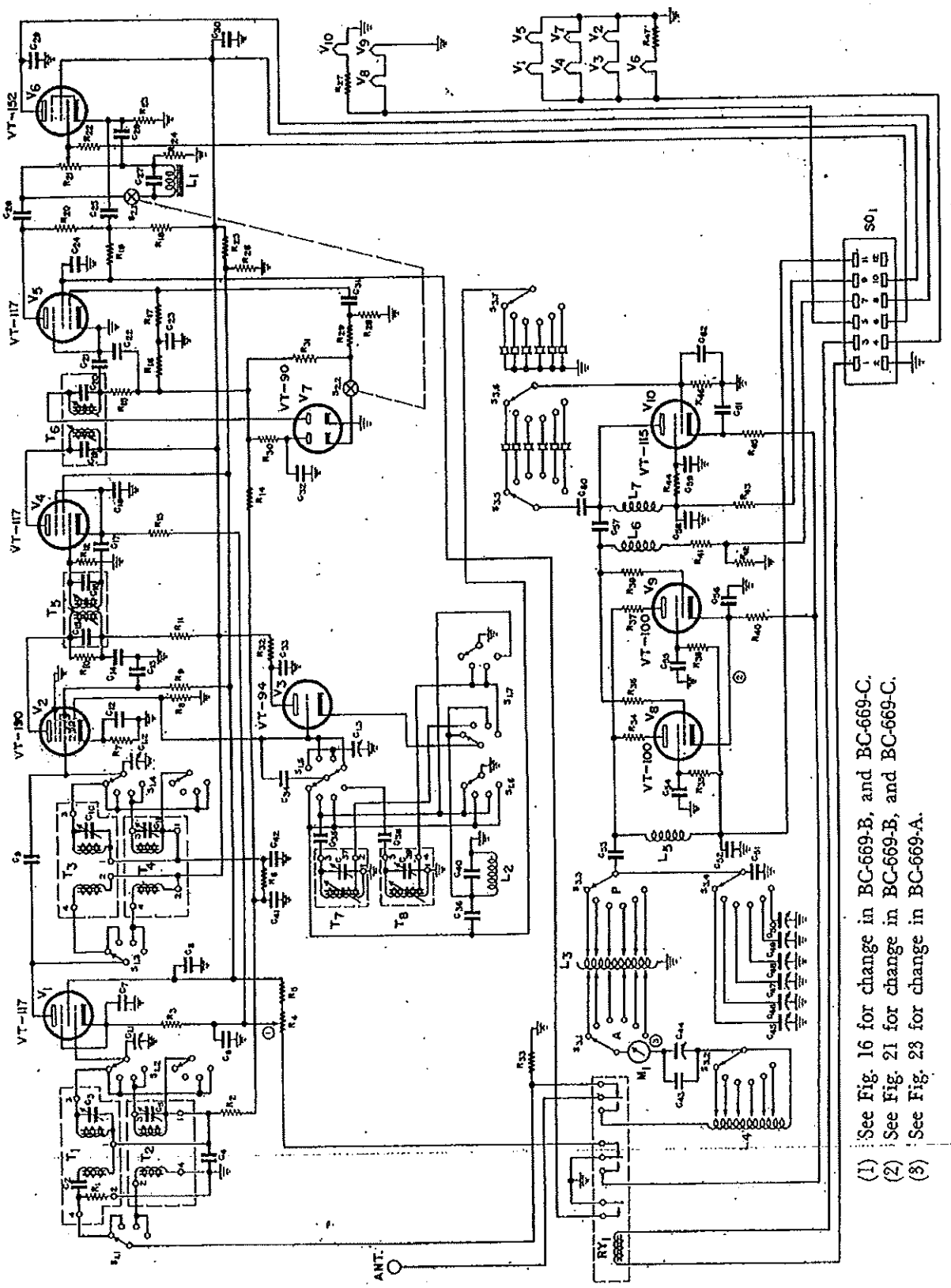


Fig. 17 — Radio Receiver and Transmitter BC-669-A Schematic Diagram of Transmitter and Receiver.

transformer T_5 and resistor R_{10}, and the voltage is filtered of r-f by capacitor C_{14}.

(c) The screen grid of tube V_2 receives its voltage through resistor R_6 and is by-passed by capacitor C_{13}.

(d) The cathode of tube V_2 is biased by the voltage drop across resistor R_7 and by-passed by capacitor C_{12}.

(e) An A.V.C. voltage is applied through resistor R_6 and T_3 secondary to grid #3 of tube V_2, filtered by capacitor C_{41} and by-passed by capacitor C_{42}, for the same purpose as that outlined in paragraph 18 *a* (1) *(f)*.

(3) Heterodyne oscillator tube V_3 is a Tube VT-94 (commercial type 6J5) which has the function of generating oscillations at a frequency which differs from the signal frequency by the value of the intermediate frequency used (385 KC.). The oscillator employs a Hartley circuit for manual operation and an additional circuit for crystal operation. Band switching and manual to crystal switching is accomplished by means of switch sections $S_{1.5}$, $S_{1.6}$ and $S_{1.7}$. BC-669-B, C use Tube VT-94-D (commercial type 6J5-GT/G) as V_3.

(a) In ***manual operation*** the frequency of oscillation is determined by the tuned circuit formed by transformer T_7 and capacitor section $C_{1.5}$. The control grid of tube V_3 is connected to one end of T_7 through switch section $S_{1.5}$ and padding capacitor C_{35} and to one end of T_8 through padding capacitor C_{38}. The other end of each coil is grounded, and a tap on each coil connects to the cathode of tube V_3 through switch section $S_{1.7}$ to provide feed-back. Grid-leak resistor R_9 provides a negative bias on the grid of the oscillator tube V_3.

(b) In ***crystal operation*** the oscillator frequency is determined by the frequency of the crystal selected by means of switch section $S_{3.7}$. Capacitors C_{36} and C_{40} are connected in series across the crystal, and the cathode of tube V_3 is connected between them through switch section $S_{1.7}$, with coil L_2 in parallel with capacitor C_{40} to provide sufficient feed-back for the purpose of sustaining strong oscillations. Grid-leak resistor R_8 is connected to the control grid of tube V_3 at all times. Capacitor C_{34} provides coupling between the control grid of tube V_3, the oscillator transformer and capacitor $C_{1.3}$ when switch S_1 is in either of the two manual positions.

(c) Switch section $S_{1.6}$ grounds T_7 when in either crystal position and the crystals when in either manual position. A portion of switch section $S_{1.7}$ grounds T_8 cathode tap when in MANUAL 1 and CRYSTAL 2 positions and T_7 when in MANUAL 2 position.

(d) The control grid of oscillator tube V_3 is coupled directly to the injection grid (#1) the mixer tube V_2 where the oscillator frequency is heterodyned with the incoming signal frequency to produce an intermediate frequency of 385 kc.

(e) The plate of tube V_3 receives its voltage through resistor R_{32} and is by-passed by capacitor C_{33}.

(4) Intermediate frequency amplifier tube V_4 is a Tube VT-117 (commercial type 6SK7), the function of which is to amplify an intermediate frequency of 385 kc. supplied by mixer tube V_2. BC-669-B, and BC-669-C use Tube VT-117-A (commercial type 6SK7-GT/G) as V_4.

(a) The output of tube V_2 is inductively coupled to the control grid of i-f tube V_4 through i-f transformer T_6. The frequency which reaches the grid is determined by the primary and secondary parallel resonant circuits of transformer T_6. The secondary is returned to cathode through capacitor C_{17}.

(b) The cathode of tube V_4 is biased by resistor R_{18} which is returned to the ground side of resistor R_3 so that the gain of tube V_4 may be controlled along with that of tube V_1, using variable resistor R_4. Capacitor C_{19} by-passes the cathode.

(c) Tube V_4 obtains its screen grid voltage directly from the receiver screen supply which is bled by resistor R_{24} and dropped by resistor R_{25}.

(d) The plate voltage of tube V_4 is supplied directly through the primary of i-f transformer T_6 from the receiver plate supply.

(5) The second detector, **NOISE LIMITER** and A.V.C. tube V_7 is a Tube VT-90 (commercial type 6H6). One diode of tube V_7 functions as the signal detector and is also utilized as a source of automatic volume control voltage. The second diode section is employed as a peak limiter which automatically limits high noise voltage peaks.

(a) The modulated 385 kc. i-f signal amplified by tube V_4, appears across the primary of diode i-f transformer T_6. Through the inductive coupling provided by transformer T_6, the signal appears across the secondary and the detector diode section of tube V_7. Only the audio modulation then appears across i-f filter capacitor C_{21} as a result of the detector action and is filtered by resistor R_{15} and capacitor C_{22}, fed through a voltage dividing network, consisting of resistors R_{31}, R_{28}, and R_{29}, and coupled

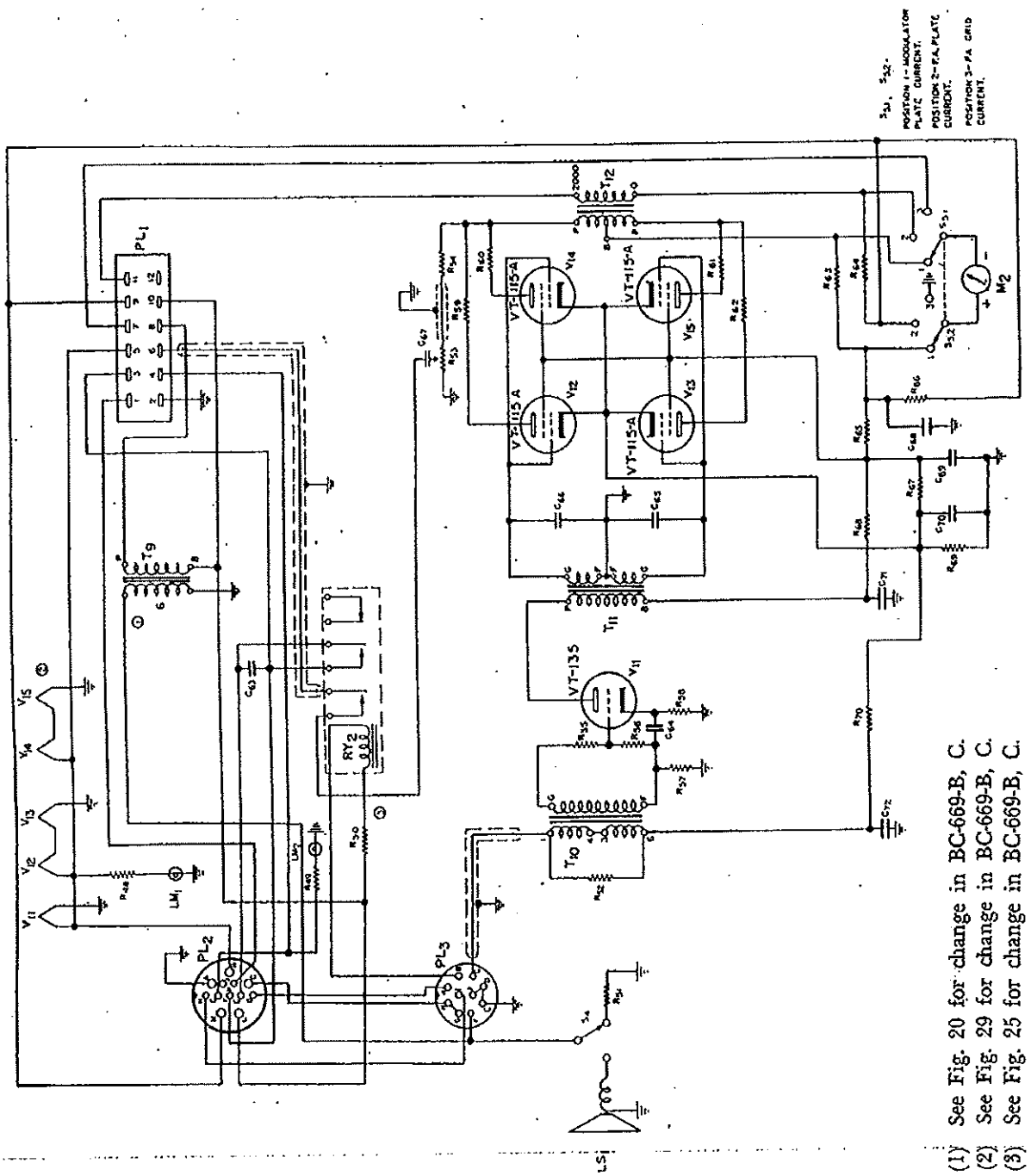


Fig. 18 — Radio Receiver and Transmitter BC-669-A, Schematic Diagram of Modulator Section.

by capacitor C_{31} to the control grid of tube V_6.

(b) The d-c voltage supplied by the detector is fed through filter resistor R_{14} to supply an A.V.C. voltage to the control grids of tubes V_1 and V_2 and through filter resister R_{16} and grid-leak resistor R_{17} as A.V.C. voltage to the control grid of tube V_6. Any portion of audio component remaining is removed by capacitor C_{28}.

(c) When switch $S_{2,2}$ is closed, the peak limiter diode section of tube V_7 is placed in operation. The cathode of this diode section is biased to a potential less negative than the plate by resistor R_{30}. When an audio peak of an amplitude not exceeding the absolute value of the difference between plate and cathode potentials appears across resistor R_{31}, no plate current flows. But, when an audio voltage peak which exceeds this value appears across resistor R_{31}, the cathode becomes negative with respect to plate, causing a flow of plate current. The negative peaks of the audio component are then by-passed to ground through capacitor C_{32}, limiting the amplitude of audio voltages reaching the control grid of tube V_5 to a value controlled by the bias voltage on the diode plate.

(6) Audio frequency voltage amplifier tube V_5 is a Tube VT-117 (commercial type 6SK7), the function of which is to amplify audio voltage supplied by the detector diode of tube V_7 and furnish an audio output voltage, having an amplitude great enough to drive tube V_6. BC-669-B, and BC-669-C use Tube VT-117-A (commercial type 6SK7-GT/G) as V_5.

(a) The cathode of tube V_5 is connected to ground, and the control grid receives its bias, filtered by resistor R_{15} and capacitor C_{23}, from the A.V.C. voltage supply through grid leak resistor R_{17}.

(b) The screen grid of tube V_5 receives its voltage, filtered by resistor R_{18} and capacitor C_{26}, through dropping resistor R_{19} and is by-passed by capacitor C_{24}. The screen is returned to ground through a set of contacts in relay RY_1, closed when in transmit position, to assist in rendering the receiver inoperative.

(c) The plate receives its voltage, filtered by resistor R_{18} and capacitor C_{25}, through load resistor R_{20}.

(7) Audio frequency power amplifier tube V_6 is a Tube VT-152 (commercial type 6K6-GT/G). The function of this tube is to amplify the output of tube V_5 and provide sufficient power to drive loudspeaker LS_1.

(a) The output of tube V_5 is resistance-capacity coupled to the control grid of tube V_6 by capacitor C_{29}, variable resistor R_{21} and resistor R_{24}. The audio gain is controlled by varying the input to the control grid with variable resistor R_{21}.

(b) The cathode of tube V_6 is biased by resistor R_{23}. Capacitor C_{28} is connected from the grid return to the cathode to filter out any variations in cathode voltage and, in conjunction with resistor R_{24}, to eliminate the necessity for a high value cathode by-pass capacitor across R_{23}.

(c) Screen voltage for tube V_6 is supplied directly from the receiver plate supply which is by-passed by capacitor C_{30}.

(d) The plate receives its voltage through the primary of output transformer T_3, located on the modulator chassis. This connection is made through contact 8 of socket SO_1 and plug PL_1 (see figure 17). The plate is by-passed by capacitor C_{20}.

(e) The audio output power of tube V_6 is transferred to the voice coil of loudspeaker LS_1 by means of transformer T_9, the secondary of which has an impedance of 6 ohms to match the voice coil impedance. The secondary is also connected to the headset through contact F on plug PL_3 which connects to Remote Control Unit RM-21-(*).

(f) In BC-669-B, and BC-669-C transformer T_9 has a 100 ohm secondary which is connected to Headset HS-30-(*) through contact F on plug PL_3 and through Remote Control Unit RM-21-(*). A 6 ohm tap is provided on T_9 secondary and is connected to switch S_4. (See Fig. 19).

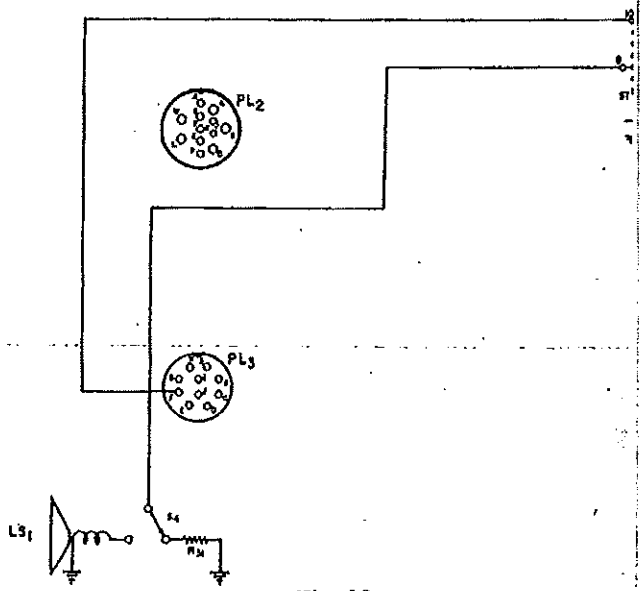


Fig. 19

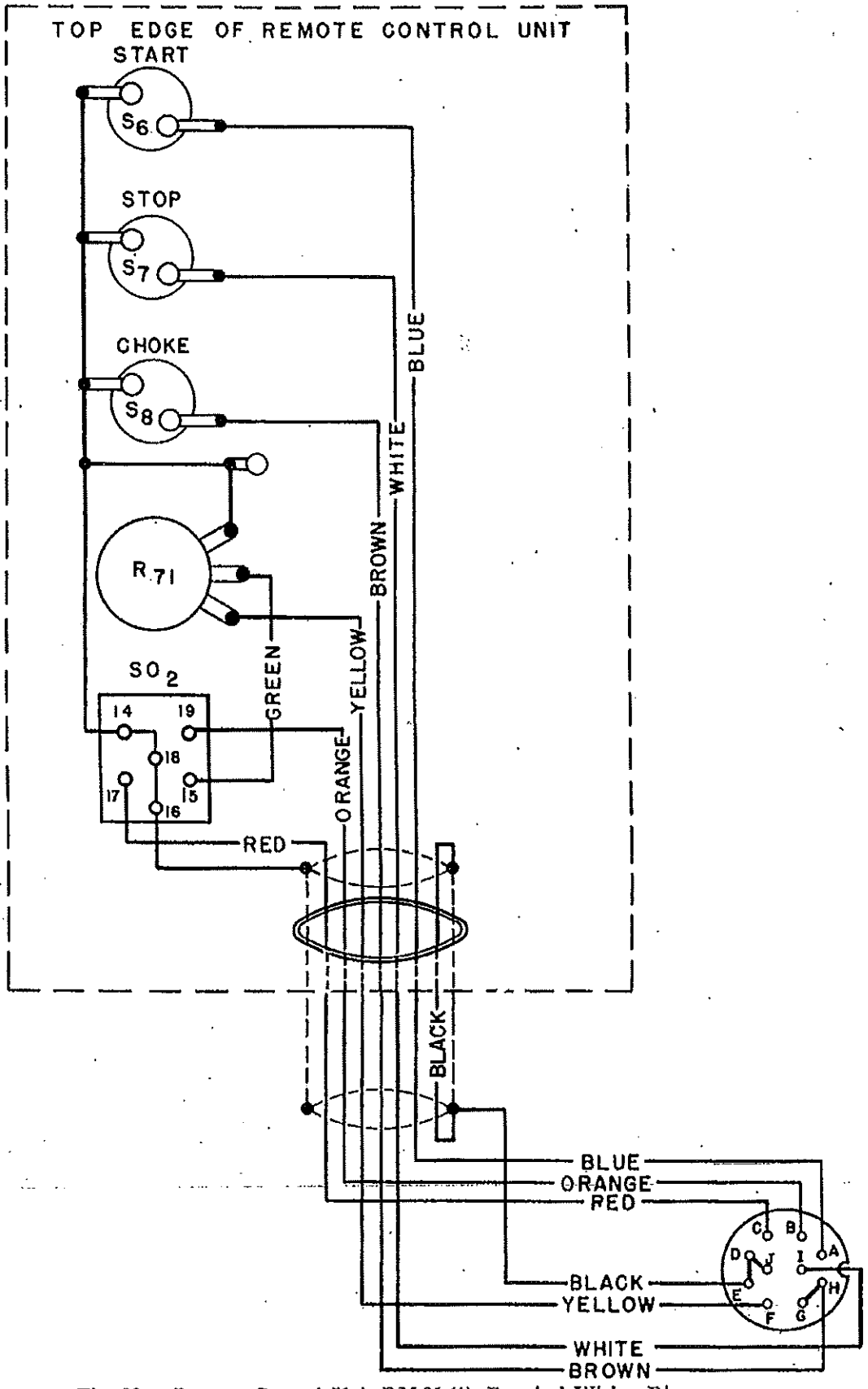


Fig. 20 — Remote Control Unit RM-21-(*), Practical Wiring Diagram.

(g) Audio choke L_1 and capacitor C_{27} form a parallel resonant circuit, resonant at 1000 cycles. When switch $S_{2.1}$ is closed, this circuit is connected across resistor R_{21}, offering a low impedance between grid and ground to audio frequency currents outside of the 1000 cycle frequency band.

(h) Switch S_4 is provided for switching speaker LS_1 on and off. With the switch at ON, the voice coil is connected to the secondary of transformer T_9, at OFF resistor R_{51} is connected in its place to maintain the proper load on the output transformer.

b. *Transmitter* — (Refer to figures 14 and 15) Electrically, the transmitter consists of oscillator tube V_{10}, r-f power amplifier tubes V_8 and V_9, modulator driver tube V_{11} and modulator tubes V_{12}, V_{13}, V_{14} and V_{15} together with their associated circuits.

(1) Oscillator tube V_{10} is a Tube VT-115 (commercial type 6L6) which has the function of generating oscillations at a radio frequency for providing power to the final stage, and maintaining these oscillations accurately at the desired frequency. (See figure 17.) BC-669-B, and BC-669-C use Tube VT-115-A (commercial type 6L6G) as V_{10}.

(a) The frequency of oscillation is determined by the frequency of the crystal that is connected between control grid and plate of tube V_{10}. Crystal switching is accomplished by means of switch sections $S_{3.5}$ and $S_{3.6}$. Capacitor C_{60} is connected in series with the crystal to keep d-c voltage off the crystal. Capacitor C_{62} is connected across grid-leak resistor R_{46} to provide excitation.

(b) Cathode bias is provided by the voltage drop appearing across resistor R_{45} which is connected to ground through a set of contacts in relay RY_1; closed when in transmit position, and opened when in receive position to render the transmitter oscillator inoperative. The cathode is by-passed by capacitor C_{61}.

(c) The plate of tube V_{10} receives its voltage from the transmitter plate supply through contact 9 of plug PL_1 and socket SO_1, dropping resistor R_{43} and r-f choke L_7 which prevents r-f from entering the transmitter plate supply system. The plate supply is by-passed by capacitor C_{53}.

(d) The screen grid receives its voltage through resistor R_{44} and is by-passed by capacitor C_{59}.

(2) R-F power amplifier tubes V_8 and V_9 are each a Tube VT-100 (commercial type 807). BC-669-B, and BC-669-C use Tube VT-100-A (commercial type 807) as V_8 and V_9. They operate in parallel as class "C" power amplifier.

(a) The oscillations produced by tube V_{10} is coupled to the control grids of tubes V_8 and V_9 through capacitor C_{57} which also prevents d-c from entering the amplifier grid circuit. Resistors R_{36} and R_{39} are provided in the grid circuit to suppress parasitic oscillations. The grids are returned to ground through r-f choke L_6 and resistors R_{41} and R_{42}.

(b) The cathodes of tubes V_8 and V_9 are connected together and biased by resistor R_{40} which is connected in resistor R_{45} and grounded at the same time as R_{45} through RY_1. The cathodes are by-passed by capacitor C_{50}.

(c) In BC-669-B, and BC-669-C an additional capacitor C_{58} is connected from V_8 cathode to ground as a by-pass. Cathode bias resistor R_{40} disconnected from R_{45} and grounded directly. (See Fig. 21.)

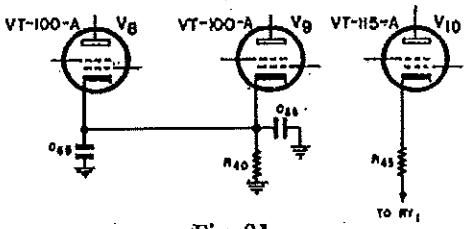


Fig. 21

(d) The plates of tubes V_8 and V_9 receive their voltage through r-f choke L_5 which prevents r-f from entering the transmitter plate supply. The plate supply is by-passed by capacitor C_{52}. Resistors R_{34} and R_{37} are connected in series with the plates to suppress parasitic oscillations.

(e) The screens of tubes V_8 and V_9 receive their voltage through resistors R_{35} and R_{38} and are by-passed by capacitors C_{54} and C_{55} respectively.

(f) The plate tank circuit consists of coil L_3 in parallel with fixed capacitor C_{51} and variable capacitors C_{45}, C_{46}, C_{47}, C_{48}, C_{49} and C_{50}, selected with switch section $S_{3.4}$. The plate tank inductance is varied by means of a set of sliding contacts which are selected with switch section $S_{3.3}$. Capacitor C_{63} is inserted to keep d-c from tank coil L_3.

(g) Antenna coupling is varied by another set of sliding contacts on tank coil L_3, selected by means of switch section $S_{3.1}$. L_3 is connected to the antenna through antenna ammeter M_1 and a series resonant circuit consisting of fixed capacitor C_{48}, antenn

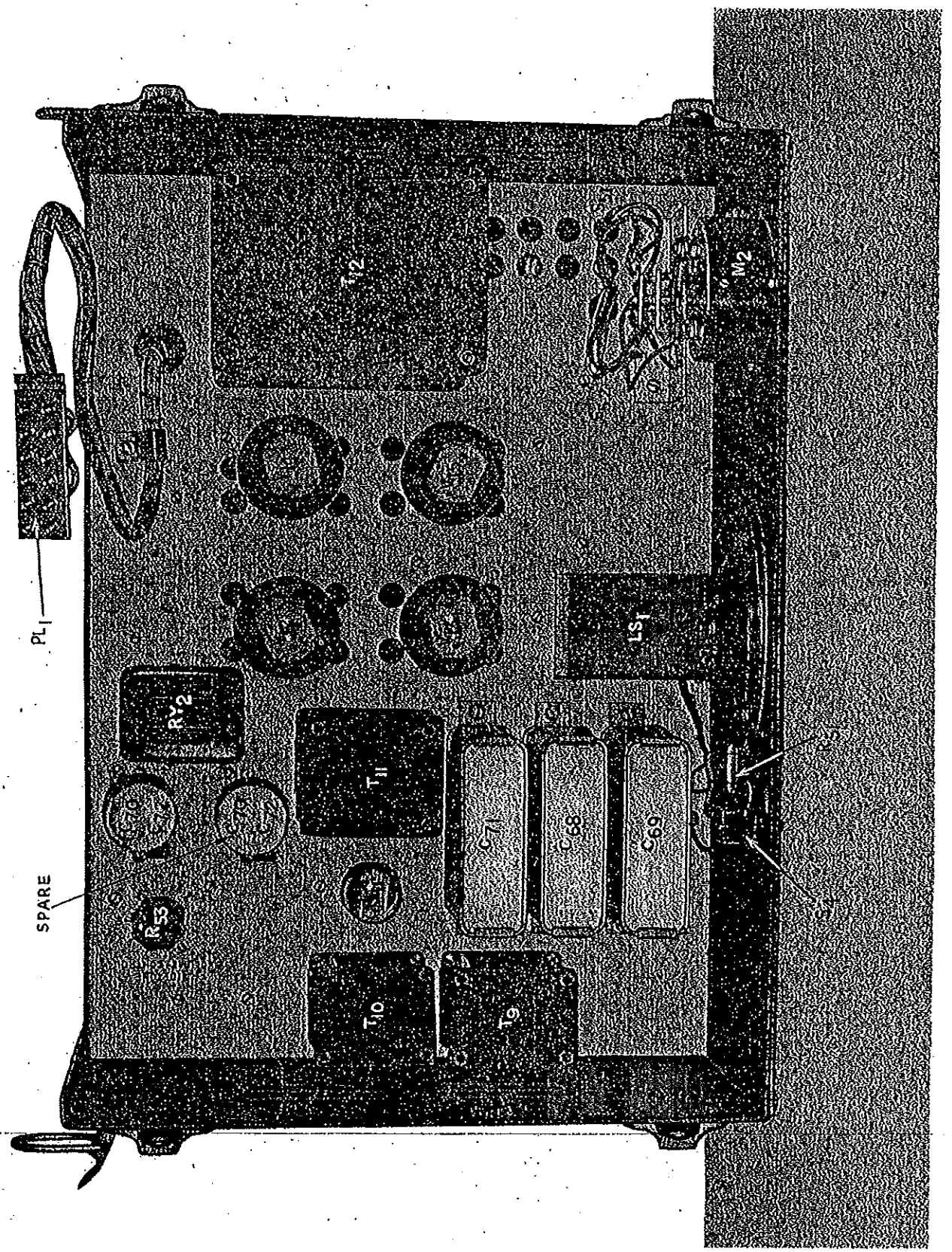


Fig. 22 — Radio Receiver and Transmitter BC-669-(*), Top View of Modulator Section.

tuning variable capacitor C_{44} and antenna loading coil L_4. The loading inductance is varied by means of of a set of sliding contacts on coil L_4 which are selected with switch section $S_{3.2}$. The transmitter antenna circuit is opened in receive position by a set of contacts in relay RY_1. (In SCR-543-A, some early units had antenna ammeter M_1 connected on the antenna side of antenna loading coil L_4. See Fig. 23.)

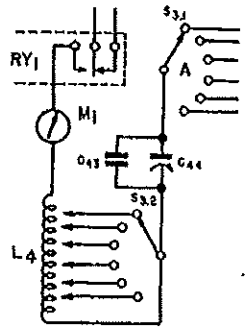


Fig. 23

(3) Modulator driver tube V_{11} is a Tube VT-135 (commercial type 12J5-GT). The function of this tube is to amplify low-level microphone voltage and provide a sufficiently large voltage swing to drive the modulator power stage. (See figure 18.)

(a) Audio speech currents enter through contact C in plug PL_3 and flow through transformer T_{10} primary which is shunted by resistor R_{52}.

(b) An induced audio voltage appears across the secondary of transformer T_{10}. This voltage is then divided by resistors R_{55} and R_{58} and a portion of it appears on the grid of tube V_{11}.

(c) The voltage drop across resistor R_{58} provides bias for the cathode of tube V_{11}. Capacitor C_{61}, in conjunction with resistor R_{57}, eliminates the necessity of a by-pass capacitor across R_{58}.

(d) The plate voltage is delivered through the primary of transformer T_{11} and resistor R_{88}. Filtering is provided by capacitor C_{71}.

(4) Modulator tubes V_{12}, V_{13}, V_{14} and V_{15} are each a Tube VT-115-A (commercial type 6L6-G) which operate in push-pull parallel as a Class AB_1 audio frequency power amplifier.

(a) The amplified audio voltage appearing across the primary of driver transformer T_{11} is transferred to the secondary which has a grounded center tap. On alternate cycles the audio appears across one half of the secondary. One side of the secondary connects to the control grids of tubes V_{12} and V_{14} and the other sid to the control grids of tubes V_{13} an V_{15}. The grids are provided wit by-pass capacitors C_{65} and C_{66}.

(b) Resistor R_{60} provides bias voltag for the modulator tube cathodes an also for the microphone throug filter resistor R_{70} and the primary transformer T_{10}. The cathodes a by-passed by capacitor C_{70} and th microphone voltage is filtered b capacitor C_{72}.

(c) Plate voltage for the modulato tubes is furnished through resisto R_{60} and R_{63} (R_{63} is a meter shun through the center-tapped primar of modulation transformer T_{12}, an parasitic suppressor resistors R_5 R_{60}, R_{61} and R_{62}. This voltage filtered by capacitor C_{68}.

(d) Screen voltage is received throug resistor R_{65}, filtered by capacitor C and bled to cathode by resistor R_6

(e) The secondary of modulation tran former T_{12} is inserted in series wit the high voltage plate power suppl of power amplifier tubes V_8 and V through contact 11 of plug PL_1 an socket SO_1 so that audio frequenc fluctuations present in the secondar will result in proportional fluctu tions in the plate voltage of th power amplifier stage and cause th output power of the transmitter t vary correspondingly, creating modulated radio frequency carrie

(f) To provide a means of monitorin the audio modulation, a side-ton circuit is included. To accomplis this a portion of the modulator ou put is taken from the primary o transformer T_{12} and fed through r sistor R_{54}, side-tone volume contr R_{53}, blocking capacitor C_{67}, a set o contacts in relay RY_2, contact #6 o plug PL_1 and socket SO_1 and finall through resistor R_{22} to the grid o receiver power output tube V_6. Th audio modulation may then b heard in loudspeaker LS_1 when th latter is in the circuit and the tran mitter is modulated; also in Headse HS-22-C, or Headset HS-30(*) o ear piece of Handset TS-11-(*) whe volume control R_{71} is turned up.

(5) Meters provided are antenna curren meter M_1 and milliammeter M_2. (Se figures 16 and 18.)

(a) Meter M_1 has the function of indi cating when the antenna loadin circuit is tuned to resonance b proper setting of capacitor C_{44} an the sliding contacts of loading coi L_4. This is indicated by a maximun r-f current reading of meter M_1.

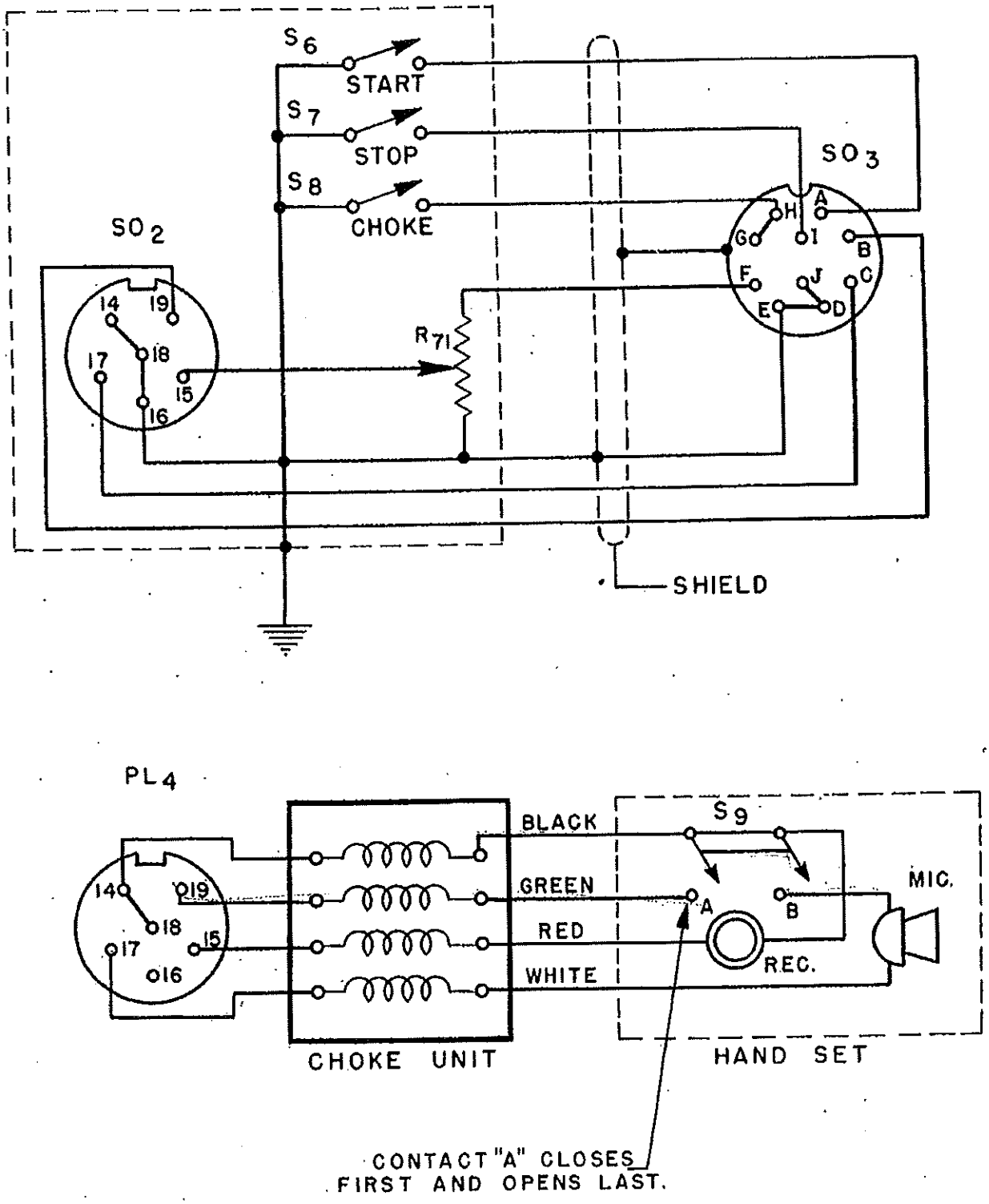


Fig. 24 — Remote Control Unit RM-21-(*), Schematic Diagram.

(*b*) Meter M_2 functions as a milliammeter in three circuits which are selected by switch $S_{5.1}$ and $S_{5.2}$.
(1) In position 1 meter M_2 is connected in series with the high voltage plate supply circuit of modulator tubes V_{12}, V_{13}, V_{14} and V_{15}, with resistor R_{68} as a shunt, for indicating modulator plate current.
(2) In position 2 this meter is connected in series with the secondary of modulation transformer T_{12} in the high voltage plate supply circuit of power amplifier tubes V_8 and V_9, with resistor R_{64} as a shunt, for indicating power amplifier plate current.
(3) In position 3 meter M_2 is connected in the control grid circuit of tubes V_8 and V_9 through contact 7 of plug PL_1 and socket SO_1 for indicating power amplifier grid current.

19. REMOTE CONTROL UNIT RM-21-(*).—
a. Electrical Circuits—(See figure 19.) Remote Control Unit RM-21-(*) contains circuits for the control of Power Unit PE-108-(*), switching from transmit to receive, voice modulating the transmitter, and operation of handset or microphone from a remote position.
(1) Variable resistor R_{71} is connected across the secondary of receiver output transformer T_9 through contacts F and E of connector SO_3 which connects to plug PL_3 on BC-669-(*). The movable tap on resistor R_{71} is connected to the handset receiver or headset through contact 15 of socket SO_2 and plug PL_4 allowing the receiver audio output voltage appearing across the handset receiver or headset to be varied. The other side of the handset receiver or headset is connected to ground through contact 14 of plug PL_4 and socket SO_2. (See figure 24.)
(2) Switch S_6 has one side connected to ground and the other side to starting relay RY_5 in Power Unit PE-108-(*) through contact A of connector SO_3 in RM-21-(*) and plug PL_3 in BC-669-(*), contact D of plug PL_2 in BC-669-(*) and plug PL_6 in PE-110-(*), and contact E of plug PL_5 in PE-110-(*) and plug PL_7 in PE-108-(*). When the switch is closed, the battery circuit to the coil of relay RY_5 is closed, and this in turn closes the battery circuit to the series cranking field of motor MT_1. (See figures 10, 15 and 51.)
(3) Switch S_7 also has one side connected to ground. The other side is connected to magneto breaker points S_{11} in Power Unit PE-108-(*) through contact I of connector SO_3 in RM-21-(*) and PL_3 in BC-669-(*), contact H of plug PL_2 in BC-669-(*) and plug PL_6 in PE-110-(*) and contact G of plug PL_5 in PE-110-(*) and plug PL_7 in PE-108-(*). When switch S_7 is closed the engine ignition voltage is shorted to ground stopping the engine.
(4) Switch S_8 is connected from ground to choke solenoid L_{10} in Power Unit PE-108-(*) through contacts G and H of connector SO_3 and plug PL_3, contact C of plugs PL_2 and PL_6 and contact B of plugs PL_5 and PL_7. On closing switch S_8, the battery circuit is closed through solenoid L_{10}, drawing in its iron core which is attached to the engine choke lever, choking the engine.
(5) The microphone is connected to the primary of transformer T_{10} in BC-669-(*) modulator through contact 17 of plug PL_4 and socket SO_2 and contact C of connector SO_3 and plug PL_3, causing audio frequency voltages to appear across the primary when the microphone is agitated. The microphone circuit is closed when the other side is grounded by one pole of switch S_9 through contact 14 of plug PL_4 and socket SO_2.
(6) The other pole of switch S_9 completes the circuit of the coil of relay RY_2 to ground when closed, providing the latter with a voltage from the receiver plate supply which is dropped to the rated voltage of relay RY_2 by resistor R_{50}. This connection is made through contact 19 of plug PL_4 and socket SO_2 and contact B of connector SO_3 and plug PL_3. The other side of switch S_9 is grounded through contact 14 of plug PL_4 and socket SO_2. (In BC-669-B, and BC-669-C on orders No. 32780-PHILA-43 and 32781-PHILA-43 resistor R_{50} is reduced in value. Resistor R_{76} is added, one end being connected between R_{50} and the coil of relay RY_2, the other end being grounded. This resistor acts as a bleeder to lower the voltage on Handset switch S_9. (See fig. 25.)

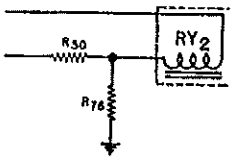


Fig. 25

20. POWER SUPPLY UNIT PE-110-(*).—
a. Electrical Design—(Refer to figure 12.) Power Supply Unit PE-110-(*) includes circuits for converting 115 volts a-c power to suitable filament power for the receiver and transmitter, plate power for the receiver and separate plate power for the transmitter. A circuit is also provided to furnish filament power to the receiver from a 12 volt storage battery and also convert it to suitable plate power for the receiver. (See figures 12, 26 and 27.)
(1) 115 volts A-C is supplied from Power Unit PE-108-(*) through contacts A and F of receptacle PL_5 or from a lighting power source through socke

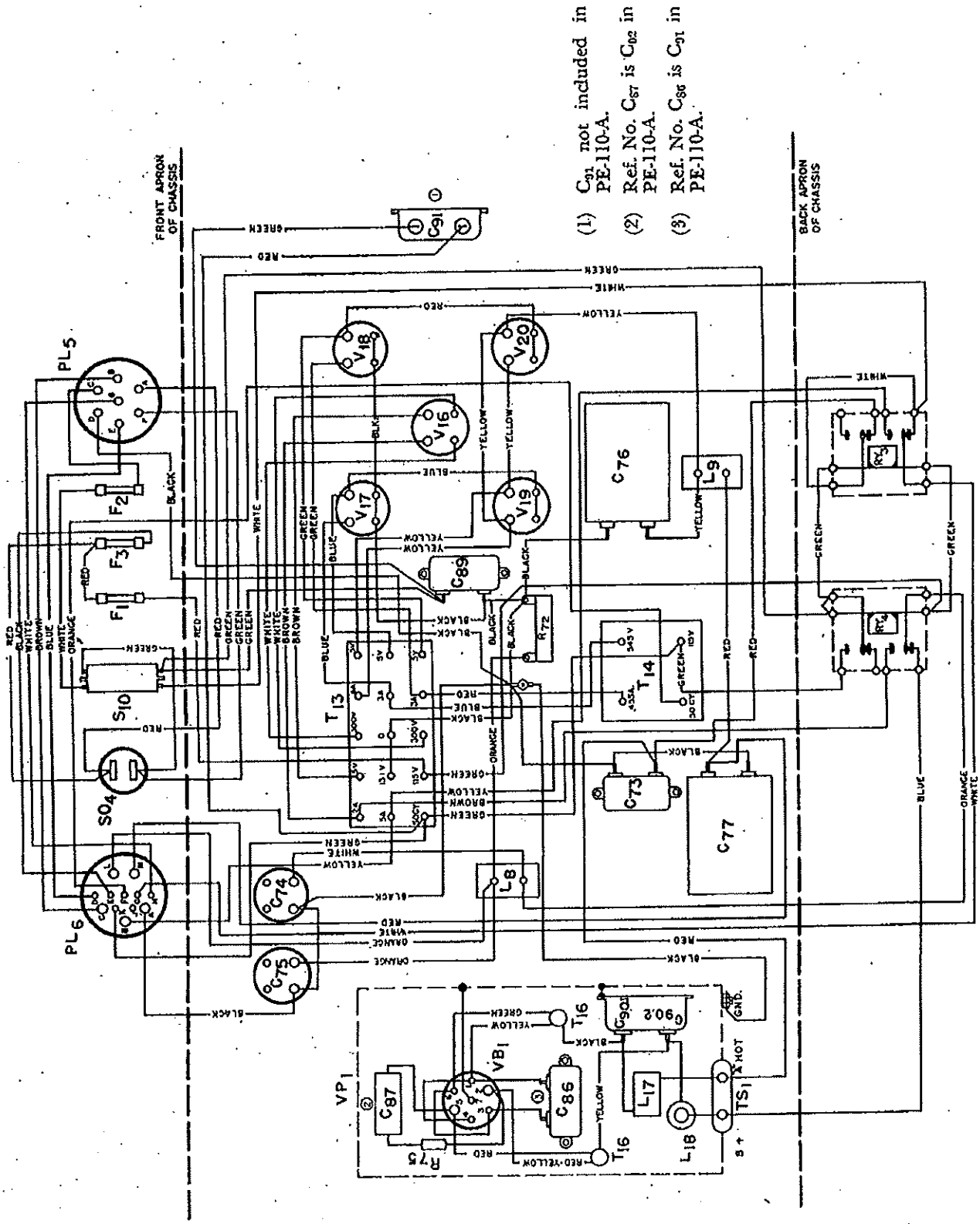


Fig. 26 — Power Supply Unit PE-110-B, Practical Wiring Diagram.

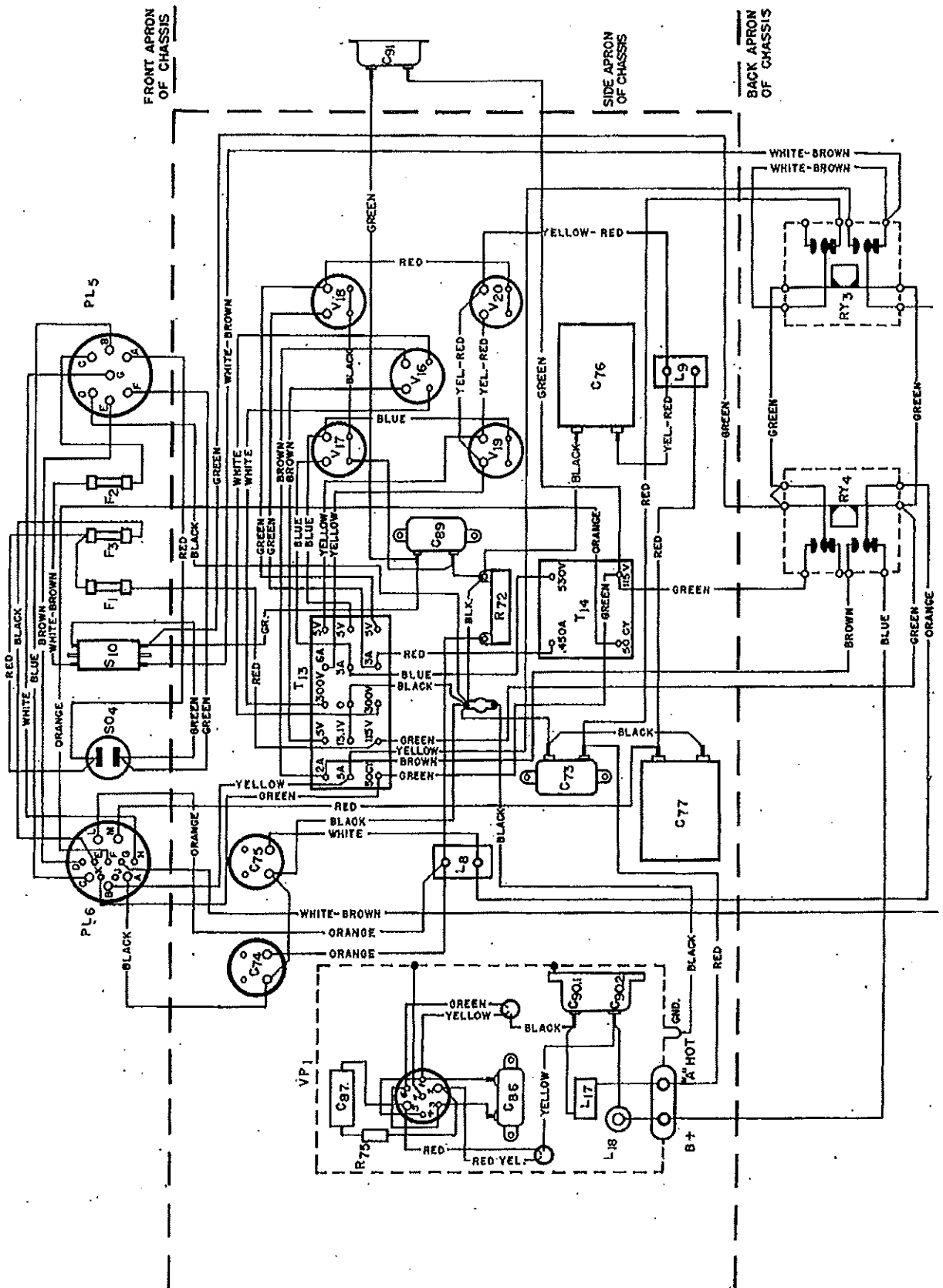


Fig. 27 – Power Supply Unit PE-110-B, PE-110-C, Practical Wiring Diagram.*

SO_4, connected across contacts A and F. One side of the a-c line connects to one side of the primary of transformers T_{13} and T_{14} from contact F through main power switch section S_{10-1} and a set of normally open contacts in relay RY_4. In PE-110-B, and PE-110-C capacitor C_{91} has been added as an arc suppressor for this set of contacts. (See fig. 28.)

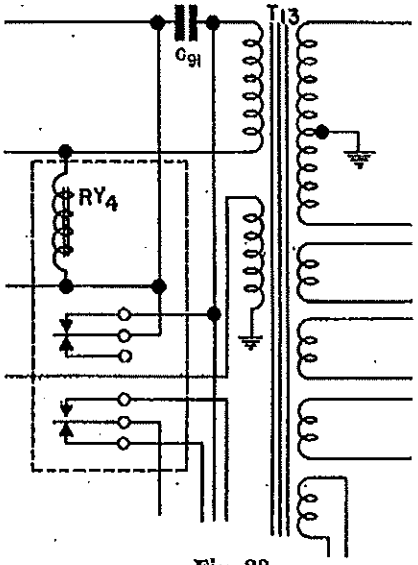


Fig. 28

The other side of the a-c line connects to the remaining side of T_{13} primary through fuse F_1 and to the remaining side of T_{14} primary through fuse F_8, contact E of plugs PL_6 and PL_2, a set of normally open contacts in relay RY_2, and contact F of plugs PL_2 and PL_6. This set of contacts in relay RY_2 is by-passed by capacitor C_{68} to suppress arcing.

(2) The coil of relay RY_1 receives its voltage from the a-c line by connection across the primary of transformer T_{14}. One side is connected through contact K of plugs PL_6 and PL_2, and contact 1 of plug PL_1 and socket SO_1. The remaining side is connected through contact F of plugs PL_6 and PL_2, and contact 3 of plug PL_1 and socket SO_1.

(3) A 12 volt winding in transformer T_{13} supplies filament voltage for both receiver and transmitter.

(a) The tubes of the modulator section receive their voltage through contact B of plugs PL_6 and PL_2. Tube V_{11} is connected to receive the full 12 volts as it has a 12 volt filament. Tubes V_{12}, V_{13}, V_{14} and V_{15} are supplied with 6 volts a-c by series-parallel connection. In BC-669-C on all orders and BC-669-B on order No. 32780-PHILA-43 only, the above tubes are connected in a different series parallel combination to accomplish the same purpose of the previous models. (See fig. 29.) Pilot lamp LM_1 is supplied with 6 volts a-c by voltage dropping resistor R_{48}. This lamp has the function of indicating the presence of filament power on the transmitter tubes.

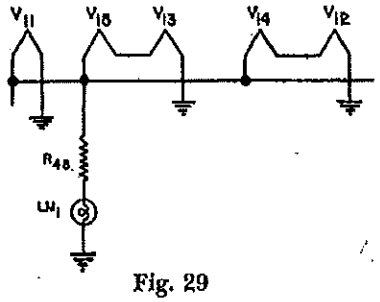


Fig. 29

(b) Transmitter r-f tubes V_8 and V_9 receive their filament voltage by connection to the modulator tube filaments through contact 5 of plug PL_1 and socket SO_1. They are supplied with 6 volts a-c by series-parallel connection. Dropping resistor R_{27} supplies 6 volts to the filament of tube V_{10}.

(c) Receiver tube filament voltage is supplied through a set of normally open contacts in relay RY_3, contact G of plugs PL_6 and PL_2 and contact 4 of plug PL_1 and socket SO_1. 6 volts is obtained by series-parallel connection. The voltage is dropped to 6 volts for tube V_6 by resistor R_{47}. Pilot lamp LM_2 is supplied with 6 volts a-c from the receiver filament supply through dropping resistor R_{49}. Lamp LM_2 serves to indicate the presence of filament power on the receiver tubes.

(4) Tube V_{16} is a tube VT-80 (commercial type 80) which rectifies the high voltage supplied by transformer T_{13} to furnish plate power for the receiver tubes.

(a) A winding of transformer T_{13} supplies 5 volts to the filament of tube V_{16}.

(b) The rectified power is connected to a set of normally open contacts in relay RY_4 and filtered by capacitors C_{74} and C_{75} and by filter choke L_8. C_{74} and C_{75} are transposed in SCR-543-C (SCR-543-B on order No. 32780-PHILA-43 also) See Fig. 30. Resistor R_{72} acts as a bleeder resistor to assist in maintaining a constant voltage and to drain off any voltage remaining when the plate power is removed.

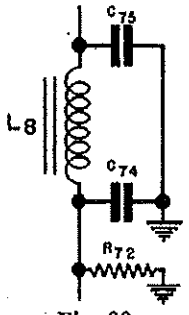


Fig. 30

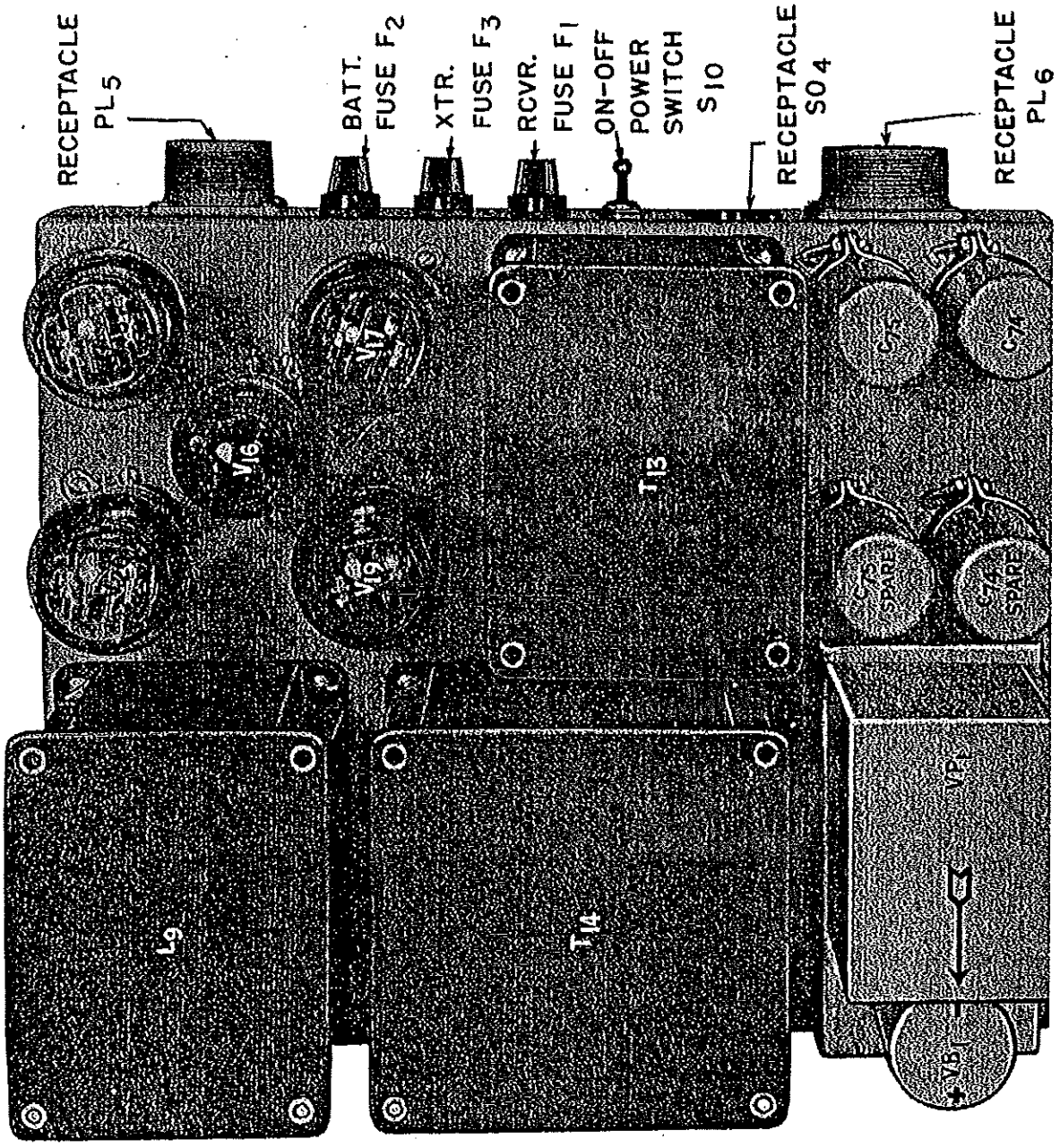


Fig. 31 – Power Supply Unit PE-110-(*), Top View of Chassis.

(c) The filtered power reaches the receiver through contact L of plugs PL_6 and PL_2 and contact 10 of plug PL_1 and socket SO_1.

(5) In battery operation, rectified plate power is supplied to the receiver plate supply filter circuit from Vibrapack VP_1 through a set of normally closed contacts in relay RY_4.

(a) Vibrapack VP_1 is supplied with 12 volts d-c from storage battery B_1 in Power Unit PE-108-(*) through contact C of plugs PL_7 and PL_5, fuse F_2, switch section $S_{10.2}$ and a set of normally closed contacts in relay RY_3. The vibrapack input is by-passed by capacitor C_{78}.

(b) The receiver filament circuit is supplied with 12 volts d-c by connection to $S_{10.2}$ through a second set of normally closed contacts in relay RY_3 and contact G of plug PL_6.

(6) Tubes V_{17}, V_{18}, V_{19} and V_{20} are each a tube VT-145 (commercial type 5Z3) which are connected in a bridge circuit to rectify the high voltage supplied by the secondary of transformer T_{14} to furnish plate power for the transmitter tubes.

(a) Three windings of transformer T_{13} supply 5 volts to the filaments of tubes V_{17}, V_{18}, V_{19} and V_{20}. One winding supplies tube V_{17}, a second winding supplies tube V_{18} and a third winding supplies tubes V_{19} and V_{20}.

(b) The rectified power is fed from the filaments of tubes V_{19} and V_{20} through a filter consisting of capacitors C_{76} and C_{77} and choke L_9. The filtered power is received by the transmitter tubes through contact M of plugs PL_6 and PL_2.

(7) The coils of relays RY_3 and RY_4 are connected across the 115-volt a-c line by connection to contact A of plug PL_5 through fuse F_1 and contact F through switch section $S_{10.1}$. The a-c line is by-passed by capacitor C_{80}.

(8) Vibrapack VP_1 consists of vibrator VB_1 and its associated circuits. (See figure 12).

(a) The battery voltage enters through the "A" hot terminal of terminal strip TS_1. It is filtered by r-f choke L_{17} and fed to the center tap of the primary of transformer T_{16}. Capacitor $C_{90.1}$ by-passes the battery voltage.

(b) One side of the primary is connected to contact 3 and the remaining side to contact 4 of vibrator VB_1. The coil of VB_1 receives its voltage by connection to contact 4 and contact 7, the armature which is connected to ground. (See figure 12.)

(c) Interrupter contacts 3 and 4 of vibrator VB_1 interrupt the d-c battery voltage to produce a pulsating voltage which is stepped up by transformer T_{16}. Simultaneously, rectifier contacts 2 and 5 rectify the voltage on the secondary by placing a positive voltage on one half of the secondary on the first half cycle and on the other half of the secondary on the alternate half cycle, producing a unidirectional voltage of suitable value. The rectified voltage is by-passed by capacitor $C_{90.2}$ and fed through r-f choke L_{18} to the B+ terminal of terminal strip TS_1 which is connected to the receiver plate supply filter.

(d) Buffer capacitor C_{92} and resistor R_{76} are connected in series across the secondary of transformer T_{16} to control the surge voltages developed in the circuit. Buffer capacitor C_{91} is connected across the primary for the same purpose. In PE-110-B, and PE-110-C reference numbers C_{91} and C_{92} are changed to C_{86} and C_{87} respectively. (See Fig. 32.)

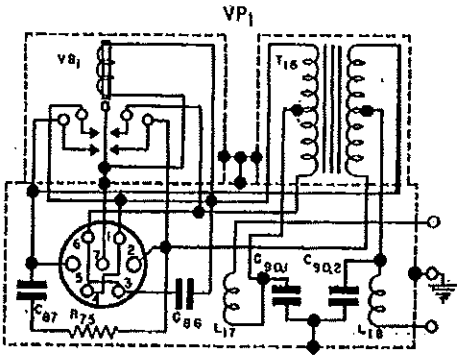


Fig. 32

SECTION IV — MAINTENANCE

21. MAINTENANCE OF RADIO COMPONENTS.—

a. Routine Maintenance
The radio set components should be periodically cleaned and checked for tightness of connections, etc. Any dust that accumulates on the interior should be blown out. Tubes and crystals should be firmly seated in their sockets.

b. Normal meter readings.
D. C. CURRENT
Meter switch set at MOD. PLATE — 200 — 230 ma.
Meter switch set at P.A. PLATE — 150 — 210 ma.
Meter switch set at P.A. GRID — 4 — 6.5 ma.
ANTENNA CURRENT
1800 k.c. 1—1.5 amps.
4000 k.c. 1—1.5 amps.

c. Radio Receiver and Transmitter BC-669-(*).—
(1) To replace tubes in the r-f chassis.
(a) Open the top lid of Chest CH-133-(*).
(b) Raise the lid of the metal cabinet giving access to all tubes in the r-f compartment.
(c) Loosen screw to release tension on tube clamps (used on BC-669-B, and BC-669-C only) if tube V_{10} or V_{15} is removed.
(d) Insert new tube and tighten clamp.
(e) Lift bracket of tube hold-down bracket (used on BC-669-B, and BC-669-C only) on tubes V_8 and V_9 high enough to clear the tube caps, turn bracket 90 degrees and remove tube.
(f) Insert new tube and replace bracket.
(2) To replace crystals (transmitter or receiver).
(a) Open the top lid of Chest CH-133-(*).
(b) Raise the lid giving access to the r-f compartment.
(c) Loosen knurled screws on crystal hold-down bracket. Slide bracket to the side and remove desired crystal or crystals.
(d) Insert new crystal, or crystals, and replace bracket.
(3) Replacement of Parts.—To replace parts, the radio receiver and transmitter must be removed from Chest CH-133-(*) and separated from the modulator chassis as follows:
(a) Lay the chest on its back.
(b) Unsnap the six snap fasteners (or draw-bolt clamps) holding the receiver and transmitter to the bottom pan. (Refer to Par. 9 *a.* (5).)
(c) Lift up and out by the two front panel handles.

CAUTION: Pull evenly on both handles or damage may result to the banana plug located on the mounting pan.

(d) Unsnap the four snap fasteners holding the r-f section to the modulator.
(e) Reach inside and detach plug
(f) Lift off the r-f section.
(g) Don't remove metal case (all se work done with case on).
(4) Replacement of antenna loading coi
(a) Unsolder six leads on coil studs the two leads at the lugs mounte the coil form.
(b) Remove the three screws holdin coil form to the chassis.
(c) Loosen tank coil L_3 by unscre the three nuts holding L_3 d (don't remove nuts completely that L_3 can be shifted to one sid
(d) Hold tank coil L_3 to one side, antenna loading coil L_4 out, rep with new coil. Put tank coil L_3 into position and tighten down ly to base.
(5) Replacement of tank coil L_8.
(a) Unsolder 12 leads from studs of coil L_8.
(b) Remove 3 nuts holding coil forr chassis.
(c) Lift out coil and insert new coil
(d) Remount new coil to chassis solder leads.
(6) Replacement of relay RY_1.
(a) Remove all accessible leads solde to the lugs on the relay and unsc the two screws holding the rela the partition.
(b) Lift the relay away from the pa tion and unsolder the remain leads.
(c) Solder leads removed at Par. 21 *c. (b)* above to the relay before mo ing. Then screw down to the pa connect and solder wires.
(7) Replacement of i-f coils.
(a) First remove coil shield by tak off the nuts holding the coil shi to the base.
(b) Remove slug mounting nuts, al turning slugs all the way in, on side of the shield holding the coil the can. Lift off shield.
(c) Unsolder leads from coil lugs, ins the coil itself and NOT at the t sockets or tie lugs. Replace wit new coil after removing its shield

CAUTION: Don't try to jerk or pull wires when removing them from solderi lugs. A heated lug breaks very easy. remove a wire from a lug, first find the lo end and untwist it gradually from its l while applying heat.

(d) Replace can, tighten coil to shie with slug nuts and mount back chassis.
(8) Replacement of r-f coils.
(a) Disconnect leads from coil lugs a remove coil assembly from chassis.

(b) Mount new coil on chassis, replace wires and resolder.

CAUTION: Do not overheat lugs as solder will drop down lug eyelet into coil and short out coil winding.

(9) Replacement of ANTENNA CURRENT meter.
- (a) Take off the two nuts holding the two wires to the back of the meter. Remove the three screws holding the meter to the metal cabinet and take out meter.
- (b) Mount and screw down the new meter. Tighten the two leads to the terminals on the back of the meter.

(10) Replacement of RECEIVER BAND-SWITCH.
- (a) Take out the three shield partitions by removing the three screws holding down each partition.
- (b) Remove all wires (to aid you in connecting these wires to the new switch mark the leads with tags, or use the practical wiring diagram, or another chassis as a sample). Take off the following: knob; the nut holding down the rear bracket to the chassis; the nut holding the switch to the front panel and lift out defective switch.
- (c) Mount new switch to base, replace and solder wires. Put shield partitions back on.

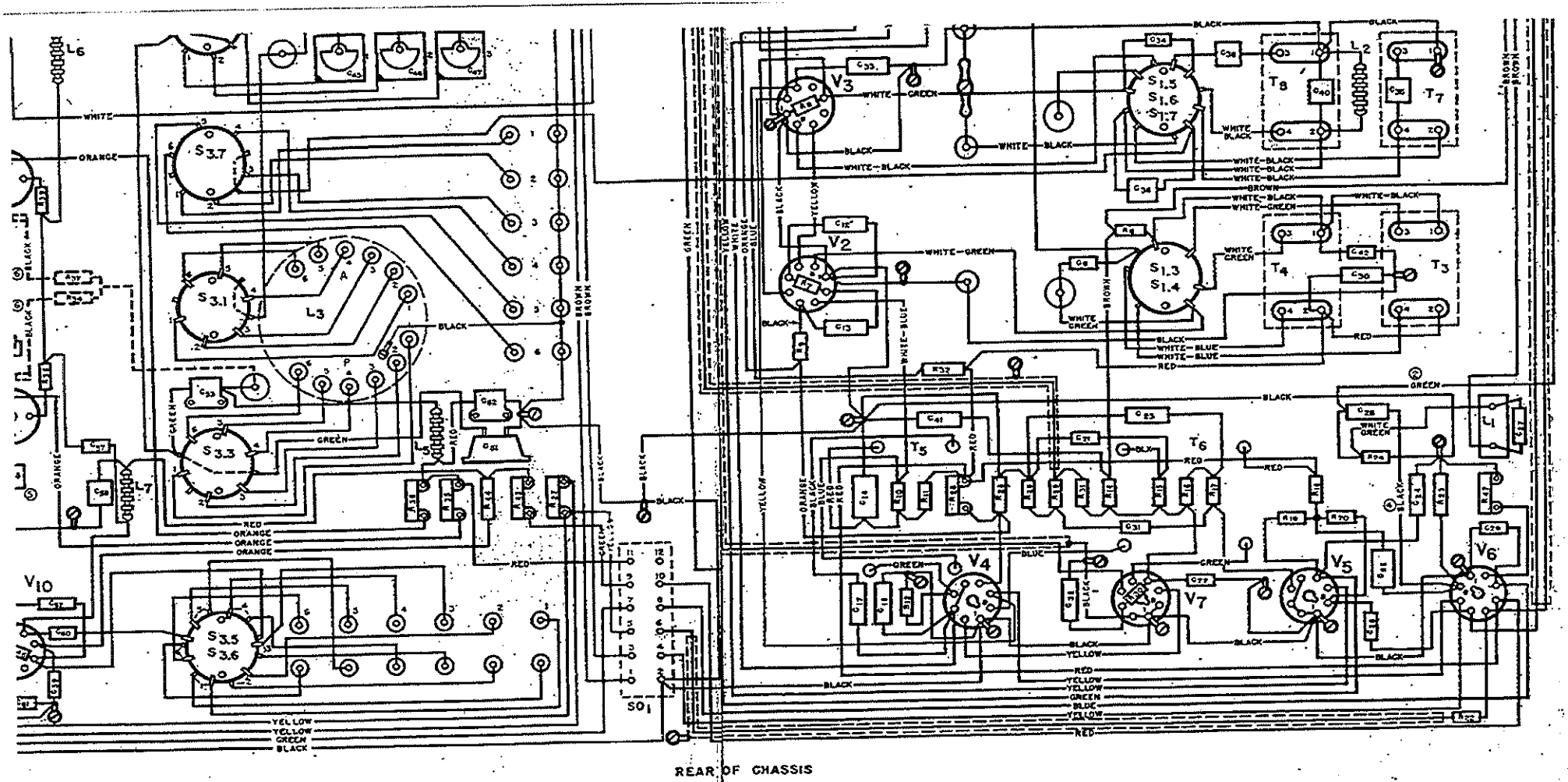
(11) Replacement of ceramic wafers on CHANNEL SWITCH.—It is easier to replace wafers than to remove the whole switch; in doing this, proceed as follows:
- (a) Unsolder all leads from the defective wafer.
- (b) Remove the four nuts located at the front end of the switch. The two rods at each side of the switch can now be pulled out.
- (c) Take off the inner "C" washer on the switch shaft, loosen the coupling and remove the shaft. Remove the defective wafer and replace new wafer in exactly the same position as the one taken out.
- (d) Line up all switch centers. Gently ease the switch shaft thru the switch centers (these switch centers are easily damaged so be careful).
- (e) Replace the "C" washer on the switch shaft. Insert the two rods and secure them into place with nuts.
- (f) Align the CHANNEL SWITCH with the high voltage switch and tighten the coupling set screws.
- (g) Connect and solder leads back on the wafer.
- (h) Dress all leads to prevent shorts. Inspect wiring when finished.

(12) Replacement of P. A. PLATE TUNING capacitors C_{46} to C_{50}.
- (a) Capacitors for either channel 4, 5 or 6 are removed by first unscrewing the two nuts on capacitor 1, 2 or 3 whichever capacitor is above the one you have to remove.
- (b) Do not remove any wires from the capacitor on the top row, just lay the capacitor and its respective wires to the back of the chassis.
- (c) Disconnect the leads from the defective capacitor by removing the nuts holding the rotor and stator leads down. Remove the wires and lift capacitor from its mounting.
- (d) Insert new capacitor. Mount to chassis and bolt down leads.
- (e) Replace top capacitor not disconnected and redress all leads.

(13) Replacement of ANTENNA TUNING capacitor.
- (a) Loosen P. A. PLATE TUNING capacitors for channels 2 and 5. Move them back about ¼". (One screw holding down the ANTENNA TUNING capacitor is directly under these two capacitors.)
- (b) Remove the two screws (one is reached by moving the P. A. PLATE TUNING capacitor back, the other is located behind this capacitor) holding the capacitor to the chassis.
- (c) Unsolder the lead at the rear of the capacitor. Take off the nut holding the lead down at the stator section and remove the lead.
- (d) Remove the capacitor and reassemble the ceramic stand-offs to the new one.
- (e) Mount the unit to the chassis (be sure to put the cork washers back on the stand-offs, otherwise they will crack when tightened down) and screw down firmly.
- (f) Tighten the nuts down on P. A. PLATE TUNING capacitors. Check leads for shorts.
- (g) Wire and solder lead to the rotor lug. Place wire on stator terminal screw and tighten down with nut.

(14) Replacement of tubes in modulator.
- (a) The tubes in the modulator compartment may be reached through the rear of the cabinet when the radio receiver and transmitter is out of Chest CH-133-(*) and also from the top of the cabinet when the r-f chassis is removed.
- (b) Loosen screw to release tension on tube clamps (used on BC-669-B, C only) if tube V_{12}, V_{13}, V_{14} or V_{15} is removed.
- (c) Insert new tube and tighten clamp.

(15) Replacement of relay RY_2.
- (a) Unsolder leads. Remove the two screws holding down relay and take out relay.



white-red in BC-669-A.
white-green in BC-669-A.
t included in BC-669-A.
white in BC-669-A.
t included in BC-669-A.

(6) Coded green in BC-669-A.
(7) In BC-669-A, R_{40} connected to ground through same set of contacts in RY_1 as R_{41}.
(8) M_1 connected between L_4 and RY_1 in some BC-669-A units.

Fig. 33 — Radio Receiver and Transmitter BC-669-BRF. Section and Receiver, Practical Wiring Diagram.

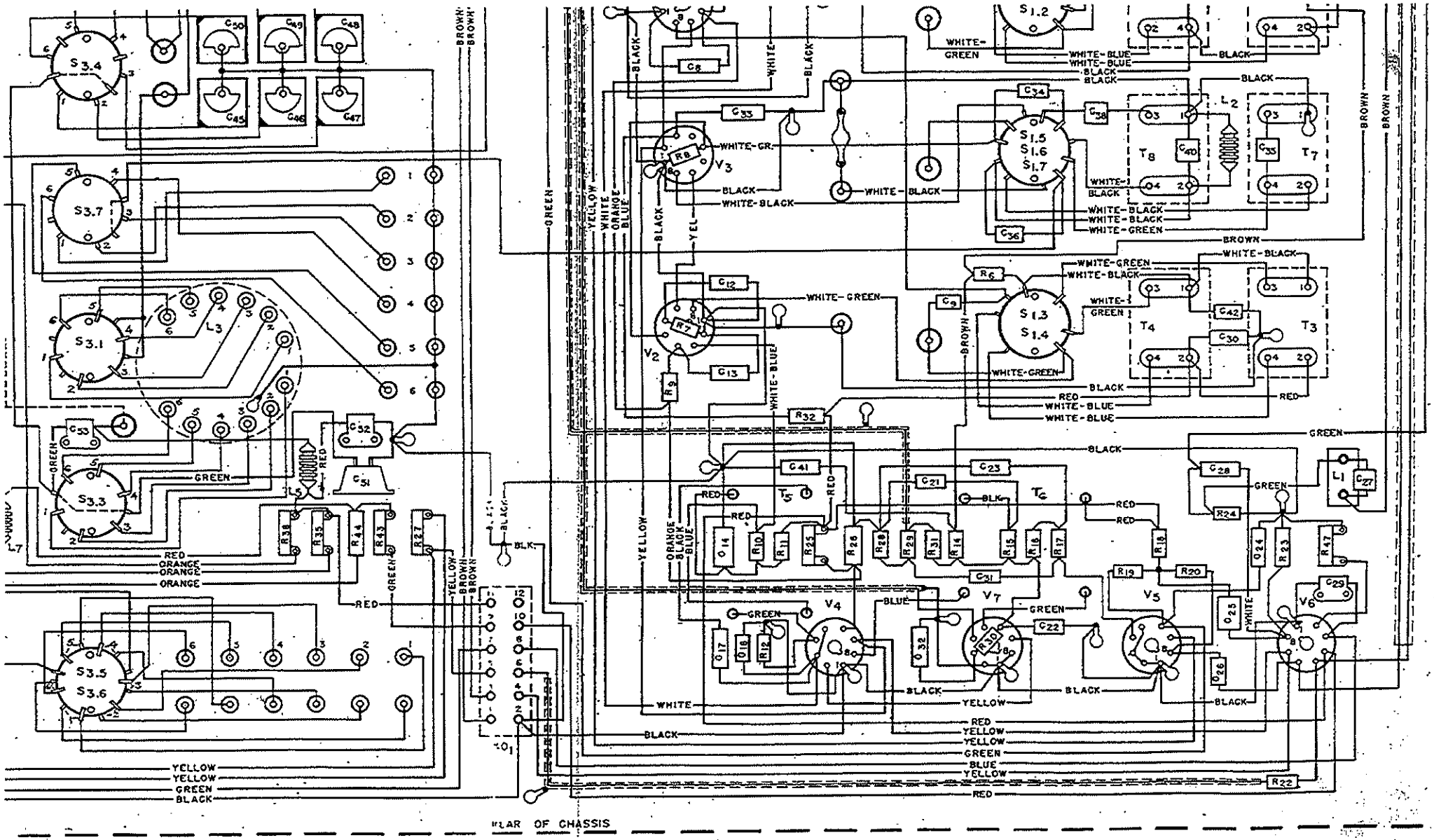


Fig. 34 — Radio Receiver and Transmitter BC-669-B, C RF. Section and Receiver, Practical Wiring Diagram.

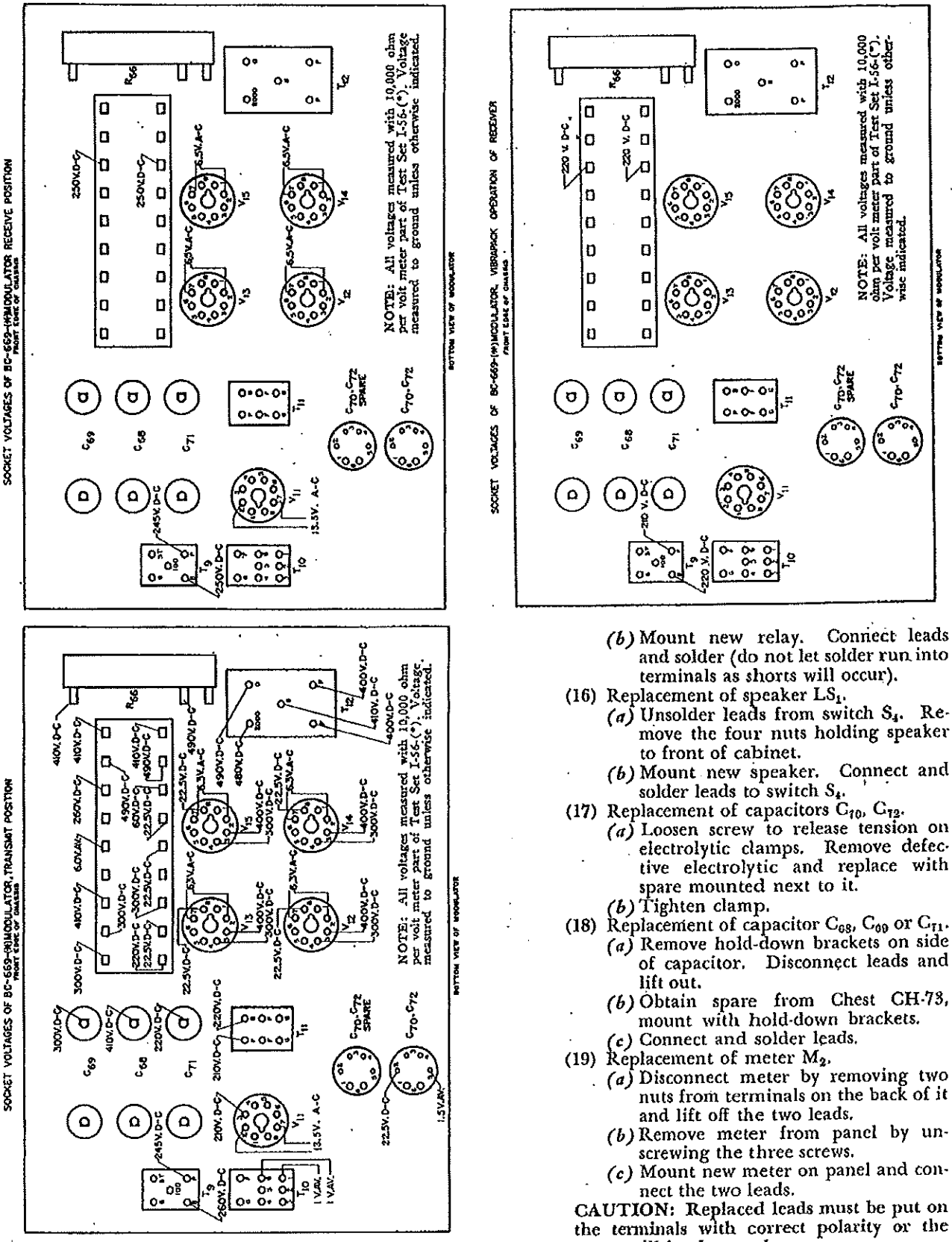


Fig. 35 — Transmitter Modulator Section Tube Socket Layout Diagrams Showing Voltages.

(b) Mount new relay. Connect leads and solder (do not let solder run into terminals as shorts will occur).

(16) Replacement of speaker LS_1.

(a) Unsolder leads from switch S_4. Remove the four nuts holding speaker to front of cabinet.

(b) Mount new speaker. Connect and solder leads to switch S_4.

(17) Replacement of capacitors C_{70}, C_{72}.

(a) Loosen screw to release tension on electrolytic clamps. Remove defective electrolytic and replace with spare mounted next to it.

(b) Tighten clamp.

(18) Replacement of capacitor C_{68}, C_{69} or C_{71}.

(a) Remove hold-down brackets on side of capacitor. Disconnect leads and lift out.

(b) Obtain spare from Chest CH-73, mount with hold-down brackets.

(c) Connect and solder leads.

(19) Replacement of meter M_2.

(a) Disconnect meter by removing two nuts from terminals on the back of it and lift off the two leads.

(b) Remove meter from panel by unscrewing the three screws.

(c) Mount new meter on panel and connect the two leads.

CAUTION: Replaced leads must be put on the terminals with correct polarity or the meter will be damaged.

(20) Replacement of receptacles PL_2 or PL_3.

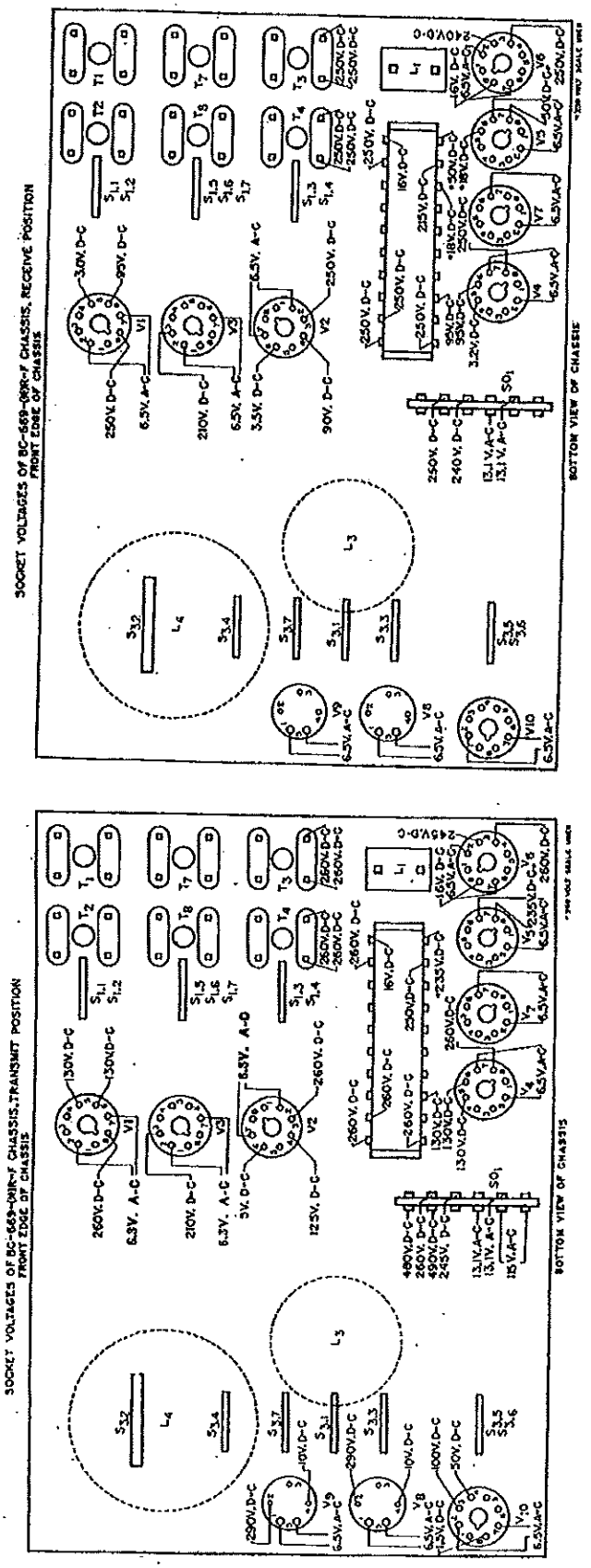
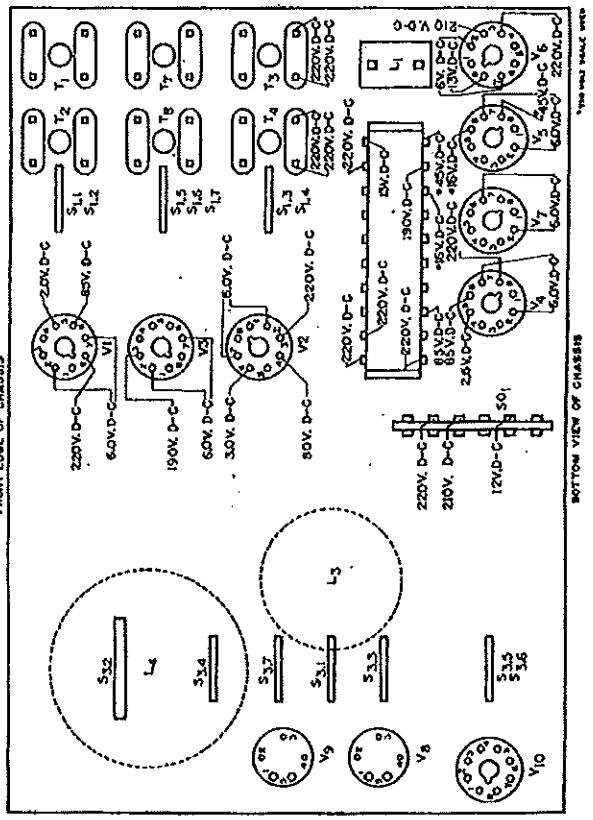


Fig. 36 — Transmitter R-F Section and Receiver Tube Socket Layout Diagrams Showing Voltages.

NOTE: All voltages measured with 10,000 ohm per volt meter part of Test Set I-56-(*). Voltage measured to ground unless otherwise indicated.



(a) Remove the four mounting screws.
(b) Lay receptacle to one side with leads connected.
(c) Mount new receptacle into position, using the four mounting screws.
(d) Transfer wires from defective receptacle to the one newly mounted.

(21) Replacement of pilot lamps.
(a) Unscrew the glass jewel from the front of the panel.
(b) Using the fingers, press in, turn and remove the pilot lamp. (Its socket is of the bayonet catch type.)
(c) Insert new pilot lamp and replace glass jewel.

d. Power Supply Unit PE-110-(*)
(1) To replace fuses.
(a) Unscrew the black knurled bakelite knobs on the front of the power unit.

(*b*) Remove old fuse.
(*c*) Insert new fuse into the holder mounted on the chassis front.
(*d*) Screw the knob back into place.

(2) To replace tubes, it is necessary to remove Power Supply Unit PE-110-(*) from Chest CH-132-(*) and remove the top metal cover. The unit slides out of the chest after lifting the latches on either side. It remains attached to a wooden base by the shock-mounts, and the metal cover may be lifted off after removing the screws around its sides. A screwdriver for doing this may be found in the tool box located in Chest CH-73-(*). If tube clamps are used loosen screw to release tension of clamp and remove tube. Insert new tube and retighten clamp.

22. **PRETUNING CHANNELS.**—All pretuning adjustments for operation on frequencies outlined in par. 8. *g.* have been made at the manufacturer's plant before shipment. However, if new channels are to be used, or if adjustments have been altered during servicing, follow instructions outlined below:

a. Receiver.—No adjustments need be made on the receiver to pretune it other than to plug the desired crystals (in Crystal Holders FT-171-B) into the proper crystal sockets. Figure 12 shows the location of the receiver crystal sockets. The sockets are numbered to correspond to the position of the OPERATING CHANNEL switch. The receiver crystal frequency must differ from the desired receiving frequency by 385 kc. For example, if it is desired to receive on a frequency of 2280 kc. in Channel 3, a crystal having a frequency of 2665 kc. (or 1895 kc.) is plugged into receiver crystal socket No. 3.

b. To pretune receiver, proceed as follows:
(1) Unlatch and lift open cover door in top of Chest CH-133-(*).
(2) Unlatch and lift open top cover door in the metal cabinet within the chest.
(3) Plug crystal of proper frequency into the receiver crystal socket whose number corresponds with the number of the channel selected for operation.

c. Receiver alignment. (See fig. 37.)
(1) Check all frequencies set on signal generator with frequency meter.
(2) Modulate signal generator.
(3) Turn **A. F. GAIN** control full on.
(4) Turn **SPEAKER** switch **ON.**
(5) Turn **STATIC FILTER** switch **OFF.**
(6) Turn **NOISE CONTROL** full on.
(7) Connect "low" side of signal generator to chassis.
(8) Connect output meter through series capacitor to V_6 plate (1) and chassis.
(9) **I-F alignment.**
(*a*) Set signal generator to 385 kc.
(*b*) Connect "high" side of signal generator to grid of V_2 (2). Use 0.001 uf capacitor in series.
(*c*) Adjust sec. (3) and pri. (4) of T_6 for maximum output.
(*d*) Adjust sec. (5) and pri. (6) of T_5 for maximum output.
(*e*) Repeat (*c*) and (*d*). I-F is now aligned.

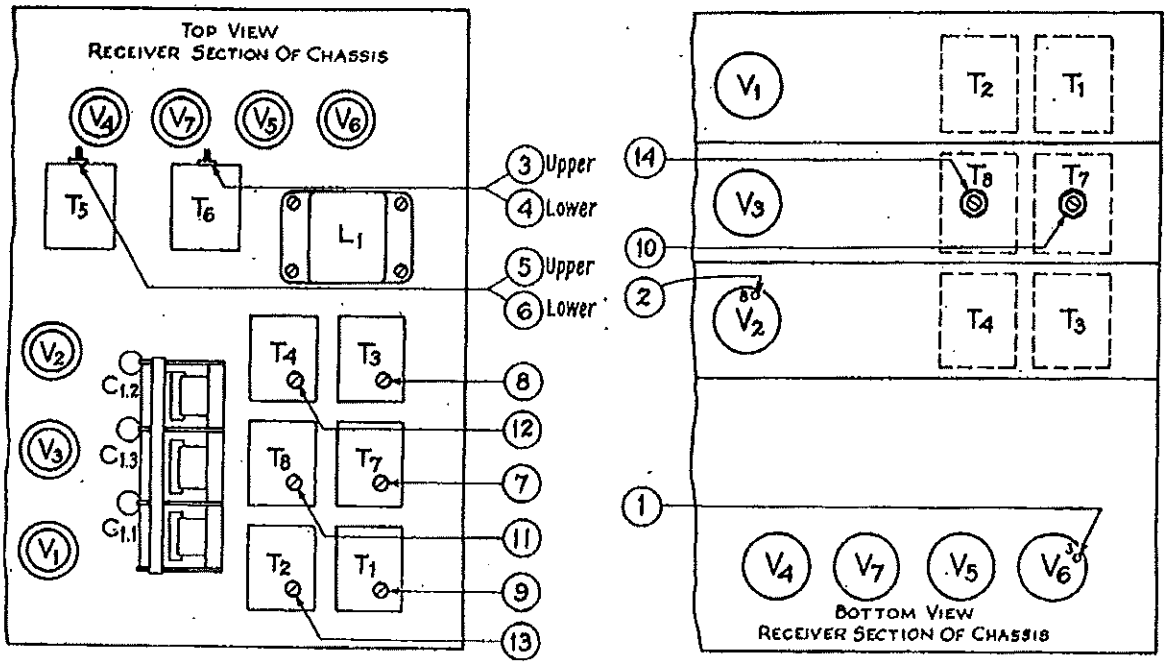
(10) **R-F alignment, 1700-2700 kc. band.**
(*a*) Set **RECEIVER BAND SWITCH** on **MANUAL 1** and the tuning dial to 2700 kc.
(*b*) Set signal generator to 2700 kc., and connect "high" side to antenna post with 150 uuf capacitor in series.
(*c*) Adjust C_{37} in T_7 (7), C_{10} in T_3 (8), and C_3 in T_1 (9), for maximum output.
(*d*) Set signal generator to 1800 kc. and **RECEIVER TUNING** dial to 1800 kc.
(*e*) Check receiver calibration and sensitivity. If there is appreciable loss of sensitivity or miscalibration, follow par. *c.* (10) (*f*) and (*g*).
(*f*) Adjust slug T_7 (10) for maximum output.
(*g*) Repeat par. *c.* (10) (*a*) to (*c*) and (*d*) to (*f*) if necessary. The 1700-2700 kc. band is now aligned.

(11) **R-F alignment, 2700-4400 kc. band.**
(*a*) Set **RECEIVER BAND SWITCH** on **MANUAL 2**, the tuning dial to 4400 kc. and signal generator to 4400 kc.
(*b*) Adjust C_{39} in T_8 (11), C_{11} in T_4 (12) and C_5 in T_2 (13) for maximum output.
(*c*) Set **RECEIVER TUNING** dial to 2900 kc. and the signal generator to 2900 kc.
(*d*) Check receiver calibration and sensitivity. If there is appreciable loss of sensitivity or miscalibration, follow par. *c.* (11) (*e*) and (*f*).
(*e*) Adjust slug in T_8 (14) for maximum output.
(*f*) Repeat par. *c.* (11) (*a*) to (*c*) and (*d*) to (*e*) if necessary. The receiver is now aligned.

d. Transmitter.—Figure 38 shows the location of the transmitter crystal sockets and tuning components. Crystals (in Crystal Holders FT-171-B) having the same frequencies as the desired transmitter operating frequencies should be used. The crystal sockets are numbered to correspond to the positions of the OPERATING CHANNEL Switch. Design of the equipment does not require that the crystals be arranged in any particular order, although they are usually arranged in order of frequency for convenience in referring to the tuning chart on the front panel. The following adjustments have already been made on this transmitter at the time of manufacture. They need not be disturbed unless it is necessary to change the operating frequencies.

RECEIVER ALIGNMENT

All frequencies set on signal generator are to be checked with frequency meter.
Signal generator is modulated.
A.F. Gain control full on.
Speaker on.
Static Filter off.
R.F. Gain or Noise Control full on.
Connect "low" side signal generator to chassis.
Connect output meter through series capacitor to V_6 plate (1) and chassis.



I-F Alignment

1. Set signal generator to 385 kc.
2. Connect "high" side signal generator to grid V_2 (2). Use 0.001 μf capacitor in series.
3. Adjust sec (3) and pri (4) of T_6 for maximum output.
4. Adjust sec (5) and Pri (6) of T_5 for maximum output.
5. Repeat 3 and 4.

I-F is now aligned.

1700-2700 kc. R-F Alignment

6. Set Receiver Band Switch on Manual 1. Tuning dial at 2700 kc.
7. Set signal generator to 2700 kc. and connect high side to antenna post with 150 μμf capacitor in series.
8. Adjust C_{37} in T_7 (7), C_{10} in T_3 (8), and C_3 in T_1 (9), for maximum output.
9. Set signal generator to 1800 kc. and receiver tuning dial to 1800 kc.
10. Check receiver calibration and sensitivity. If there is appreciable loss of sensitivity because of miscalibration follow steps 11 and 12.
11. Adjust slug T_7 (10) for maximum output.
12. Repeat steps 6 to 8 and then steps 9 to 11 if necessary.

The 1700-2700 kc. band is now aligned.

2700-4400 kc. R-F Alignment

13. Set Receiver Band Switch on Manual 2, the tuning dial to 4400 kc. and signal generator to 4400 kc.
14. Adjust C_{30} in T_8 (11), C_{11} in T_4 (12), and C_6 in T_2 (13), for maximum output.
15. Set receiver tuning dial to 2900 kc. and the signal generator to 2900 kc.
16. Check receiver calibration and sensitivity. If there is appreciable loss of sensitivity or miscalibration, follow steps 17 and 18.
17. Adjust slug in T_8 (14), for maximum output.
18. Repeat steps 13 to 15 and 16 to 17 if necessary.

The receiver is now aligned.

Fig. 37 — Receiver Alignment Chart.

e. To pretune transmitter, proceed as follows: (See Figure 38).

(1) With Radio Set SCR-543-(*) connected for operation and supplied with a-c power, turn the ON-OFF switch of Power Supply Unit PE-110-(*) to ON.

WARNING: This equipment uses HIGH VOLTAGES which will give SEVERE SHOCK or CAUSE DEATH if touched. High r-f VOLTAGES can cause PAINFUL BURNS. Do not touch the antenna or antenna connections while operating. The r-f voltage at the antenna is the only exposed voltage. When you have the top cover of the transmitter open, other r-f voltage points are exposed. Always close your cover before turning on power to the transmitter. With transmitter or power supply unit removed from carrying chests for servicing, both r-f and d-c voltages are exposed. Don't try to make any service adjustments unless you know all about this equipment.

(2) On the transmitter, plug crystal of desired frequency into the transmitter crystal socket whose number corresponds with the channel number selected for operation.

(3) Turn the OPERATING CHANNEL switch to selected channel number.

(4) Remove the cover plate under the inscription P.A. PLATE TUNING. This permits access to the plate tuning capacitor shafts.

(5) Move the sliding contactor (whose number corresponds to the channel number) on the A side of the plate tank coil L_3 down to the bottom of the coil.

(6) Move the sliding contactor on the P side under numbered position corresponding to the channel number, to approximately the center of the coil.

(7) Remove the cover plate over the inscription METER SWITCH and set the switch to position marked P. A. PLATE.

(8) Turn the transmitter on by pressing the press-to-talk switch on hand-set or microphone, (DC CURRENT meter will now indicate some value).

(9) Use the ½ inch socket wrench provided in the tool box to unlock the shaft of the plate tuning capacitors by loosening the locking nut. Using a screwdriver, turn the slotted shaft of the plate tuning capacitor, whose number corresponds to the channel number, until the plate current is a minimum. Note: When the slot is horizontal the capacity is at mid-value. Do not turn it past the vertical position.

(10) Turn the transmitter off and move the same "P" sliding contactor on the plate tank coil L_3 a few turns toward the top.

(11) Repeat (8), (9) and (10) and continue these readjustments until the plate current dips to a minimum and rises again while the plate tuning capacitor is being turned in one direction, but thru not more than 180°, during which the slot must not turn past vertical.

(12) Then set the shaft to the position producing a minimum plate current. (This will be about 40 to 60 ma.) If no minimum is obtained repeat the above procedure, moving the sliding contactor downward, however, instead of upward!

(13) Repeat the above procedure with any remaining channels, whose frequency it is desired to change.

(14) Adjust the antenna circuit in the following manner:

(a) Set the OPERATING CHANNEL switch to the channel number selected for tuning.

(b) Move the corresponding numbered sliding contactor on the A side of the plate tank coil L_3 up approximately five turns.

(c) Open the door marked ANTENNA LOADING ADJUSTMENT.

Note: The antenna must be connected to the antenna post of the transmitter from here on.

(d) Move the sliding contactor (whose number corresponds to the channel number), on antenna loading coil L_4 approximately half-way up the coil.

(e) Turn the transmitter on by pressing the press-to-talk switch of the hand-set or microphone.

(f) Turn ANTENNA TUNING knob until the ANTENNA CURRENT meter reads maximum, then release press-to-talk switch. If the reading goes thru a maximum and then dips while the ANTENNA TUNING dial is turned from 0 to 100 on its scale, the antenna tuning is correct when set for the maximum ANTENNA CURRENT meter reading.

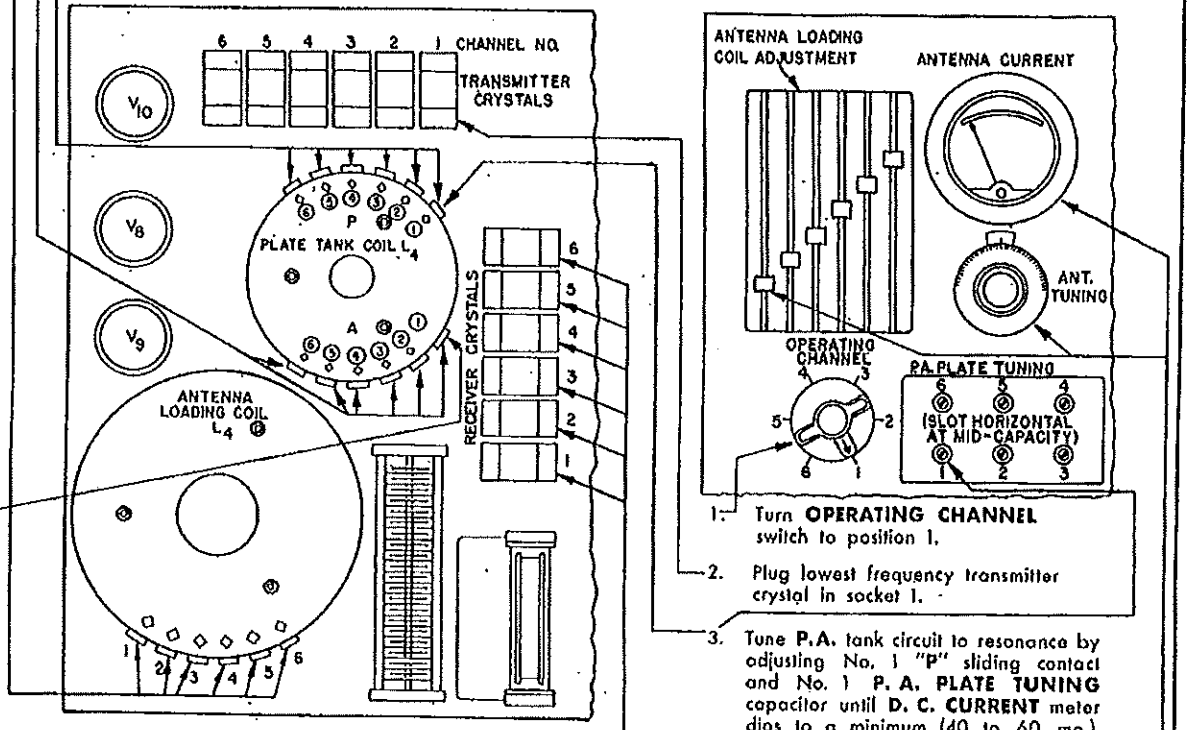
(g) If no maximum is reached, move the same antenna loading coil sliding contactor up or down, repeating *(e)* and *(f)* until the ANTENNA CURRENT meter goes thru a maximum, then set the dial for this maximum. If maximum ANTENNA CURRENT is reached as the ANTENNA TUNING dial is rotated past 0, move the sliding contactor up one turn at a time. If the maximum is reached as the dial is rotated past 100, move the sliding contactor down one turn at a time.

Caution: Do not be misled by a false maximum caused by passing 0 or 100 on the ANTENNA TUNING dial.

(h) Press the press-to-talk switch for one or two seconds and note the D.C.

TRANSMITTER PRESETTING

Remove plate under **P. A. PLATE TUNING**; leave antenna disconnected.
Remove plate over **METER SWITCH** and set to **P. A. PLATE.**
Open **ANTENNA LOADING COIL ADJUSTMENT** door.
Set all **ANTENNA LOADING COIL** sliding contacts to mid-position.
Set all **"A"** sliding contacts to bottom position.
Set all **"P"** sliding contacts to mid-position.



1. Turn **OPERATING CHANNEL** switch to position 1.
2. Plug lowest frequency transmitter crystal in socket 1.
3. Tune **P.A.** tank circuit to resonance by adjusting No. 1 "P" sliding contact and No. 1 **P. A. PLATE TUNING** capacitor until **D. C. CURRENT** meter dips to a minimum (40 to 60 ma.).

CAUTION: Make sure sliding contacts do not short-circuit turns. Erratic behavior indicates improper sliding contact setting.

4. Repeat 1 to 3 above for channels 2 through 6, turn **OPERATING CHANNEL** switch to corresponding positions in turn.
5. Reset **OPERATING CHANNEL** switch to position 1
6. Set No. 1 "A" sliding contact 6 turns up from bottom.
7. Connect antenna and tune circuit to resonance, by adjusting **ANTENNA TUNING** knob and No. 1 sliding contact on antenna "A" loading coil until maximum **ANTENNA CURRENT** meter reading is obtained.
8. If necessary adjust No. 1 "A" sliding contact and retune antenna circuit as in 7 above until **D. C. CURRENT** meter reads between 150 to 210 ma. **ANTENNA CURRENT** meter should read from 1.2 to 1.5 amperes.
9. Repeat 5 to 8 above for channels 2 through 6, turn **OPERATING CHANNEL** switch to corresponding positions in turn
10. Repeat 3 through 8 on all channels making slight readjustment where necessary.

RECEIVER PRESETTING

Plug receiving crystals into receiving crystal sockets. That is all that is required for operation on **CRYSTAL 1** or **CRYSTAL 2.**

Each receiving crystal is 385 KC higher than the corresponding transmitting crystal of the same channel number, except for channel 6 which is 385 KC lower

Fig. 38 — Transmitter Presetting Chart.

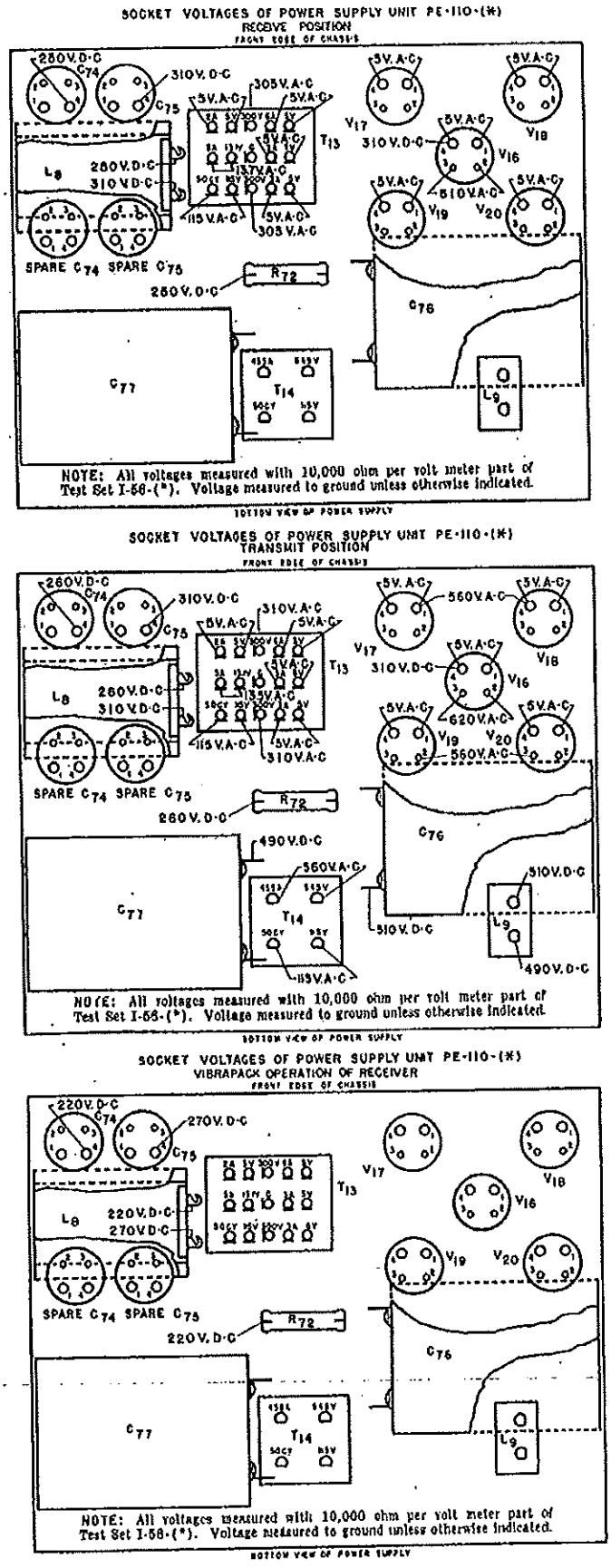


Fig. 39 — Power Supply Unit PE-110(*) Tube Socket Layout Diagrams Showing Voltages.

CURRENT meter reading. This reading should be between 150 ma. and 210 ma. for proper operation of the transmitter.

(i) If the D. C. CURRENT meter indication exceeds 210 ma. move the sliding contactor on the "A" side of the plate tank coil L_3 downward one turn at a time, repeating the antenna loading coil L_4 adjustment and ANTENNA TUNING knob adjustment as in *(e)*, *(f)*, *(g)*, until the D. C. CURRENT meter reads between 150 ma. and 210 ma.

(j) If the D. C. CURRENT meter reads less than 150 ma., repeat the procedure recommended in *(i)* but move the sliding contactor on the "A" side of the plate tank coil L_3 upward instead of downward.

(k) When the correct adjustment is reached, the D. C. CURRENT meter will indicate 150 to 210 ma. of plate current and ANTENNA CURRENT meter will indicate 1. to 1.5 amperes of antenna current.

(l) Repeat the antenna tuning procedure outlined in (14) for any remaining channels, using the sliding contactors pertinent to the corresponding operating channel numbers.

(15) *(a)* Check all tuning adjustments made in par. 28. *d.*, making slight readjustments where necessary to compensate for slight misalignment in tuning due to effects of subsequent circuit adjustments. **CAUTION: Be careful not to locate any of the sliding contactors so that the contacting spring rests between turns as this may short-circuit these turns. Erratic behavior of the transmitter during circuit adjustments indicates improper sliding contactor setting.**

(b) Using the ½" socket wrench in tool box, lock plate tuning capacitors by tightening the locking nut.

(c) Recheck tank tuning, making sure capacitors have not shifted while being locked.

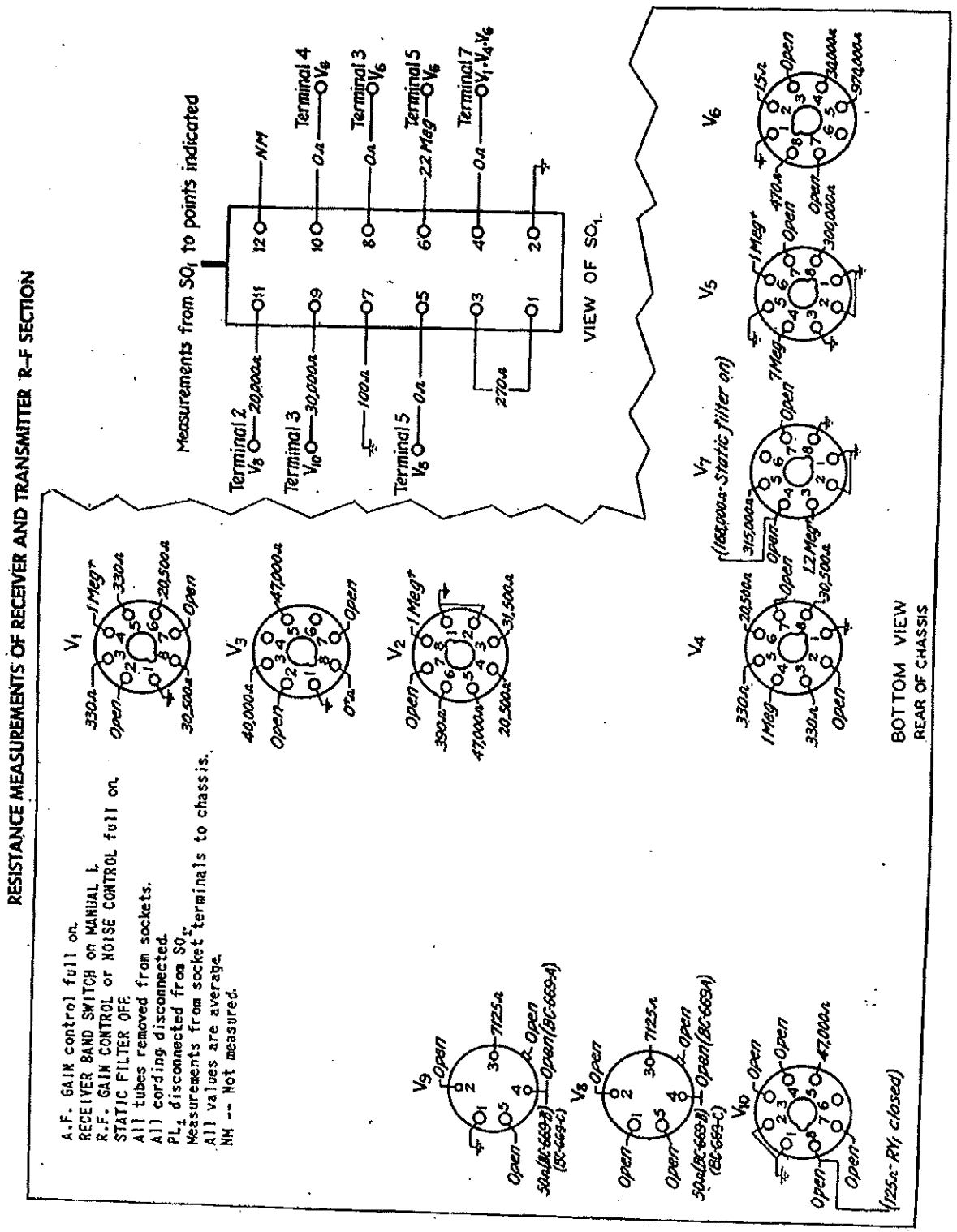


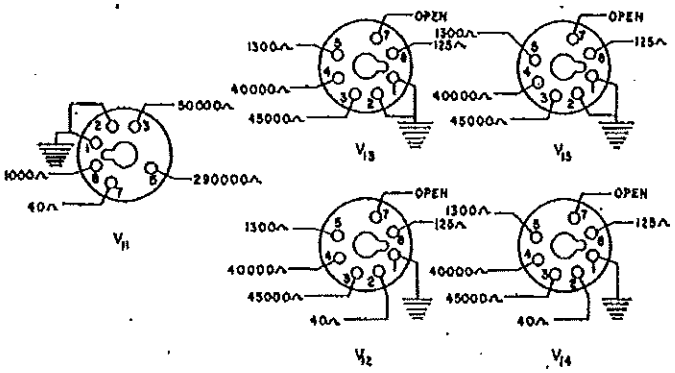
Fig. 40 — Transmitter R.F. Section and Receiver Resistance Measurements.

23. TROUBLE AND REMEDY CHART.—

Symptom	Possible Cause	Check	Remedy
a. Receiving			
(1) No B+ on Receiver (Battery operation)	*(a)* Dead or weak battery	Check battery voltage	Charge if weak Return to depot if dead
	(b) Blown Fuse F_2	Check continuity with meter	Replace
	(c) Poor Relay contacts at RY_3 and RY_4	Check continuity with meter	Clean contacts
	(d) Transformer T_{16} sec. in Vibrapak open	Check continuity with meter	Return to depot
	(e) Defective Vibrator VB_1	Check by substitution	Replace
	(f) Choke L_{18} in Vibrapak open	Check continuity with meter	Return to depot
	(g) Capacitor $C_{90.1,\ 90.2}$ in Vibrapak shorted	Check continuity with meter	Replace
	(h) Buffer Capacitor C_{87} in Vibrapak shorted	Check continuity with meter	Replace
	(i) Capacitors $C_{74,\ 75}$ shorted	Check continuity with meter	Replace
	(j) Filter choke L_8 open	Check continuity with meter	Return to depot
	(k) Poor contact between plug PL_3 of power supply unit and PL_2 of modulator at pin L & Cord CD-515-(*)	Check continuity with meter	Repair
	(l) Poor contact between PL_1 and SO_1 pin #10	Check continuity with meter	Repair
(2) No B+ on Receiver (a-c operation).	*(a)* Blown Fuse F_1	Check continuity with meter	Replace
	(b) Transformer T_{18} pri. or sec. open	Check continuity with meter	Return to depot
	(c) Relay RY_4 inoperative or has bad contacts.	Check continuity with meter	Replace
	(d) Defective tube V_{16}	Check by substitution	Replace
	(e) Capacitors C_{74} or C_{75} shorted	Check continuity with meter	Replace
	(f) Follow par. 23 *a.* (1), sections *(j)*, *(k)* and *(l)* for further procedures	Same	Same
(3) Failure of Tubes to light (Battery operation). Note: Tubes in power supply unit and modulator unit do not light on battery operation.	*(a)* Follow par. 23. *a.* (1) *(a)*, *(b)*, *(c)*, *(k)* and *(l)* for procedure	Same	Same
	(b) Defective tube filaments	Check by observing filaments and substitution	Replace

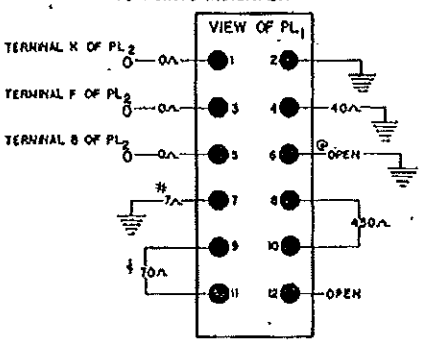
RESISTANCE MEASUREMENTS OF MODULATOR SECTION

SIDETONE VOLUME CONTROL FULL ON.
ALL TUBES REMOVED FROM SOCKETS.
ALL CORDING DISCONNECTED.
PL_1 DISCONNECTED FROM SO_1.
MEASUREMENTS FROM TUBE SOCKETS TO CHASSIS.
ALL VALUES ARE AVERAGE, ACTUAL READINGS MAY VARY.



BOTTOM VIEW OF MODULATOR TUBE SOCKETS.

RESISTANCE MEASUREMENTS FROM PL_1 TO POINTS INDICATED.

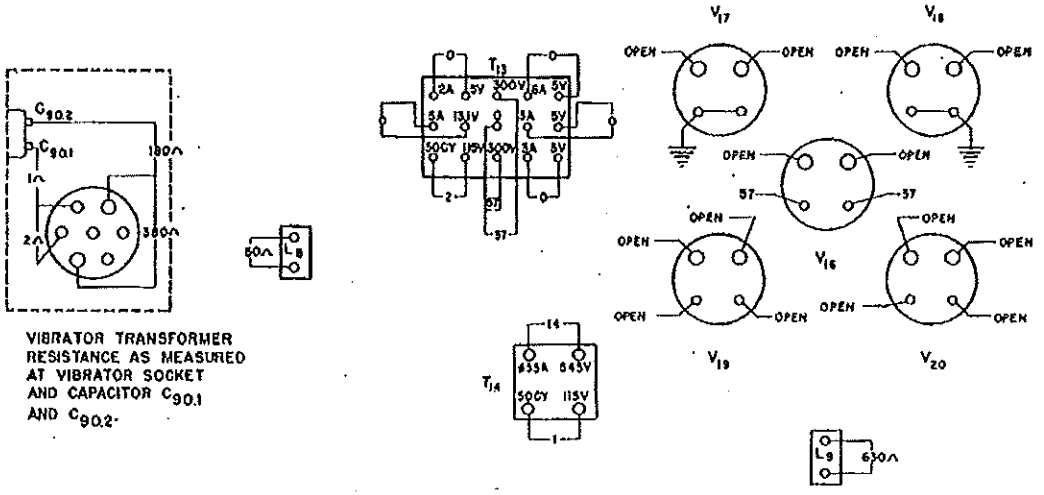


METER SWITCH AT PA GRID
♯ METER SWITCH AT PA PLATE
@ RY_2 HELD CLOSED BY HAND

Fig. 41 — Modulator Resistance Measurements.

RESISTANCE MEASUREMENTS OF POWER SUPPLY.

ALL TUBES REMOVED FROM SOCKETS.
ALL CORDING DISCONNECTED.
MEASUREMENTS FROM SOCKET TERMINALS TO CHASSIS.
ALL VALUES ARE AVERAGE.



VIBRATOR TRANSFORMER RESISTANCE AS MEASURED AT VIBRATOR SOCKET AND CAPACITOR $C_{90.1}$ AND $C_{90.2}$.

BOTTOM VIEW REAR OF CHASSIS

NOTE: Values given in ohms on the outside of T_{13} and T_{14}.

Fig. 42 — Power Supply Unit Resistance Measurements.

Symptom	Possible Cause	Check	Remedy
(4) Failure of Tubes to light (a-c operation)	*(a)* Follow Par. 23. *a.* (2) *(a)* and *(b)* for procedure.		
	(b) Relays RY_3 or RY_4 inoperative or have bad contacts	Check continuity with meter	Repair
	(c) Defective tube filaments	Check by observing filaments and substitution	Replace
	(d) No a-c being supplied by PE-108-(*)	Check PE-108-(*)	Repair
(5) Dead audio	*(a)* Speaker voice coil open	Check continuity with meter (speaker ON-OFF switch in OFF position)	Return to depot
	(b) Output transformer T_9 sec. winding open	Check continuity with meter between terminals 6 and ST (lead from T_9 to ON-OFF switch disconnected)	Return to depot
	(c) Output transformer T_9 pri. winding open	Check continuity with meter between terminals P and B	Return to depot
	(d) Capacitor C_{29} shorted	Check continuity with meter	Replace
	(e) Capacitor C_{30} shorted	Check continuity with meter	Replace
	(f) Resistor R_{23} open	Check continuity with meter	Replace
	(g) Capacitor C_{25} shorted	Check continuity with meter	Replace
	(h) Capacitor C_{26} shorted	Check for positive voltage on pin #7 of tube V_6. Check continuity of C_{26}	Replace
	(i) Capacitor C_{28} open	Check by substitution	Replace
	(j) Resistor R_{19} open	Check continuity with meter	Replace
	(k) Capacitor C_{24} shorted	Check continuity with meter	Replace
	(l) Capacitor C_{31} open	Check by substitution	Replace
	(m) Capacitor C_{22} shorted	Check continuity with meter	Replace
	(n) Capacitor C_{21} shorted	Check continuity with meter	Replace
	(o) Resistor R_{18} open	Check continuity with meter	Replace
	(p) Resistor R_{31} open	Check continuity with meter	Replace
	(q) Defective tube V_8	Check by substitution	Replace
	(r) Defective tube V_5	Check by substitution	Replace
(6) Audio blocks on signal after a period of reception	*(a)* Resistor R_{16} or R_{17} open	Check continuity with meter	Replace

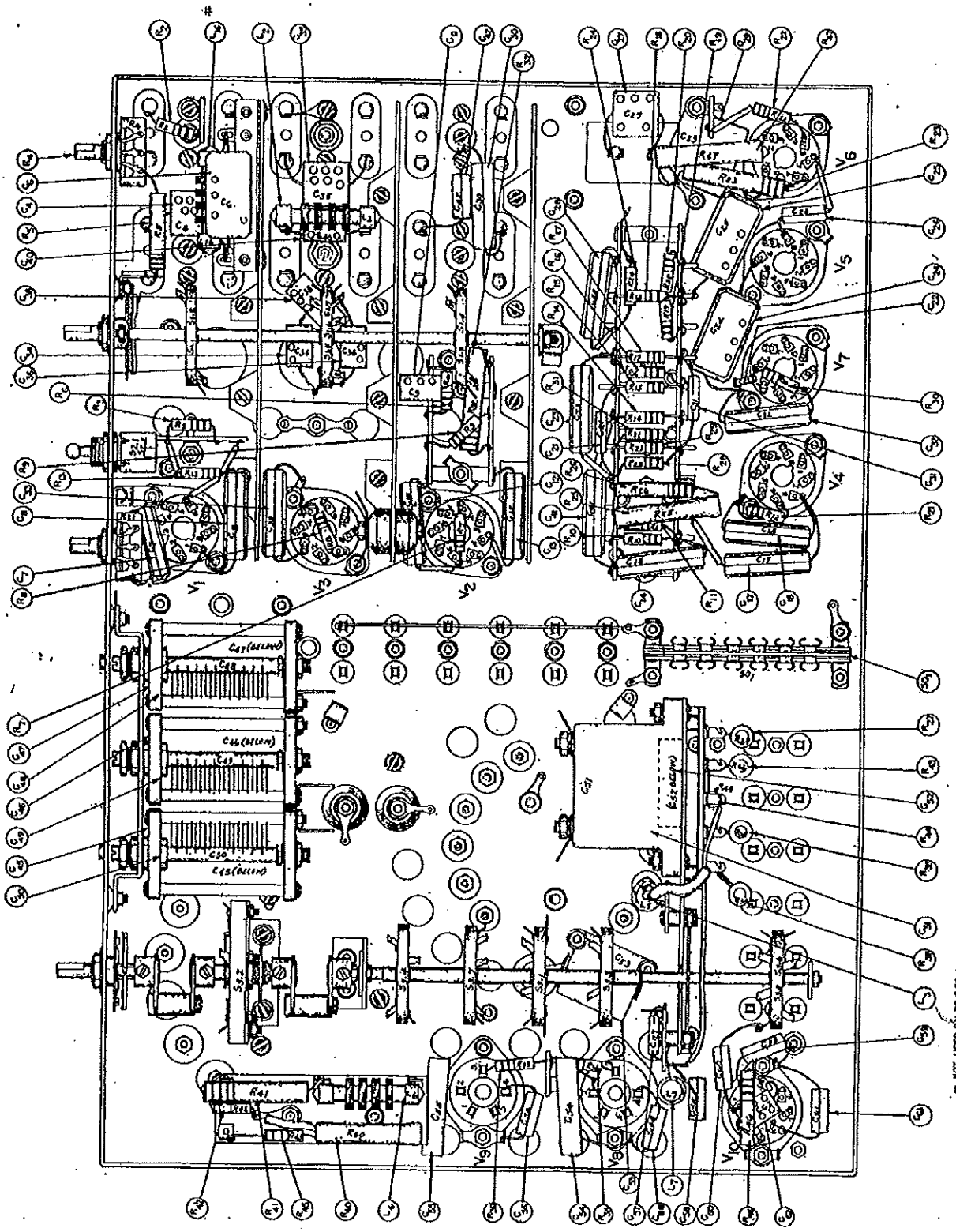


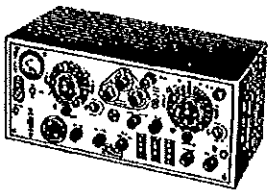
Fig. 43 – Parts Layout of R.F. Chassis.

Symptom	Possible Cause	Check	Remedy
(7) Audio gain higher than normal	*(a)* Resistor R_{28} open	Check continuity with meter	Replace
(8) Dead Noise Limiter	*(a)* Capacitor C_{27} open	Check by substitution	Replace
	(b) Capacitor C_{27} shorted	Check continuity with meter	Replace
	(c) Capacitor C_{28} shorted	Check continuity with meter	Replace
	(d) Choke L_1 open	Check continuity with meter	Return to depot
(Audio also blocks on strong signal)	*(e)* Capacitor C_{24} open	Check by substitution	Replace
	(f) Resistor R_{30} open	Check continuity with meter	Replace
	(g) Capacitor C_{32} shorted	Check continuity with meter	Replace
(9) Signal output higher with Noise Limiter switch in ON position	*(a)* Capacitor C_{31} shorted	Check continuity with meter	Replace
(10) Poor reaction of Noise Limiter to noise	*(a)* Capacitor C_{32} open	Check by substitution	Replace
(11) Dead i-f	*(a)* Tube V_4 defective	Check by substitution	Replace
	(b) Transformer T_6 sec. or pri. open	Check continuity with meter	Repair or return to depot
	(c) Capacitor C_{17} shorted	Check continuity with meter	Replace
	(d) Resistor R_{18} open	Check continuity with meter	Replace
(at grid of V_2)	*(e)* Capacitor R_{14} shorted	Check continuity	Replace
	(f) Tube V_2 defective	Check by substitution	Replace
(12) Weak i-f	*(a)* Capacitor C_{17} open	Check by substitution	Replace
	(b) Transformer T_5 sec. or pri. open	Check continuity with meter	Repair or return to depot
(slug for tuning T_6 will not peak coil)	*(c)* Capacitor C_{20} shorted	Check continuity with meter	Remove shield from coil and replace
(slug for tuning T_6 will not peak coil)	*(d)* Capacitor C_{20} open	Check by substitution	Remove shield from coil and replace
	(e) Capacitor C_{18} shorted	Check continuity with meter	Replace
(Tuning slug on sec. T_5 will not peak coil)	*(f)* Capacitor C_{16} open	Check by substitution	Remove coil shield and replace
(Tuning slug at pri. T_5 will not peak coil)	*(g)* Capacitor C_{15} open	Check by substitution	Remove coil shield and replace
	(h) Capacitor C_{14} open	Check by substitution	Replace
	(i) Capacitor C_{13} shorted	Check continuity with meter	Replace
	(j) Defective tube V_4	Check by substitution	Replace
(at grid of Tube V_2)	*(k)* Capacitor C_{12} open	Check by substitution	Replace
(at grid of Tube V_2)	*(l)* Resistor R_7 open	Check continuity with meter	Replace
	(m) Defective tube V_2	Check by substitution	Replace

2/2 73's EIAPJ

SOUS 48 HEURES VOUS RECEVREZ VOTRE COMMANDE

250 EMETTEURS-RECEPTEURS ZC1. MKII « New-Zealand ».

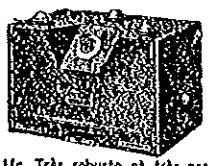


Comportant 11 lampes américaines standard : 1-6K8G, 1-6Q7G, 7-6U7G, 2-6V6G. ● 3 gammes 2 Mc = 150 m - 4 Mc = 75 m - 8 Mc = 37,5 m. Puissance 2 W. ● Cet appareil comporte une quantité fantastique de matériel tropicalisé impossible à décrire, entre autre : 2 verniers démultipliés avec préréglage, 1 milli à cadre de 0 à 100, etc... ● La partie réception de cet appareil est impeccable. ● La partie émission a été détériorée volontairement par l'administration mais peut être remise en état très facilement. ● Ces appareils sont absolument neufs.
(Décrit dans le H.-P. de mai 1959)
Dim. : 540x300x250 mm. Poids : 22 kg. Complet avec lampes et alimentation 12 V. Prix Cirque-Radio **13.500**

2 EMETTEURS-RECEPTEURS PORTABLES

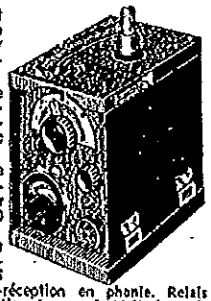
« 1 800 appareils vendus » très légers. Emploi facile, très robustes et toujours à des prix CIRQUE-RADIO.
SCOUTISME - SECOURS EN MONTAGNE Monteurs E.D.F. - Mines - Carrières - Entreprises diverses : LIAISONS RAPIDES avec nos émetteurs-récepteurs portables.

EMETTEUR-RECEPTEUR ER1



Réception et émission en phonie. Portée de 4 à 20 km. Bande couverte 46 à 55 Mc. Très robuste et très pratique. 2 lampes : 1J6, 1E7. Poids 4 kg. Dimensions : 230x140x125 mm. Livré complet avec micro, casque, antenne, piles .. **12.700**

LE NOUVEAU BC-922 U.S. PORTABLE



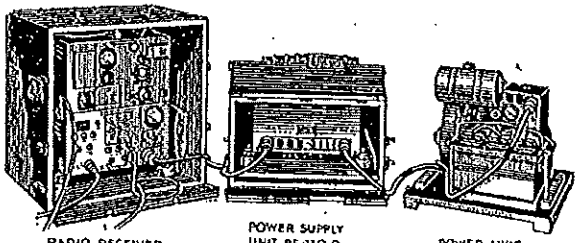
transformé et pouvant être utilisé par tous les amateurs.
● Bande amateur couverte, réception 13,5 Mc à 15,5 Mc.
● Bande émission pilotée par quartz. 14 230 kilocycles.
Appareil très robuste. Portée 5 à 25 km. Emission-réception en phonie. Relais émission-réception incorporé. Voltmètre de contrôle. — 2 lampes : VT33 = 33 ; VT67 = 30. — Poids : 4,6 kg. Dimensions : 210x195x130 mm. Livré complet avec microphone à clés, casque, antenne télescopique et piles, en état de marche. Prix **14.500**

CONTROLEUR D'INTENSITE

Comprenant : 1 coffret avec ampèremètre, 2 lectures avec shunt, 1 lecture : 0 à 25 amp., 2e lecture : 10 à 75 amp. Possibilité d'ajouter un shunt supplémentaire pour lecture supérieure. 1 place à mâchoires pour mesurer l'intensité passant dans les câbles. Indispensable aux radio-électriciens. Valeur 12.000 **3.950**

MATERIEL PROFESSIONNEL UNIQUE
300 STATIONS complètes S. C. R. 543

HALLICRAFTERS-INC, Chicago (U.S.A.)
Station fixe ou station voiture (décrite dans ce numéro, page 79)



RADIO RECEIVER AND TRANSMITTER BC-669-D — POWER SUPPLY UNIT PE-110-D — POWER UNIT PE-108-D

Cet ensemble comprend :
● Un EMETTEUR-RECEPTEUR BC-669 en emballage d'origine. Complet avec lampes et HP. Bande couverte de 1 680 à 4 450 Kcs, comportant pour la partie réception 7 tubes : 1-6H6, 1-6J5, 3-6SK7, 1-6SA7, 1-6K6. Pour la partie émission, 8 tubes : 2-807, 5-6L6, 1-12J5.
La partie émission a été volontairement détériorée par l'administration mais est facilement réparable.
L'émetteur-récepteur. Prix .. **55.000**
● ALIMENTATION-SECTEUR PE 110. Prim. 115 V alt. Sortie 115 V alt, en emballage d'origine 5 tubes 4-5Z3, 1-80. L'alimentation. Prix **25.000**
● GROUPE ELECTROGENE PE 108. Modèle de précision 1 cyl. 4 temps. Essence. Sortie 115 V alt. 600 watts. Le groupe, prix **90.000**
Ces trois articles peuvent être vendus séparément. Valeur réelle de la station : 1.200.000. L'émetteur-récepteur BC-669, l'alimentation PE 110, le groupe PE 108. Prix net sans remise **140.000**

Voici toute une série de
GROUPES ELECTROGENES

pouvant faire fonctionner tous les appareils électriques à usage courant tels que machines-outils, appareils ménagers, scies, ponceuses, perceuses, compresseurs, appareils médicaux et chirurgicaux, etc...
Tous ces groupes sont monophasés, mais peuvent être transformés en triphasés grâce à un appareil s'adaptant instantanément à la sortie.

GROUPE ELECTROGENE « MEA », 1 cyl. 4 temps, 115 V, altern. 50 Ps, 2 KVA. Poids 130 kg **120.000**

GROUPE ELECTROGENE « CEBI », régulateur électrique automatique. Monocylindre, 4 temps. 220 V alt. 1 500 W. **110.000**

GROUPE ELECTROGENE « CEBI », 4 CV, 4 temps, 110 et 220 V, altern. 50 Ps, 2,2 KVA. Long. 1 m, haut. 0,76 m, larg. 0,53 m. Pds 200 kg **145.000**

GROUPE ELECTROGENE « POWER UNIT, KOHLER » U.S.A. Type M.2I.A. 115 V altern. 13 Amp. 1 500 W. Vitesse 1 200 TM. Moteur 4 cyl. 4 temps, essence, de faible consommation. Refroidissement par eau. Poids 175 kg environ **120.000**

GROUPE ELECTROGENE « D.K.W. » Moteur 2 cyl. Flat-Win 4 temps culbuté 6 CV. Démarrage manivelle. Sortie 220 V alternatif 3 KVA. Pds 150 kg environ. Prix **185.000**

GRAND CHOIX DE GROUPES ELECTROGENES toutes marques et toutes puissances. Eclairage, chargeurs d'accus et éclairage combinés. Absolument neufs, révisés, essayés par Techniciens spécialisés et garantis 1 an.

GROUPE ELECTROGENE « JAPLANCASHIRE-CRYPTOL Ltd », 1 cylindre, 4 temps. Sortie 35 V continu, 1 260 watts, démarrage avec manivelle. Poids 50 kg environ **75.000**

GROUPE ELECTROGENE « HOMELYTE », USA, 1 cyl. 2 temps, 110 V continu, 1 800 W. Poids 40 kg environ. **75.000**

GROUPE ELECTROGENE « NORMAN », Moteur 2 cylindres, 4 temps, en Flat-Win. 35 V continu, 1 260 watts, démarrage avec manivelle. Poids 55 kg envir. Prix **75.000**

GROUPE ELECTROGENE ANGLAIS (Marque E.C.C. Limited). Portable. Type miniature Sortie 24 V, 80 watts, 4 temps. Dim. : 360x360x180 mm. Pds : 19 kg. **25.000**

GROUPE ELECTROGENE « HOMELYTE », USA, 1 cyl. 2 temps, 30 V, 1 500 W. Poids 25 kg environ **60.000**

GROUPE ELECTROGENE « PE.77 » USA, 1 cylindre 4 temps. 110 V continu 300 W. Type portable. Poids 30 kg env. **70.000**

GROUPE ELECTROGENE, MOTEUR « CONTINENTAL ELECTRIC », USA, type DM 832X, 2 voltages :
1er voltage : 15 V, 25 Amp. continu.
2e voltage : 1 000 V continu, 350 millis. Vitesse 2 700 TM, moteur 4 temps, refroidissement par air, monté sur châssis. Voltage réglable par rhéostat. Double disjoncteur. Valeur 250.000. Poids 50 kg environ. Prix **85.000**

GROUPE ELECTROGENE « GUINARD », Moteur TRAIN, 1 cylindre, 2 temps. Sortie 30 V continu. 500 watts, démarrage par batterie avec tableau de contrôle. Poids : 25 kg environ **35.000**

GROUPE ELECTROGENE US « Pioneer General Motor », 1 cylindre 4 temps, sortie 12-15 V. continu 300 W, démarrage batterie ou ficelle. Poids : 20 kg. environ. Prix **40.000**

GROUPE ELECTROGENE « PE 108 US », Moteur 1 cylindre, 4 temps. Sorties 110 V 60 Ps 600 W et 12-15 V continu pour recharge de batterie. Démarrage batterie ou ficelle. Poids : 60 kg. env. **90.000**

GROUPE ELECTROGENE « GENERAL-MOTOR » 1 cyl. 4 temps. Démarrage par ficelle ou batterie. Sortie 12-15 V., 20 Amp. Tableau de contrôle, charge, décharge. Poids : 30 kg. environ **40.000**

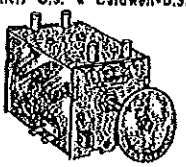
GROUPE ELECTROGENE « US MOTOR » 1 cyl. 2 temps. Démarrage batterie et ficelle. Sortie 24-30 V, 50 Amp. Tableau de contrôle de charge. Poids : 40 kg. environ **65.000**

GROUPE ELECTROGENE « JAP-LONDON » 1 cyl. 4 temps. Régulateur automatique. Sortie 24-32 V, 280 W. Tableau de contrôle, charge, décharge. 30 kg. environ. Prix **59.000**

GROUPE ELECTROGENE « US MOTOR », 1 cyl. 4 temps. Démarrage batterie ou ficelle. Une sortie 12 V, continu pour recharge de batteries. Une 2e sortie 110 V altern. 300 W. 45 kg. environ **80.000**

1.000 Condensateurs variables professionnels O.C. « Rayland - U.S.A. », Comporte 7 cages : 2 de 220 PF, 3 de 120 PF, 1 de 100 PF, 1 de 90 PF entièrement blindé, pouvant être branchées ensemble ou séparément à volonté. Lames argentées, variation linéaire de capacité, grand isolement, vernier démultiplicateur de grande précision avec cadran de lecture gradué. Valeur : 10.000. Prix **1.200**

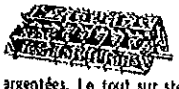
1.500 Condensateurs variables professionnels O.S. « Cardwell-U.S.A. », 2x140 PF, entièrement blindé, à variation linéaire de capacité. Grand isolement. Cadran gradué de 0 à 100 divisions. Valeur : 3.000. .. **700**



700 Condensateurs variables professionnels U.S.A.

à commande automatique 10 touches poussoir réglables à volonté et commande manuelle. Condensateur 4 cages 150 PF monté sur stéatite + 3 ajustable 15 PF sur stéatite, lames argentées. Dim. : 180x125x120 mm. Valeur : 6.000. Prix **900**

700 Condensateurs variables professionnels U.S.A.



Très robustes, comportant sur le même axe 5 cages de 150 PF + 1 cage de 470 PF. Lames argentées. Le tout sur stéatite, 5 CV ajustables de 50 pF sur stéatite, lames argentées. Dim. : 220x80x40 mm. Valeur 6.000. Prix **900**
PRIX NET pour les 4 C. V. 2.900

500 INTERPHONES A TRANSISTORS

(10.000 pas évités dans la journée). Comprend 1 poste contenant l'ampli et les piles, un 2e poste secondaire. Les 2 appareils sont munis d'un bouton d'appel. Caractéristiques : les deux appareils sont de forme pupitre en matière moulée. ● L'ampli incorporé comprend 5 transistors alternatifs télécommandés. ● Chaine de contre-réaction sur les aigus. ● Correction de l'impédance ligne ● Signal d'entrée minimum inférieur à 1 millivolt. ● Puissance modulée 250 milliwatts. ● Gain supérieur à 60 décibels. ● Appareil mobile de grande utilité dans tous les domaines. ● Conversation d'une netteté incomparable. ● Fonctionne avec 2 piles de poche 4,5 V standard, livrées avec les appareils. ● Consommation insignifiante. ● Fonctionne de 2 à 250 m. entre chaque poste. Distance jusqu'à :

15 m. Fil 5 à 6/10 double, le m.			**20**
30 m. —	7/10	— le m.	**25**
50 m. —	9/10	— le m.	**45**
100 m. —	12/10	— le m.	**55**
supérieure à 100 m. —	16/10	— le m.	**65**

Dim. d'un app. 200x140x55 mm. Pds des 2 app. : 1,1 kg. Val. des 2 app. : 35.000.
Prix Cirque-Radio **17.000**

NAVIGATION ET INDUSTRIES DIVERSES

150 MOTEURS « DOUGLAS » de la fameuse fabrication des Avions Douglas DC3 - DC4 - DC6, Constellation, etc..., 2 cylindres Flat-Win, 5-6 CV, culbutés, turbine de refroidissement. Ces moteurs peuvent être montés sur bateaux, scies, faucheuses, tondeuses à gazon, etc... Ils sont à réviser, mais très facilement réparables. Poids 25 à 30 kg environ. Valeur neuf 150.000.
Prix variant de **25.000 à 40.000** suivant état. Vendus en magasin seulement.

SUITE AU VERSO

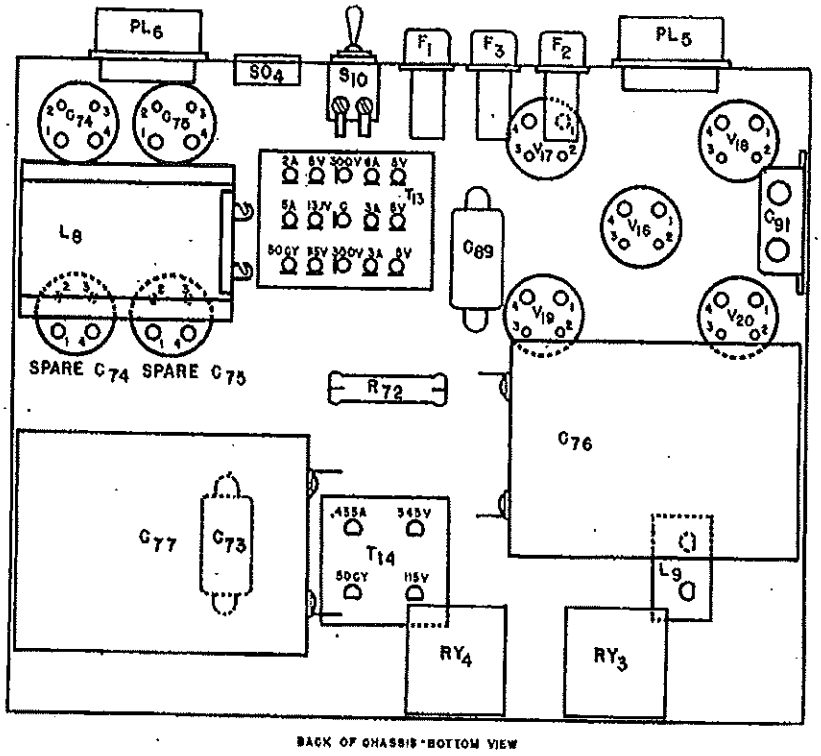


Fig. 44 — Parts Layout of Power Supply Unit.

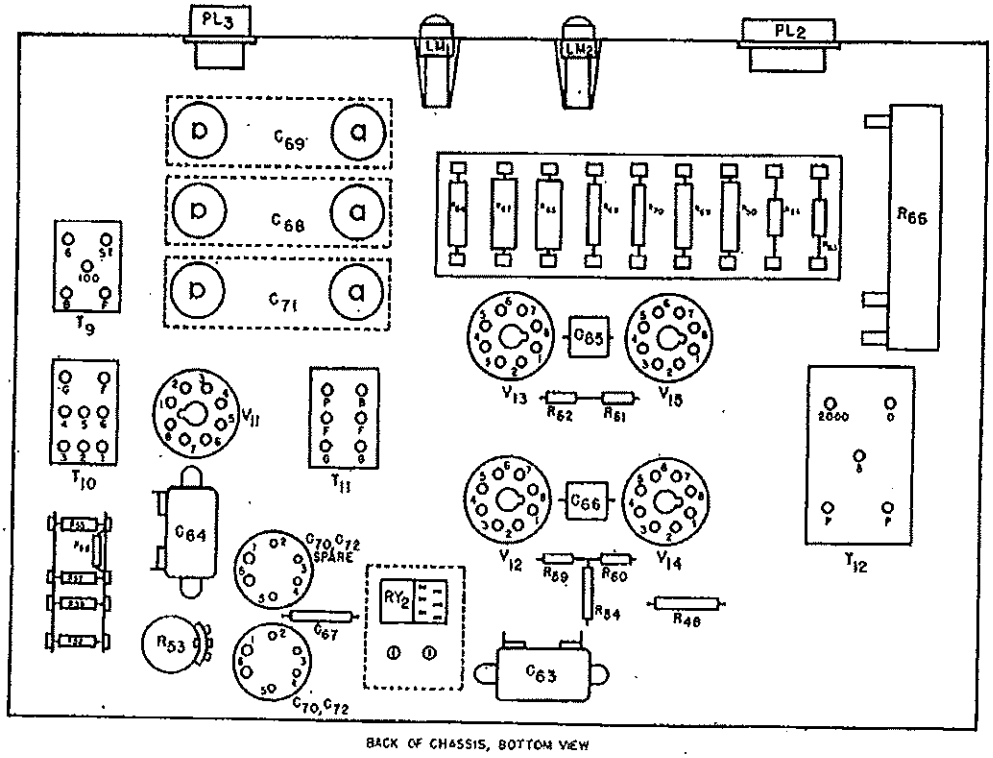


Fig. 45 — Parts Layout of Modulator.

	Symptom	Possible Cause	Check	Remedy
(13)	I-F sensitivity higher than normal	*(a)* Capacitor C_{18} shorted	Check continuity with meter	Replace
		(b) Capacitor C_{12} shorted	Check continuity with meter	Replace
(14)	Sharp i-f picture obtained when using oscilloscope for visual alignment	*(a)* Resistor R_{10} open	Disconnect one lead of R_{10} from T_5 and check continuity	Replace
(15)	Dead oscillator	*(a)* Capacitor C_{33} shorted	Check continuity with meter	Replace
		(b) Capacitor C_{33} open	Check by substitution	Replace
	(Receiver motorboats)	*(c)* Resistor R_8 open	Check continuity with meter	Replace
	(Band #1)	*(d)* Capacitor C_{35} open	Check by substitution	Replace
	(Band #1)	*(e)* Capacitor C_{35} shorted	Check continuity with meter	Replace
	(Band #2)	*(f)* Capacitor C_{38} open	Check by substitution	Replace
	(Band #2)	*(g)* Capacitor C_{38} shorted	Check continuity with meter	Replace
		(h) Capacitor C_{34} open	Check by substitution	Replace
		(i) Capacitor C_{34} shorted	Check continuity with meter	Replace
	(Band #1)	*(j)* Transformer T_7 open	Check continuity with meter	Remove coil shield and repair or return to depot
	(Band #2)	*(k)* Transformer T_8 open	Check continuity with meter	Remove coil shield and repair or return to depot
	(Crystal operation)	*(l)* Choke L_2 open	Check continuity with meter	Return to depot
	(Crystal operation)	*(m)* Capacitor C_{36} open	Check by substitution	Replace
	(Crystal operation)	*(n)* Capacitor C_{40} open	Check by substitution	Replace
		(o) Tube V_3 defective	Check by substitution	Replace
(16)	Dead r-f (Checks OK on i-f)	*(a)* Transformer T_8 sec. open	Check continuity of T_8 across pins #1 and #3 with meter	Remove coil shield and repair or return to depot
	(Check OK on i-f)	*(b)* Transformer T_8 pri. open	Check continuity of T_8 across pins #2 and #4 with meter	Remove coil shield and repair or return to depot
		(c) Capacitor C_{30} shorted	Check continuity across C_{30} with meter	Replace
	(i-f dead also)	*(d)* Capacitor C_9 shorted	Check continuity across C_9 with meter	Replace
	(i-f dead also)	*(e)* Relay R_{4} not making contact	Check continuity of contacts with meter	Repair
	(i-f dead also)	*(f)* R-F choke L_{10} open	Check continuity of L_{10} with meter	Return to depot

Symptom	Possible Cause	Check	Remedy
	(l) Poor contact between contacts E, F, M, A of PL_6 on PE-110-(*) and PL_2 on BC-669-(*)	Check continuity with meter	Repair
	(m) Defective relay contacts at RY_2	Check continuity with meter	Repair or replace
	(n) Resistor R_{64} open	Check continuity with meter	Replace
	(o) Transformer T_{12} open	Check continuity across pins #0 to #2000 with meter	Return to depot
	(p) Poor contact between PL_1 and SO_1 pins 11, 9 and 7	Check continuity with meter	Repair
	(q) Defective relay contacts RY_1	Check continuity with meter	Repair or replace
	(r) Grounded antenna	Check continuity with meter	Repair
	(s) Open relay coil RY_1	Check continuity with meter	Replace
	(t) Shorted or open loading coil L_4	Check continuity with meter	Repair
	(u) Shorted or open tank coil L_3	Check continuity with meter	Repair
(on one frequency only)	*(v)* Shorted tank tuning capacitor	Check continuity with meter	Repair
	(w) Defective Meter M_1	Check by substitution	Replace
	(x) Defective P. A. stage	See Par. 23, *b*, (2), *(a)* to *(d)*	Repair
	(y) Defective osc. stage	See Par. 23, *b*, (5), *(a)* to *(e)*	Repair
(2) No plate voltage on tubes V_8 and V_9	*(a)* Defect in a stage other than P. A. amplifier	See Par. 23, *b*, (1), *(a)* to *(p)*	Repair
	(b) Resistors R_{34} and R_{37} open	Check continuity with meter	Replace
	(c) Capacitor C_{53} shorted	Check continuity with meter	Replace
	(d) Capacitor C_{53} open	Check by substitution	Return to depot
(3) No screen voltage on V_8 and V_9	*(a)* Defect in a stage other than P. A. amplifier	See Par. 23, *b*, (1), *(a)* to *(p)*	Repair
	(b) Capacitor C_{52} shorted	Check continuity with meter	Replace
	(c) Resistor R_{35} or R_{36} open	Check continuity with meter	Replace
	(d) Capacitors C_{54} or C_{55} shorted	Check continuity with meter	Replace

Symptom	Possible Cause	Check	Remedy
(17) Weak r-f.	*(a)* Resistor R_3 open	Check continuity of R_3 with meter	Replace
(at 4400 kc)	*(b)* Capacitor C_4 open	Check by substitution	Replace
(at 1800 kc)	*(c)* Capacitor C_4 shorted	Check continuity of C_4 with meter	Replace
(Band #1)	*(d)* Transformer T_1 sec. open	Check continuity of T_1 across pins #1 and #3 with meter	Remove coil shield and repair or return to depot
(Band #1)	*(e)* Transformer T_1 pri. open	Check continuity of T_1 across pins #2 and #4 with meter	Remove coil shield and repair or return to depot
(at 4400 kc)	*(f)* Capacitor C_9 open	Check by substitution	Replace
(at 4400 kc)	*(g)* Capacitor C_8 open	Check by substitution	Replace
(at 4400 kc)	*(h)* Capacitor C_7 open	Check by substitution	Replace
(Band #2)	*(i)* Transformer T_2 sec. open	Check continuity of T_2 sec. across pins #1 and #3 with meter	Remove coil shield and repair or return to depot
(Band #2)	*(j)* Transformer T_2 pri. open	Check continuity of T_2 pri. across pins #2 and #4 with meter	Remove coil shield and repair or return to depot
	(k) Resistor R_6 open	Check continuity of R_6 with meter	Replace
(18) Noise control (inoperative)	*(a)* Capacitor C_6 shorted	Check continuity of C_6 with meter	Replace
(becomes noisey)	*(b)* Capacitor C_6 open	Check by substitution	Replace
(19) Oscillation in mixer stage	*(a)* Capacitor C_{41} open	Check by substitution	Replace
b. Transmitting			
(1) No current at r-f ammeter	*(a)* Defective Power Unit PE-108-(*)	Check trouble and remedy chart on PE-108-(*)	Repair
	(b) Poor contact between PL_5 of PE-110-(*) and PL_7 of PE-108-(*) pins F and A	Check continuity with meter	Repair
	(c) Blown Fuse F_1	Check continuity with meter	Replace
	(d) Open Relay Coils RY_3 and RY_4	Check continuity with meter	Replace relay
	(e) Open Switch $S_{10.1}$	Check continuity with meter	Return to depot
	(f) Defective switch S_9	Check continuity with meter	Return to depot
	(g) Blown Fuse F_3	Check continuity with meter	Replace
	(h) Transformer T_{14} pri. or sec. open	Check continuity with meter	Return to depot
	(i) Any one of tubes $V_{17, 18, 19, 20}$ defective	Check by observation and substitution	Replace
	(j) Choke L_8 open	Check continuity with meter	Return to depot
	(k) Capacitors $C_{76, 77}$ shorted	Check continuity with meter	Replace

Symptom	Possible Cause	Check	Remedy
(4) No current in d-c milliameter	*(a)* Defective meter	Check by substitution	Replace
	(b) Defective meter switch	Check continuity with meter	Return to depot
(P. A. grid current)	*(c)* Resistors R_{36} or R_{30} open	Check continuity with meter	Replace
	(d) Choke L_6 open	Check continuity with meter	Return to depot
	(e) Resistor R_{41} open	Check continuity with meter	Replace
	(f) Resistor R_{42} open	Check continuity with meter	Replace
	(g) Bad connection between pin 7 of SO_1 and PL_1	Check continuity with meter	Repair
(P.A. plate current)	*(h)* Check circuits for continuity	See Par. 23, *b*, (1), *(a)* to *(p)*	Repair
(No grid current)	*(i)* Dead crystal	Check by substitution	Replace
(No grid current)	*(j)* Dead osc. tube V_{10}	Check by substitution	Replace
(No grid current)	*(k)* Resistor R_{46} open	Check continuity with meter	Replace
(No grid current)	*(l)* Capacitor C_{60} open	Check continuity with meter	Replace
(5) No plate or screen voltage on tube V_{10}	*(a)* R-F choke L_7 open	Check continuity with meter	Return to depot
	(b) Capacitor C_{58} shorted	Check continuity with meter	Replace
	(c) Resistor R_{43} open	Check continuity with meter	Replace
	(d) Resistor R_{44} open	Check continuity with meter	Replace
	(e) Capacitor C_{59} shorted	Check continuity with meter	Replace
(6) No plate voltage on plate of V_{11}	*(a)* Check circuits for continuity	See Par. 23, *b*, (1), *(a)* to *(o)*	Repair
	(b) Resistor R_{66} open	Check continuity with meter	Replace
	(c) Capacitor C_{68} shorted	Check continuity with meter	Replace
	(d) Resistor R_{65} open	Check continuity with meter	Replace
	(e) Resistor R_{69} open	Check continuity with meter	Replace
	(f) Capacitor C_{69} shorted	Check continuity with meter	Replace
	(g) Capacitor C_{11} shorted	Check continuity with meter	Replace
	(h) Transformer T_{11} pri. open	Check continuity across terminals P and B	Return to depot

Symptom	Possible Cause	Check	Remedy
(7) No plate voltage on plates of tubes V_{12}, V_{13}, V_{14}, V_{15}	*(a)* Check circuits for continuity	See Par. 23, *b*, (1), *(a)* to *(o)*	Repair
	(b) Defective meter shunt R_{68}	Check continuity with meter	Replace
	(c) Resistor R_{66} open	Check continuity with meter	Replace
	(d) Capacitor C_{68} shorted	Check continuity with meter	Replace
	(e) Transformer T_{12} pri. open	Check continuity across terminals	Return to depot
	(f) Resistors $R_{59, 60, 61, 62}$ open	Check continuity with meter	Replace
(8) No screen voltage on screens of tubes V_{12}, V_{13}, V_{14}, V_{15}	*(a)* Check circuits for continuity	See Par. 23, *b*, (6), *(a)* to *(d)*	Repair
	(b) Capacitor C_{69} shorted	Check continuity with meter	Replace
(9) Failure of microphone or handset switch to operate Relay RY_2	*(a)* Defective microphone switch contact A	Check continuity with meter	Use spare microphone or handset
	(b) Defective microphone or handset cord	Check continuity with meter	Repair or use spare microphone or handset
	(c) Defective contact between PL_4 and SO_2	Check continuity with meter	Repair or use spare microphone or hands
	(d) Defective contact between SO_3 of remote control unit, PL_3 on modulator unit and Cord CD-513-(*)	Check continuity with meter	Repair or use spare Cord CD-513-(*)
	(e) Resistor R_{50} open	Check continuity with meter	Replace
	(f) Relay coil of RY_2 open	Check continuity with meter	Replace
	(g) No B+ on terminal B of T_8 or contact 10 of PL_1	Check continuity with meter	Return to depot
(10) Failure of microphone or handset to operate	*(a)* Defective microphone switch contact B	Check continuity with meter	Use spare microphone or handset
	(b) Packed carbon in microphone	Jar slightly	Use spare microphone or handset
	(c) Bad connection between PL_4 and SO_2	Check continuity with meter	Repair or use spare cord
	(d) Defective contact between SO_3 of remote control unit, PL_3 on modulator unit and Cord CD-513-(*)	Check continuity with meter	Repair or use spare Cord CD-513-(*)
	(e) Transformer T_{10} pri. or sec. open	Check continuity with meter	Return to depot
	(f) Capacitors $C_{70, 72, 89, 98}$ shorted	Check continuity with meter	Replace
	(g) Resistors $R_{65, 66, 67, 69, 70}$ open	Check continuity with meter	Replace

Symptom	Possible Cause	Check	Remedy
(11) Failure of microphone or handset to modulate r-f signal (Microphone or handset although known to be good may fail to modulate the carrier due to defective parts in modulator and remote control units)	*(a)* Check circuits for continuity	See Par. 23, *b*, (10), *(a)* to *(g)*	Repair
	(b) Transformer T_{10} sec. open	Check continuity with meter	Return to depot
	(c) Resistors $R_{56, 58, 59, 60, 61, 62, 63, 65, 66, 67, 68}$ or $_{69}$ open	Check continuity with meter	Replace
	(d) Defective tubes $V_{11, 12, 13, 14,}$ or $_{15}$	Check by substitution	Replace
	(e) Transformer T_{11} pri. or sec. open	Check continuity with meter	Return to depot
	(f) Transformer T_{12} pri. or sec. open	Check continuity with meter	Return to depot
	(g) Capacitors $C_{65, 66, 68, 69, 70,}$ or $_{71}$ open	Check continuity with meter	Replace
(12) Failure of speaker LS_1 to operate on side tone (assuming speaker operates on receiver)	*(a)* Resistors $R_{22, 53}$ or $_{54}$ open	Check continuity with meter	Replace
	(b) Relay contacts of RY_2 open	Check continuity with meter	Repair or replace
	(c) Capacitor C_{07} open	Check continuity with meter	Replace
	(d) Bad connection between PL_1 and SO_1, pin 6, (R_{53} turned to off position)	Check continuity with meter	Repair
(13) Failure of handset receiver or headset to operate on side tone	*(a)* Defective switch in microphone or headset	Check by substitution	Use spare
	(b) Defective transformer C-410 used in CD-605	Check by substitution	Use spare
	(c) Defective Headset HS-30-(*)	Check by substitution	Use spare headset
	(d) Open circuit in receiver of handset	Check by continuity with meter or by substitution	Use spare handset
	(e) Open circuit in microphone or handset cord	Check continuity with meter	Use spare microphone or handset
	(f) Defective connection between PL_4 and SO_2	Check continuity with meter	Repair
	(g) Volume control R_{53} or R_{71} turned to off position	Check to see if turned off	Turn on
(14) Failure of receiver of handset or headset to operate on receiver	*(a)* Check circuits for continuity	See Par. 23, *b*, (13), *(a)* to *(g)*	Repair

Symptom	Possible Cause	Check	Remedy
(15) Failure of relay RY_1 to operate (assuming RY_2 operates)	*(a)* Relay coil of RY_1 open	Check continuity with meter	Replace relay
	(b) Bad contact between PL_1 and SO_1 pins 1 and 3	Check continuity with meter	Repair
	(c) Poor contact on relay RY_2	Check continuity with meter	Repair
	(d) Poor contact between PL_2 of modulator and PL_6 of power supply unit	Check continuity with meter	Use spare cord
	(e) Poor contact between PL_5 of power supply unit and PL_7 of power unit.	Check continuity with meter	Use spare Cords CD-515-(*) or CD-514-(*)
	(f) Blown Fuse F_3	Check continuity with meter	Replace
	(g) No a-c supplied by Power Unit PE-108-(*)	Check "Trouble & Remedy Chart" on Power Unit PE-108-(*)	Repair
(16) Failure of relays RY_3 and RY_4 to operate when a-c is supplied	*(a)* Blown Fuse F_1	Check continuity with meter	Replace
	(b) Open relay coils	Check continuity with meter	Replace relay
	(c) Poor contact between PL_5 of Power Supply Unit PE-110-(*) and PL_7 of Power Unit PE-108-(*) pins F and A	Check continuity with meter	Repair
	(d) No a-c being supplied by Power Unit PE-108-(*)	Check "Trouble & Remedy Chart" on Power Unit PE-108-(*)	Repair
(17) Failure of set to operate from a light socket source of a-c supply (**CAUTION: Be sure Power Unit PE-108-(*) is disconnected before connecting Power Supply Unit PE-110-(*) to a commercial power source with Cord CD-511-(*), failure to do this will result in severe damage to Power Supply Units PE-108-A, PE-108-B, and PE-108-C. Power Unit PE-108-D is protected against this damage by a circuit breaker.**)	*(a)* A-c source dead	Check fuses in power line	Replace line fuses
	(b) Poor contact between socket SO_4 and commercial a-c source through Cord CD-511-(*)	Check continuity with meter	Replace Cord CD-511-(*) with spare or return socket SO_4 to depot

24. DIFFERENCES BETWEEN RADIO SETS SCR-543-A AND SCR-543-B.—

a. Radio Receiver and Transmitter BC-669-B on Signal Corps Order No. 4792-PHILA-43.—

(1) Tubes V_1, V_2, V_3, V_4, V_5, V_7 and V_{10} changed to glass.

(2) R-F choke L_{10} added in cathode circuit of V_1 and V_4.

(3) Capacitor C_6 reconnected to arm of noise control R_4.

(4) Two tie lugs added to mount C_6 and L_{10}.

(5) Capacitor C_{88} added to cathode of tube V_8.

(6) V_9 cathode resistor R_{40} disconnected from R_{45} and grounded directly.

(7) Transformer T_9—

(a) 6 ohm secondary changed to impedance of 100 ohms.

(b) 6 ohm tap added.

(c) 100 ohms connected to terminal F on plug PL_3.

(d) Tap connected to switch S_4.

(8) Transmitter channel switch $S_{3.1}$, $S_{3.3}$, $S_{3.4}$, $S_{3.5}$, $S_{3.6}$, $S_{3.7}$.

(a) Mtg. dimensions 1/16" longer (front to rear).

(b) Some metal spacers replaced with ceramic spacers.

(c) Rotor contact blades wider.

(9) C_{45} to C_{50} inclusive—locking ring added to lock shaft bushing to ceramic front plate.

(10) Trunk fasteners replaced with improved type.

(11) Sliders on coils L_3 and L_4 replaced with one piece type.

(12) Ground binding post replaced with captive type.

(13) Relay RY_1.

(a) Contact spacing increased.

(b) Contact diameter and thickness decreased.

(14) R. F. GAIN on panel changed to NOISE CONTROL.

(15) Banana plug replaced with heavier type.

(16) Crystal shield has additional section between tubes V_8 and V_{10}.

(17) Dial indicators replaced with improved type.

(18) Antenna feed-thru thumb nut made captive.

(19) Slotted set screws replaced with Allen head type.

(20) Crystal holder nameplates stamped "TRAN. 1," "REC. 1."

(21) I-F transformers T_6 moved closer to T_5 so T_6 aligning screw may be reached between tubes V_3 and V_7.

(22) Channel switch couplings replaced with two-piece type which was later replaced with a one-piece flexible type.

(23) Transmitter channel switch shield revised to mount two types of capacitor C_{51}.

(24) Insulator board added to rear of resistor terminal board on channel switch shield.

(25) Side modulator cabinet clips replaced with heavier type.

(26) Ground wire added from mounting screw on tank coil L_3 to ground lug.

(27) C_{44} mounting insulators changed to type without brass inserts on the latter part of Order 4792-PHILA-43.

(28) The following capacitors changed (see 27. Table of Replaceable Parts):

C_2	C_{11}	C_{31}	C_{38}	C_{59}
C_3	C_{12}	C_{32}	C_{39}	C_{60}
C_5	C_{28}	C_{34}	C_{40}	C_{61}
C_6	C_{26}	C_{35}	C_{51}	C_{65}
C_9	C_{27}	C_{36}	C_{56}	C_{66}
C_{10}	C_{29}	C_{37}	C_{58}	

(29) R_{51} changed from 100 ohm ½ watt to 33 ohm 2 watt on some Radio Receivers and Transmitters BC-669-A on Signal Corps Order No. 1980-CHI-42, and then to 6 ohm 10 watt on Order 4792-PHILA-43.

(30) The following misc. parts changed (see Par. 27. Table of Replaceable Parts):

RY_1	T_4	V_2	V_8
S_3	T_7	V_3	V_9
T_1	T_8	V_4	V_{10}
T_2	T_9	V_5	
T_3	V_1	V_7	

b. Radio Receiver and Transmitter BC-669-B on some equipment produced on Signal Corps Order No. 15536-PHILA-43.

(1) Base clamps added to tubes V_{10}, V_{12}, V_{13}, V_{14}, V_{15}.

(2) Tube holder assembly added to tubes V_8, V_9.

(3) Crystal clamps added.

(4) Steel strap added around capacitors C_{68}, C_{69}, C_{71}.

(5) Clamp added to hold cover of relay RY_2 in place.

c. Power Supply Unit PE-110-B on Signal Corps Order No. 4792-PHILA-43.—

(1) Reference numbers of capacitors C_{91} and C_{92} changed to C_{86} and C_{87} respectively in vibrapack VP_1.

(2) Capacitor C_{91} added across relay RY_4 contacts.

(3) Ground lug on vibrapack VP_1 replaced with screw and lug.

(4) Holders for fuses F_1, F_2, F_3 replaced with new type.

d. Miscellaneous Changes on Signal Corps Order No. 4792-PHILA-43.—

(1) Headset HS-22-C replaced with Headset HS-30-(*).

(2) Two Cord CD-605 added.

(3) Two Mast Sections MS-54 added.

(4) Microphone not supplied.

(5) One each Guys GY-11 and GY-12 added.

(6) Omitted one Mast Base MP-37 and Mast Bracket MP-50 with removable wing nuts.

(7) One Cover BG-67-(*) added.

(8) One each Mast Sections MS-49 to MS-53 inclusive omitted.

(9) Two 8-32 Allen set screw wrenches added to BC-669-B tool box.

25. DIFFERENCES BETWEEN RADIO SET SCR-543-B AND RADIO SET SCR-543-C.—

a. Radio Receiver and Transmitter BC-669-C on Signal Corps Order No. 4791-PHILA-43 and 15537-PHILA-43.—

(1) Capacitor C_6 connected between R_3 and L_{10}.
(2) Allen head type set screw not used.
(3) Fuse holders remain old type.
(4) Allen set screw wrenches not used.
(5) Knobs on front panel different style.

b. Radio Receiver and Transmitter BC-669-C; on some sets produced on Signal Corps Order No. 4791-PHILA-43 and 15537-PHILA-43.—

(1) Trunk fasteners mounting BC-669-C to the mounting pan changed to draw-bolt clamps.
(2) Cover of relay RY_1 held in place by set screw.
(3) Straps holding down capacitors C_{68}, C_{69}, C_{71} constructed of heavier metal.
(4) Plates added below shock-mounts to facilitate removal of mounts.
(5) Channel switch coupling, one piece flexible type of different construction.

c. Power Supply Unit PE-110-C; on some sets produced on Signal Corps Order No. 4791-PHILA-43 and 15537-PHILA-43.

(1) Ball type contacts used on Relays RY_3 and RY_4.

26. RADIO SET SCR-543-B, AND RADIO SET SCR-543-C.—The radio sets on Order No. 32780-PHILA-43 and Order No. 32781-PHILA-43 are identical in construction and are the same as some Radio Sets SCR-543-C produced on Signal Corps Order No. 4791-PHILA-43 and 15537-PHILA-43 with the following exceptions:

a. Radio Receiver and Transmitter BC-669-B, and BC-669-C.

(1) Resistor R_{60} changed from 25,000 ohms to 15,000 ohms.
(2) Resistor R_{76} added from coil of relay RY_2 to ground. (See fig. 25.)
(3) Capacitor C_{74} and C_{75} changed to 8 μf. 475W.V.
(4) Capacitor C_{25}, C_{31}, C_{65} and C_{66} are of moulded paper type only.
(5) Differences between SCR-543-B and SCR-543-C are:
(a) Knobs slightly different style.
(b) Nameplates.
(c) Nomenclature of respective parts.

SECTION V — SUPPLEMENTARY DATA

27. Table of Replaceable Parts, Radio Set SCR-543-(*)

REF. SYMBOL	SIG. CORPS STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
a. Radio Receiver and Transmitter BC-669-(*)					
$C_{1.1}$		Capacitor, single 13.5 μμf. to 120.5 μμf. section of 3 gang variable.	Rec. ant. stage tuning	OM	664A-3-60
$C_{1.2}$		Same as $C_{1.1}$	Rec. mixer tuning		
$C_{1.3}$		Same as $C_{1.1}$	Rec. osc. tuning		
C_2A*		Capacitor, .0045 μf. 20%, 300W.V.; molded mica, postage stamp type.	Rec. ant. coupling, band 1	CD	1WLS
C_2B*		Capacitor, .006 μf. (−10%+20%) 300W.V.; molded mica, postage stamp type.	Rec. ant. coupling, band 1	CD	1WS
C_2C*		Capacitor, .0045 μf. 20%, 300W.V.; molded mica, postage stamp type.	Rec. ant. coupling, band 1	MIC SO	WXM MWBW
C_3A, C*		Capacitor, 6-25 μμf. variable, air, 11 plate, ceramic base 1-13/16 in. x 1-3/8 in. x 1/4 in.; 1/4 in. x 5/16 in. long shaft, with screw driver slot, special.	T_1 sec. trimmer, band 1	SI	SD-2794
C_3B*		Capacitor, 6-25 μμf. variable, air, 8 plate; ceramic base 1-7/32 in. x 15/16 in. x 1/4 in.; 1/4 in. hex. x 5/16 in. long shaft with screw driver slot, special.	T_1 sec. trimmer, band 1	GU	C972
C_4		Capacitor, .001 μf. 5%, 500W.V.; molded, silver-mica, postage stamp type.	V_1 A.V.C. by-pass	MIC CD SO	PW 1R MWSW
C_4C*		Capacitor, .001 μf. 5%, 500W.V.; tubular ceramic, postage stamp type.	V_1 A.V.C. by-pass	ER	N750F
C_5A, C*		Same as C_3AC*	T_2 sec. trimmer, band 2		
C_5B*		Same as C_3B*	T_2 sec. trimmer, band 2		
C_6A*		Capacitor CA-234, 1 μf. (+14%−6%), 200W.V.; paper, oil-filled; bathtub type metal case with lug terminals and mtg. ears; 2-3/8 in. x 2 in. x 1 in.	R_4 r-f filter	A	230
C_6B*		Capacitor, .05 μf. (−10%+20%), 400W.V.; molded paper, 1-5/32 in. x 5/8 in. x 1/4 in.	R_4 r-f filter	MIC	342-33
C_6C*		Capacitor, .01 μf. 20%, 400W.V.; molded paper, 1-7/16 in. x 3/4 in. x 5/16 in.	R_4 r-f filter	MIC	340-21

C_7AB*	Capacitor, .02 μf. (−10%+20%) 400W.V.; molded paper, 1-7/16 in. x 3/4 in. x 5/16 in.	V_1 cathode by-pass	MIC	342-12
C_7C*	Capacitor, .02 μf. 20%, 400V; molded paper, 1-7/16 in. x 3/4 in. x 5/16 in.	V_1 cathode by-pass	MIC	342-12
C_8A, B*	Capacitor, .1 μf. (−10%+20%), 400W.V.; molded paper, 1-7/16 in. x 3/4 in. x 3/8 in.	V_1 screen by-pass	MIC	345-21
C_8C*	Capacitor, .1 μf. 20%, 400W.V.; molded paper.	V_1 screen by-pass	MIC	345-21
C_9A*	Capacitor, 3 μμf. 20%, 500W.V.; molded mica, small postage stamp type.	V_1 plate to V_2 control grid coupling	CD SO	5WLS MOBW
C_9B*	Capacitor, 2.5 μμf. (−0+80%), 500W.V.; molded mica, postage stamp type, special.	V_1 plate to V_2 control grid coupling	GU	C971
C_9C*	Capacitor, 3 μμf. 20%, 500W.V.; temp. coeff. .00075; tubular, ceramic.	V_1 plate to V_2 control grid coupling	CRL ER	D N750K
$C_{10}A, C$*	Same as C_8A, C*	T_3 sec. trimmer, band 1		
$C_{10}B$*	Same as C_9B*	T_3 sec. trimmer, band 1		
$C_{11}A, C$*	Same as C_8A, C*	T_4 sec. trimmer, band 2		
$C_{11}B$*	Same as C_9B*	T_4 sec. trimmer, band 2		
$C_{12}A$*	Capacitor, .05 μf. (−10%+20%), 400 W.V.; molded paper, 1-7/16 in. x 3/4 in. x 3/8 in.	V_2 cathode by-pass	MIC	345
$C_{12}B$*	Same as C_8B*	V_2 cathode by-pass		
$C_{12}C$*	Capacitor, .05 μf. 20%, 400W.V.; molded paper, 1-7/16 in. x 3/4 in. x 5/16 in.	V_2 cathode by-pass	MIC	342-33
$C_{13}A, B$*	Same as C_7A, B*	V_2 screen by-pass		
$C_{13}C$*	Same as C_7C*	V_2 screen by-pass		
$C_{14}A, B$*	Capacitor, .02 μf. (−10+20%), 600W.V.; molded paper; 1-7/16 in. x 3/4 in.	V_2 plate supply filter	MIC	345-9
$C_{14}C$*	Capacitor, .02 μf. 20%, 600W.V.; molded paper, 1-7/16 in. x 3/4 in. x 3/8 in.	V_2 plate supply filter	MIC	345-9
C_{15}	Capacitor, 200 μμf. 5%, 500W.V.; molded silver-mica, small postage stamp type.	T_5 pri. resonator	CD MIC SO	5R PO MOSW
$C_{15}C$*	Capacitor, 200 μμf. 5%, 500W.V.; temp. coeff. .00075; tubular, ceramic.	T_5 pri. resonator	CRL ER	C N750C

The word special indicates part made for, or by the Contractor.
**Applies only to models indicated.*

REF. SYMBOL	SIG. CORPS STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
C_{14}		Same as C_{13}	T_5 sec. resonator		
$C_{14}C$*		Same as $C_{13}C$*	T_5 sec. resonator		
$C_{17}A$, B*		Same as C_7A, B*	T_5 sec. return		
$C_{17}C$*		Same as C_7C*	T_5 sec. return		
$C_{18}A$, B*		Same as C_7A, B*	V_4 cathode by-pass		
$C_{18}C$*		Same as C_7C*	V_4 cathode by-pass		
C_{19}		Same as C_{15}	T_6 pri. resonator		
$C_{19}C$*		Same as $C_{15}C$*	T_6 pri. resonator		
C_{20}		Same as C_{15}	T_6 sec. resonator		
$C_{20}C$*		Same as $C_{15}C$*	T_6 sec. resonator		
C_{21}		Capacitor, 50 μμf. 20%, 500W.V.: molded mica, small postage stamp type; low-loss bakelite case.	T_6 sec. return	MIC SO	OXMS MOBW
$C_{21}C$*		Capacitor, 50 μμf. 20%. 500W.V.; temp. coeff. .00075; tubular, ceramic.	T_6 sec. return	CRL ER	D N750K
C_{22}		Same as C_{21}	I-F filter		
$C_{22}C$*		Same as $C_{21}C$*	I-F filter		
$C_{23}A$*		Same as $C_{12}A$*	V_3 A.V.C. filter		
$C_{23}B$*		Same as C_8B*	V_3 A.V.C. filter		
$C_{23}C$*		Same as $C_{12}C$*	V_3 A.V.C. filter		
$C_{24}A$, B*		Same as C_8A, B*	V_3 screen by-pass		
$C_{24}C$*		Same as C_8C*	V_3 screen by-pass		
$C_{25}A$, B*		Capacitor, .05 μf. (−10%+20%), 600W.V.; molded paper, 1-7/16 in. x 3/4 in. x 3/8 in.	V_3 plate and screen supply filter	MIC	345-22
$C_{25}C$*		Capacitor, .05 μf. 20%. 600W.V.: molded paper, 1-7/16 in. x 3/4 in. x 3/8 in.	V_3 plate and screen supply filter	MIC	345-22
$C_{26}A$, C*		Capacitor, .005 μf. 20%, 300W.V.; molded mica, postage stamp type.	V_8 audio coupling	CD MIC SO	IWLS WXM MWBW
$C_{26}B$*		Capacitor, .006 μf. 20%, 600W.V.; molded paper, 1-7/16 in. x 3/4 in. x 5/16 in.	V_8 audio coupling	MIC	342

$C_{26}C$*	Capacitor, .005 μf. 20%, 400W.V.; molded paper, 1-5/32 in. x 5/8 in. x 1/4 in.	V_6 audio coupling	MIC	340-14
$C_{27}A$*	Capacitor, .0075 μf. 20%, 300W.V.; molded mica, postage stamp type.	Static filter resonator	CD	1WLS
$C_{27}B$*	Capacitor, .007 μf. 20%, 400W.V.; molded paper, 1-7/16 in. x 3/4 in. x 5/16 in.	Static filter resonator	MIC	342-7
$C_{27}C$*	Capacitor, .0075 μf. 10%, 300W.V.; molded mica, postage stamp type.	Static filter resonator	MIC SO	WXM MWBW
$C_{28}A, B$*	Same as C_8A, B*	V_6 cathode filter		
$C_{28}C$*	Same as C_8C*	V_6 cathode filter		
$C_{29}A$*	Capacitor, .002 μf. 20%, 800W.V.; molded mica, postage stamp type	V_6 plate by-pass	CD	1WLSP
$C_{29}B, C$*	Capacitor, .002 μf. 10%, 2500W.V.; molded mica, 1-5/8 in. x 1-1/8 in. x 7/16 in. low-loss bakelite case with mtg. ears and terminal lugs.	V_6 plate by-pass	MIC SO	6XM XQBW
$C_{30}A, B$*	Same as $C_{25}A, B$*	V_6 screen by-pass		
$C_{30}C$*	Same as $C_{25}C$*	V_6 screen by-pass		
$C_{31}A, C$*	Capacitor, .002 μf. 20%, 500W.V.; molded mica, postage stamp type.	V_5 audio coupling	CD MIC SO	1WLS WXM MWBW
$C_{31}B$*	Capacitor, .002 μf. 20%, 600W.V.; molded paper, 1-5/32 in. x 5/8 in. x 1/4 in.	V_5 audio coupling	MIC	340-17
$C_{31}C$*	Capacitor, .002 μf. 20%, 400W.V.; molded paper, 1-5/32 in. x 5/8 in. x 1/4 in.	V_5 audio coupling	MIC	340-11
$C_{32}A$*	Same as $C_{12}A$*	V_7 A.N.L. diode by-pass		
$C_{32}B$*	Same as C_6B*	V_7 A.N.L. diode by-pass		
$C_{32}C$*	Same as $C_{12}C$*	V_7 A.N.L. diode by-pass		
$C_{33}A, B$*	Same as $C_{14}A, B$*	V_8 plate by-pass		
$C_{33}C$*	Same as $C_{14}C$*	V_8 plate by-pass		
$C_{24}A$*	Capacitor, 25 μμf. 5%, 500W.V.; molded mica, small postage stamp type	V_8 grid coupling, manual position	CD	5WLS
$C_{34}B$*	Capacitor, 25 μμf. 10%, 500W.V.; molded silver-mica, postage stamp type.	V_8 grid coupling, manual position	MIC	PO

**Applies only to models indicated.*

REF. SYMBOL	SIG. CORPS STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
$C_{34}C^*$		Capacitor, 25 μμf. 5%, 500W.V.; molded mica, small postage stamp type.	V_3 grid coupling, manual position	MIC SO	OXM MOBW
$C_{34}C^*$		Capacitor, 25 μμf. 5%, 500W.V.; zero temp. coeff.; tubular ceramic.	V_3 grid coupling, manual position	CRL ER	D N470K
$C_{35}A^*$		Capacitor, 380 μμf. 2%, 300W.V.; molded silver-mica, postage stamp type.	Osc. pad, band 1	CD	1R
$C_{35}B, C^*$		Capacitor, 380 μμf. 2%, 300W.V.; molded silver-mica, small postage stamp type.	Osc. pad, band 1	MIC SO	PO MWSW
$C_{35}C^*$		Capacitor, 380 μμf. 2%, 300W.V.; zero temp. coeff.; tubular ceramic.	Osc. pad, band 1	CRL ER	A N470E
$C_{36}A^*$		Capacitor, 100 μμf. 2%, 500W.V.; molded mica, postage stamp type.	V_3 feed-back for crystal operation	CD	1WLST
$C_{36}B, C^*$		Capacitor, 100 μμf. 5%, 500W.V.; molded silver-mica, small postage stamp type.	V_3 feed-back for crystal operation	MIC	PO
$C_{36}C^*$		Capacitor, 100 μμf. 2%, 500W.V.; molded silver-mica, small postage stamp type.	V_3 feed-back for crystal operation	SO	MOSW
$C_{36}C^*$		Capacitor, 100 μμf. 2%, 500W.V.; zero temp. coeff.; tubular ceramic.	V_3 feed-back for crystal operation	CRL ER	C N150M
$C_{37}A, C^*$		Same as C_3A, C^*	T_7 trimmer, band 1		
$C_{37}B^*$		Same as C_3B^*	T_7 trimmer, band 1		
$C_{39}A^*$		Capacitor, 500 μμf. 2%, 500W.V.; molded silver-mica, postage stamp type.	Osc. pad, band 2	CD	1R
$C_{38}B, C^*$		Capacitor, 500 μμf. 2%, 500W.V.; molded silver-mica, small postage stamp type.	Osc. pad, band 2	MIC SO	PO MWSW
$C_{38}C^*$		Capacitor, 500 μμf. 2%, 300W.V.; zero temp. coeff.; tubular ceramic.	Osc. pad, band 2	CRL ER	A N470F
$C_{39}A, C^*$		Same as C_3A, C^*	T_8 trimmer, band 2		
$C_{39}B^*$		Same as C_3B^*	T_8 trimmer, band 2		
$C_{40}A^*$		Same as $C_{36}A^*$	V_3 feed-back for crystal operation		
$C_{40}B, C^*$		Same as $C_{36}B, C^*$	V_3 feed-back for crystal operation		

$C_{40}C$*	Same as $C_{36}C$*	V_2 feed-back for crystal operation		
$C_{41}A, B$*	Same as C_6B*	A.V.C. filter		
$C_{41}C$*	Same as $C_{12}C$*	A.V.C. filter		
C_{42}	Capacitor, .0015 μf. 5%, 500W.V.; molded silver-mica, postage stamp type.	A.V.C. by-pass	MIC SO	PW MWSW
C_{43}	Capacitor, 200 μμf. 5%, 1430W.V.; a-c; 3.5 amps. r-f @ 3000 kc. molded mica, upright mtg. transmitting type with screw terminals on top and mtg. ears at base.	Shunt capacitor for C_{44}	A A MIC SO	1550LS-203 1550LS-403 3 XSBW6-32-5
C_{44}	Capacitor, 11 μμf. to 250 μμf. variable, air, 51 plate, straight-line capacity with 2 mtg. feet; overall shaft length 31/32 in. 3/8-32 thd'd bushing 11/32 in. long; 1/4 in. dia., shaft protrudes 1/2 in.	Transmitter ant. tuning	JO TEL	250H-15
C_{45}	Capacitor, 8 μμf. to 150 μμf. variable, air, 31 plate, straight-line capacity with split bushing for locking shaft.	Trans. r-f tank tuning, channel 1	JO TEL	150H-15
C_{46}	Same as C_{45}	Trans. r-f tank tuning, channel 2		
C_{47}	Same as C_{45}	Trans. r-f tank tuning, channel 3		
C_{48}	Same as C_{45}	Trans. r-f tank tuning, channel 4		
C_{49}	Same as C_{45}	Trans. r-f tank tuning, channel 5		
C_{50}	Same as C_{45}	Trans. r-f tank tuning, channel 6		
$C_{51}A$*	Capacitor, 70 μμf. 5%, 1140W.V. a-c; 1 amp. r-f @ 2.5 mc., molded mica, upright mtg. transmitting type with screw terminals on top and mtg. ears at base; 2-9/16 in. x 1-3/16 in. x 15/16 in. low-loss bakelite case.	Shunt capacitor for tank tuning capacitors	A	1580LS-208
$C_{51}B$*	Capacitor 70 μμf. 5%, 1140W.V. a-c; 1 amp. r-f @ 2.5 mc. molded mica, upright mtg. transmitting type with screw terminals on top and mtg. ears at base; 3-1/8 in. x 1-1/4 in. x 1-3/4 in. low-loss bakelite case.	Shunt capacitor for tank tuning capacitors	MIC SE	3 F2L
$C_{51}C$*	Capacitor, 70 μμf. 5%, 1140W.V. a-c; molded mica, 2-9/16 in. x 1-11/16 in. x 1-5/16 in., upright mounting. Special.	Shunt capacitor for tank tuning capacitors	MIC SO	XRBW3-47-5

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C_{52}		Same as $C_{29}B$, C*	V_8, V_9 plate and screen supply by-pass		
C_{53}		Same as $C_{29}B$, C*	L_3 d-c blocking		
C_{54}		Same as $C_{29}B$, C*	V_8 screen by-pass		
C_{55}		Same as $C_{29}B$, C*	V_9 screen by-pass		
$C_{56}A$*		Capacitor, .006 μf. 10%, 300W.V.; molded mica, postage stamp type.	V_9 cathode by-pass	A	1467LS
$C_{56}B$*		Same as $C_{26}B$*	V_9 cathode by-pass		
$C_{56}C$*		Capacitor, .006 μf. 20%, 400W.V.; molded paper, 1-3/16 in. x 5/8 in. x 1/4 in.	V_9 cathode by-pass	MIC	340-15
C_{57}		Capacitor, 50 μμf. 5%, 500W.V.; molded silver-mica, small postage stamp type.	V_9 grid d-c blocking	A MIC SO	1469 PO MOSW
$C_{57}C$*		Capacitor, 50 μμf. 50%, 500W.V.; zero temp. coeff.; tubular ceramic.	V_9 grid d-c blocking	CRL ER	D N470L
$C_{58}A$, C*		Capacitor, .002 μf. 10%, 500W.V.; molded mica, postage stamp type.	V_{10} plate and screen supply by-pass	A MIC SO	1467LS WXM MWBW
$C_{58}B$*		Same as $C_{31}B$*	V_{10} plate and screen supply by-pass		
$C_{59}A$, C*		Same as $C_{58}A$, C*	V_{10} screen by-pass		
$C_{59}B$*		Same as $C_{31}B$*	V_{10} screen by-pass		
$C_{60}A$, C*		Capacitor, .006 μf. 10%, 300W.V.; molded mica, postage stamp type.	Trans. crystal d-c blocking	A MIC SO	1467LS WXM MWBW
$C_{60}B$*		Same as $C_{26}B$*	Trans. crystal d-c blocking		
$C_{61}A$*		Same as $C_{60}A$, C*	V_{10} cathode by-pass		
$C_{61}B$*		Same as $C_{26}B$*	V_{10} cathode by-pass		
$C_{61}C$*		Same as $C_{56}C$*	V_{10} cathode by-pass		
$C_{62}A$, B*		Capacitor, 50 μμf. 7-1/2%, 500W.V.; molded silver-mica, small postage stamp type.	V_{10} grid excitation	A MIC	1469 PO

$C_{62}C^*$	Same as $C_{57}C^*$	V_{10} grid excitation		
C_{63}	Capacitor, .5 μf. (+14%–6%), 200W.V.; paper, oil-filled; bath-tub type metal case with lug terminals and mtg. ears; 1-3/4 in. x 1 in. x 13/16 in.	By-pass for RY_2 contacts in T_{14} pri. circuit	IC MIC KSS SSC	2BA50 BMM306-105
C_{64}	Same as C_{63}	V_{11} cathode by-pass		
$C_{65}A^*$	Capacitor, .002 μf. 10%, 500W.V.; molded mica, postage stamp type.	V_{13}, V_{15} control grid by-pass	A	1467
$C_{65}B, C^*$	Capacitor, .002 μf. 10%, 500W.V.; molded mica, postage stamp type; low-loss bakelite case.	V_{13}, V_{15} control grid by-pass	MIC	WXM
$C_{66}C^*$	Same as $C_{31}C^*$	V_{13}, V_{15} control grid by-pass		
$C_{66}A^*$	Same as $C_{65}A^*$	V_{12}, V_{14} control grid by-pass		
$C_{66}B, C^*$	Same as $C_{65}B, C^*$	V_{12}, V_{14} control grid by-pass		
$C_{66}C^*$	Same as $C_{31}C^*$	V_{12}, V_{14} control grid by-pass		
$C_{67}A, B^*$	Same as $C_{14}A, B^*$	Side-tone d-c blocking		
$C_{67}C^*$	Same as $C_{14}C^*$	Side-tone d-c blocking		
C_{68}	Capacitor, 8 μf. (+14%–6%), 1000W.V.; oil-filled, 4-3/4 in. x 3-3/4 in. x 1-5/16 in. metal case.	Trans. plate supply filter	IC KSS MIC SSC	10SAR800 CS-2175 BMA324-21 P-8726
C_{69}	Same as C_{68}	Trans. screen supply filter		
C_{70}	Capacitor, dual 40 μf. (+65%–0), 100W.V.; dry electrolytic tubular 5 pin plug-in; 3-1/4 in. x 1-3/8 in. dia. metal case.	V_{12}, V_{13}, V_{14}, V_{15} cathode by-pass	IC	10B288
C_{72}		Microphone by-pass	MIC	938-1
C_{71}	Same as C_{68}	V_{11} plate supply filter		
$C_{58}B^*$	Same as $C_{26}B^*$	V_8 cathode by-pass		
$C_{58}C^*$	Same as $C_{56}C^*$	V_8 cathode by-pass		
L_1	Reactor, 3.3 henries, 10% at 1000 c.p.s. 185 ohms d-c resistance; 2-15/16 in. x 2-3/8 in. x 1-15/16 in. metal case.	1000 c.p.s. static filter inductance	ST	10C15

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L_2		R-F Choke, 1 mh. 3%, 24.8 ohms d-c resistance; 4 pi universal wound; 1-7/8 in. x 7/16 in. dia.	V_3 cathode inductor for crystal operation	GU RM	4885
L_3		R-F Coil Assembly, 60 uh. single 45 turn winding with 12 sliding taps. Special.	R-F P.A. plate tank	SWI ERLA	3257 13989
L_4		R-F Coil Assembly, 133.2 uh. single 50 turn winding with 6 sliding taps. Special.	Trans. ant. loading	SWI ERLA	3227 14074
L_5		Same as L_2	V_8, V_9 plate choke		
L_6		Same as L_2	V_8, V_9 grid choke		
L_7		Same as L_2	V_{10} plate choke		
$L_{16}B$, C*		Same as L_2	R_4 r-f filter		
LM_1		Lamp LM_{27}, 6-8V., .250 amp. blue bead; bayonet base; 1-1/8 in. x 3/8 in. dia.	Trans. fil. power indicator	GE	44
		*A, B Pilot Lamp Socket Assembly, bayonet type with red jewel; bracket 1-3/16 in. long for 1/16 in. panel.	Holder for lamp LM_1	DR	20
		*C Pilot Lamp Socket Assembly, bayonet type with red jewel; bracket 1-3/32 in. long for 1/8 in. panel.	Holder for lamp LM_1	DR	40
		Jewel, Pilot Lamp, red; mounted in threaded metal bushing 5/8 in. long x 5/8 in. dia.	Jewel for LM_1 pilot lamp socket	DR	
LM_2		Pilot Lamp, same as lamp LM_1	Rec. fil. power indicator		
		*A, B Pilot Lamp Socket Assembly, bayonet type with green jewel; bracket 1-3/16 in. long for 1/16 in. panel.	Holder for lamp LM_2	DR	20
		*C Pilot Lamp Socket Assembly, bayonet type with green jewel; bracket 1-3/32 in. long for 1/8 in. panel.	Holder for lamp LM_2	DR	40
		Jewel, Pilot Lamp, green; mounted in threaded metal bushing; 5/8 in. long x 5/8 in. dia.	Jewel for LM_2 pilot lamp socket	DR	
LS_1		Speaker, 6 ohm V.C., 5 in., 14 oz., permanent magnet; depth 3-5/8 in.	Speaker	JR	PM5LS-C2483-6
M_1		Ammeter, 0 to 2.5 amps r-f, thermocouple type; accuracy ±2% full scale to 6 mc., 2.8 in. dia. bakelite case; 3-15/32 in. dia. flange; 1-9/16 in. mtg. radius.	Ant. current indicator	SM WEM	35 NT-35
M_2		Milliameter, 0-15 ma d-c movement, 6.66 ohms internal resistance; 0-300 ma. d-c with external shunt; accuracy ±2% full scale. Special.	V_8, V_9 pl. and grid current V_{12}, V_{13}, V_{14}, V_{15} pl. current	SM TE WEM	25 0321 NX-35

PL_1	Plug, 12 terminal male, canvas bakelite, exposed type. Special.
PL_2	Receptacle, 12 terminal Army-Navy style "P" (pin insert) box mounting. Special.
PL_3	Receptacle, 10 terminal Army-Navy style "S" (socket insert) box mounting; mtg. flange 2 in. x 2 in., 1-3/4 in. dia. body.
R_1	Resistor, 15,000 ohm 10%, 1/3 watt insulated carbon.
R_1B*	Resistor, 15,000 ohm 20%, 1/2 watt insulated carbon.
R_2	Same as R_1B*
R_3	Resistor, 330 ohm 10%, 1/2 watt insulated carbon.
R_4	Resistor, 10,000 ohm potentiometer, carbon, 3 terminal; shaft 11/16 in. long overall with 1/4 in. long 3/8-32 thd'd bushing; 1-1/8 in. dia. case. Special.
R_5	Resistor, 27,000 ohm 10%, 1 watt insulated carbon.
R_6	Same as R_1B*
R_7	Resistor, 390 ohm 10%, 1/2 watt insulated carbon.
R_8	Resistor, 47,000 ohm 20%, 1/2 watt insulated carbon.
R_9	Same as R_8
R_{10}	Resistor, 1 megohm 20%, 1/2 watt insulated carbon.
$R_{11}A$, B*	Resistor, 1,000 ohm 20%, 1/2 watt insulated carbon.
$R_{11}C$*	Resistor, 1,000 ohm 10%, 1/2 watt insulated carbon.
R_{12}	Same as R_{10}
R_{13}	Same as R_2
R_{14}	Same as R_{10}
R_{15}	Same as R_8

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Mod. to r-f unit connection	J	1412
PE-110-(*) input to BC-669-(*)	AP	MOD. 3102-28-8P
RM-21-(*) connection to BC-669-(*)	AP	AN-3102-18-1S
Ant. static leak	IRC SC	BTS-1/3 MB-1/3
Ant. static leak	IRC SPR	BT-1/2 SCI-1/2
V_1 A.V.C. filter		
V_1 cathode bias	IRC SPR	BT-1/2 SCI-1/2
Rec. noise control	CT	35
V_1 screen bleeder	IRC SPR	BT-1 SI-1
V_2 A.V.C. filter		
V_2 cathode bias	IRC SPR	BT-1/2 SCI-1/2
V_3 grid-leak	IRC SPR	BT-1/2 SCI-1/2
V_2 screen dropping		
T_3 pri. load	IRC SPR	BT-1/2 SCI-1/2
V_2 plate isolation	IRC SPR	BT-1/2 SCI-1/2
V_2 plate isolation	IRC	BT-1/2
V_4 grid-leak		
V_4 cathode bias		
A.V.C. filter		
Diode filter		

REF. SYMBOL	SIG. CORPS STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
R_{16}		Resistor, 2.2 megohm 20%, 1/2 watt insulated carbon.	Audio A.V.C. filter	IRC SPR	BT-1/2 SCI-1/2
R_{17}		Resistor, 4.7 megohm 20%, 1/2 watt insulated carbon.	V_5 grid-leak	IRC SPR	BT-1/2 SCI-1/2
R_{18}		Resistor, 33,000 ohm 20%, 1/2 watt insulated carbon.	V_5 plate and screen supply filter	IRC SPR	BT-1/2 SCI-1/2
R_{19}		Same as R_{10}	V_5 screen dropping		
R_{20}		Resistor, 220,000 ohm 20%, 1/2 watt insulated carbon.	V_5 plate load	IRC SPR	BT-1/2 SCI-1/2
R_{21}		Resistor, 500,000 ohm potentiometer, carbon, 3 terminal; shaft 11/16 in. long overall with 1/4 in. long 3/8-32 thd'd bushing; 1-1/8 in. dia. case. Special.	Rec. a-f gain	CT	35
R_{22}		Same as R_{16}	Side-tone coupling		
R_{23}		Resistor, 470 ohm 10%, 2 watt insulated carbon.	V_6 cathode bias	IRC SPR	BT-2 SI-2
R_{24}		Resistor, 470,000 ohm 20%, 1/2 watt insulated carbon.	V_6 grid filter	IRC SPR	BT-1/2 SCI-1/2
R_{25}		Resistor, 10,000 ohm 10%, 10 watt vitreous enameled wire-wound.	V_2 V_3, V_4 screen supply dropping	U	10VWQ
R_{26}		Resistor, 47,000 ohm 10%, 1 watt insulated carbon.	V_1 V_2, V_4 screen supply bleeder	IRC SPR	BT-1 SI-1
R_{27}		Resistor, 7.5 ohm 10%, 10 watt vitreous enameled wire-wound.	V_{10} fil. dropping	U	10VWQ
R_{28}		Resistor, 68,000 ohm 10%, 1/2 watt insulated carbon.	Audio voltage divider	IRC SPR	BT-1/2 SCI-1/2
R_{29}		Resistor, 100,000 ohm 20%, 1/2 watt insulated carbon.	Audio voltage divider	IRC SPR	BT-1/2 SCI-1/2
R_{30}		Same as R_{10}	V_7 A.N.L. diode bias		
R_{31}		Same as R_{29}	A.N.L. peak limiting		
R_{32}		Resistor, 10,000 ohm 10%, 2 watt insulated carbon.	V_3 plate dropping	IRC SPR	BT-2 SI-2
R_{33}		Resistor, 1 megohm 20%, 2 watt insulated carbon.	Ant. static leak	IRC SPR	BT-2 SI-2

R_{34}	Resistor, 10 ohm 10%, 2 watt insulated wire-wound.	V_8 plate suppressor	IRC OC	BW-2 PEW
R_{35}	Resistor, 20,000 ohm 10%, 10 watt vitreous enameled wire-wound.	V_8 screen dropping	U	10VWQ
R_{36}	Resistor, 25 ohm 10%, 1/2 watt insulated wire-wound.	V_8 control grid suppressor	IRC OC	BW-1/2 PW
R_{37}	Same as R_{34}	V_9 plate suppressor		
R_{38}	Same as R_{35}	V_9 screen dropping		
R_{39}	Same as R_{36}	V_9 control grid suppressor		
R_{40}	Resistor, 50 ohm 10%, 10 watt vitreous enameled wire-wound.	V_8, V_9 cathode bias	U	10VWQ
R_{41}	Resistor, 7,000 ohm 10%, 2 watt insulated carbon.	V_9 control grid load	IRC SPR	BT-2 SI-2
R_{42}	Resistor, 100 ohm 10%, 1/2 watt insulated wire-wound.	V_8, V_9 grid circuit return	IRC OC	BW-1/2 PW
R_{43}	Resistor, 30,000 ohm 10%, 10 watt vitreous enameled wire-wound.	V_{10} plate and screen supply dropping	U	10VWQ
R_{44}	Same as R_{26}	V_{10} screen dropping		
R_{45}	Resistor, 125 ohm 10%, 1/2 watt insulated wire-wound.	V_{10} cathode bias	IRC OC	BW-1/2 PW
R_{46}	Same as R_{26}	V_{10} grid-leak		
R_{47}	Resistor, 15 ohm 10%, 10 watt vitreous enameled wire-wound.	V_6 fil. dropping	U	10VWQ
R_{48}	Resistor, 40 ohm 10%, 2 watt insulated wire-wound.	Lamp, LM_1, dropping	IRC	BW-2
R_{49}	Same as R_{48}	Lamp, LM_2, dropping		
R_{50}	Resistor, 25,000 ohm 10%, 10 watt vitreous enameled wire-wound.	RY_2 coil dropping	LEC U	1-3/4E 10VWQ
$R_{50}B$, C†	Resistor, 15,000 ohm 10%, 10 watt vitreous enamel wire-wound.	RY_2 coil dropping	U	10VWQ
$R_{51}A$*	Resistor, 100 ohm 10%, 1/2 watt insulated wire-wound.	T_9 sec. load with speaker off	IRC	BW-1/2
$R_{51}A$*	Resistor, 33 ohm 10%, 2 watt insulated carbon.	T_9 sec. load with speaker off	IRC	BW-2
$R_{51}B$*	Resistor, 6 ohm 10%, 10 watt vitreous enameled wire-wound.	T_9 sec. load with speaker off	LEC U	1-3/4E 10VWQ

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$R_{51}C$*		Resistor, 6 ohm 10%, 2 watt insulated wire-wound.	T_9 sec. load with speaker off	IRC	BW-2
R_{52}		Same as $R_{51}A$*	T_{10} pri. load		
R_{53}		Resistor, 100,000 ohm potentiometer, carbon 3 terminal; shaft 7/8 in. long overall with 1/2 in. long 3/8-32 thd'd bushing; 1-1/8 dia. case. Special.	Side-tone volume.	CT	35
R_{54}		Resistor, 220,000 ohm 10%, 1 watt insulated carbon.	Side-tone coupling	IRC SPR	BW-1 SI-1
R_{55}		Resistor, 100,000 ohm 10%, 1/2 watt insulated carbon.	V_{11} input voltage divider	IRC SPR	BT-1/2 SCI-1/2
R_{56}		Resistor, 50,000 ohm 10%, 1/2 watt insulated carbon.	V_{11} grid load	IRC SPR	BT-1/2 SCI-1/2
R_{57}		Resistor, 250,000 ohm 10%, 1/2 watt insulated carbon.	V_{11} grid circuit filter	IRC SPR	BT-1/2 SCI-1/2
R_{58}		Resistor, 1,000 ohm 10%, 1/2 watt insulated carbon.	V_{11} cathode bias	IRC SPR	BT-1/2 SCI-1/2
R_{59}		Resistor, 50 ohm 10%, 1/2 watt insulated wire-wound.	V_{12} plate suppressor	IRC	BW-1/2
R_{60}		Same as R_{59}	V_{14} plate suppressor		
R_{61}		Same as R_{59}	V_{15} plate suppressor		
R_{62}		Same as R_{59}	V_{13} plate suppressor		
R_{63}		Resistor, .351 ohm 1/2%; meter shunt for 300 ma. range; wire-wound on bakelite strip; varnished cambric shield. Special.	Mod. plate current shunt for M_2	SM TE	1315 7151
R_{64}		Same as R_{63}	P.A. plate current shunt for M_2		
R_{65}		Resistor, 5,000 ohm 10%, 20 watt vitreous enameled wire-wound.	V_{12}, V_{13}, V_{14}, V_{15} screen dropping	LEC U	2R 20VWQ
$R_{66}A$, B*		Resistor, 500 ohm 10%, 50 watt with 400 ohm tap; vitreous enameled wire-wound 2 mtg. brkts. Special.	Modulator "B" supply filter	U	
$R_{66}C$*		Resistor, 400 ohm 10%, 50 watt vitreous enameled wire-wound 2 mtg. brackets. Special.	Modulator "B" supply filter	O	ABZUG
R_{67}		Resistor, 40,000 ohm 10%, 20 watt vitreous enameled wire-wound.	V_{12}, V_{13}, V_{14}, V_{15} screen bleeder	LEC U	2R 20VWQ
R_{68}		Resistor, 10,000 ohm 10%, 10 watt vitreous enameled wire-wound.	V_{11} plate filter and dropping	LEC U	1-3/4E 10VWQ

R_{69}	Resistor, 125 ohm 10%, 10 watt, vitreous enameled wire-wound.	V_{12}, V_{13}, V_{14}, V_{15} cathode bias	LEC U	1-3/4E 10VWQ
R_{70}	Resistor, 1000 ohm 10%, 2 watt insulated wire-wound.	Mic. voltage filter and dropping	IRC	BW-2
$R_{76}B$, C†	Same as R_{68}	Reduce voltage on S_9		
RY_1A, C*	Relay, DPDT plus one set of normally open contacts; all contacts 1/4 in. dia. coil 115V. 60 c.p.s. a-c. Special.	Antenna changeover	AE	1000-1B
RY_1B*	Relay, DPDT plus one set of normally open, 1/4 in. dia. contacts; remaining 4 sets of contacts 3/16 in dia. coil 115V. 60 c.p.s. a-c. Special.	Antenna changeover	AE	1004A-1B
RY_2A, B*	Relay, DPST plus one set of normally closed contacts; contacts 2 amp. type 1B flat type; coil 45;700 t. of No. 39 E.C. wire, 6500 ohms; frame 3-1/2 in long overall.	Side-tone circuit and T_{14} pri. circuit breaker	CPC	A3733
RY_2C*	Relay, DPST plus one set of normally closed contacts; contacts 2 amp. type 1B ball type; coil 45,700 t. of No. 39 E.C. wire, 6500 ohms; frame 3-1/2 in. long overall.	Side-tone circuit and T_{14} pri. circuit breaker	CPC	C-12443
$S_{1.1}$	Switch Assembly, 3 section ceramic wafer type; index plate 4 position thru 90°; mtg. bracket on rear.	T_1, T_2 pri. switching	OM	24498-H3C
$S_{1.2}$		T_1, T_2 sec. switching		
$S_{1.3}$	Part of $S_{1.2}$	T_3, T_4 pri. switching		
$S_{1.4}$	Part of $S_{1.2}$	T_3, T_4 sec. switching		
$S_{1.5}$	Part of $S_{1.2}$	T_7, T_8 crystal switching		
$S_{1.6}$	Part of $S_{1.2}$	T_7, T_8 and crystal shorting		
$S_{1.7}$	Part of $S_{1.2}$	V_3 cathode switching		
$S_{2.1}$ $S_{2.2}$ A, B*	Switch, DPST toggle type; 1-1/16 in. x 11/16 in. x 9/16 in. molded bakelite case; shaft 15/32-32 thd. x 7/16 in. long.	Static filter on-off A.N.L. on-off	CH	8360-K2
$S_{2.1}$ $S_{2.2}$ B, C*	Switch, DPST toggle type; 1-3/16 in. x 21/32 in. x 5/8 in. molded bakelite case; shaft 15/32-32 thd. x 3/8 in. long.	Static filter on-off A.N.L. on-off	HH HH	81024-Q 81024-QA
$S_{3.1}$	Switch Assembly, 5 section ceramic wafer type less index plate; 6 position thru 360°; shield disc between sections 4 and 5. Special.	L_3 ant. coupling switching	OM	
$S_{3.3}$	Part of $S_{3.1}$	L_3 plate switching		
$S_{3.4}$	Part of $S_{3.1}$	C_{45}, C_{46}, C_{47}, C_{48}, C_{49}, C_{50} selector		
$S_{3.5}$ A*	Part of $S_{3.1}$	V_{10} plate circuit crystal channel switching		
$S_{3.6}$	Part of $S_{3.1}$	V_{10} grid circuit crystal channel switching		
$S_{3.7}$	Part of $S_{3.1}$	Rec. osc. crystal channel switching		

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REF. SYMBOL	SIG. CORPS STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
$S_{3.1}$		Switch Assembly, 5 section ceramic wafer type less index plate; 6 position thru 360°; mtg. bracket on front, shield disc between sections 4 and 5. Special.	L_2 ant. coupling switching L_3 plate switching C_{45}, C_{46}, C_{47}, C_{48}, C_{49}, C_{50} selector V_{10} plate circuit crystal channel switching V_{10} grid circuit crystal channel switching Rec. osc. crystal channel switching	OM	24499-H5C
$S_{3.3}$ $S_{3.4}$		Part of $S_{3.1}$			
$S_{3.5}B$, C*		Part of $S_{3.1}$			
$S_{3.6}$		Part of $S_{3.1}$			
$S_{3.7}$		Part of $S_{3.1}$			
$S_{3.2}$		Switch Assembly, single section ceramic with mtg. bracket; 6 position thru 360°; ceramic wafer 2-7/8 in. x 2-3/8 in. x 1/4 in. Shaft 1-1/2 in. long overall. Special.	L_4 switching	OM ERLA	5301 13915
S_4A, B*		Switch, SPDT toggle type; 1-3/16 in. x 21/32 in. x 5/8 in. molded bakelite case; shaft 15/32-32 thd. x 1/4 in. long. Special.	LS_1 on-off	HH	81021U
S_4C*		Switch, SPDT toggle type, 1-3/4 in. x 1-1/8 in. x 21/32 in., molded bakelite case; 3 amp, 250 volt. Special.	LS_1 on-off	CH	8282K7
$S_{5.1}$ $S_{5.2}$		Switch, 2 pole bakelite rotary wafer type; index plate 3 position thru 120°; shaft 3/8 in. long. Special.	M_2 circuit selector	OM	23822-H1
SO_1		Socket, 12 terminal female, bakelite, base mount. exposed type; 3-7/16 in. long x 1-1/6 in. high x 1-1/8 in. wide; 4 mtg. holes on 3-1/8 in. x 3/4 in. centers.	R-F unit to mod. connection	J	1412
T_1A, C*		Transformer, Antenna, 1680 to 2750 kc. when tuned with $C_{1.1}$, pri. to match 500 mmf., 30 ohm antenna; short mtg. frame for coil form; contains trimmer capacitor C_3A, C*; lug terminals. Special.	Band 1 ant. coil	ERLA	13781
T_1B*		Transformer, Antenna, 1680 to 2750 kc. when tuned with $C_{1.1}$, pri. to match 60 mmf., 10 ohm antenna; full length mtg. frame for coil form; contains trimmer capacitor C_3B*; lug terminals. Special.	Band 1 ant. coil	GU	4982
T_2A, C*		Transformer, Antenna, 2700 to 4450 kc. when tuned with $C_{2.1}$, pri. to match 500 mmf., 30 ohm antenna; short mtg. frame for coil form; contains trimmer capacitor C_5A, C*; lug terminals. Special.	Band 2 ant. coil	ERLA	13815
T_2B*		Transformer, Antenna, 2700 to 4450 kc. when tuned with $C_{2.1}$, pri. to match 60 mmf., 10 ohm antenna; full length mtg. frame for coil form; contains trimmer capacitor C_5B*; lug terminals. Special.	Band 2 ant. coil	GU	4983
T_3A, C*		Transformer, R-F, 1680 to 2750 kc. when tuned with $C_{1.2}$; short mtg. frame for coil form; contains trimmer capacitor $C_{10}A$, C*; lug terminals. Special.	Band 1 r-f amp. coil	ERLA	13803

T_8B^*	Transformer, R-F, 1680 to 2750 kc. when tuned with $C_{1.2}$; full length mtg. frame for coil form; contains trimmer capacitor $C_{10}B^*$; lug terminals. Special.	Band 1 r-f amp. coil	GU	4984
T_4A, C*	Transformer, R-F, 2700 to 4450 kc. when tuned with $C_{1.2}$; short mtg. frame for coil form; contains trimmer capacitor C_{11} A, C*; lug terminals. Special.	Band 2 r-f amp. coil	ERLA	13818
T_4B^*	Transformer, R-F, 2700 to 4450 kc. when tuned with $C_{1.2}$; full length mtg. frame for coil form; contains trimmer capacitor $C_{11}B^*$; lug terminals. Special.	Band 2 r-f amp. coil	GU	4985
T_5	Transformer, I-F, 385 kc. double permeability tuned; color coded leads, contains capacitors C_{15} and C_{16}. Special.	Ist i-f amp. coil	ERLA SWI	13822 SW3344
T_6	Transformer, I-F, 385 kc. double permeability tuned; color coded leads different length than those of T_5. Contains capacitors C_{19} and C_{20}. Special.	Diode i-f amp. coil	ERLA SWI	13838 SW3343
T_7A, C*	Transformer, Osc. 2065 to 3135 kc. when tuned with $C_{1.3}$; permeability tuned; short mtg. frame for coil form; contains trimmer capacitor $C_{37}A$, C*; lug terminals. Special.	Band 1 osc. coil	ERLA	13805
T_7B^*	Transformer, Osc. 2065 to 3135 kc. when tuned with $C_{1.3}$; permeability tuned; full length mtg. frame for coil form; contains trimmer capacitor $C_{37}B^*$; lug terminals. Special.	Band 1 osc. coil	GU	4986
T_8A, C*	Transformer, Osc. 3085 to 4835 kc. when tuned with $C_{1.3}$; permeability tuned; short mtg. frame for coil form; contains trimmer capacitor $C_{39}A$, C*; lug terminals. Special.	Band 2 osc. coil	ERLA	13820
T_8B^*	Transformer, Osc. 3085 to 4835 kc. when tuned with $C_{1.3}$; permeability tuned; full length mtg. frame for coil form; contains trimmer capacitor $C_{39}B^*$; lug terminals. Special.	Band 2 osc. coil	GU	4987
T_9A^*	Transformer, Output, pri. to match 7600 ohm single class "A" plate. Sec. to match 6 ohm voice coil 2-7/8 in. x 2-7/16 in. x 2 in. metal case; 4 mtg. holes at each end on 2-1/32 in. x 1-9/16 in. centers; lug terminals. Special.	V_6 plate to LS_1, Headset HS-22-C, Handset TS-11-F	ST	10A4
T_9B, C*	Transformer, Output, pri. to match 7600 ohm single class "A" plate. Sec. to match 100 ohm load (tapped at 6 ohms). 2-7/8 in. x 2-7/16 in. x 2 in. metal case; 4 mtg. holes at each end on 2-1/32 in. x 1-9/16 in. centers; lug terminals. Special.	V_6 plate to LS_1, Headset HS-30-( ), Handset TS-11-(*)	ST ST	10A44 4A44
T_{10}	Transformer, Microphone, pri. to match 400 ohm carbon microphone. Sec. to match single class "A" grid. 2-7/8 in. x 2-3/16 in. x 2 in. metal case; 4 mtg. holes at each end on 2-1/32 in. x 1-9/16 in. centers; lug terminals.	Microphone T-24-( ) input to V_{11} grid	ST ST	10A7 4A43

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REF. SYMBOL	SIG. CORPS STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
T_{11}		Transformer, Interstage, pri. to match single 10,000 ohm class "A" plate. Sec. to match P.P. class "A" grids. 3-3/16 in. x 2-3/4 in. x 2-3/8 in. metal case; 4 mtg. holes at each end on 2-1/8 in. x 1-13/16 in. centers.	Interstage, V_{11} plate to V_{12}, V_{13}, V_{14}, V_{15} grids	ST ST	10A6 4A42
T_{12}		Transformer, pri. to match P.P. 3500 ohm class "AB" plates. Sec. to match 2000 ohm class "C" final amp. plate. 5 in. x 5 in. x 3-7/8 in. metal case; 4 mtg. holes at each end on 4-5/16 in. x 3-3/16 in. centers.	Modulation, V_{12}, V_{13}, V_{14}, V_{15} plates to V_8, V_9 plates	ST ST	10A5 4A41
V_1A*		Tube VT-117, radio receiving; R.M.A. type 6SK7; metal, single ended heater-cathode, triple grid super-control amplifier; octal base.	Rec. r-f amp.	KR	71-1217**
V_1B, C		Tube VT-117-A, radio receiving; R.M.A. type 6SK7GT/G; glass, single ended, heater-cathode, triple grid super-control amplifier; octal base.	Rec. r-f amp.	SEP	71-1217**
V_1B, C†		Tube JAN-6SK7GT/G, VT-117-A, radio receiving; glass, single ended, heater-cathode, triple grid super-control amplifier; octal base.	Rec. r-f amp.	SEP	JAN-1A
V_2A*		Tube VT-150, radio receiving; R.M.A. type 6SA7; metal, single ended, heater-cathode pentagrid converter; octal base.	Rec. mixer	KR	71-1250**
V_2B, C*		Tube VT-150-A, radio receiving; R.M.A. type 6SA7GT/G; glass, single ended, heater-cathode, pentagrid converter; octal base.	Rec. mixer	SEP	71-1250**
V_2B, C†		Tube JAN-6SA7GT/G, VT-150-A, radio receiving; glass, single ended, heater-cathode, pentagrid converter; octal base.	Rec. mixer	SEP	JAN-1A
V_3A*		Tube VT-94, radio receiving; R.M.A. type 6J5, metal, heater-cathode, triode amplifier-detector; octal base.	Rec. osc.	KR	71-974-B**
V_3B, C*		Tube VT-94-D, radio receiving; R.M.A. type 6J5GT/G; glass, heater-cathode, triode amplifier-detector; octal base.	Rec. osc.	SEP	71-974-B**
V_3B, C†		Tube JAN-6J5GT/G, VT-94-D, radio receiving; glass, heater-cathode, triode amplifier-detector; octal base.	Rec. osc.	SEP	JAN-1A
V_4A*		Same as V_1A*	Rec. i-f amp.		
V_4B, C*		Same as V_1B, C*	Rec. i-f amp.		
V_4B, C†		Same as V_1B, C†	Rec. i-f amp.		
V_5A*		Same as V_1A*	Rec. 1st audio amp, and A.V.C.		
V_5B, C*		Same as V_1B, C*	Rec. 1st audio amp, and A.V.C.		

V_5B, C†	Same as V_1B, C†	Rec. 1st audio amp, and A.V.C.		
V_6	Tube VT-152, radio receiving; R.M.A. type 6K6GT/G; glass, heater-cathode, power amplifier pentode; octal base.	Rec. audio power output	SEP	71-1252**
V_6B, C†	Tube JAN-6K6GT/G, VT-152, radio receiving; glass, heater-cathode, power amplifier pentode; octal base.	Rec. audio power output	SEP	JAN-1A
V_7A*	Tube VT-90, radio receiving; R.M.A. type 6H6, metal, heater-cathode, twin diode; octal base.	Rec. second detector and A.N.L.	KR	71-790-A**
V_7B, C*	Tube VT-90-A, radio receiving; R.M.A. type 6H6GT/G; glass, heater-cathode, twin diode; octal base.	Rec. second detector and A.N.L.	SEP	71-790-A**
V_7B, C†	Tube JAN-6H6GT/G, VT-90-A, radio receiving; glass, heater-cathode, twin diode; octal base.	Rec. second detector and A.N.L.	SEP	JAN-1A
V_8A*	Tube VT-100, radio transmitting; R.M.A. type 807; large glass, heater-cathode, beam power amplifier; 5-pin base.	Transmitter final amp.	KR	71-1200**
V_8B, C*	Tube VT-100-A, radio transmitting; R.M.A. type 807; large glass, heater-cathode, beam power amplifier; 5-pin base.	Transmitter final amp.	SEP	71-1200**
V_8B, C†	Tube JAN-807, VT-100-A, radio transmitting; large glass, heater-cathode, beam power amplifier; 5-pin base.	Transmitter final amp.	SEP	JAN-1A
V_9A*	Same as V_8A*	Transmitter final amp.		
V_9B, C*	Same as V_8B, C*	Transmitter final amp.		
V_9B, C†	Same as V_8B, C†	Transmitter final amp.		
V_{10}A*	Tube VT-115, radio receiving; R.M.A. type 6L6; metal, heater-cathode, beam power amplifier; octal base.	Transmitter oscillator	KR	71-1215-A**
V_{10}B, C*	Tube VT-115-A, radio receiving; R.M.A. type 6L6G; large glass, heater-cathode beam power amplifier; octal base.	Transmitter oscillator	SEP	71-1215-A**
V_{10}B, C†	Tube JAN-6L6GA, radio receiving; medium glass, heater-cathode, beam power amplifier; octal base.	Transmitter oscillator	SEP	JAN-1A
V_{11}	Tube VT-135, radio receiving; R.M.A. type 12J5GT; glass, heater-cathode type, amplifier triode; octal base.	Modulator driver	SEP	71-1235**
V_{11}B, C†	Tube JAN-12J5GT, VT-135, radio receiving; glass, heater-cathode type, amplifier triode; octal base.	Modulator driver	SEP	JAN-1A
V_{12}	Same as V_{10}B, C*	Modulator power output		

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REF. SYMBOL	SIG. CORPS STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
$V_{12}B$, C†		Same as $V_{10}B$, C†	Modulator power output		
V_{13}		Same as $V_{10}B$, C*	Modulator power output		
$V_{13}B$, C†		Same as $V_{10}B$, C†	Modulator power output		
V_{14}		Same as $V_{10}B$, C*	Modulator power output		
$V_{14}B$, C†		Same as $V_{10}B$, C†	Modulator power output		
V_{15}		Same as $V_{10}B$, C*	Modulator power output		
$V_{15}B$, C†		Same as $V_{10}B$, C†	Modulator power output		
b. Remote Control Unit RM-21-(*).—					
PL_4		Plug PL-106, 6 terminal female, spring-stud locking type.	TS-11-(*) cord connector	AMM KSS	SC-D-1357-J**
R_{72}		Resistor, 500 ohm potentiometer, carbon, 3 terminal; shaft 3/4 in. long overall with 1/4 in. long 3/8-32 thd'd. bushing; case dia. 1-1/8 in. min., 1-7/16 in. max. Special.	Headset volume	CT	35
S_6		Switch, SPST momentary push-button type; mounted with single 7/8-27 x 1 in. hex. nut; screw terminals; 1-3/8 in. long overall; supplied with 7/8 in. I.D. lockwasher. Special.	PE-108-(*) engine remote start	RBM	1875G
S_7		Same as S_6	PE-108-(*) engine remote stop		
S_8		Same as S_6	PE-108-(*) engine remote choke		
S_9		Switch, DPST rotary jack, non-locking, thumb-lever type on Handset TS-11-(*).	Transmit-receive switch	AMM	SC-D-1055-M**
SO_2		Socket SO-45, 6 terminal male, panel mounting type; consists of steel ring and bakelite base in which banana pins are mounted.	RM-21-(*) to TS-11-(*) or T-24-( ) connection	UL	SC-D-457**
SO_3		Socket, 10 terminal Army-Navy style "P" (pin insert) straight cord connector.	RM-21-(*) to mod. connection	AP	AN-3106-18-1P
c. Power Supply Unit PE-110-(*).—					
C_{72}		Same as C_{68}	"A" hot by-pass		
C_{74}		Capacitor, 8 μf. (+50%—0), 600W.V.; dry electrolytic tubular 4 pin plug-in; 3-1/4 in. x 1-3/8 in. dia. metal case.	Rec. plate supply input filter on PE-110-A, B Rec. plate supply output filter on PE-110-C	MIC IC SSC	937-1 60-B-7

C_{75}	Same as C_{74}	Rec. plate supply output filter on PE-110-A, B Rec. plate supply input filter on PE-110-C		
$C_{74}B$, C†	Capacitor, 8 μf. (+50%—0), 475W.V.; dry electrolytic tubular 4 pin plug-in; 3-1/4 in. x 1-3/8 in. dia. metal case.	Receiver plate supply output filter on PE-110-B, C	SSC	#742
$C_{75}B$, C†	Same as $C_{74}B$, C†	Receiver plate supply input filter on PE-110-B, C		
C_{76}	Same as C_{68}	Transmitter plate supply input filter		
C_{77}	Same as C_{68}	Transmitter plate supply output filter		
$C_{86}B$, C*	Capacitor, 1 μf. (+14%—6%), 50W.V.; paper, oil-filled; bathtub type metal case with lug terminals and mtg. ears; 1-3/4 in. x 1 in. x 13/16 in.	VB_1 buffer	MA	A-42290-2
$C_{87}B$, C*	Capacitor, .004 μf. 10%, 1600W.V.; tubular paper, oil-filled; 1-5/16 in. x 5/8 in. dia. paper covered metal case with mtg. strap.	T_{16} sec. capacitive buffer	MA	A-144217
C_{89}	Capacitor, .05 μf. (+14%—6%), 600W.V.; paper, oil-filled; bathtub type metal case with lug terminals and mtg. ears; 1-3/4 in. x 1 in. x 13/16 in.	A-C line by-pass	IC MIC	6BA05 BMM-306-106
$C_{90.1}$	Capacitor, .5 μf. (+14%—6%), 50W.V.;	VP_1 "A" hot r-f filter	MA	A-205099
$C_{90.2}$	Capacitor, .1 μf. (+14%—6%), 400W.V.; Paper, oil-filled; bathtub type metal case with lug terminals and mtg. ears; case is common negative; 1-3/4 in. x 1 in. x 7/8 in.	VP_1 B+ r-f filter		
$C_{91}A$*	Same as $C_{86}B$, C*	VB_1 buffer		
$C_{91}B$, C*	Capacitor, CA-177-A, .5 μf. (+14%—6%), 400W.V.; paper, oil-filled; bathtub type metal case with lug terminals and mtg. ears; 1-3/4 in. x 1 in. x 13/16 in.	Arc suppressor, RY_4 a-c contacts	KSS IC	 6BA50
$C_{92}A$*	Same as $C_{87}B$, C*	T_{16} sec. capacitive buffer		
F_1	Fuse, 5 amp. 25V.; tubular glass type; 1-1/4 in. x 9/32 in. dia.	RY_3, RY_4 coil circuit; T_{13} pri. circuit	BUS LF	4AG 1094
F_2	Fuse, 15 amp. 25 V.; tubular glass type; 1-1/4 in. x 9/32 in. dia.	B_1 circuit	BUS LF	4AG 1096

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REF. SYMBOL	SIG. CORPS STOCK NO.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
F_3		Same as F_1	T_{14} pri. circuit		
L_8		Reactor, 22 henries 10%, .090 amp. 658 ohms d-c resistance; 3-3/4 in. x 2-3/4 in. x 1-1/2 in. metal case; 4 mtg. holes on 2-1/8 in. x 1-13/16 in. centers; lug terminals.	Rec. plate supply filter	GT ST	1F1116 4C16
L_9		Reactor, 5.3 henries (+10%—13%), .450 amp. 50 ohms d-c resistance; 5 in. x 5 in. x 3-7/8 in. metal case; 4 mtg. holes on 4-5/16 in. x 3-7/8 in. centers; lug terminals.	Transmitter plate supply filter	GT ST	1N49 4C17
L_{17}		R-F Choke, 55 (+5—0), turns #16 enamel wire, 6 pi. bank wound; enclosed in 1-3/16 in. x 1 in. dia. cardboard case. Special.	VP_1 "A" hot r-f filter	MA	A-42328-1
L_{18}		R-F Choke, 1 μh. at 1000 c.p.s. 9.7 ohms d-c resistance; 2 pi universal wound; mounted on bakelite strip. Special.	VP_1 B+ r-f filter	MA	A-40919-1
PL_5		Receptacle, 7 terminal Army-Navy style "P" (pin insert) box mounting.	Input from PE-108-(*)	AP	AN-3102-24-2P
PL_6		Receptacle, 12 terminal Army-Navy style "S" (socket insert) box mounting.	Output to BC-669-(*)	AP	Mod. 3102-28-8S
R_{72}		Resistor, 20,000 ohm 10%, 25 watt vitreous enameled wire-wound with mtg. brackets; 2 in. x 9/16 in. dia.	Rec. plate supply bleeder	O	0218
R_{75}		Resistor, 500 ohm 10%, 1/4 watt insulated carbon; 3/8 in. x 1/8 in. dia.	T_{16} sec. resistive buffer	IRC	BT-1/4
RY_3		Relay, DPDT; coil 115V. 60 c.p.s. a-c; contacts 1/4 in. dia. code 4; 1.875 in. x 1.625 in. x 1.562 in. Type J. Special.	115V. a-c to B_1 operation changeover, filament circuit	GM GM	12510 12510-1
RY_4		Same as RY_3	115 V. a-c to B_1 operation changeover, B+ and a-c circuits		
$S_{10.1}$ $S_{10.2}$ A, B*		Switch, DPST toggle type; molded bakelite case with screw terminals; shaft 15/32-32 thd. 11/32 in. long.	A-C on-off B_1 on-off	CH	7860-K7
$S_{10.1}$ $S_{10.2}$ C*		Switch, DPST toggle type, 2 in. x 1 in. x 1-5/8 in. bakelite case; shaft 15/32-32 thd. 3/8 in. long.	A-C on-off B_1 on-off	HH	80602-HC
SO_4		Socket, 2 terminal female, 115V. a-c; 9/16 in. x 1-3/32 in. dia. bakelite with molded-in mtg. flange; mtg. centers 1-1/2 in.	A-C input connection from commercial a-c source	AP	MIP-61F
T_{12}		Transformer, Power, pri. 115V. 60 c.p.s. a-c. Sec. (1) 600V. C.T. at .070 amp. Sec. (2) 13.1V. at 5 amp. Sec. (3) 5V. at 2 amp. Sec. (4) 5V. at 6 amp. Sec. (5) 5V. at 3 amp. Sec. (6) 5V. at 3 amp.: 5 in. x 5 in. x 3-7/8 in. metal case; 4 mtg. holes at each end on 4-5/16 in. x 3-3/16 in. centers: lug terminals.	Rec.-transmitter fil. and rec. plate power	GT ST	6K68 4P87

T_{15}	Transformer, Power, pri. 115V. 60 c.p.s. a-c. Sec. 545V. at .455 amp. 5 in. x 5 in. x 5-1/8 in. metal case; 4 mtg. holes on 4-1/2 in. x 4-5/16 in. centers; lug terminals.
T_{16}	Transformer, Power, pri. 12.6V. at 2.5 amp. Sec. 260V. at .065 amp. potted type; 3-5/8 in. x 3-1/2 in. x 2-5/8 in. metal case; mounts with 4 spade bolts on 3-1/4 in. x 1-5/8 in. centers; provided with lead terminals. Special.
TS_1	Terminal Strip, screw type terminals; bakelite, 2 in. x 11/16 in. x 1/16 in. Stamped "A HOT" – "B+"; mtg. centers 1-11/16 in. Special.
V_{16}	Tube VT-80, radio receiving; R.M.A. type 80; medium glass, filament type, full-wave high-vacuum rectifier, 4-pin base.
$V_{16}B$, C†	Tube JAN-80, VT-80, radio receiving; medium glass, filament type, full-wave high-vacuum rectifier, 4-pin base.
V_{17}	Tube VT-145, radio receiving; R.M.A. type 5Z3; large glass, filament type, full-wave high-vacuum rectifier, 4-pin base.
$V_{17}B$, C†	Tube JAN-5Z3, VT-145, radio receiving; large glass; filament type, full-wave high-vacuum rectifier, 4-pin base.
V_{18}	Same as V_{17}
$V_{18}B$, C†	Same as $V_{17}B$, C†
V_{19}	Same as V_{17}
$V_{19}B$, C†	Same as $V_{17}B$, C†
V_{20}	Same as V_{17}
$V_{20}B$, C†	Same as $V_{17}B$, C†
VB_1	Vibrator, 12V. 105±5 c.p.s. synchronous type, 5-pin base with pin in center; 3-1/4 in. x 1-1/2 in. dia. metal case.
VP_1	Vibrapack, 12.6V. d-c at 2.5 amp. input; 245V. at .065 amp. output. Consists of T_{16} and VB_1 mounted on chassis in which $C_{86}B$, C*, $C_{87}B$, C*, $C_{90.1}$, $C_{90.2}$, L_{17}, L_{18}, R_{75}, and TS_1 are mounted. Special.

Transmitter plate power	GT ST	8K234 4P36
VP_1 power transformer	GT	4A302
VP_1 input and output connection	CN	1720
Rec. plate supply rectifier	SEP	71-780-A**
Rec. plate supply rectifier	SEP	JAN-1A
Transmitter plate supply rectifier	SEP	71-1245**
Transmitter plate supply rectifier	SEP	JAN-1A
Transmitter plate supply rectifier		
Transmitter plate supply rectifier		
Transmitter plate supply rectifier		
Transmitter plate supply rectifier		
Transmitter plate supply rectifier		
Transmitter plate supply rectifier		
Converter, 12V. d-c to to 12V. a-c	MA	G534C
Rec. plate supply, B_1 operation	MA	G369

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28. INDEX OF MANUFACTURERS.—

Abbrev.	Name and Address
A	Aerovox Corp. New Bedford, Mass.
AE	Advance Electric Co. Los Angeles, Calif.
AA M	American Microphone Co., Ltd. Los Angeles, Calif.
AP	American Phenolic Corp. Chicago, Ill.
BUS	Bussman Mfg. Co. St. Louis, Mo.
CD	Cornell Dubilier Corp. South Plainfield, N. J.
CH	Cutler-Hammer, Inc. Milwaukee, Wis.
CN	Cinch Mfg. Corp. Chicago, Ill.
CPC	C. P. Clare & Co. Chicago, Ill.
CRL	Centralab Milwaukee, Wis.
CT	Chicago Telephone Supply Co. Elkhart, Ind.
DR	Drake Mfg. Co. Chicago, Ill.
ER	Erie Resistor Co. Erie, Pa.
ERLA	Electrical Research Laboratories, Inc. Evanston, Ill.
GE	General Electric Co. Chicago, Ill.
GM	G. M. Laboratories, Inc. Chicago, Ill.
GT	General Transformer Corp. Chicago, Ill.
GU	E. I. Guthman Co. Chicago, Ill.
H	The Hallicrafters Co. Chicago, Ill.
HH	Arrow-Hart & Hegeman Electric Co. Hartford, Conn.
IC	Industrial Condenser Corp. Chicago, Ill.
IRC	International Resistance Co. Philadelphia, Pa.
J	Howard B. Jones Co. Chicago, Ill.
JO	E. F. Johnson Co. Waseca, Minn.
JR	Jensen Radio Mfg. Co. Chicago, Ill.
KR	Ken-Rad Tube & Lamp Corp. Owenboro, Ky.
KSS	Kellogg Switchboard & Supply Co. Chicago, Ill.
LEC	Lectrohm, Inc. Newark, N. J.
LF	Littelfuse, Inc. Chicago, Ill.
MA	P. R. Mallory Co. Indianapolis, Ind.
MIC	Micamold Radio Corp. Brooklyn, N. Y.
O	Ohmite Mfg. Co. Chicago, Ill.
OC	The Ohio Carbon Co. Cleveland, O.
OM	Oak Mfg. Co. Chicago, Ill.
RBM	R.B.M. Mfg. Co. Logansport, Ind.
RM	Ross Mfg. Co. Chicago, Ill.
SC	Stackpole Carbon Co. Saint Marys, Pa.
SE	Sangamo Electric Co. Springfield, Ill.
SEP	Sylvania Electric Products, Inc. Emporium, Pa.
SI	F. W. Sickles Co. Springfield, Mass.
SM	Simpson Electric Co. Chicago, Ill.
SO	Solar Mfg. Co. Chicago, Ill.
SPR	Speer Carbon Co. St. Marys, Pa.
SSC	Sprague Specialties Co. North Adams, Mass.
ST	Standard Transformer Corp. Chicago, Ill.
SWI	S-W Inductor Co. Chicago, Ill.
TE	Triplett Electrical Instrument Co. Bluffton, O.
TEL	Teleradio Engineering Corp. New York, N. Y.
U	Utah Radio Products Co. Chicago, Ill.
UL	A. J. Ulmer Co. Philadelphia, Pa.
WEM	Westinghouse Electric & Mfg. Co. Chicago, Ill.

SAFETY NOTICE

1. Do not make adjustments or changes in wiring while power unit PE-108-(*) is in operation. You can get SEVERE and possibly FATAL SHOCKS especially when the power unit is operating on DAMP GROUND. WATCH OUT!
2. Make sure there is sufficient and proper VENTILATION if the power unit is operated in a closed place (such as a car, room, or shed). EXHAUST GASES produced are DEADLY POISON, and can KILL you. BE VERY CAREFUL!
3. Do not fill the gasoline tank while the power unit is running. Don't spill gasoline on a hot engine.
4. Obey every safety regulation while operating this power unit.

REMEMBER THESE POINTS

1. Don't attempt repairs or adjustments to this unit unless you are sure of what you're doing.
2. Watch your lubrication; check the oil level every 5 hours.
3. Don't take chances with carbon monoxide; keep your exhaust line gas tight and be sure you have proper ventilation.
4. Be sure there is no dirt in your oil and gasoline.
5. Keep your filter clean. Watch this closely in dusty locations.
6. Keep the unit as clean as possible. Dirt on the cooling fins and in the air passages will cause overheating.
7. Don't expose your unit to rain or dampness. Electrical equipment and water don't mix.
8. Look out for shock. Don't touch exposed wires.
9. Go over your unit daily and tighten all screws and nuts.
10. Don't spill gas on your unit when filling the tank. It may catch fire.
11. Always warm up your unit before applying a load.
12. Study this book. Keep it handy. It'll save you plenty of headaches.

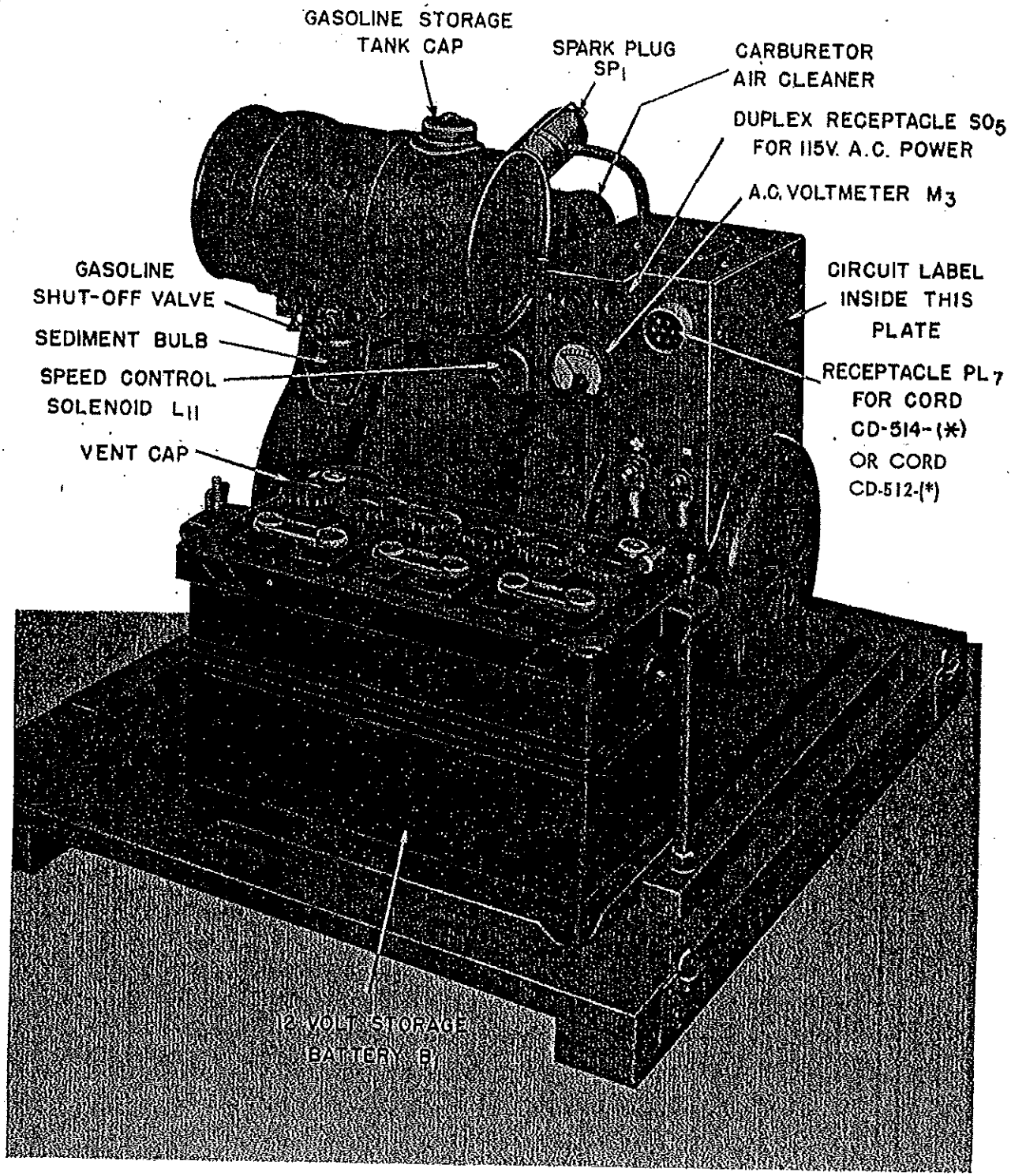


Fig. 46 — Power Unit PE-108-(*), Front View.

POWER UNIT PE-108-(*)

SECTION VI — DESCRIPTION

29. GENERAL.—Power Unit PE-108-(*) is a gasoline-engine driven generator for supplying a-c power to Radio Set SCR-543-(*). It is assembled as a compact unit which includes the following:

a. Engine.—
(1) A 1.8 hp. air-cooled, 1800 RPM, one cylinder, 4 cycle gasoline motor (used on PE-108-A, PE-108-B and PE-108-C) with a bore of 2¼ inches and a 2¾ inch stroke.
(2) A 2.3 hp. air-cooled, 1800 RPM, one cylinder, 4 cycle gasoline motor (used on PE-108-D) with a bore of 2-1/2 inches and a 2-3/4 inch stroke.
(3) Ignition is supplied by a high tension magneto with impulse coupling mounted on one side of the engine, and a magneto filter (L_{14} and C_{85}) is connected in series with the primary of the magneto to reduce ignition interference. The spark plug and associated leads are shielded for the same purpose.
(4) The governor is of the built-in mechanical flyball type.
(5) Choking—(accomplished by the CHOKE button on the Remote Control Unit RM-21-(*)) is done electrically.

b. Generator.—
(1) A 4 pole, dual wound type delivering 600 Watts, at 110 volts, 60 cycle, a-c, single phase, plus 12 to 15 volts d-c for charging the starting battery. Operation is at 1800 rpm.
(2) The frame of the generator is bolted directly to the generator adapter at the take-off end of the engine and contains the shunt and series field windings and their associate pole pieces.
(3) The armature is mounted directly to a tapered extension of the engine crankshaft. It contains two windings, one for a-c which terminates at the collector rings and a d-c winding which terminates at the commutator.

c. Control Box.—The control box is mounted on top of the generator and contains the following items:
(1) A-C voltmeter to read the line voltage.
(2) Dual a-c socket for servicing and lighting use.
(3) Receptacle PL_7.
(4) D-C battery terminals.
(5) D-C and a-c radio interference filter.
(6) Starting relay.
(7) D-C charging resistor.
(8) Reverse current cutout.
(9) A-C circuit breaker (used on PE-108-D only).
(10) D-C ammeter (used on PE-108-D only).

d. Fuel Tank.—A cylindrical, 1 gallon capacity fuel tank is mounted on top of the engine. The engine uses .3 gallons of gasoline (PE-108-A, PE-108-B, and PE-108C) or .4 gallons (PE-108-D) per hour at full rated load. One filling of the tank is sufficient for 2½ to 3 hours of operation.

e. Battery Starting.—Power Unit PE-108-(*) is designed for remote control starting through Remote Control Unit RM-21-(*), details of which are given in Section VII, paragraph 38. The battery is used for starting by making the d-c generator act as a motor when the START button is pressed on the remote control unit.
(1) The battery is a 12 volt, 60 ampere hour type, dry-charged with rubber separators (for Power Unit PE-108-A, PE-108-B, and PE-108-C) and an uncharged battery with moist wood separators (for PE-108-D).
(2) It rests on a metal pan which is mounted on the reinforced wood platform alongside the generator and gasoline engine.
(a) A metal band around the top edge of the battery with brackets and heavy bolts and wing nuts to hold the band in place, secure the battery to the platform.
(b) The battery is shipped dry and requires addition of electrolyte (dilute H_2SO_4, [sulphuric acid] specific gravity 1.275) for operation.
(c) The power unit is also equipped for emergency starting which can be performed by a starting rope contained in the "Tools and Spare Parts Box" for PE-108-(*) in chest CH-73-(*).

f. Base Mounting.—Power Unit PE-108-(*) is mounted on a plywood base by means of special shock-absorbing rubber mountings. The unit is held down tightly by means of thumb nuts to protect it in shipping. (Thumb-nuts used on latter part of PE-108-B, PE-108-C and all Power Units PE-108-D). To the base are also clamped the battery, muffler and exhaust pipe assembly. A protective crate cover is placed over the entire unit to form the chest and is attached to the base by readily removable snap fasteners.

30. MAJOR COMPONENTS.—

Description	Length	Width	Height	Weight
Power Unit PE-108-(*)	28″	24″	23-3/4″	249
1 Engine	15-1/4″	15-9/16″	18-3/4″	83-1/2
2 Generator	8-1/2″	10-7/8″	10-7/8″	65
3 Control Box	9-1/2″	8-1/4″	8-1/4″	8-1/2
4 Chest	28″	23-3/4″	24″	65
5 Tool Kit	13″	9-3/4″	6-1/8″	16
6 Storage Battery	14-3/8″	7-3/8″	9-5/8″	51-3/4
7 Fuel Tank	10-1/8″	6″	6-3/4″	2
8 Exhaust Assembly	15-1/2″	15-1/2″	4-1/2″	5-1/8
9 Spare Parts Group				566

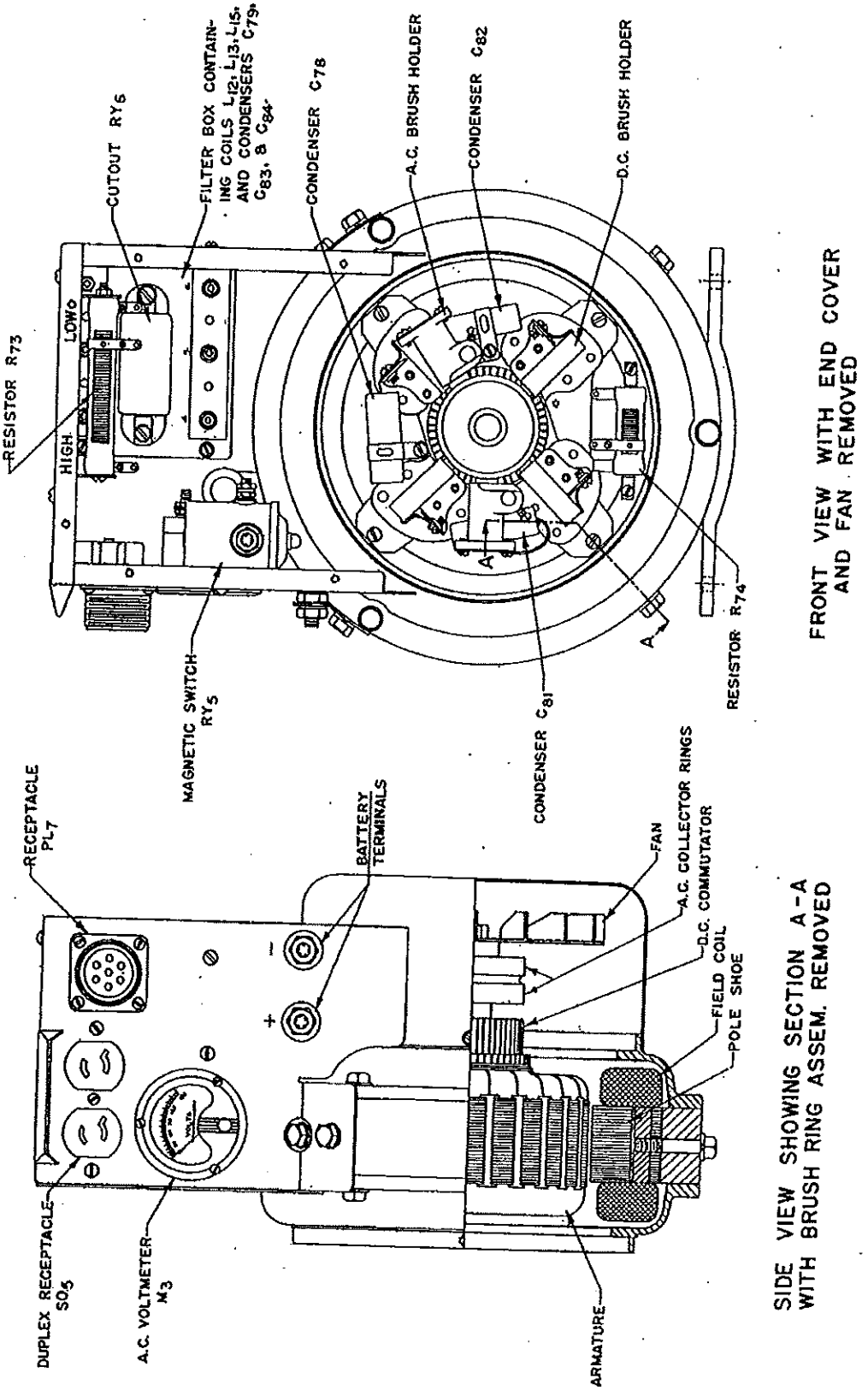


Fig. 47 — Power Unit PE-108-(*) Generator and Control Box.

SECTION VII — INSTALLATION AND OPERATION

31. UNPACKING.—

a. Uncrate chest CH-131-(*) containing Power Unit PE-108-(*) and the box containing the bottles of electrolyte for the storage battery. Inspect for any possible damage.

CAUTION

The bottles containing electrolyte should be handled very carefully as they contain sulphuric acid.

b. The power unit when packed for shipment is mounted down tight to the base by thumb-nuts to protect it against possible damage. These thumb-nuts are to be loosened when preparing the unit for use and tightened when the power unit is to be reshipped.

32. PREPARATION FOR USE.—

a. Remove cover of chest CH-131-(*) from power unit PE-108-(*).

b. Loosen 4 thumb-nuts holding the unit down, so that the power unit will float on its shock-mounts.

c. Unscrew the top oil plug on the base of the engine directly under the gas tank.

d. Fill with oil to the top of the filler plug opening. The body of the oil should be as follows:

Temperature	Oil
Above 32°F	SAE—30
32°F to 0°F	SAE—10
Below 0°F	SAE—10 (diluted)

Dilute with 1% gasoline for each degree below 0°F. Total dilution must never exceed 40%.

NEVER USE AN OIL HEAVIER THAN SAE 30.

e. The engine base holds approximately one quart of oil.

f. Fill the oil bath air cleaner (used on some Power Units PE-108-B and PE-108-C and all Power Units PE-108-D) with the same SAE grade of oil used in the crankcase. Do not use the diluted mixture. Fill only to the mark indicated on the outside of the container. Be sure to replace the air cleaner cap securely.

g. Fill the fuel tank with a good grade of gasoline free from dirt and water. If the gasoline is impure, strain it by using the funnel and a chamois as a filter.

h. The fuel tank has a 1 gallon capacity.

i. Check the filter bowl and screen. Clean if necessary. Open fully the valve on the filter bowl. Be sure the bowl is tight and does not leak around the gasket.

j. Attach the flexible exhaust pipe extension. Check all mechanical connections. See that all nuts, bolts and screws on the generator, control box and engine are tight.

k. Service the starting battery as follows:

(1) Carefully remove the stoppers from the bottles of electrolyte.

CAUTION

Do not spill this electrolyte as it will burn the body and damage clothing or equipment. (Remedy for accidental spillage: Immediately flush well with clear water and wipe dry.)

l. Remove the vent caps from the storage battery cells and fill each cell until the level is seen visibly rising in the filler well. The electrolyte used is sulphuric acid having a specific gravity of 1.275. (1.345 for moist wood separator type).

m. Make sure the battery connections are tight.

(1) If the battery is of the dry charged type allow it to stand for two hours and it is ready for service. (Battery has a tag attached indicating type of charge.)

(2) If the battery is of the moist wood separator type, the following procedure is necessary to put battery into service: Fill each cell with electrolyte of 1.345 specific gravity until electrolyte rises approximately 3/8 inch over top of separators. Charge at a rate of 5 amperes for 48 hours, watching carefully that electrolyte temperature does not get above 110° Fahrenheit. When battery is fully charged, specific gravity of the electrolyte should be 1.280 to 1.290. When battery is put into service and becomes discharged, specific gravity will drop to 1.150 or under but will rise to 1.280 or 1.290 again when recharged.

NOTE: Electrolyte is a mixture of sulphuric acid and distilled water. (Acid must be of electrolytic grade or better). To mix electrolyte of 1.245 specific gravity add very slowly one volume of concentrated sulphuric acid (1.835 sp. gr. or 65.7°Baume) to 3.3 volumes of distilled water. To mix electrolyte of 1.300 specific gravity add very slowly one volume of concentrated sulphuric acid (1.835 sp. gr. 65.7° Baume) to 2.5 volumes of distilled water. Use glass or earthen receptacle for mixing electrolyte. Stir constantly while adding acid. Allow electrolyte to cool to room temperature before using. **NEVER ADD WATER TO CONCENTRATED ACID! POUR THE ACID INTO THE WATER—SLOWLY!**

CAUTION

Do not charge a battery too long or place a high rate of charge on a fully charged battery. This will cause the plates in the battery to buckle and permanently damage the battery.

(3) To reset charging rate proceed as follows:

(a) Remove control box cover.

(b) Advance sliding terminal on the wire wound resistor attached to the top of control box to the end marked LOW to decrease the charging rate. (To increase the charging rate slide the terminal toward the end marked HIGH.)

n. When this unit has once been placed in

service, refer to paragraph 37 and 38 for maintenance procedure which must be rigidly adhered to.

33. INSTALLATION.—

a. Power Unit PE-108-(*) may be installed in a field radio station or in a vehicular radio station in any suitable vehicle with Radio Receiver and Transmitter BC-669-(*) and Power Supply Unit PE-110-(*). In paragraphs 13, 14 and 15, a recommended procedure is given for the radio receiver and transmitter and also the power supply unit. In paragraphs 34, 35 and 36 the recommended procedure is given to set up the power unit for the following installations, respectively:
(1) As a field station.
(2) In a 1/2 ton Pick-up Truck.
(3) In a 3/4 ton Command and Reconnaissance Car.

b. The simplest and most instructive installation is the field station. For this reason, this type of installation is best for instructing new personnel until familiar with this set. In reading these instructions for the first time, it is recommended that after covering paragraph 34, the reader skip paragraphs 35 and 36, and continue immediately with paragraphs 37 (Starting Precautions) and 38 (Operation).

34. INSTALLATION AS A FIELD STATION.—

a. Set up Radio Receiver and Transmitter BC-669-(*) and Power Supply Unit PE-110-(*) in operating position as described in paragraph 13. Then set up the Power Unit PE-108-(*) in operating position. Figure 2 shows a recommended arrangement.
b. Unlatch and remove cover.
c. Remove from the upper compartment of Chest CH-132-(*), Cord CD-512-(*).
d. Insert one end of Cord CD-512-(*) into receptable PL_7 of Power Unit PE-108-(*). The other end insert into PL_5 on the front panel of Power Supply Unit PE-110-(*).
e. Tighten locking rings.
f. If you want to operate Power Unit PE-108-(*) at a greater distance from the operating position, remove Cord CD-514-(*) from Chest CH-132-(*) and insert it in series with Cord CD-512-(*) and Power Unit PE-108-(*). This reduces the noise from the power unit and can be further helped by extending the exhaust pipe as far away from the operating position as possible.
g. Connect exhaust pipe extension and place it where it will allow fumes to be directed away from the operating position.

35. INSTALLATION IN 1/2 TON PICK-UP TRUCK.—(See Figure 11).

a. Proceed as in paragraph 14 for installation of BC-669-(*) and PE-110-(*).
b. Locate chest CH-131-(*) about two feet in back of chest CH-133-(*) on the floor of the truck, and remove cover.
c. Install Cord CD-512-(*) as described in paragraph 34 *d*.
d. Remove the roll of asbestos tape and iron wire from the "tools and spare parts box" for PE-108-(*) and Chest CH-73-(*).
e. Wrap the asbestos tape around the exhaust pipe extension, securing it with the iron wire.
f. Remove the exhaust pipe extension and feed it through the slots in Chest CH-131-A, or CH-131-B (if either chest is used) and replace exhaust pipe extension.
g. Replace the chest.
h. If Chest CH-131-C is used, open cleat on chest cover marked PULL and feed exhaust pipe through slot.
i. Tie the exhaust pipe extension to the exterior of the vehicle with the iron wire furnished.
j. Put up truck rear platform and fasten in place.

36. INSTALLATION IN 3/4 TON COMMAND RECONNAISANCE CAR.—(See figure 1).

a. (1) Place Chest CH-131-(*) containing Power Unit PE-108-(*) on top of rear seat as far to the right as possible and remove cover of chest CH-131-(*). If installation is to be anything but very temporary, a simple wood platform of 2x4 lumber should be built over the seat with two legs extending to the floor. The power unit may be placed on this.
(2) Install cords and exhaust pipe as outlined in paragraph 35 *c.* to *i*.
(3) Tie Chest CH-131-(*) containing Power Unit PE-108-(*) down to the seat with straps or rope to prevent it from jumping out while the car is in motion.
b. Set up Power Supply Unit PE-110-(*) and Radio Receiver and Transmitter BC-669-(*) as outlined in paragraph 15 *b.* to *h*.

37. STARTING PRECAUTIONS.—

a. Checks to be made before starting each time equipment is to be used.
(1) Check oil with oil gauge.
(2) Check fuel supply.
(3) Be sure exhaust hose is placed to properly carry away dangerous fumes.
(4) Check level of electrolyte in battery.
(5) See that all cord connections are tight.
(6) If power unit is mounted in a vehicle, make sure, that all components are sufficiently well fastened, so that they will not jar out of place or be damaged.
(7) Remove all load from generator until engine attains proper speed.

CAUTION

Except in cases of extreme emergency operate the unit for not less than ten minutes before applying load.

(8) Always press START button when starting with rope to prevent the d-c generator from reversing polarity.

38. OPERATION.—

a. To start Power Unit PE-108-(*).—
(1) Press the START button on Remote Control Unit RM-21-(*) and hold closed until PE-108-(*) starts. The power unit should come up to an even speed and

run smoothly, both TRANSMITTER and RECEIVER pilot lamps on the modulator should light indicating that both are ready for operation.

(2) Release START button. NOTE: If the power unit is cold, it may be necessary to press CHOKE button on the remote control unit while pressing START button, until engine starts.

(3) CAUTION—Except in cases of extreme emergency, under low temperature conditions operate the unit for not less than ten minutes before applying load.

b. To Stop Power Unit PE-108-(*).—

(1) Press STOP button on Remote Control Unit RM-21-(*) until the power unit has come to a complete stop. (The battery is automatically switched on and off as the power unit is stopped or started.)

c. Emergency starting.—

(1) If battery is more than 50% discharged start motor by placing knotted end of starting rope in the starting sheave, wind rope around the sheave several times in a clockwise direction. Then pull briskly on the rope to turn the crankshaft over. If the motor is cold, it may be necessary to choke the engine while pulling the rope. If the engine does not start on the first application, the operation should be repeated.

d. If Power Unit PE-108-(*) is to be left inoperative for a short period of time, the following precautions should be taken.

(1) Let the unit run until the storage battery is completely charged after filling each cell to the proper level with distilled water.

(2) Drain gasoline from tank and sediment bulb to prevent any possibility of leakage.

(3) Coil up exhaust hose and secure under bracket provided for it on platform.

(4) Tighten unit down to base with the thumb-nuts located at the base of the engine. This will help prevent damage to the unit if it is to be shipped.

(5) Cover unit with Chest CH-131-(*).

(6) Cover chest with canvas or heavy paper or, if a shipping box is available, place unit into box and close. This will help prevent rust and corrosion.

39. TROUBLE AND REMEDY CHART.—

a. Engine difficult to start.—

(1) No gasoline in tank
(2) Gasoline flow obstructed
(3) Loose or defective wiring
(4) Spark plug cracked
(5) Spark plug fouled
(6) Improper gas mixture
(7) Throttle valve stuck or out of adjustment
(8) Throttle rod loose
(9) Valve seats bad
(10) Valve sticking
(11) Improper timing
(12) Defective magneto
(a) Breaker points worn or pitted
(b) Breaker points out of adjustment
(c) Breaker cam out of time
(d) Switch shorted
(e) High tension wire shorted

b. Engine Missing.—

(1) Spark plug fouled
(2) Spark plug cracked
(3) Spark plug gap wrong
(4) Defective wiring
(5) Ignition breaker points sticking
(6) Valves warped or broken
(7) Valve tappets sticking
(8) Valve tappets improperly adjusted

c. Engine Overheating.—

(1) Carburetor choke valve partly closed
(2) Improper gas mixture
(3) Piston rings sticking
(4) Improper timing
(5) Muffler clogged
(6) Governor or throttle loose
(7) Air cleaner requires cleaning
(8) Cooling air passages obstructed
(9) Generator overloaded

d. Engine Knocks.—

(1) Carbon in cylinder
(2) Loose main bearings
(3) Loose rod bearings
(4) Worn piston and cylinder
(5) Loose valve tappets
(6) Motor is overheated
(7) Tight piston
(8) Loose flywheel
(9) Lack of oil

e. Faulty Carburetion.—

(1) Carburetor improperly adjusted
(2) Valve leaking
(3) Shut off valve closed
(4) Carburetor fuel level too high
(5) Sediment in fuel tank

f. Excessive Smoke from Exhaust.—

(1) Carburetor needle valve open too far
(2) Carburetor float sticking or leaking
(3) Worn piston or piston rings
(4) Too light oil
(5) Too much oil in crankcase

g. Explosion in Carburetor.—

(1) Gas mixture too lean
(2) Intake valve sticking
(3) Intake tappet sticking
(4) Intake valve spring weak
(5) Intake valve warped or broken
(6) Intake tappets set too close
(7) Air leak in intake manifold

h. Poor Compression.—

(1) Valves not seating
(2) Valve sticking
(3) Valve tappets sticking
(4) Valve tappets set too close
(5) Piston rings worn or weak
(6) Piston rings broken
(7) Piston rings sticking
(8) Loose spark plug
(9) Cylinder head loose
(10) Scored cylinder
(11) Worn piston and cylinder

i. Engine will not start with battery.—
(1) Defective Remote Control Unit RM-21-(*)
(2) Defective cord (See Cording Diagram Fig. 10)
(3) Dead battery
(4) Defective starting relay
(5) Battery cable disconnected
(6) Open series field
(7) Open d-c armature

j. A-C voltage too high or too low.—
(1) Improper adjustment of speed control
(2) Defective shunt field

k. Battery discharged.—
(1) D-C generator does not charge
(2) Too short a period of charge given to battery

l. Battery bubbles excessively.—
(1) Charging rate is too high

m. Generator does not charge battery.—
(1) Cutout not operating
(2) D-C brushes stick in holders
(3) Dirty commutator
(4) Charging resistor open
(5) Open field
(6) Armature open
(7) Brushes worn down

n. No A-C output.—
(1) Check 7 items in *m*
(2) A-C brushes stick
(3) Open a-c armature

o. Excessive sparking.—
(1) Open armature
(2) Sticking brushes
(3) Rough or dirty commutator
(4) Brushes worn

SECTION VIII — FUNCTIONING OF PARTS

40. GASOLINE ENGINE.—
The engine is a Wisconsin Motors Engine, Model AA (for PE-108-A, PE-108-B, PE-108-C, and Model AB for PE-108-D), single cylinder, air-cooled, L-head 4-cycle, internal combustion type operating at 1800 rpm.

a. Fuel System.—
(1) Supply.—The fuel supply is stored in the gasoline tank and travels through the gasoline filter bowl through the tubing and thence to the carburetor. The shut-off valve located at the filter bowl is used to shut off the gasoline supply.
(2) Carburetor.—The carburetor is of the single updraft, plain tube, float feed type. It supplies the proper mixture of air and gasoline to the cylinder.
(a) Choke.—The choke valve is mounted on a center shaft and is equipped with a poppet valve to allow air to enter when the engine starts.
(b) Drain.—A drain opening is provided in the bottom to allow manifold condensation or excessive fuel collection to escape.
(c) Idle Fuel Supply.—Fuel for idling passes through jets and up the passage to the discharge holes. Air enters the idle fuel supply as controlled by the idle mixture adjustment screw.
(d) Main Fuel Supply.—Fuel for the main fuel supply enters the main fuel supply discharge tube through the jets and out the discharge tube in the center of the venturi. Air is introduced into the main fuel supply in the form of bubbles through the small holes in the main discharge tube. The adjustment permits leaning of the mixture for constant speed and load operation.
(e) Power Operation.—The float chamber opening to the carburetor results in the air pressure being less than the atmospheric pressure at all times. This difference is controlled by the throttle position and speed of the engine. Air enters the float chamber through openings. This air is metered in the part throttle position.
(f) Throttle.—The throttle shaft and plate control the flow of the mixture to the intake manifold and in turn to the cylinders. The throttle shaft is connected to the governor by a link so the engine is run at a regulated speed.
(3) Air Cleaner.—The air cleaner is of the wire mesh type (PE-108-A, PE-108-B, and PE-108-C) and oil bath type on PE-108-D. It cleans all air passing to the carburetor through the air intake pipe by drawing the air through mesh wire, or the oil covered mesh trap, in the upper part of the cleaner.
(4) Manual Choke.—The manual choke is connected to the same choke butterfly as the automatic choke. It performs the same function except that it is operated by hand and provided for emergency or manual starting of the plant.

b. Governor Action.—The governor is located on the carburetor side of the engine and is mounted on the cylinder front cover. It maintains a function of operating the engine at a constant speed. The governor gear meshes with the camshaft gear. Centrifugal force moves the weights toward or away from the shaft. The action of the weights moves the operating fork riser, against which the operating form is pressed. This fork connected to the governor arm by the operating shaft moves the arm according to the pressure of the fork riser against it. The arm in turn acts on the carburetor throttle to regulate the speed of the engine.

c. Lubrication System.—
(1) Oil Pan.—The crankcase has a capacity of one quart and acts as a reservoir for the oil pump and lubricating system.

(2) Oil Pump. — The oil pump is of the plunger type, formed integral with the splash trough. The plunger is held against the driving eccentric on the camshaft by a spring. The up or suction stroke of the pump is by this spring and the down or discharge stroke is by the eccentric. Two ball check valves are used in the pump.

(3) Operation.—Oil in the crankcase is forced up through the jet of the oil pump and thrown in a spray over the connecting rod and bearing. The oil in the crankshaft feeds the connecting rod bearing. The cylinder walls, piston, pin, valve lifters and valves are lubricated by spray from the bearing.

d. Electrical System.—

(1) Magneto.—

(a) The ignition is supplied by a high tension magneto equipped with an impulse spring coupling to facilitate starting at low cranking speeds.

(b) This magneto consists, fundamentally, of a source of flux—a magneto rotor, a primary coil in series with a contact which is shunted by a condenser, a secondary winding over the primary, and an impulse coupling mechanism.

(c) The magnet simply provides a magnetic field which is carried through the iron core to the primary winding. This field is established and then broken or reversed by the rotation of the rotor and it is the energy put into the magneto by this mechanical means which ultimately shows up at the spark plug. The change in value of the magnetic field throughout the iron core in the primary coil induces a flow of electrical energy in the coil.

The total value of this energy is dependent on how strong the magnetic field is, how rapidly its intensity through the iron core is changed and on the length and cross section of the magnetic circuit. The magnetic field is actually reversed through the coil, thus changing the intensity of the field from full strength in one direction to full strength in the other direction.

(d) The spark producing cycle begins when the pole shoes of the magnet are completely covered by the shoes of the iron path, thus carrying the full flux strength through the coil. Under this condition, the contacts are closed, completing the primary circuit. Since there is no change of flux value under this condition there is no current flowing in the primary circuit.

The change in value of the magnetic field throughout the iron core in the primary coil induces a flow of electrical energy in the coil.

As the rotor or magnet begins to rotate, the poles begin to be uncovered, thus decreasing the cross section of the iron path and reducing the density of the magnetic field. This causes a current to flow in the primary coil. Further rotation of the rotor brings it to a point where the primary current reaches the highest value it can obtain and the primary circuit is then opened. This opening of the circuit reduces the current to zero. During the interval, prior to the opening of the primary circuit, the changing of the flux value has been resisted or choked by the closed primary circuit. There has not been as much of a change as there would have been if no coil were present around the magnetic circuit. When the contacts are opened by the action of the cam and the flux choke removed, there is a rapid change in flux in order to allow it to catch up with where it would normally be without the closed primary. The primary current having been reduced to zero and the flux allowed to follow its normal trend, the rotor continues to turn until one quarter revolution has been completed from its original starting point. The flux is now completely and fully established in the opposite direction and the contacts are again closed and the cycle is ready to be repeated.

(e) During all the action just described in the primary coil, another coil of wire, having from sixty to ninety times as many turns of wire as the primary and wound around the primary has been idle until the primary circuit was opened. It is the secondary coil and is in series with the spark plug in the engine. Since the resistance of this gap is very high, no current can flow in the coil until a sufficiently high voltage has been created to allow the resistance of the gap to be overcome.

Throughout the first stages of the primary current rise, the flux change is also causing a slight voltage rise in the secondary coil, but it is much too small to bridge the spark plug gap, particularly at low rotor speeds. However, as the primary circuit is broken, this rapid reduction of the primary current and increase of primary voltage causes a strong electro-magnetic field to be created. This field induces a high voltage in the secondary coil raising it to the point where it will overcome the resistance

Ref. No.	Description	Req'd
AA_1	Cylinder and Crankcase	1
AB_1	Valve, Exhaust	1
AB_2	Valve, Inlet	1
AB_3	Valve, Springs	2
AB_4	Valve Spring Seat	2
AB_5	Valve Spring Seat Lock	2 pr.
AB_6	Valve Seat Insert: Exhaust Only	1
AB_7	Valve Tappet Inspection Plate	1
AE_2	Connecting Rod Cap Screw with Lock-washer	2
AF_{20}	Governor Spring Anchor Stud	1
AF_{21}	Governor Spring Adjusting Screw	1
AH_3	Breather Tapper Compartment to Crank-case	1
AJ_1	Oil Pump Body and Splash Trough	1
AJ_2	Oil Pump Plunger	1
AJ_3	Oil Pump Plunger Push Rod Cap	1
AJ_4	Oil Pump Push Rod	1
AJ_4	Steel Ball in Oil Pump	2
AJ_6	Straight Pin for Oil Pump Plunger	1
AJ_7	Oil Pump Ball Retainer	1
AJ_8	Oil Pump Plunger Spring	1
AJ_9	Oil Pump Strainer	1
AJ_{11}	Carburetor	1
AJ_{12}	Air Filter Assembly	1
AJ_{13}	Fuel Filter Assembly	1
AJ_{14}	Fuel Tank	1
AJ_{15}	Special Stud for Mtg. Carburetor	2
AJ_{16}	Fuel Tank Support Strap—Flywheel End	1
AJ_{17}	Fuel Tank Support Strap—Take Off End	1
AJ_8	Close Nipple	1
AJ_{19}	Copper Tubing for Fuel Line	1
AJ_{20}	Elbow for Fuel	2
AJ_{21}	Compression Nut for Fuel Line	2
AK_1	Street Ell for Exhaust	1
NW	Titeflex Spark Plug Shield Assem.	1
SP_1	Spark Plug	1
TG_{24}	Gasket for Carburetor Flange	1
TG_{25}	Gasket for Valve Tappet Inspection Plate	1

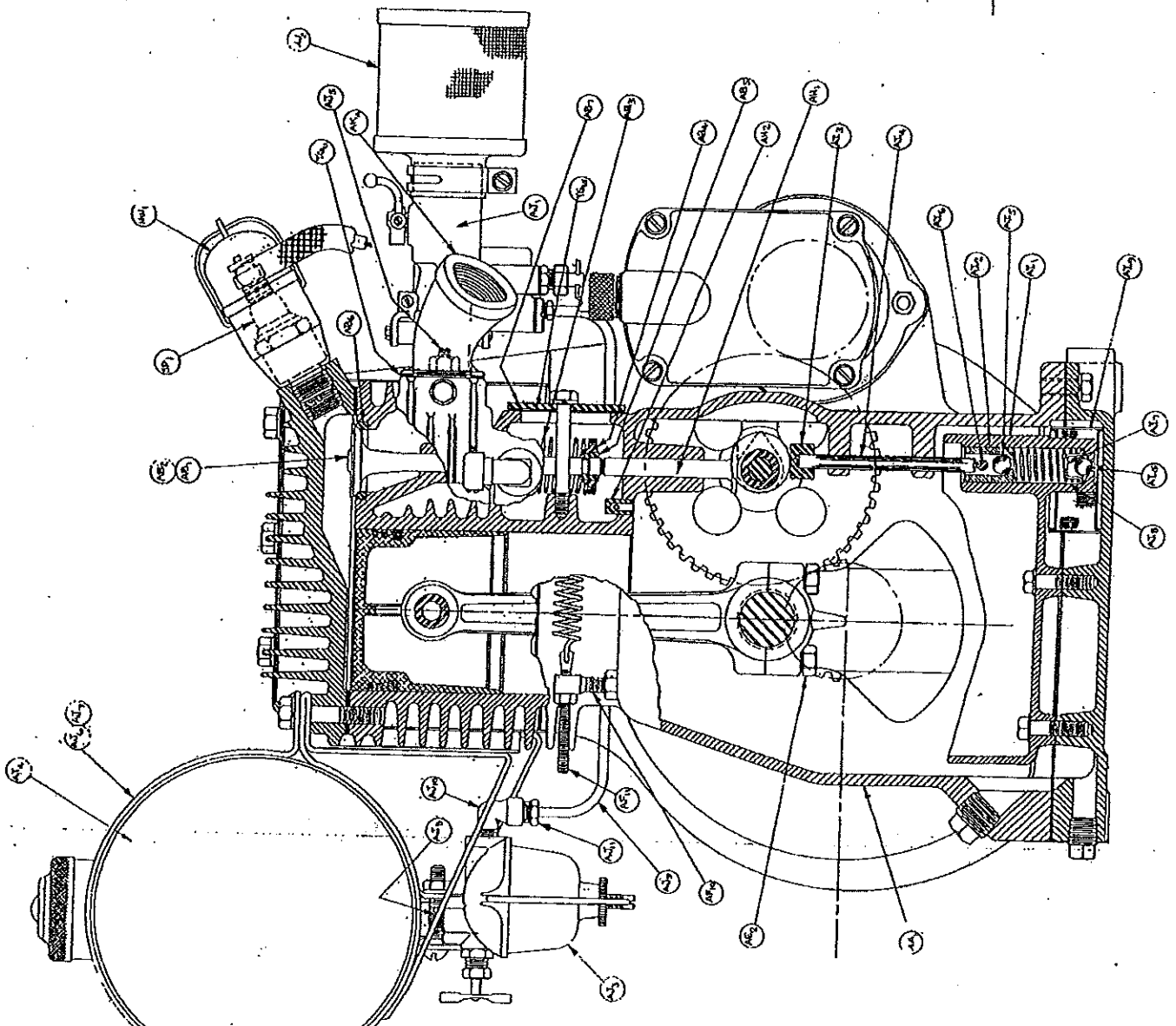


Fig. 48 — Power Unit PE-108-(*) Gasoline Engine, Front Cutaway View.

Ref. No.	Description	Req'd
AA_2	Cylinder Head	1
AA_3	Gasket for Cylinder Head	1
AA_4	Main Bearing Plate—Take Off End	1
AA_6	Main Bearing Plate—Flywheel End	1
AA_8	Generator Adapter	1
AA_7	Air Shroud	1
AA_9	Engine Base	1
AB_1	Bracket	1
AC_7	Main Bearing Oil Seal Cup	2
AC_2	Crankshaft with Main Bearings, Crankshaft Gear and Key	1
AC_{2-2}	Woodruff Key for Crankshaft Gear	1
AC_5	Main Bearing	2
AC_4	Main Bearing Oil Seal Cork	2
AC_3	Crankshaft Gear	1
AC_6	Crankcase Breather Assembly	1
AD_1	Piston	1
AD_2	Piston Ring—Compression	1
AD_3	Piston Ring—Scraper	1
AD_4	Piston Ring—Oil Regulating	1
AD_5	Piston Pin	1
AD_6	Piston Pin Retaining Ring	2
AE_1	Connecting Rod Complete	1
AF_3	Flywheel	1
AF_5	Governor Flyweight Toggle Pin	1
AF_4	Woodruff Key for Flywheel	1
AF_8	Governor Spring	1
AF_6	Governor Flyweight	2
AF_7	Governor Yoke and Shaft Ass'y	1
AF_9	Governor Shaft Support Bracket	1
AF_{10}	Governor Control Lever	1
AF_{12}	Governor Control Rod	1
AG_1	Camshaft and Gear	1
NS_1	Starting Rope Assembly	1
NS_2	Lockwasher for Starting Rope Sheave	1
NS_3	Starting Rope Sheave	1
NW_2	Ignition Cable Support Strap	1
TG_{2-2}	Gasket for Engine Base	1
TG_{2-1}	Gasket for Governor Shaft Support Bracket	1
TG_{1-4}	Gasket for Main Bearing Plate .006" Thick, Take Off End	1
TG_{1-7}	Gasket for Main Bearing Plate .003" Thick, Take Off End	3
TG_{1-8}	Gasket for Main Bearing Plate Flywheel End	1

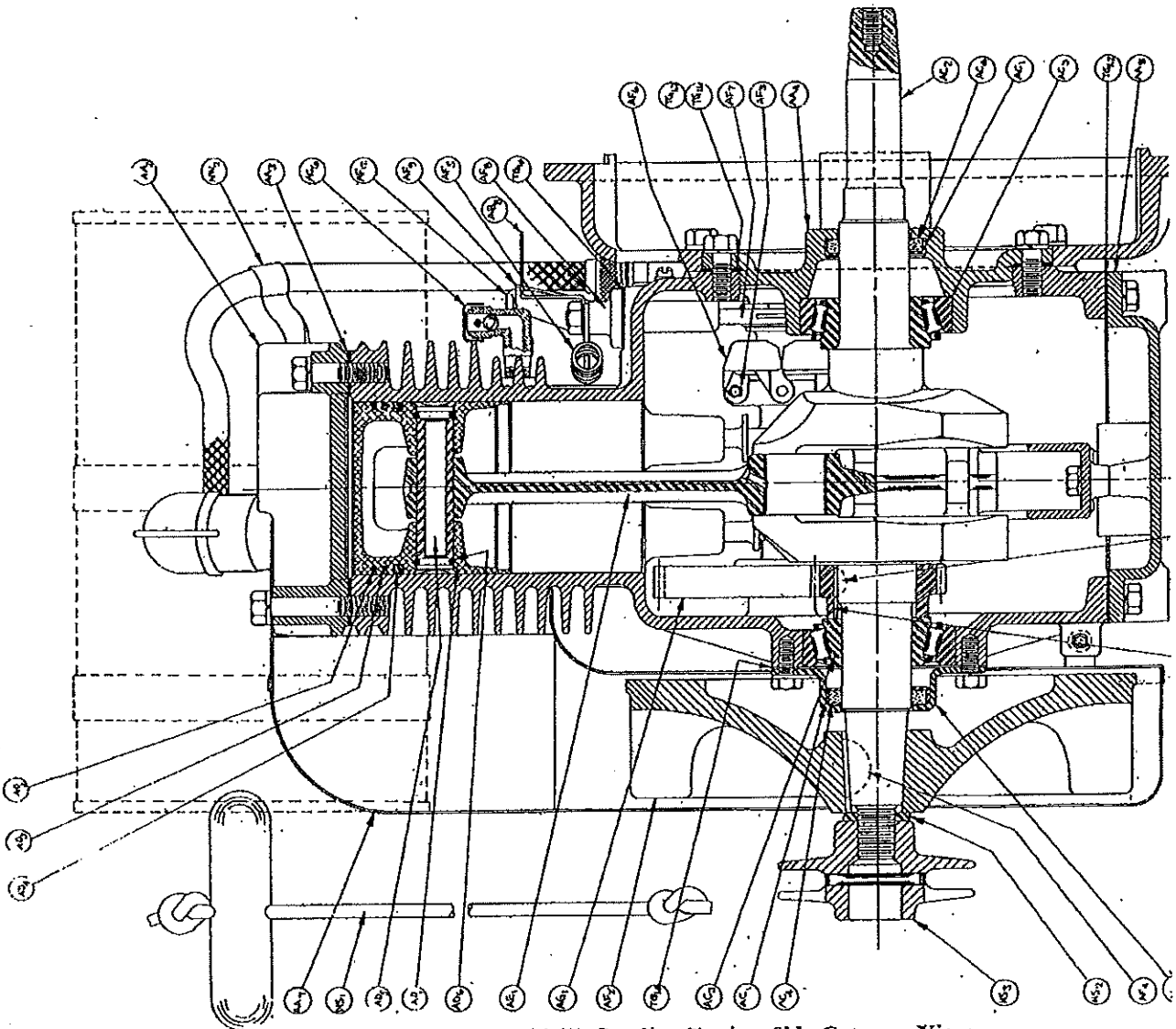


Fig. 49 — Power Unit PE-108-(*) Gasoline Engine, Side Cutaway View.

of the spark gap and cause a current in the form of a spark to flow. This induction between the primary and secondary coils is further aided by the flow of current out of the condenser through the primary and by the sudden rapid change of flux when released by the primary coil.

(f) The rapidity of rise of the secondary voltage is slowed down by the leakage in the secondary system as explained before. The insulation of the coil, the distributor, the lead wires and the spark plugs all leak away a certain amount of energy. The rate of rise of the secondary is speeded up by the condenser discharging back through the primary and also the change of the magnetic field released by the opening of the primary circuit. Once the voltage has risen to the breakdown voltage of the gap it will go no higher and actually drops considerably since the resistance of the gap decreases as soon as a flow of current has been started. The secondary system then continues to discharge itself until there is insufficient energy to maintain the flow across the gap. It then becomes open circuited again and is ready for the next cycle. The impulse coupling mechanism consists of a drive shaft coupled to the rotor by a spring assembly; a trip arm fastened to a support plate assembly which in turn is fastened to the end plate which not only provides for the mounting of the magneto to the engine but also furnishes a bearing for the drive shaft and contains the impulse stop pin. Fastened to the end of the drive shaft is a cam plate which contains, as does the support plate, a pin. The impulse spring unit is assembled so that one end of the spring unit is over a pin in the cam plate and the other end over a pin in the support plate.

The impulse mechanism operates as follows: As the engine is cranked the drive shaft, which is geared to the engine, rotates but the trip arm, because of its weight, hangs in a vertical position and is resting against the impulse stop pin, thus preventing the rotor from turning. As the drive shaft continues to rotate the impulse spring is compressed. At the same time, however, the cam plate is also rotating, tending to push the trip arm free from the impulse stop. As the drive shaft continues to rotate, the spring is further compressed and the cam plate continues to push the trip arm out. As the spring nears complete compression, the cam plate pushes the trip arm free of the impulse stop and the energy stored in the spring snaps the rotor around at high speed at just the right moment to produce a powerful spark, thus starting the engine.

During starting of the engine the coupling pawl engages the pawl stop pin once per revolution in order to provide the impulse action which intensifies the ignition spark. The functioning of the coupling can be checked by turning the drive gear by hand in a clockwise direction and noting the engagement, windup and release of the coupling. The impulse feature continues to function until a rotative speed of between 190-210 rpm, has been reached, after which centrifugal force causes the pawl end to retract with the result that no engagement with the stop pin occurs and the coupling serves as a solid drive member.

(2) **Spark Plug.**—The ignition current is supplied to the spark plug through the high tension shielded wire from the magneto.

(3) **Starting.**—When the **START** button on Remote Control Unit RM-21-(*) is pressed, it closes the circuit from the battery to the exciter winding of the generator through a 12 volt start solenoid. This solenoid is used because of the heavy current drawn. The heavy contacts of the relay can move adequately to carry the load.

(4) **Stopping.**—When the **STOP** button is pressed, this grounds out the primary circuit of the magneto so that no ignition current reaches the spark plugs. Hold the **STOP** button down until the engine has completely stopped. The power unit can also be stopped by pressing the grounding lug on the side of the magneto.

(5) **Engine Interference Suppression.**—Suppression of engine radio interference is accomplished by using magneto ignition and a completely shielded system for the ignition. The magneto has a stamped steel shield to which is connected the high tension shielded ignition cable. This is held to the shield with a compression nut and is fastened at the other end to the spark plug which has a die cast metal shield.

e. Exhaust System.—The exhaust gases from the cylinder are released through a port which is opened by the exhaust valve which opens at the correct instant because of its timed operation off the camshaft. The gases then escape through the exhaust connection on the engine block. These gases then flow through the exhaust adapter flange and elbow, through the nipple, the coupling, the elbow and finally to the outside through the

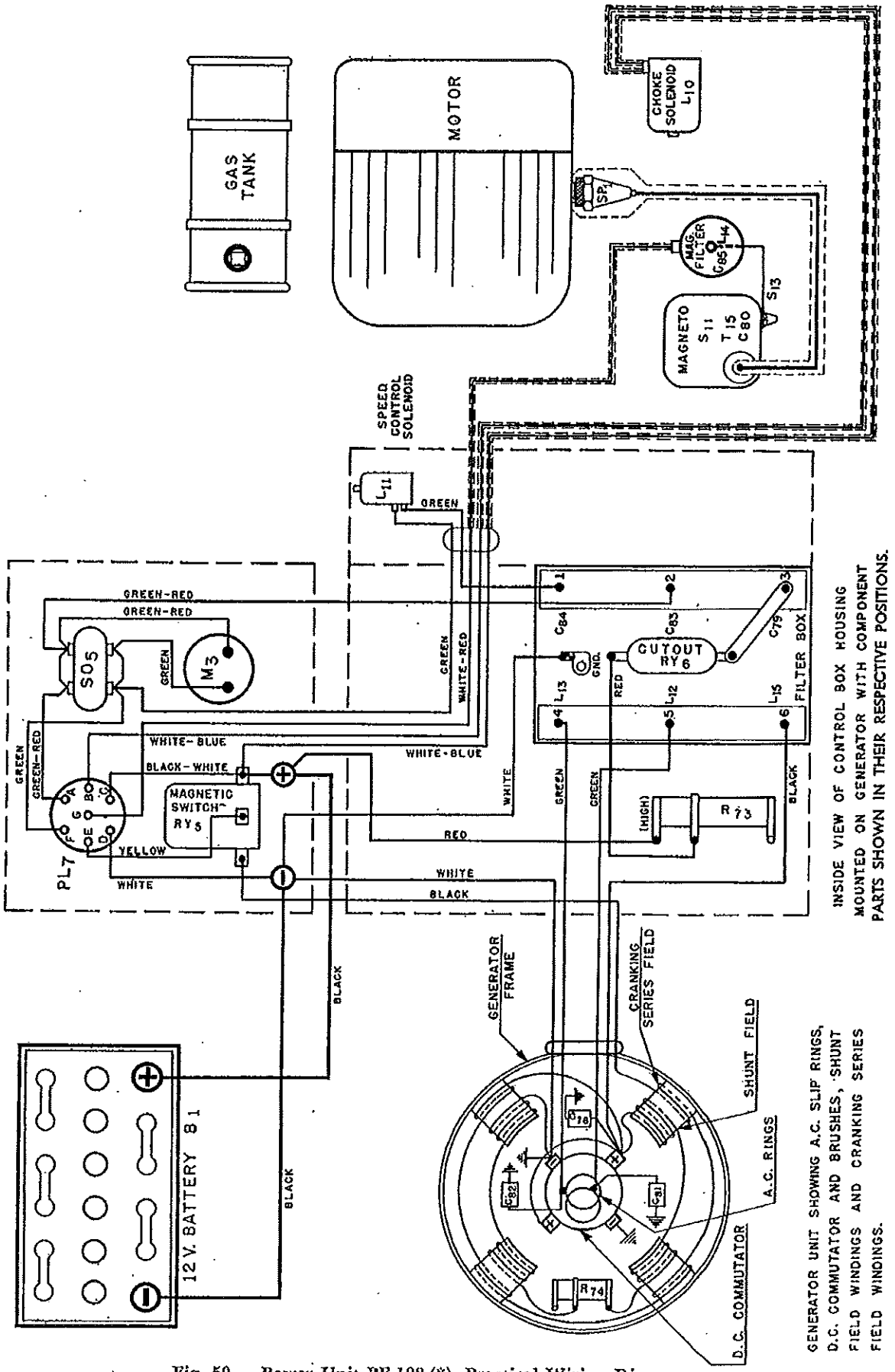
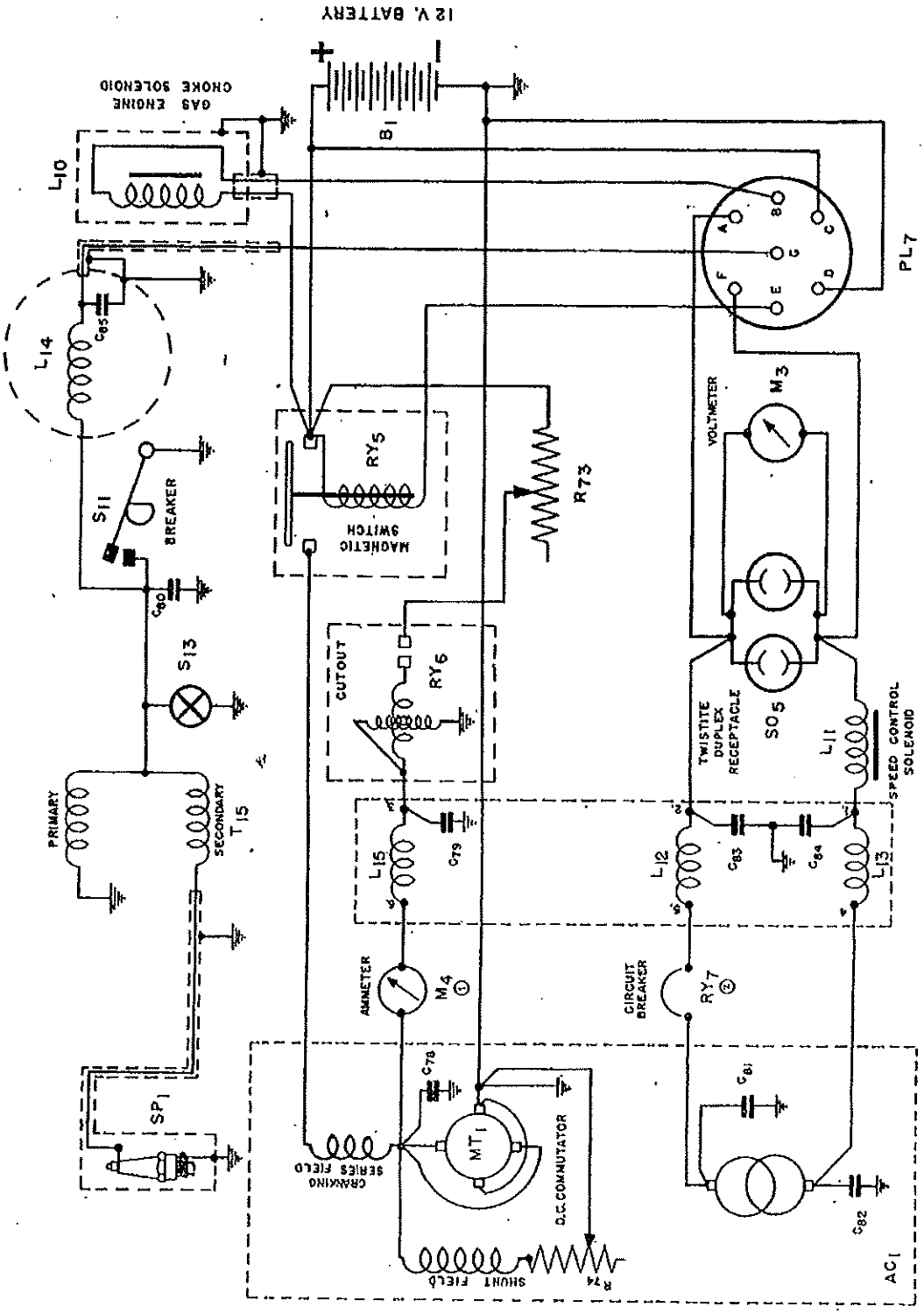


Fig. 50 — Power Unit PE-108-(*), Practical Wiring Diagram.



(1) Not used on PE-108-A, PE-108-B, and PE-108-C.
(2) Not used on PE-108-A, PE-108-B, and PE-108-C.

Fig. 51 — Power Unit PE-108-(*) Schematic Diagram.

muffler. A flexible tube is used at the end of the muffler to extend the point at which the exhaust gases are released.

f.. Mechanical System.—The piston is fitted into the cylinder block with two compression rings and one oil ring. These are of the split expanding type which provide a perfect fit between piston and cylinder walls. The piston is connected to the connecting rod by means of a wrist pin about which it can rotate. This assembly is the arrangement by which the engine's power is transmitted to the crankshaft to which the connecting rod is connected. The crankshaft is supported to the block by the main bearings. The rear end of the crankshaft is connected to the flywheel, which is equipped with fins for the air-cooling of the engine. The front end of the crankshaft is tapered and the generator armature is mounted on this tapered extension. On the extreme rear end of the crankshaft is the flanged starter pulley for emergency rope-pull starting.

The timing gear is fastened to the end of the camshaft. The camshaft has eccentric sections on which the valve push rods ride. In turn the valves rest directly on the push rods so that the action of the eccentrics on the camshaft is transmitted directly to them. The timing is such that the valves, both intake and exhaust, open at the correct instant to meet the operation of the piston.

The camshaft gear also meshes with the governor gear which is mounted on the governor drive shaft. This direct drive of the governor provides for more positive speed control of the engine.

The magneto is driven by a gear which meshes with and is driven by a similar gear. This gear is mounted on a drive shaft which engages directly with the timing gear end of the camshaft. Thus, the magneto, governor and valves are operated by one shaft and are correctly synchronized with one another. The plunger type oil pump is driven by the camshaft.

41. GENERATOR.—

a. Generator.—The generator consists of a 4-pole rotating armature type alternator with double winding, a 12-volt exciter winding which also supplies the current for the starting battery, and a 110 volt a-c winding. Mechanically both alternator and exciter are built into one unit. The generator develops 600 watts of 110-volt, 60 cycle, single-phase, alternating current at 1800 rpm.

Voltage regulation is obtained by inherent characteristics of the magnetic circuit of both alternator and exciter, as well as by a magnetic speed regulator which operates in conjunction with the mechanical engine governor. This arrangement permits good voltage regulation at no great sacrifice to efficiency and heat rise.

b. Alternator.—The alternator is that part of the generator which supplies the 110 volt alternating current for use at the main lines. It consists of two parts—a rotor and a stator. The stator (the stationary windings and magnetically active iron in an electrical machine) is in the generator frame and is the field. Leads are brought directly from the slip rings to the a-c terminals on the control box.

The revolving part which includes the d-c and a-c windings on the same shaft is the armature. It receives excitation from the shunt winding of the field. This rotor is directly mounted and bolted to the crankshaft of the gasoline engine. Both operate at the same speed—1800 rpm. As the engine is governed at this speed, and this varies but slightly according to the load, the generator frequency is well regulated.

For this power unit the overall voltage regulation is 7%. That means that at full load the voltage is 110-volts and at no load, it is 120-volts—an addition of 7% over the full load voltage.

The main 110-volt a-c wires from the slip rings of the armature are connected to the devices on the control panel and finally terminate in the a-c receptacle on the control panel.

After starting the power unit, the voltmeter will register between 110-volts and 120-volts depending on the size of the load. The ammeter PE-108-D only, will only register if there is a connected load. The circuit breaker is both a disconnect switch and overload protection device.

(1) **Starting Circuit.** — When the **START** button on the remote control unit is pressed, the starting relay is closed and stays closed as long as the **START** button contact is made. Closing of this relay completes the circuit between the starting batteries and the exciter. This energizes the exciter which now acts as a motor, the power of which is transmitted to the engine and cranks it. Cranking continues as long as the **START** button contact is made and the batteries can furnish electrical power.

(2) **Excitation to Alternator.** — After the plant has started the exciter fulfills its designed function of furnishing excitation to the alternator. This excitation increases the efficiency and output of the alternator. Impressing a voltage on the wires of the electromagnets in the alternator armature increases the magnetic flux. The larger the flux, the greater is the number of lines of force that can be cut by the armature and so the output of the generator is inreased.

(3) **D-C Supply to Battery and Output.**—The exciter also serves as a source of power for charging the starting batteries and for feeding a 12-volt d-c circuit when the power unit is running. This circuit is terminated in the d-c receptacle on the control box. The d-c generated when

the plant is running feeds through two relays when charging the starting batteries. The positive wire from the generator is connected to the start relay since that is the point from which heavy current is drawn for starting purposes. From there a wire is connected to the coil of the charge relay. As the other side of the coil is grounded, as soon as the exciter does generate a current, the coil becomes an electromagnet, pulling down a contact arm. This contact arm is in the circuit between the battery and the exciter. The function of this charge relay is to prevent a discharge of the batteries when no current is being generated either because of plant idleness or trouble in the charging circuit.

When the plant is not running the starting batteries act as the source of power for the d-c circuit. Connection is made at the positive wire which comes from the battery to the starting relay on the control box.

When the plant is running the d-c terminals not only are supplied current from the batteries but also from the generation of the exciter. In that case, the batteries "float on the line," absorbing the higher voltage so that the voltage at the d-c terminals is 12 volts. If the current drawn from these terminals is greater than that supplied from the exciter, the balance is taken from the batteries.

SECTION IX — MAINTENANCE

42. ENGINE.—

a. Fuel.—
The fuel recommended for the engine is a non-leaded gasoline of an octane rating of at least 67.

b. Addition of oil.—
A new engine should not require the addition of oil during an eight hour working day. It is however, advisable to check oil level each shut down period, such as at noon or every 5 hours of operation and see that this level is maintained. The base of the engine holds approximately 1 quart of oil and it should be filled level with the filler hole. Oil should be added to maintain this level.

c. Changing of Oil.—
(1) The old oil should be drained and fresh oil added after every 59 hours of operation.

d. Check for Spark.—
(1) To prove that a satisfactory spark is being obtained from the magneto remove the ignition cable from the spark plug. Hold the ignition cable terminal about 1/8" from the metal part of the engine. Keep hand on insulated part of cable to avoid a shock. Turn motor with starting crank or rope and if a spark jumps this gap, the entire ignition system with the exception of the spark plug is all right.

e. Changing Spark Plug.—
(1) Spark plug life on a gasoline engine depends on the type of service and kind of fuel used. Clean the spark plug after every 200 hours of operation and reset the points to .025". Alcohol is a good solvent and should be used to dissolve all carbon and gum deposits.

f. Changing Magneto.—
(1) If a magneto is replaced, caution must be taken so that the new magneto is properly timed to the engine.
(2) The magneto must be assembled to the engine so that the magneto gear is in time with the camshaft gear. In order to facilitate the proper assembly the gears are marked with a chisel mark and these marks must coincide to have the gears in time. In order to line up these timing marks, a peep hole is provided in the crankcase (see Fig. 52). The crankshaft should be turned over until the chisel mark on the camshaft gear is visible through the peep hole. The magneto should then be assembled so that the mark on the magneto gear is in line with the mark on the camshaft gear.
(3) The bolt, lockwashers and nuts should then be replaced and securely tightened.

g. Servicing Fuel Strainer.—
(1) The fuel strainer filters the gasoline before it enters the carburetor.
(2) Inspect the filter daily and if dirt is present in the cup, it should be emptied and the cup thoroughly cleaned.

h. Servicing Air Filter.—
(1) The engine on PE-108-A, PE-108-B, PE-108-C is equipped with a screen type air cleaner whose function is to clean the air before it enters the carburetor to mix with the gasoline. The air filter can be cleaned by first removing it from the carburetor and swishing in Diesel oil. Drain the Diesel oil and soak the filter in light lubricating oil. Use the same oil as used in the engine crankcase.
(2) The engine on PE-108-D and some on PE-108-C, is equipped with an oil bath air cleaner. To service remove the cup at the bottom of the air cleaner and empty out the oil together with the dust collected at the bottom of the cup. Clean the cup and refill to the level as shown on the cup, with the same grade of oil as used in the engine crankcase.
(3) It is also necessary to clean the filtering unit of the oil bath air cleaner. This filtering unit consists of fine mesh wire which will prevent large pieces of dust or

dirt from entering into the carburetor. To clean, the three screws which hold the air cleaner to the bracket should be removed and the body of the filter pulled free of the bracket. Clean the element thoroughly in Diesel oil and reassemble.

DO NOT REMOVE FILTERING UNIT FROM AIR CLEANER

(4) The air cleaners should be cleaned after each day of engine operation and in extreme dusty conditions it is necessary to clean two or even three times a day.

43. DISASSEMBLY.—

a. Removal of Starting Rope Sheave.—

(1) The rope starter sheave can be removed from the crankshaft by unscrewing it in a counter-clockwise direction. This is facilitated by the use of a common monkey-wrench.

b. Removal of Shroud and Fuel Tank.—

(1) Next remove the 4 cap screws and plain washers which hold the shroud and cylinder head to the cylinders. Next loosen and remove the 2 round head screws and lockwashers which hold shroud to engine base. Loosen the gas line at the fuel strainer under the tank. The assembly of the fuel tank and shroud may now be removed as a unit. To remove the fuel tank from the shroud, take out the 2 bolts and nut holding the fuel tank bracket to the shroud.

c. Removal of Flywheel.—

(1) The flywheel fits on a taper on the crankshaft and is easily removable. After the shroud and the fuel tank have been removed grasp the flywheel with the left hand and strike the end of the crankshaft several sharp blows with a babbitt hammer. The flywheel will then slide off the taper.

d. Removal of Cylinder Head.—

(1) First disconnect the spark plug wire and remove the spark plug. Loosen and remove the 4 cap screws and washers, which still hold the head in place. The head and gasket can then be lifted off.

e. Removal of Carburetor and Air Cleaner.—

(1) Loosen the control rod from the carburetor to the governor control lever. This is accomplished by removing the cotter pin which secures the control rod to the control lever. The control rod may be left threaded into the carburetor. Loosen and remove the two nuts which hold the carburetor to the cylinder. The assembly of the carburetor and air cleaner can then be removed. If it is desired to remove the air cleaner from the carburetor, loosen the clamp screw on the air cleaner and pull the air cleaner off the carburetor.

(2) Disassembly of Carburetor. — Stromberg Model OH-5/8 completely assembled showing high speed needle valve adjustment, idle needle valve adjustment and throttle stop adjustment (see fig. AJ_1 in List of Replaceable Parts).

(a) Remove high speed needle valve adjustment and gasket using a ½" open end wrench. Remove main discharge jet using a screw driver of suitable size to avoid damaging part. Remove strainer plug gasket and strainer.

(b) Remove idle needle valve and spring. Remove throttle stop screw and spring. Remove throttle stop lever, nut, lockwasher and lever. Remove throttle valve screw, valve and throttle shaft.

(c) Loosen choke lever set screw and remove lever. Remove choke lever screw, lockwashers, valve and choke shaft.

(d) Remove float chamber cover screws, lockwashers, cover and cover gasket.

(e) Remove float fulcrum pin spring. Remove float, fulcrum pin and float needle valve. With a large suitable screw driver, remove float needle valve seat and gasket.

(3) Reassembly.—

(a) Insert choke shaft into body from lower side of main body and assemble choke valve making certain that the valve seats around the entire edge when it is in closed position. Assemble choke lever on choke shaft with ball plunger in one of the indent holes on top of the body. Apply light pressure on the lever to slightly compress the plunger spring and when held in this position, fasten set screw securely. Make certain that choke valve operates freely.

(b) Insert throttle shaft into body from lower side. Hold shaft with the countersunk end of hole on the right side of the center line. Place throttle valve in shaft with the projections on the valve on the right hand side. Assemble throttle valve screw loosely and with a small screwdriver tap lightly on the high side of the valve to aid in centering it. Hold in closed position and tighten screw securely. Place throttle stop lever on shaft with long end toward choke shaft and with ear down towards the body. Assemble lockwasher and nut. Assemble throttle stop screw and spring. Hold throttle valve in closed position turning in the stop screw until it just contacts the lever and then turn in, an additional one-half turn. Assemble idle needle valve and spring seating needle valve lightly with fingers and turning out one-half turn.

(c) Assemble float needle valve seat and gasket securely. Assemble gasoline strainer, plug and gasket making

certain that the strainer fits over the lower end of the float needle valve seat. Assemble main discharge jet securely. Unscrew high speed needle adjustment at least two turns to avoid damaging needle valve point when it is assembled into the body. Assemble high speed needle and gasket securely. Turn the adjustment in until it seats, and then turn out approximately one and one-half turns. This is only a preliminary setting and final adjustment will have to be made on the engine.

(d) Insert float fulcrum pin in float lever. Attach float needle valve into fork of float lever. Assemble float and these parts into the body. Assemble float fulcrum spring in slots in the body and with the flanged ends resting on top of float fulcrum pin; curved section of spring is towards the top.

(e) *Fuel Level.*—In order to obtain the most efficient operation from a carburetor it is necessary that the fuel level be maintained at the correct height in the float chamber. The correct fuel level for the carburetor is 17/32" from the gasket surface of the float chamber with the inlet pressure one-half to one pound. This can be checked either on the engine or on a test stand. When checking the level, it is necessary to hold the fulcrum spring down so that float parts are in their normal position. The height of the level can be measured by placing a standard depth gauge between the side of float chamber and the float making certain that the scale does not contact either part as it will result in an incorrect reading. If the level needs to be changed, bend the float lever at the hole on top to obtain the desired height. When doing this operation use a pair of long-nose pliers.

(f) Assemble float chamber cover and gasket.

f. Removal of Magneto.—

(1) Loosen the knurled nut which fastens the shielding to the magneto and pull the wire and shield off the magneto. Next loosen and remove the upper cap screw, nut and lockwasher and also the lower nut and lockwasher.

(2) The magneto assembly can then be pulled off of the engine.

g. Removal of Valves.—

(1) First remove the cylinder head. Remove the cap screw and washer which holds the inspection plate to the engine. The plate can then be pried away from the cylinder which will expose the valve spring keepers and locks. A standard adjustable type valve lifter should be used and the valve springs compressed. This will expose the retainer locks which can be pried away from the valve stems with a screw driver. The springs should then be removed with the valve spring seats, and the valve pulled upward out of the guide.

h. Removal of Engine Base.—

(1) To facilitate the removal of the engine base, the generator adaptor housing should first be removed. This is accomplished by removing the 4 cap screws and lockwashers which hold the adaptor to the crankcase and tapping the adaptor with a babbitt hammer away from the case. The engine base can be removed by loosening and removing the ten cap screws and washers and lifting the base off the crankcase.

NOTE: BE SURE TO DRAIN THE OIL OUT OF THE ENGINE BASE BEFORE ATTEMPTING TO REMOVE.

i. Removal of Connecting Rod and Piston Assembly.—

(1) Loosen and remove the two cap screws and lockwashers on the connecting rod cap and remove the cap. The rod should then be tapped gently with a hammer handle to drive the piston out of the bore. As soon as the piston protrudes over the edge of the cylinder, it should be grasped firmly in the hand and withdrawn.

j. Removal of Crankshaft.—

(1) Loosen and remove the four cap screws and lockwashers which hold the main bearing plate to the crankcase. The plate can then be pulled off the crankcase. The crankshaft assembly can then be pulled out of the case. When removing the crankshaft, the bearings should be protected with the hand so that they are not bumped or scratched.

k. Removal of Governor Control Lever and Governor Spring.—

(1) First remove the governor spring by detaching from the governor lever and adjusting screw. Then remove the nut which holds the governor lever to the shaft. The lever can then be pried from the shaft. Then loosen and remove the 2 cap screws which hold the governor shaft support bracket to the case. The bracket and shaft can then be withdrawn from the case.

l. Removal of Camshaft.—

(1) Remove the welch plug on the take off end of the engine by driving a sharp pointed tool into it and wedging out of base. Use a drift punch and drive out camshaft support pin. The entire camshaft assembly with the weights assembled can then be removed from the bottom of the crankcase.

m. Disassembly of Governor Weights.—

(1) The weights should be spread outward

away from the shaft and the thrust sleeve and spacer pulled from the shaft. The cotter pins which lock the fulcrum pin in place should then be removed and the fulcrum pin driven out.

n. Removal of Oil Pump Plunger Push Rod.—

(1) The plunger push rod should be grasped firmly with a pair of pliers. The head of the push rod should then be driven off and the push rod can be withdrawn from the guide. The valve tappets can now also be pulled out of their guides.

o. Disassembly of Oil Pump.—

(1) The cover which holds the plunger on the bore and retains the oil in the trough should first be removed by removing the two screws which hold it in place. A screw driver should be held against the plunger to prevent its popping out as the cover is removed. The plunger and spring can then be lifted out of the cylinder bore. The oil pump body should then be turned over and the retainer and check ball will fall out of the cylinder bore. The oil pump body can be removed from the base by removing the 2 cap screws and washers which hold it in place.

44. GENERATOR.—

a. A-C and D-C Brushes.—

(1) To remove brushes and brush holder plate, first remove the fan housing below the control box. The housing is secured to the generator ring by two screws, one on each side of the housing. When the housing has been removed the brushes are readily accessible. The two outer brushes are the a-c brushes and rest on the slip rings. The a-c brushes are thinner than the d-c brushes. The four d-c brushes are mounted closer to the brush holder plate and are heavier than the a-c brushes. The brush holder plate mounts to the generator ring by four screws. To remove the brush holder plate, the fan must first be removed. It is held in place by a bolt into the center of the crankshaft.

b. Field Coils.—

(1) To remove field coils, remove fan housing, fan and brush holder plate. Loosen bolts on outside of generator ring which hold field pole pieces in place, and remove coils from pole pieces.

c. Armature.—

(1) To remove the armature, first remove the fan housing, the fan and the brush holder plate. The same bolt which secures the fan also holds the armature to the crankshaft. On the generator end of the crankshaft is a long tapered shaft which fits through the center of the armature and is tapped in the end to receive the threaded bolt which holds the fan and the armature to the shaft.

45. REASSEMBLY OF ENGINE.—

a. Reassembly of Oil Pump.—

(1) All parts of the pump should be thoroughly washed in Diesel oil or solvent to remove all traces of thickened oil and sludge. The oil pump plunger should be fitted to the bore with a clearance of .0035" to .006". If the clearance is greater than .010" the plunger and oil pump body should be replaced. Inspect the check ball seat in the bottom of the pump cylinder. This seat must be perfectly cleaned and must not be lined or pitted. The check ball should then be dropped into the cylinder and tapped into the seat lightly with a punch and hammer. The retainer should then be put in place and the spring lowered into the cylinder bore. The other check ball should then be placed into the plunger and tapped lightly into the seat. The retaining pin should then be driven into place. Be sure to clean up any burr on the plunger which might be caused by driving the retaining pin in place. The burrs can be removed with a fine file. The plunger should then be inserted into the cylinder and held in place with a screwdriver until the retainer cover is replaced. Next fill the base with about ½ pint of oil. With a screwdriver pump the piston up and down to draw oil into the trough. If no oil is discharged into the trough the body and plunger are worn should be replaced.

b. Reassembly of Oil Pump Rod.—

(1) The push rod should be inserted into the guide and the cap held in place. Use a hammer and drive the rod into the cap.

(2) The valve tappers should now also be replaced in the guide. The proper clearance for the tappers is .002" to .004".

c. Reassembly of Governor Weights.—

(1) The weights should be held in position and the fulcrum pin driven in place and secured with cotter pins. The thrust sleeve should be placed over the spacer and assembled to the camshaft so that the thrust pins on the weights bear on the flange of the thrust sleeve. If excessive play or looseness is noted in the fit of the weights and fulcrum pins, both parts should be replaced.

d. Reassembly of Camshaft.—

(1) The camshaft together with the governor weights and thrust sleeve should be held in position in the crankcase with the camshaft support pin driven in place. The camshaft is fitted to the support pin with a clearance of .002" to .003". The camshaft should have an end clearance of .002" to .013". New welch plugs should be used to seal the camshaft support pin holes in the crankcase.

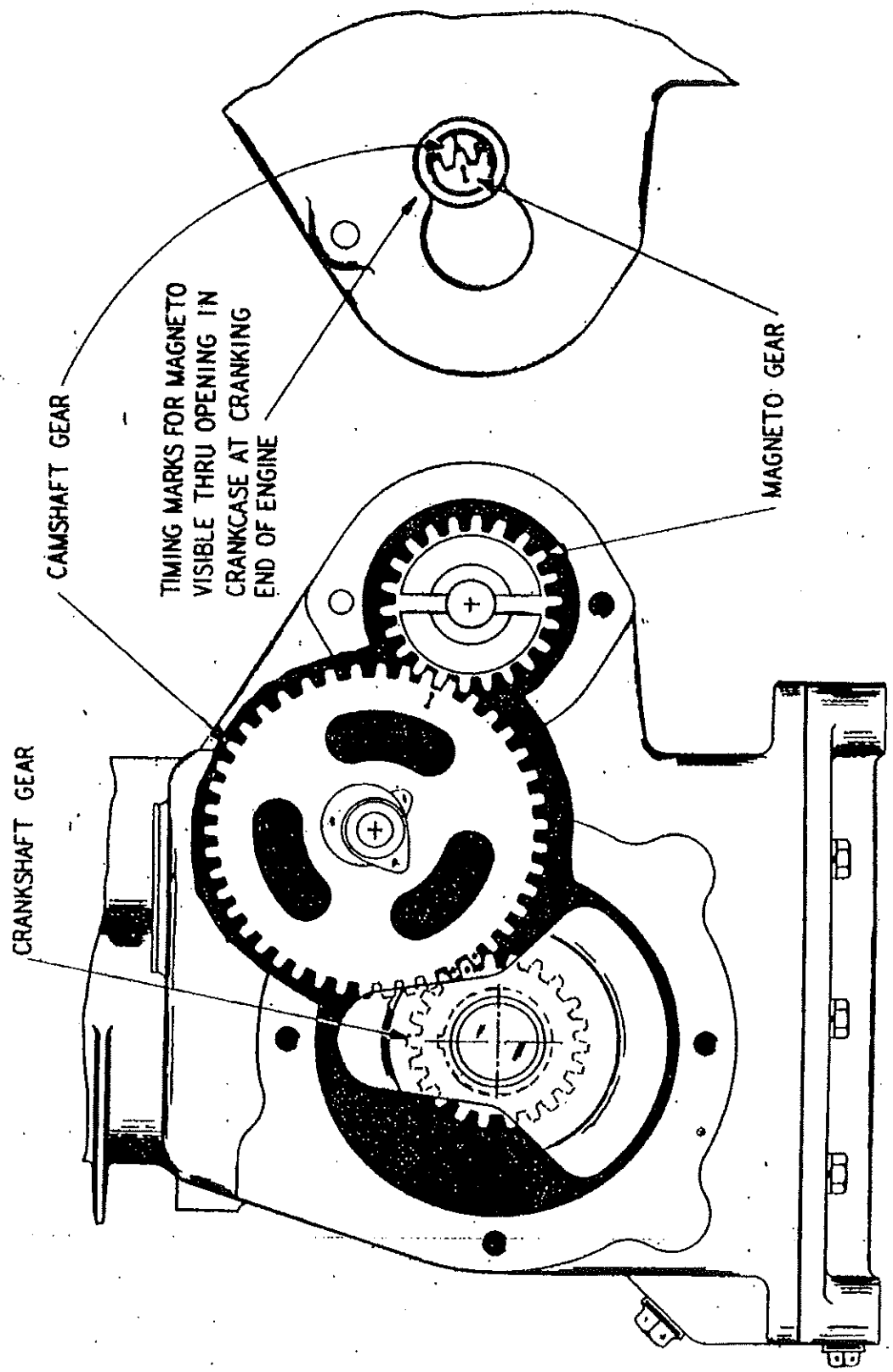


Fig. 52 — Timing Diagram.

e. Reassembly of Governor Control Lever and Governor Shaft.—

(1) The governor shaft and support bracket should be installed so that the yoke is placed behind the governor sleeve. This is accomplished by pushing the thrust sleeve as far as possible toward the flywheel end of the engine before inserting the yoke and shaft assembly. The bracket should then be bolted to the case with the two cap screws provided and the control lever mounted and tightened in place. The spring may then be replaced by hooking into the governor lever and the adjusting screw.

f. Reassembly of Crankshaft.—

(1) The crankshaft should be inserted into the crankcase and the main bearing plate replaced. The main bearing plate is fitted with shims to allow clearance for the main bearings. This clearance should be .002" to .004" with the engine cold.

(2) When meshing the crankshaft gear with the camshaft gear care must be taken that the timing marks line up. The crankshaft gear is marked with a punch mark on one of the teeth. This mark must be placed between the two punch marks on the camshaft gear. (see timing diagram Fig. 52)

g. Reassembly of Piston and Connecting Rod.—

(1) The piston should be assembled to the connecting rod with a clearance of .0002" to .0003" between the piston pin and connecting rod. The piston pin is a light press fit into the piston bosses and an oversize pin should be used if the pin is loose. The rings should be installed on the piston with the oil ring in the lower groove, scraper in the second groove and compression rings in the top groove. The rings are fitted with a gap clearance of .012", and a side clearance in the ring grooves of .002" to .003". The piston is fitted to the cylinder with a clearance of .0055" to .006" measured on the skirt of the piston. To reassemble, the piston and rod assembly should be lowered into the cylinder until the expanded rings contact the top of the cylinder. A ring compressor can be made from a piece of band iron and should be used to compress the rings into the grooves of the piston. Using the handle of a hammer, the piston should be tapped gently into the cylinder. The cap and the top part of the connecting rod have a mark and these marks must be on the same side. The oil hole in the lower part of the connecting rod should face the carburetor side of the engine. The rod should be fitted to the crankshaft with a clearance of .001" to .002" and a side clearance of .006" to .010".

h. Reassembly and Grinding of Valves.—

(1) The seat in the cylinder block should first be inspected and if signs of pitting or burning are present, should either be replaced or reground. If it is determined that the seats should be reground, a standard automotive type valve seat insert grinder should be used. The seat angle is 45°.

(2) The valves should now be thoroughly cleaned and scraped free of any deposit of carbon which may exist. If the seat of the valve shows signs of burning or pitting, it should be replaced. The valves are now ready to be ground. This is accomplished by putting a small amount of medium grade grinding compound on the seat of the valve. A small spring should then be placed on the stem of the valve and the valve placed in the guide. Using a screwdriver, the valve should be twirled back and forth while applying pressure toward the valve seat in the cylinder, occasionally allowing the pressure of the spring to lift the valve away from the seat in the cylinder. This allows the grinding compound to stay on the surface of the valve seat. **BE CAREFUL** that an entire circle or two of the valve is made in grinding as well as a back and forth or grinding motion. During the grinding operation the valve seat should be inspected at intervals.

(3) When the valve is properly ground it will be indicated by a dull gray ring completely around the seat of the valve. The actual width of this seat should be about 3/32". After grinding, the seats and valves should be thoroughly washed in Diesel oil or solvent to remove all traces of grinding compound. Any small amount of compound left on the valve stems would result in rapid wear of the valve stem and guide. The clearance in the guide should be .003" to .005".

(4) The valves should now be placed in the guides and checked for clearance. Turn the crankshaft over until the valve tapper is at the bottom of its stroke and then continue turning about ¼ turn. This is to make sure the tapper is not riding the cam which would give a false reading. Then using a feeler gauge insert between the tapper and valve. The proper clearance is .010" to .016", if the clearance is less than .010" the valve should be removed and the bottom of the valve stem ground off to obtain this clearance.

(6) When reassembling the valves to the cylinder the spring should be held in place so that the stem of the valve is in the center of the spring. The valve spring seat should then be slipped over the end of the valve under the spring and a valve lifter used to compress the spring and seat. A sticky grease should be used to coat the retainer locks and

they can then be easily inserted with the help of a screwdriver. The small end of the retainer lock should be up. The spring and seat should now be lowered over the retainers.

(6) The tapper plate should now be replaced using a new gasket.

i. Reassembly of Engine Base.—

(1) The engine base and oil pump assembly may now be installed. A new gasket should be used and the engine base assembled to the crankcase so that the oil pump push rod seats in the oil pump plunger. The bolts should be replaced and tightened alternately and securely.

j. Reassembly of Carburetor and Air Filter.—

(1) A new gasket should be used and the carburetor should be placed over the two studs on the cylinder and tightened in place with the nuts provided. The governor control rod which threads into a pivot on the carburetor, must be adjusted correctly to give proper governor regulation. The governor control lever has just sufficient travel to give full travel of the carburetor throttle.

(2) The throttle on the carburetor should be held in a wide open position. The control lever should be held as far as possible toward the carburetor, and the control rod threaded into the swivel on the carburetor to a point where the bent end lines up perfectly with the hole in the governor control lever. If assembled in this manner, the governor lever will give the full throw of the carburetor throttle. The air cleaner should then be attached to the carburetor by sliding over the air horn and tightening the clamp screw.

k. Reassembly of Cylinder Head.—

(1) The cylinder head should first be scraped clean of any carbon deposit and thoroughly washed in Diesel oil or solvent. A stiff wire brush should be used and the cooling fins should be brushed free of all dust and dirt. At this time it is also advisable to brush all dirt from between the fins on the cylinder. All fins must be perfectly clean to allow proper cooling of the engine. All carbon deposits should also be scraped from the top of the cylinder and special care should also be taken to see that the portion of the cylinder and cylinder head which contact the cylinder head gasket be absolutely clean and flat. Do not scratch the surface when scraping carbon deposits. A new cylinder head gasket should be used and placed on the cylinder with the flange side of the gasket up. The cylinder head should be placed over the gasket and the 4 cap screws and washers nearest the take-off end of the engine replaced. These 4 bolts should be drawn down loosely. Do not replace the 4 cap screws and washers which hold the shroud and fuel tank strap.

CAUTION: SPECIAL CARE MUST BE TAKEN THAT THE PROPER LENGTH CAP SCREWS ARE USED. SOME OF THE CAP SCREWS ARE LONGER – SUCH AS THE ONES WHICH ALSO HOLD THE SHROUD IN PLACE. IF A LONGER CAP SCREW IS USED IT WILL THREAD TOO DEEPLY INTO THE HOLE AND CRACK OFF THE FINS ON THE CYLINDER. MEASURE THE LENGTH OF THE BOLTS BY HOLDING THEM NEXT TO THE HOLE IN WHICH THEY ARE TO BE USED.

l. Replacement of Flywheel and Starting Rope Sheave.—

(1) The Woodruff key which prevents the flywheel from turning on the shaft should be replaced. The flywheel can then be assembled to the shaft. The keyway in the flywheel must of course line up with the key in the crankshaft. A new lockwasher should be used and the starting rope sheave threaded by hand on to the crankshaft. A monkey wrench should be used to tighten the starting nut and the wrench may be struck sharply with a hammer until the sheave draws up tightly against the flywheel. Then replace the set screw which helps lock the sheave in place.

m. Replacement of Shroud and Fuel Tank.—

(1) The fuel tank should first be assembled to the shroud with the 2 cap screws, washers and nuts provided. The entire unit should be assembled to the engine and the cap screws and washers replaced. *As previously mentioned be sure the right length cap screws are used.* Then tighten all cylinder head cap screws alternately and securely.

n. Replacement of Spark Plug and Wiring.—

(1) The spark plug should be inspected and thoroughly cleaned. Alcohol is a good solvent to use and it will in most cases remove carbon and gum deposit. The porcelain insulator should be inspected and if chipped or cracked the plug should be replaced. The points of the spark plug if burned will also necessitate the replacement of the plug. If the points and porcelain insulator are found to be in good condition the gap between the points should be reset to .025" using a point tool or similar instrument. Then replace the spark plug and connect spark plug wire.

o. Replacement of Muffler.—

(1) First thread the street ell into the cylinder and lock in position with the cap screw provided. Then thread the exhaust hose into position.

(2) After the engine has been completely assembled it should be run in before using Run at about ¼ throttle for

about ½ hour and then at governor speed without load for two hours.

(3) Then drain the oil used for running in.

46. **LEAD DEPOSITS IN COMBUSTION CHAMBER AND ON VALVES.**—

a. Many present day gasolines are treated with lead compounds in order to raise the octane rating of these fuels so that they can be used in engines without causing detonation with its evil effects.

b. In many cases it is necessary to use leaded gasoline, because non-leaded fuels are not available. If non-leaded fuels are available they should be used by all means so as to avoid all of the evils described in the following paragraphs.

c. While this lead treatment of gasolines raises the octane rating of the fuel, it is also a fact that the lead compounds will deposit in the combustion chambers of the engines, on the valve heads and stem, and some will also work down into the crankcase lubricating oil, which will eventually take on the appearance of light gray paint.

d. All of these deposits have a bad effect on the engines, but the one which will show up serious results first, is the deposit on the valves. These deposits build up to a thickness of about 1/32 of an inch, in about 50 hours of operation. This building up process is more pronounced with engines running constantly at the same speed and load, than when operating intermittently and at varying loads and speeds.

e. When these deposits reach a thickness of about 1/32 inch, they will crack and flake away in patches, after which the deposits will build up again and so on indefinitely.

f. When this breaking away in patches occurs on the bevelled seats of the valves leakage will occur at these points and the flame of combustion will blow through causing any material of which the valves might be made to burn up.

g. This condition occurs in all types of engines, whether air-cooled or water-cooled.

h. No method has been found for preventing these lead deposits from forming. The lead will not burn, but is left behind in the engine.

i. A method of removing these deposits without taking the engine down and scraping, has been found and this consists in injecting water into the engine through the carburetor while the engine is hot and running at normal speed. This water is instantly turned to steam when it strikes the walls of the combustion chamber and the valves, and during this process the lead will crack away. Much of the lead will be discharged with the exhaust gases, but some of it will find its way to the crankcase lubricating oil, adding to whatever lead was deposited there during the operation of the engine.

IT IS THEREFORE ABSOLUTELY NECESSARY THAT THE OLD CRANKCASE OIL BE DRAINED AND FRESH OIL ADDED AFTER THE WATER INJECTION OPERATION, OTHERWISE DAMAGE MIGHT BE DONE DUE TO LUBRICATING THE ENGINE WITH CONTAMINATED OIL.

j. The best time for the water injection operation is just before it is necessary to change the lubricating oil in the crankcase, which should be done every 50 hours of operation.

k. The water injection should be done at least once every 100 hours, and even every 50 hours would be better.

l. The engine has no inlet manifold, the carburetor being bolted directly into the cylinder. Therefore, the water should be injected directly into the carburetor air intake opening, after the air cleaner has been removed from the carburetor.

m. With squirt can in one hand, the other hand on the carburetor choke lever, squirt the water into the carburetor until the engine slows down. Before the engine is stopped, however, interrupt the water injection and close the carburetor choke partly, until the engine recovers its speed, then open the choke and continue the water injection as above until about a pint of water has been used.

n. The squirt can, should have an opening in the spout of about 2/32 inch diameter, which is about standard for these cans.

BE SURE THE AIR CLEANER IS REPLACED AFTER THE ABOVE OPERATION.

o. During the very cold weather, it is especially important that the engine be hot, otherwise the injection operation will not be effective. The injection had best be done immediately after the engine has been running under full load.

THE WATER MUST BE FRESH (NOT SALT WATER) AND CLEAN, FREE FROM SAND AND GRIT, OTHERWISE THE ENGINE MAY BE SCORED. AFTER ALL OF THIS WATER HAS BEEN INJECTED AND WHILE THE ENGINE IS STILL HOT ALL OF THE CRANKCASE OIL SHOULD BE DRAINED AND REPLACED WITH FRESH OIL.

p. The engine should now be ready to continue on its regular duty.

This injection of water will also remove deposits back of the piston rings, and after the injection operation and changing of the crankcase oil have been properly carried out, the engine should run very appreciably smoother and with increased power.

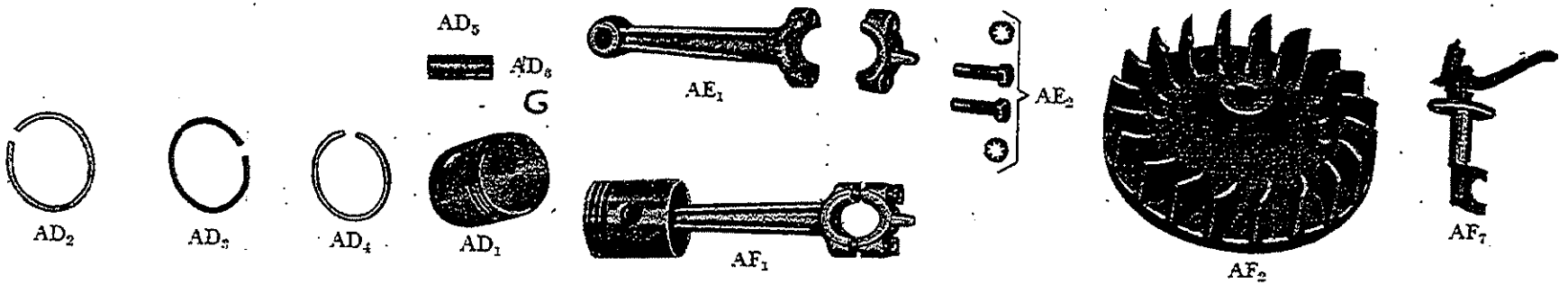
q. It will not do much good to feed the water into the engine at a very low rate. The best results are obtained by feeding the water in rather rapidly, so that the engine will be slowed down considerably, and so that the steam will be ejected out of the exhaust quite profusely, but the injection should be interrupted before the engine is stopped completely.

SECTION X — SUPPLEMENTARY DATA

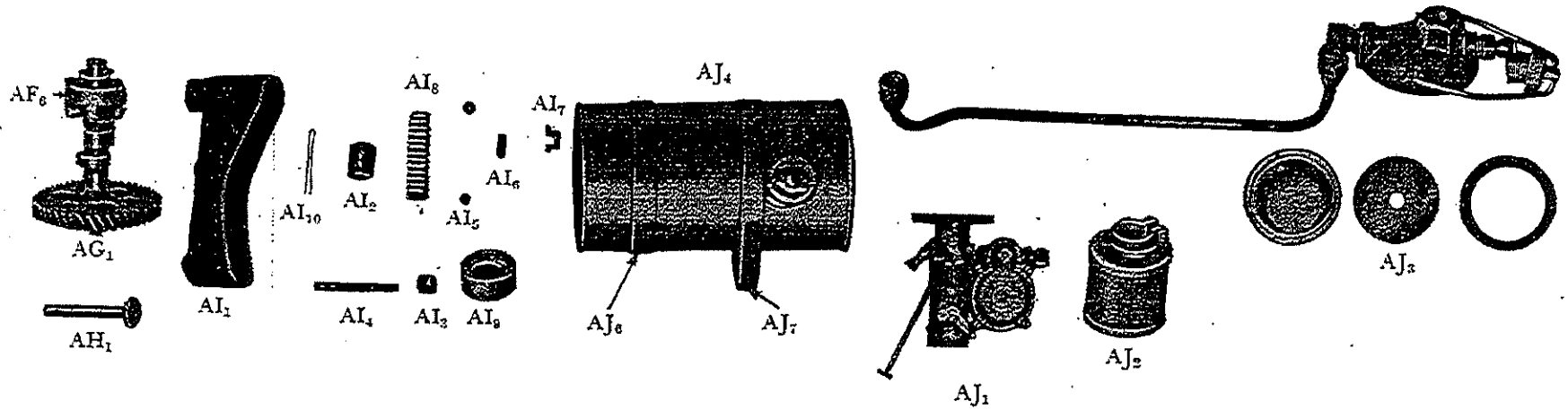
47. TABLE OF REPLACEABLE PARTS

REF. SYMBOL	SIG. CORPS STOCK NO.	NO. REQD.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
a. Power Unit PE-108-(*), Gasoline Engine.—						
AA_2		1	Cylinder Block and crankcase, 2-1/4 in. bore, 2-3/4 in. stroke single cylinder; with valve insert, used on PE-108-A, B, C.	Base for motor assembly	WISC	AA-81-G-1
$AA_{2.1}$		1	Cylinder and crankcase, 2-1/2 in. bore, 2-3/4 in. stroke, single cylinder; used on PE-108-D.	Base for motor assembly	WISC	AA-81K-1
AA_3		1	Cylinder head, 5/8 in. high fins for cooling; 6-1/2 in. long x 4-1/4 in. wide x 1-1/4 in. high. Used on PE-108-A, B, C.	Seal top of cylinder block	WISC	AB-76-K
$AA_{3.1}$		1	Cylinder head, used on PE-108-D.	Seal top of cylinder block	WISC	AB-76D-1
AA_4		1	Cylinder Head Gasket, Cork with copper sheath, 6-3/16 in. long x 4-1/4 in. wide. Used on PE-108-A, B, C, D.	Seal between block and head	WISC	QD-568-E
AA_4		1	Main bearing plate—take off end, used on PE-108-A, B, C, D.	Retain crankshaft bearing	WISC	BG-170

AA_5	1	Main bearing plate—flywheel end, used on PE-108-A, B, C, D.	Retains crankshaft bearing	WISC	BG-171
AA_6	1	Generator adaptor, used on PE-108-A, B, C, D.	Mounting generator	WISC	BG-205
AA_7	1	Air Shroud, used on PE-108-A, B, C, D.	Directs air flow for cooling	WISC	SE-53-G
AA_8	1	Engine Base, used on PE-108-A, B, C, D.	Holds oil supply	WISC	BB-116-B
AB_1	1	Exhaust Valve, 4-1/2 in. long x 1-1/8 in. diam., used on PE-108-A, B, C, D.	Outlet for burnt gases	WISC	AE-73-C
AB_2	1	Intake Valve 4-1/2 in. long x 1-1/6 in. diam., used on PE-108-A, B, C, D.	Outlet for fresh gas	WISC	AE-73-N
AB_3	2	Valve springs, intake and exhaust; overall 2-1/4 in. long x 1 in. O.D., used on PE-108-A, B, C, D.	Keeps valves closed	WISC	AF-48
AB_4	2 pr.	Valve spring seats 9/32 in. x 1 in. O.D., used on PE-108-A, B, C, D.	Holds valve springs in their proper positions	WISC	AG-26
AB_5	2 pr.	Valve spring seat locks, 3/8 in. x 7/16 in. O.D., used on PE-108-A, B, C, D.	Locks valve seats into position	WISC	AH-9
AB_6	1	Valve seat insert, exhaust; part of crankcase, used on PE-108-A, B, C, D.	Seat for exhaust valve (Can be replaced)	WISC	HG-156-1
AB_7	1	Valve tappet inspection plate, used on PE-108-A, B, C, D.	Cover for valve tapper compartment	WISC	SA-61
AC_1	2	Main bearing plate oil seal cup, used on PE-108-A, B, C, D.	Retains oil seal	WISC	PH-254
AC_2	1	Crankshaft with main bearings, Crankshaft gear and key, 14 in. long, used on PE-108-A, B, C, D.	Drive for load	WISC	CA-51-A-8
$AC_{2.1}$	1	Woodruff key for crankshaft, used on PE-108-A, B, C, D.	Locks crankshaft gear	WISC	PL-21
AC_3	2	Crankshaft bearings, steel 7/8 in. x 1-3/16 in. I.D., (part of AC_2) used on PE-108-A, B, C, D.	Minimizes friction	WISC	ME-88
AC_4	2	Oil seal corks for main bearings, 1/4 in. x 1-3/16 in. O.D. x 1-1/16 I.D.	Prevents leakage of oil	WISC	PH-256
AC_5	1	Crankshaft gear, part of AC_2; used on PE-108-A, B, C, D.	Drives camshaft	WISC	GH-34-A
AC_6	1	Crankcase breather assembly; used on PE-108-A, B, C, D.	Relieves crankcase pressure and prevents condensation	WISC	LO-31-A

REF. SYMBOL	SIG. CORPS STOCK NO.	NO. REQD.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
						
AD		1	Piston assembly, including pins and rings; used on PE-108-A, B, C.	Drives crankshaft	P	AS-9553
AD_1		1	Piston, semi-finished, heavy duty aluminum 2-1/2 in. long x 2-1/4 in. diam.; used on PE-108-A, B, C.	Provides drive for connecting rod	WISC	DB-178-A
$AD_{1.1}$		1	Piston, semi-finished, heavy duty aluminum 2-1/2 in. long x 2-1/2 in. diam.; used on PE-108-D.	Provides drive for connecting rod	WISC	DB-177-A
AD_2		1	Piston Ring (compression), 6/24 in. wide x 2-1/4 in. O.D. compressed; used on PE-108-A, B, C.	Prevents leakage of gases	WISC	DC-154
$AD_{2.1}$		1	Piston Ring (compression), used on PE-108-D.	Prevents leakage of gases	WISC	DC-155
AD_3		1	Piston Ring (scraper), 5/64 in. wide x 2-1/4 in. O.D. compressed; used on PE-108-A, B, C.	Keeps oil out of gas chamber	WISC	DC-154-1
$AD_{3.1}$		1	Piston Ring (scraper), used on PE-108-D.	Keeps oil out of gas chamber	WISC	DC-155-1
AD_4		1	Piston Ring (oil regulating), 6/32 in. wide x 2-1/4 O.D. compressed; used on PE-108-A, B, C.	Regulates oil flow on cylinder wall	WISC	DC-156
$AD_{4.1}$		1	Piston Ring (oil regulating), used on PE-108-D.	Regulates oil flow on cylinder wall	WISC	DC-157
AD_5		1	Piston Pin, 1-7/8 in. long x 5/8 in. dia.; used on PE-108-A, B, C.	Holds piston and connecting rod together	WISC	DE-66
$AD_{5.1}$		1	Piston Pin, used on PE-108-D.	Holds piston and connecting rod together	WISC	DE-67
AD_6		2	Piston Pin retaining ring, "C" shaped spring 1/2 in. diam.; used on PE-108-A, B, C, D.	Locks piston pin into position	WISC	PK-69

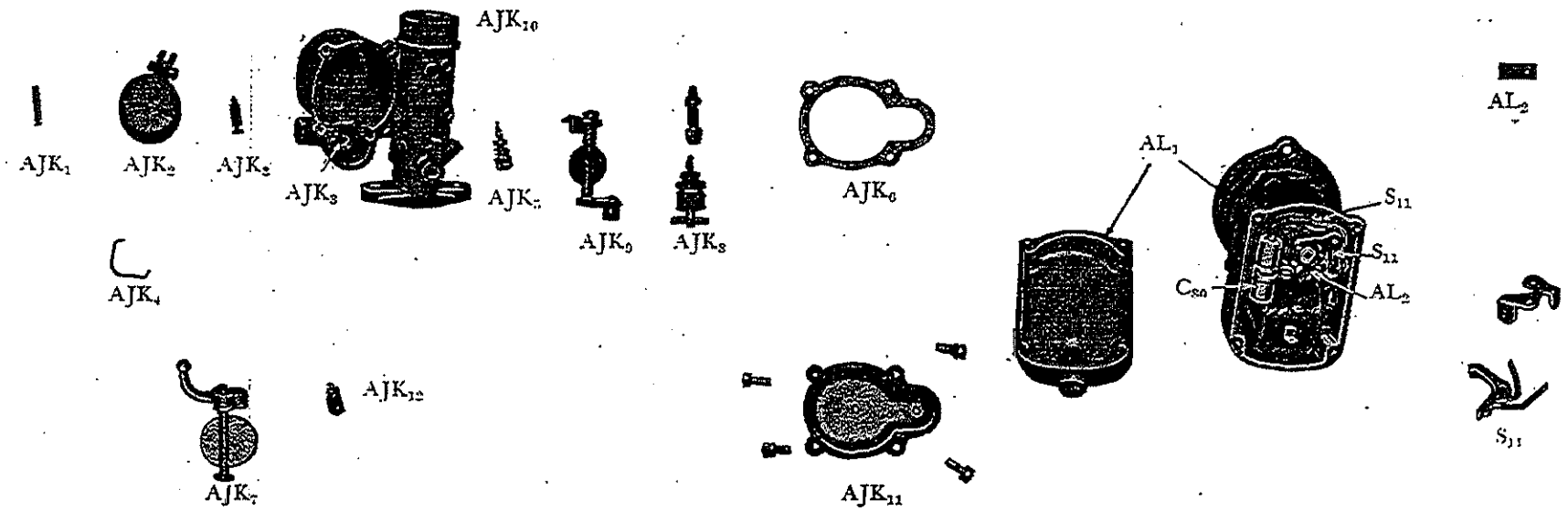
AE_1	1	Connecting rod, complete with bearing, aluminum alloy, 7-7/8 in. long x 2-1/16 in. x 1 in.; used on PE-108-A, B, C, D.	Connects piston to crankshaft	WISC	DA-55-B
AE_2	2	Connecting rod hex. head cap screw with lockwasher, 1/4-18 thd. x 1-1/4 in. long. Used on PE-108-A, B, C, D.	Connects bearing to connecting rod	WISC	SAE #1035
AF_1	1	Piston and connecting rod assembly, including pins, rings and connecting rod; used on PE-108-A, B, C.	Drives crankshaft	P	9469
AF_2	1	Flywheel and cooling fan, used on PE-108-A, B, C.	Creats uniform crankshaft motion and circulates air for cooling	WISC	NC-126
$AF_{2.1}$	1	Flywheel and cooling fan, used on PE-108-D.	Creates uniform crankshaft motion and circulates air for cooling	WISC	NC-126D
AF_3	1	Governor flyweight toggle pin, used on PE-108-A, B, C, D.	Axis for gov. flyweight	WISC	PA-256
AF_4	1	Woodruff key for flywheel #13, used on PE-108-A, B, C, D.	Locks flywheel	WISC	PL-17
AF_5	1	Spring, governor, used on PE-108-A, B, C, D.	Keeps carburetor throttle open	WISC	PM-74
AF_6	2	Flyweight, governor, used on PE-108-A, B, C, D.	Governs sleeve travel	WISC	TC-323
AF_7	1	Governor yoke and shaft assembly, used on PE-108-A, B, C, D; including:—	Controls gov. throttle opening	WISC	TC-324-C
AF_8	1	Governor shaft support bracket, used on PE-108-A, B, C, D.	Guide for yoke and shaft assem.	WISC	TC-325
AF_9	1	Governor control lever, used on PE-108-A, B, C, D.	Lever for control rod to carburetor	WISC	TC-332-C
AF_{10}	1	Governor spring anchor stud, used on PE-108-A, B, C, D.	Support for adj. screw	WISC	TC-330
AF_{11}	1	Governor spring adjusting screw, used on PE-108-A, B, C, D.	Adjusts tension on gov. spring	WISC	PI-121-I
AF_{12}	1	Governor control rod, used on PE-108-A, B, C, D.	Opens and closes carb. throttle	WISC	VE-304



REF. SYMBOL	SIG. CORPS STOCK NO.	NO. REQD.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.
AG_1		1	Camshaft and gear, with oil pump eccentric, overall dimensions 3-5/8 in. x 4-1/4 O.D.; used on PE-108-A, B, C, D.	Provides timing and oil pressure	WISC	EA-101-A
AG_2		1	Camshaft support pin, used on PE-108-A, B, C, D.	Supports camshaft	WISC	PA-264
AH_1		2	Valve tappets, steel, 2-7/16 in. x 5/16 in. diam. shaft x 13/16 in. diam. Clearance .010 in. to .016 in.; used on PE-108-A, B, C, D.	Drivers for valves	WISC	FA-42
AH_2		1	Breather, tappet compartment to crankcase; used on PE-108-A, B, C, D.	Relieves pressure in valve tappet compartment	WISC	QD-574
AI		1	Oil pump assembly, including:—	Splash type lubrication to motor parts	P	AS-9505
AI_1		1	Oil pump body, 5-7/8 in. long x 1-5/16 in. wide x 2-3/4 in. high; used in PE-108-A, B, C, D.	Container for oil	WISC	KA-59
AI_2		1	Oil pump plunger, 7/8 in. long x 5/8 in. O.D.; used in PE-108-A, B, C, D.	Maintains level of oil in pump body	WISC	KF-14
AI_3		1	Oil pump plunger push rod cap, 7/16 in. x 5/8 in. O.D. x 1/4 in. I.D.; used in PE-108-A, B, C, D.	Drives plunger in conjunction with cam	WISC	KF-19-A
AI_4		1	Oil pump push rod, 3-3/16 in. long x 1/4 in. diam.; used on PE-108-A, B, C, D.	Drives oil pump	WISC	KF-22

AI_5	2	Steel balls in oil pump, 1/4 in. diam.; used on PE-108-A, B, C, D.	Controls oil pump intake	WISC	ME-88
AI_6	1	Oil pump plunger pin, 5/8 in. long x 3/16 in. diam.; used on PE-108-A, B, C, D.	Locks pumping assembly into place	WISC	PA-217
AI_7	1	Oil pump ball retainer, 3/16 in. x 11/32 in. I.D. x .031 in. thick, used on PE-108-A, B, C, D.	Hold ball in proper position inside of spring.	WISC	PK-50
AI_8	1	Oil pump plunger spring, 2-5/16 in. x 9/16 in. O.D.; used on PE-108-A, B, C, D.	Forces oil pump plunger up	WISC	PM-58
AI_9	1	Oil Pump strainer, brass, 7/8 in. x 1-7/8 in. diam.; used on PE-108-A, B, C, D.	Oil filter	WISC	RD-107
AI_{10}	1	Cotter pin in oil pump body 1/16 in. x 1-1/2 in.; used on PE-108-A, B, C, D.	Secures oil pump assembly	WISC	XI-5
AJ_1	1	Carburetor, 3-3/4 in. x 4 in.; used on PE-108-A, B, C, D.	Mixes gasoline and air	STROM	A-18010
AJ_2	1	Air filter assembly, mesh wire, 3-1/4 in. x 2-1/2 in. O.D.; used on PE-108-A, B, C.	Keeps dust and dirt out of motor	AIRM	OJH
$AJ_{2.1}$	1	Air filter, oil bath type; used on PE-108-C, D.	Keeps dust and dirt out of motor	UNIS	#6325
AJ_3	1	Fuel filter assembly, consists of wire mesh strainer 1-3/4 in. O.D. x 5/16 in. I.D. and bulb 1-5/16 in. x 1-15/16 in. O.D. x 1-9/16 in. I.D.; sediment bulb cover and gas feedline; used on PE-108-A, B, C, D.	Trap to catch and settle dirt	WISC	LP-19
AJ_4	1	Fuel tank, with cap; 1 gallon capacity, 10 in. long x 6 in. diam.; used on PE-108-A, B, C.	Gas container	WISC	WE-112-1
	1	Fuel tank, with cap; used on PE-108-D.	Gas container	WISC	WE-112-E-1
AJ_5	1	Special stud for mtg. carburetor, 1-5/6 in. long with 1/4-20 and 1/4-28 thread; used on PE-108-A, B, C, D.	Carburetor mtg. stud	WISC	PC-368-2
AJ_6	1	Fuel tank support strap, flywheel end; used on PE-108-A, B, C.	Mounts fuel tank to motor	WISC	PG-186-C
AJ_7	1	Fuel tank support strap, take off end; used on PE-108-A, B, C.	Mounts fuel tank to motor	WISC	PG-187-B
	1	Fuel tank bracket, used on PE-108-D.	Mounts fuel tank to motor	WISC	BK-71
	2	Fuel tank straps, used on PE-108-D.	Mount for fuel tank	WISC	BG-431
AJ_8	1	Nipple close pipe, used on PE-108-A, B, C.	For mounting fuel strainer	WISC	RF-794
	1	Nipple, 1/8 in. close pipe; used on PE-108-D.	For mounting fuel strainer	WISC	RF-934

REF. SYMBOL	SIG. CORPS STOCK NO.	NO. REQD.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.

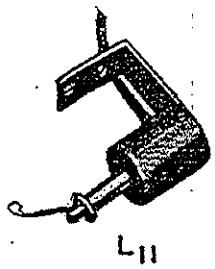


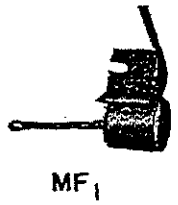
AJ_9		1	Fuel line, used on PE-108-A, B, C, D.	Fuel channel from tank to carburetor	WISC	RM-197
AJ_{10}		2	Elbow, for fuel line and fuel strainer; used on PE-108-A, B, C, D.	Fuel line mtg.	WISC	RF-270
AJ_{11}		2	Compression nut, inverted for fuel line; used on PE-108-A, B, C, D.	Mounting and sealing line	WISC	RF-1124
AJK		1	Kit of carburetor parts, used on PE-108-A, B, C, D including:—			
AJK_1		1	Fulcrum pin for float	Axis for float	STROM	P-23583
AJK_2		1	Float	Controls fuel level in carburetor	STROM	P-23579

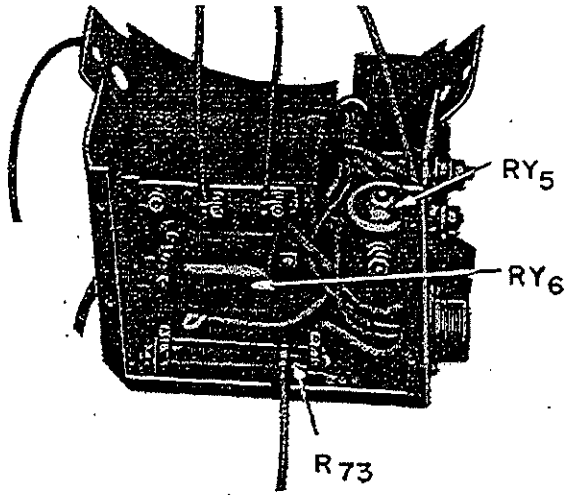
AJK_3	1	Float needle valve and seat	Controls flow of fuel into carburetor	STROM	P-23639
AJK_4	1	Fulcrum pin spring	Controls tension to float	STROM	P-23584
AJK_5	1	Metering jet	Adjusts fuel to discharge jet	STROM	P-23576
AJK_6	1	Cover gasket	Seals chamber cover to carb. body	STROM	P-23574
AJK_7	1	Throttle lever and stem	Controls throttle valve	STROM	P-23588
AJK_8	1	Main discharge jet	Meters fuel	STROM	P-23575
AJK_9	1	Choke lever and stem	Controls carb.	STROM	P-22323
AJK_{10}	1	Carburetor body	Choke valve	STROM	382322
AJK_{11}	1	Bowl cover	Cover float chamber	STROM	P-23572
AJK_{12}	1	Throttle adjustment screw	Controls volume of gas vapor to engine	STROM	P-23594
AK	1	Exhaust assembly used on PE-108-A, B, C, D consisting of:—	Outlet for gases	P	AS-C-9484
AK_1	1	Exhaust pipe, ten ft. long, 1-1/4 in. diam., spiral tubing	For carrying away exhaust fumes	CRAN	9551
AK_2	1	Pipe nipple 3/4 in. diam. x 5 in. long.			
AK_3	1	Engine muffler, 3-1/16 in. diam.	Reduces noises	P	9487
AL_1	1	Magneto with housing, armature, transformer and drive gear, 6 in. x 6 in. x 3-1/2 in.; used on PE-108-A, B, C, D. Containing:—	Engine ignition voltage generator and step up	FM	FMJ1B7
AL_2	1	Wick, felt for cam on magneto.	Lubricates surface of cam	FM	E2788
S_{11}	1	Breaker points, stationary contact assembly. movable contact assembly.	Establishes and breaks ignition current	FM FM	C-2455 R-2436
C_{80}	1	Capacitor, .19 μf. (±10%) paper, oil filled 1-3/4 in. x 2-1/32 in. diam. Metal case with mounting strap.	Magneto breaker point filter. Mounted in magneto	FM	M-2433
S_{13}	1	Switch, S.P.S.T. momentary push strap type; mounted on magneto	Engine stop	FM	D2514

REF. SYMBOL	SIG. CORPS STOCK NO.	NO. REQD.	NAME OF PART AND DESCRIPTION	FUNCTION	MFR. CODE	MFR. TYPE NO.

b. Power Unit PE-108-(*), Control Box Assembly.—







C_{79}	1	Capacitor, .05 μf. 400 W.V., mounted in filter box; used in PE-108-A.	B_1 charging circuit filter	CD	DI-4P5
	1	Capacitor, .05 μf. (±10%), 200 W.V.; paper, oil-filled; 1-3/4 in. long and 11/16 in. diam. Metal case with lug terminals and mtg. ears; used on PE-108-B, C, D.	B_1 charging circuit filter	IC	#7909
$C_{82, 84}$	1	Capacitor, dual .05 μf., 600 W.V., bath tub type, metal case, with lug terminal and mounting ears; used on PE-108-A.	A-C line filter	IC	#7652
	1	Capacitor, dual .05 μf. (+14%–6%) 600 W.V.; paper, oil-filled; bathtub type metal case, with lug terminals and mounting ears. 1-3/4 in. x 1 in. x 13/16 in. Used on PE-108-B, C, D.	A-C line filter	IC	#7910
L_{10}		Automatic choke assembly, used on PE-108-A.	For operating engine choke by remote control	P	AS-9526
	1	Automatic choke assembly, 450t. #21 heavy formex wire, layer wound; 220 V. 250 Watts; mounted in metal cup. Used on PE-108-B, C, D.	For operating engine choke by remote control	P	AS-C-10802
L_{11}	1	Voltage regulator assembly, used on PE-108-A.	Engine speed control solenoid	P	AS-9527

	1	Voltage regulator assembly, 175t. #16 heavy formex wire, layer wound 100 V. 600 Watts; mounted in metal cup. Special; used on PE-108-B, C, D.	Engine speed control solenoid	P	AS-C-10755
L_{12}	1	RF choke assembly, 30t. #15 S.C.E. single layer wound on bakelite strip; 2 mounting brackets; used on PE-108-B, C, D.	A-C line filter	P	AS-C-10804
	1	RF choke assembly, used on PE-108-A.	A-C line filter	P	A-9569
L_{13}	1	RF choke assembly, same as L_{12}.			
L_{15}	1	RF choke assembly, same as L_{12}.	B_1 charging circuit filter		
MF_1	1	Magneto filter assembly, pitch filled; 1-3/4 in. long x 1-1/8 in. diam.; used in PE-108-B, C, D. Containing:—	Magneto filter	P	AS-C-10744
L_{14}	1	RF choke, 200 mh. at 1000 cycles. 20 ohms. (.1%) d-c resistance; 110t. #29 D.C.C. wire lattice wound; 3/8 in. long x 15/16 in. O.D. Special.		P	A-9568
C_{85}	1	Capacitor, .002 µf. (±20%), 500W.V.; moulded mica.		CD	1W-5D2
M_3	1	Voltmeter, 0-150 V., 25-133 cycles; a-c magnetic wave type; accuracy 2% of full scale; resistance 16,300 Ohms; 2-1/16 in. diam., bakelite case; 2-9/16 in. flange 2.315 in. mounting diam.; used on PE-108-A, B, C, D.	A-C output indicator	GE	AW41
M_4	1	Ammeter, 20-0-20 (d-c); used on PE-108-D.	For checking d-c charge	STER	#7020
PL_7	1	Receptacle, AN-3102-24-2S, female socket, 7 terminal; used on PE-108-A, B, C, D.	PE-108-(*) output	APH	AN-3102-24-2S
R_{73}	1	Resistor, 2 Ohm. (±10%), wire wound vitreous enamel type, 50 Watt; with adjustable tap and 2 mounting brackets; 4 in. long x 5/8 in. diam. Special; used on PE-108-A, B, C.	B_1 charging current adjustment	O	0560-B
	1	Resistor, 2 Ohm. (±10%), wire wound vitreous enamel type, 100 Watt; with 1 adjustable tap and 1 mounting bracket; 6-1/2 in. long x 3/4 in. diam.; used in PE-108-D.	B_1 charging current adjustment	O	0956-B
RY_5	1	Relay, SPST solenoid plunger-type; 12 V. d-c; used on PE-108-A.	Magnetic starting relay	RBM	70
	1	Relay SPST solenoid plunger-type; 12 V. d-c 3 stud terminals and mounting bracket; body 2-3/8 in. x 1-9/16 in. metal; used on PE-108-B, C, D.	Magnetic starting relay	RBM	#2242
RY_6	1	Relay, SPST reverse current type cutout; 12 V. d-c contains 1 series winding and 1 shunt winding; used on PE-108-A.	B_1 discharge circuit breaker at low speed	ELEC	EC-43-A
		Used on PE-108-B, C, D.		P	A-2705

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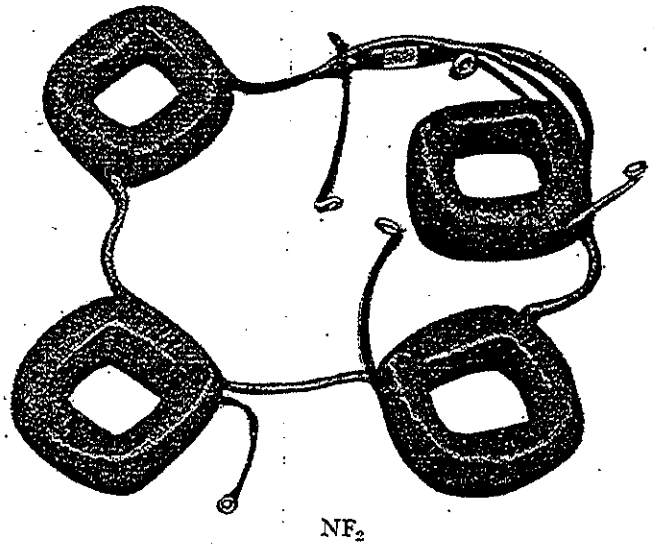

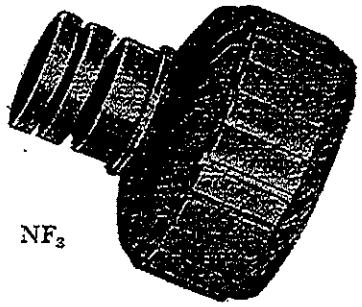

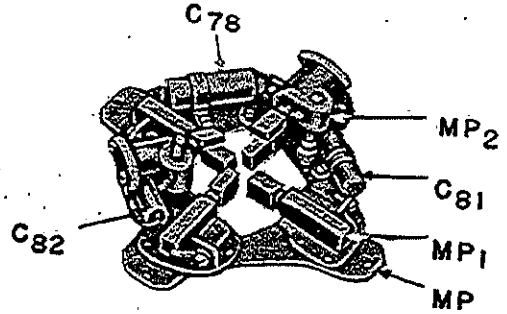

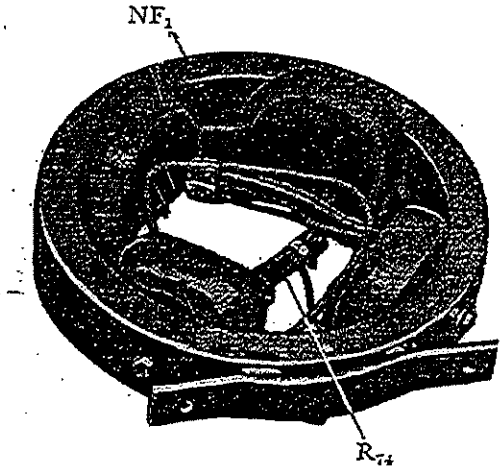

RY_7	1	Circuit breaker, used on PE-108-D.	To prevent overload on a-c line	SPEN	C-6363-2-6
SO_5	1	Socket, 2 terminal female, duplex twistite type; 4-1/8 x 1-5/16 in. x 1-1/8 in. overall; used on PE-108-A, B, C, D.	115 V. a-c convenience outlet	HUB	9200
MP	1	Brush holder mounting plate assembly, 5-3/4 in. square x 2-3/8 in. high; used on PE-108-A, B, C, D. Including:—	Means of mtg. and assembling brushes	P	AS-C-10796-1
MP_1	4	Brush assembly, d-c; complete with spring, brush holder cap, brush and lug. 4-1/8 in. long.	Provides contact to commutator for d-c output	P	G2893
MP_2	2	Brush assembly, a-c; complete with spring, brush holder cap, and brush. 1-7/8 in. long.	Provides contact with a-c slip rings	P	AS-A-9533
C_{78}	1	Capacitor, .5 μf. (±10%), 200 V.; used on PE-108-A.	D-C brush filter	IC	#7651

	1	Capacitor, .5 μf. (±10%), 200 V.; paper; metal case with mounting strap. 2-1/8 in. long x 3/4 in. diam.; used on PE-108-B, C, D. Special.	D-C brush filter	FA	X-5476
C_{S1}	1	Capacitor, .1 μf. (+14%–6%), 300 V.; a-c, paper, oil-filled; 2 in. x 5/8 in. diam.; metal case with mounting strap; used on PE-108-B, C, D. Special.	A-C brush filter	FA	X-5475
C_{S2}	1	Same as C_{S1}			
R_{T4}	1	Resistor, 1 ohm (±10%), vitreous enamel type, 25 Watt; with an adjustable tap and 2 mounting brackets: 2 in. long x 9/16 in. diam.; used on PE-108-A, B, C, D.	Shunt field current adjustment	O	0360
NF_1	1	Field assembly, complete with shell, supports, pole shoe assembly and field coil assembly; used on PE-108-A.	Provides magnetic field	P	AS-9545
	1	Field assembly, complete with shell, supports, pole shoe assembly and field coil assembly. 4-3/8 in. high x 11-1/8 in. diam.; used on PE-108-B, C, D.	Provides magnetic field	P	AS-C-10800
NF_2	1	Field coil assembly, 4 coils complete with shunt and series windings; used on PE-108-A.	Carries current for magnetic field	P	AS-D-9547
	1	Field coil assembly, 4 coils complete with shunt and series windings. Each coil 1-5/16 in. wide x 3-11/16 in. square; used on PE-108-B, C, D.	Carries current for magnetic field	P	AS-C-10798
NF_3	1	Armature assembly, complete with a-c - d-c windings; slip rings; commutator and insulators; used on PE-108-A.	Induced voltage outlet	P	G-2959
	1	Armature assembly, complete with a-c - d-c windings; 2-5/16 in. diam. slip rings; commutator and insulators; 6 in. long x 5-5/8 in. diam.; used on PE-108-B, C, D.	Induced voltage outlet	P	AS-B-9666
d. Power Unit PE-108-(*), Miscellaneous.—					
B_1	1	Battery, 12 V., 6 cell storage battery; used on PE-108-A.	Power for PE-108-(*) starting and VP_1	WILL	RH-9-6
	1	Battery, 12 V., 6 cell storage battery, 68 ampere hr. capacity; dry charged with rubber separators, 9-1/2 in. x 13 in. x 7 in. Special; used on PE-108-B, C.	Power for PE-108-(*) starting and VP_1	PRTO	129-HSR
	1	Battery, 12 V., 6 cell storage battery, dry uncharged with wood separators; used on PE-108-D.	Power for PE-108-(*) starting and VP_1	PRTO	129-HS
NJ_1	1 Jar	Electrolyte, (1-1/2 gal.) Sulphuric acid having a specific gravity of 1.275; used on PE-108-A, B, C.	Chemical agent to produce current flow	WILL	
NK_1	1	Funnel.	For filling battery with electrolyte	VORT	#156

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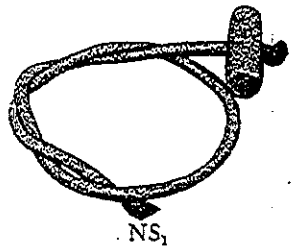
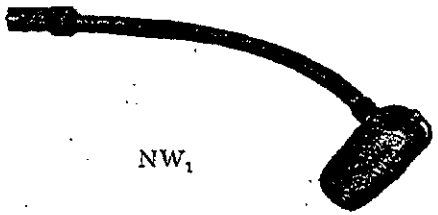
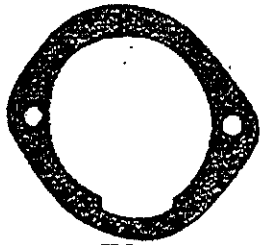

NS_1


NW_1


$TG_{1.4}$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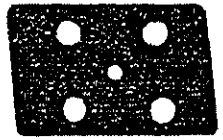
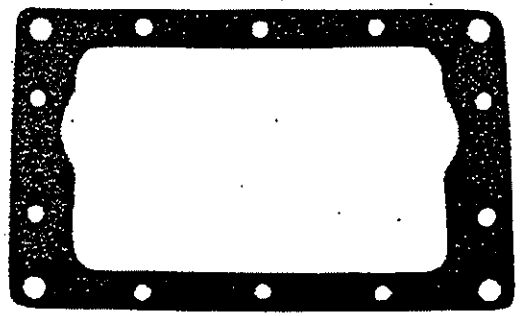

$TG_{1.5}$


SP_1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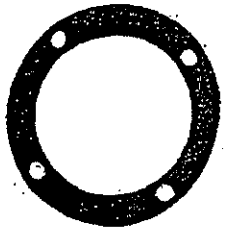
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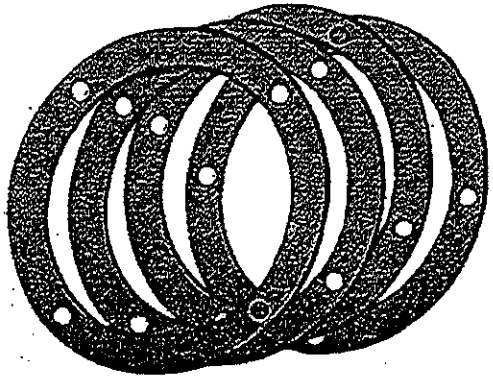
$TG_{1.6,\ 1.7}$


NS_2


NS_2


$TG_{1.1}$

NS_1	1	Starting rope, 3 ft. long, 5/16 in. diam. Crimped steel washer on each end; wooden handle; used on PE-108-A, B, C, D.	Emergency starter for motor	WISC	U-218
NS_2	1	Lockwasher, used on sheave for PE-108-A, B, C, D. Special.	Locks rope starter sheave	WISC	PE-57
NS_3	1	Sheave, starting rope, used on PE-108-A, B, C, D.	For starting engine	WISC	UC-62-B
NW_1	1	Spark plug shield assembly, including magneto insert, spark plug shield, and shielded wire; used on PE-108-A, B, C, D.	Eliminates interference with radio reception	WISC	YD-69
SP_1	1	Spark plug, 18mm., .025 in. gap; used on PE-108-A, B, C, D.	Ignition spark gap	CSP	#6M

TG_1	1 set	Gaskets, for complete motor and generator assembly; used on PE-108-A, B, C, D.	Seals	P	#9477
$TG_{1.1}$	1	Gasket, for carburetor, used on PE-108-A, B, C, D.	Carburetor mounting	WISC	QC-53
$TG_{1.2}$	1	Gasket, for engine base, used on PE-108-A, B, C, D.	Engine base mounting	WISC	QD-569-A
$TG_{1.3}$	1	Gasket, for magneto mounting, used on PE-108-A, B, C, D.	Seal between magneto and motor base	WISC	QD-570-A
$TG_{1.4}$	1	Gasket, for governor shaft support bracket; used on PE-108-A, B, C, D.	Seal between bracket and base	WISC	QD-571
$TG_{1.5}$	1	Gasket, for valve tappet inspection plate; used on PE-108-A, B, C, D.	Seals inspection plate and base	WISC	QD-572
$TG_{1.6}$	5	Gasket, for main bearing plate, .006 in. thick; T.O. end; used on PE-108-A, B, C, D.	For crankshaft end play and seals plate	WISC	QD-573
$TG_{1.7}$	1	Gasket, main bearings plate .003 in. thick; T.O. end; used on PE-108-A, B, C, D.	For crankshaft end play and seals plate	WISC	QD-573-A
$TG_{1.8}$	1	Gasket, for bearing plate, fan end; used on PE-108-A, B, C, D.	Seals plate against crankcase	WISC	QD-574

48. TABLE OF STANDARD NUTS, BOLTS, SCREWS, AND WASHERS

QUANTITY	SIZE	LENGTH	*THREAD	DESCRIPTION	WHERE USED
2	5/16″	2″	USS 18	Hex. Head Screw	Secure cylinder head and air shroud
2				Steel Washers	Used with the above screws
1	5/16″	1-1/4″	USS 18	Hex. Head Screw	Secure cylinder head
1	5/16″			Split Lockwasher	Used with the above screw
1	5/16″	1-1/4″	USS 18	Hex. Head Screw	Secure cylinder head and fuel tank strap
1	5/16″			Split Lockwasher	Used with the above screw
2	5/16″	1-1/2″	USS 18	Hex. Head Screw	Secure cylinder head
1				Split Lockwasher	Used with one of the above screws
2	1/4″	1/2″	USS 20	Round Head Screw	Secures air shroud to case
2	1/4″			Split Lockwasher	Used with the above screw
10	1/4″	3/4″	USS 20	Hex. Head Screw	Secures engine base to housing
10	1/4″			1/4″ Steel Washer	Used with the above screw
4	1/4″	1/2″	USS 20	Hex. Head Screw	Secures main bearing plate, flywheel end
4	1/4″			Split Lockwasher	Used with the above screw
2	5/16″		USS 18	Hex. Head Bolt	Secures connecting rod to crankshaft
2	5/16″			Internal Lockwasher	Used with the above bolt

4	3/8"	7/8"	USS 16	Hex. Head Screw	Secures main bearing plate, take-off end
4	3/8"			Split Lockwasher	Used with the above screw
4	5/16"	3/4"	USS 18	Hex. Head Screw	Secures main bearing plate, take-off end
4	5/16"			Flat Washer	Used with the above screw
1	5/16"	2-5/8"	USS 24	Hex. Head Bolt	Secures magneto to housing
2	5/16"		USS 24	Plain Nuts	Secures magneto to housing
2	5/16"			Split Lockwashers	Used with the above nuts
1				Slotted Pipe Plug	Inspection of timing gears
1	1/4"	2"	USS 20	Hex. Head Screw	Secures valve tappet inspection plate
1	1/4"			1/4" Copper Washer	Used with the above screw
1	1/4"	1/2"	USS 20	Hex. Head Screw	Secure exhaust elbow to block
2	1/4"	1/2"	USS 20	Hex. Head Screw	Secures governor shaft support
1	3/16"	1-7/8"	USS 32	Screw	Adjustment of governor
2	3/16"		USS 32	Nuts	Used with the above screw
1	1/4"	1"	USS 20	Stud Bolt	Secures above screw into proper position
1	1/4"			Washer	Used with the above screw
1	1/4"	1/2"	USS 20	Nut	Used with the above screw
2	1/4"	1"	USS 20	Hex. Head Screw	Secures oil trough to base
2	1/2"			Split Lockwashers	Used with the above screw

*NOTE: U.S.S. thread now designated as National Coarse Thread
S.A.E. thread now designated as National Fine Thread

QUANTITY	SIZE	LENGTH	*THREAD	DESCRIPTION	WHERE USED
2	1/4"	3/4"	USS 20	Hex. Head Screw	Secures fuel tank support strap to shroud
2	1/4"			Split Lockwashers	Used with the above screw
1	1/2"	1-1/2"	USS 20	Round Head Screw	Secures fuel tank support strap
3	1/4"	1/2"	USS 20	Nuts	Used with the above screw
1	1/2"	7/16"	USS 18	Square Head Pipe Plug	Plug for oil drain hole
1	1/2"	7/16"	USS 18	Square Head Pipe Plug	Plug for oil filler hole
2	1/4"	7/16"	USS 28	Nut	Secures Carburetor to block
	3/16"	1"	USS 24		Secures air filter to carburetor
6	5/16"	3/4"	USS 24	Hex. Head Cap Screw	Secures field assembly to end plate and end bracket
2	5/16"	5/8"	USS 24	Hex. Head Machine Screw	Secures control box to generator frame
1	5/16"	3-1/2"	USS 24	Hex. Head Bolt	Secures fan and bushing to armature
9	5/16"			Split Lockwasher	Used with the above screws
2	6"	5/16"	USS 32	Round Head Machine Screw	Secures resistor R_{74} to frame
2	8"	1/4"	USS 32	Round Head Machine Screw	Secures end cover to Generator
2	8"			Split Lockwasher	Used with the above screw

2	1/4"	2"	USS 28	Hex. Head Cap Screw	Secures shell assembly to lord mounting
2	1/4"			Split Lockwasher	Used with the above screw
2	1/4"		USS 28	Hex. Nut	Used with the above screw
2	9/32" ID	1-1/2" OD		Steel Washer	Used with the above screw
4	5/16"	1-5/8"	USS 24	Cap Screw Hex. Head	Secures pole shoes to shell
4	5/16"			Split Lockwasher	Used with the above screw
2	10"	3/8"	USS 24	Square Head Cup Point Set Screw	Secure AC brush holders into place
4	10"	3/8"	USS 32	Round Head Machine Screw	Secures wires to brush assembly
3	8"	5/16"	USS 32	Round Head Machine Screw	Secures condensers to brush mtg. plate
4	6"	5/16"	USS 32	Round Head Machine Screw	Secures brush mtg. plate assembly to frame
6	10"	3/8"	USS 32	Round Head Machine Screw	Secures control box cover
6	10"			Lockwasher	Used with the above screw
2	10"	3/8"	USS 32	Round Head Machine Screw	Secures power relay RY_5 to control housing
2	10"			Shakeproof Lockwasher	Used with the above screw
2	10"		USS 32	Hex. Nut	Used with the above screw
4	6"	5/16"	USS 32	Round Head Machine Screw	Secures PL_7 Receptacle to housing
4	6"			Shakeproof Lockwasher	Used with the above screw

*NOTE: U.S.S. thread now designated as National Coarse Thread
S.A.E. thread now designated as National Fine Thread

QUANTITY	SIZE	LENGTH	*THREAD	DESCRIPTION	WHERE USED
2	10″	3/8″	USS 32	Round Head Machine Screw	Secures resistor R_{73} to housing
2	10″		USS 32	Hex. Nut	Used with the above screw
2	10″			Shakeproof Lockwasher	Used with the above screw
2	10″			Plain Washer	Used with the above screw
3	6″	3/8″	USS 32	Round Head Machine Screw	Secures SO_5 AC outlet to housing
1	6″			External Lockwasher	Used with one of the above screws
2	6″			Split Lockwasher	Used with two of the above screws
2	6″			Plain Washer	Used with two of the above screws
3	4″	3/8″	USS 40	Binder Head Machine Screw (Parkerized)	Secures voltmeter M_3 to housing
3	4″			External Lockwasher	Used with the above screw
1	5/16″	1-1/4″	USS 18	Round Head Machine Screw (Brass)	Secures positive terminal for battery cable connection on control housing
1				Fiber Shoulder Washer	Used with the above screw
1	11/32″ ID	1″ OD		Black Fibre Washer	Used with the above screw
2	5/16″		USS 18	Hex. Brass Jam Nut	Used with the above screw
2	5/16″			Brass Washer	Used with the above screw
2	5/16″			Shakeproof Lockwasher (Internal)	Used with the above screw

1	5/16"	1"	USS 18	Round Head Machine Screw (Brass)	Secures negative terminal for battery cable to housing
2	5/16"		USS 18	Hex. Brass Jam Nut	Used with the above screw
2	5/16"			Brass Washer	Used with the above screw
2	5/16"			Shakeproof Lockwasher	Used with the above screw
6	8"	1"	USS 32	Round Head Machine Screw (Brass)	Secures coil assemblies $L_{12, 13, 15}$ to filter box cover
24	8"			Split Lockwashers	Used with the above screws
18	8"			Plain Steel Washer	Used with the above screw
7	8"	3/8"	USS 32	Round Head Machine Screw	Secures cutout and condenser C_{84} to top plate and top plate to filter box
5	8"			Split Lockwasher	Used with the above screw
2	8"			External Lockwasher	Used with the above screw
4	8"	3/8"	USS 32	Round Head Machine Screw	Secures filter box to housing
4	8"			Split Lockwasher	Used with the above screw
2	10"	1/4"	USS 32	Round Head Machine Screw	Secures connections to cutout
2	10"			Split Lockwashers	Used with the above screw
2	8"	3/8"	USS 32	Round Head Machine Screw	Secures voltage regulator to housing
2	8"			Split Lockwasher	Used with the above screw
2	8"	1/4"	USS 32	Round Head Machine Screw	Secures cable clamps
2	8"			Split Lockwashers	Used with above screw

*NOTE: U.S.S. thread now designated as National Coarse Thread
S.A.E. thread now designated as National Fine Thread

QUANTITY	SIZE	LENGTH	*THREAD	DESCRIPTION	WHERE USED
1	6″	5/16″	USS 32	Round Head Machine Screw	Secures magneto filter to motor block
82	10″	1-1/2″		Steel Flat Head Wood Screw	Secures crate cover assembly
20	10″	2″		Steel Flat Head Wood Screw	Secures crate cover assembly
12	12″	2-1/8″	USS 24	Flat Head Machine Screw	Secures chest CH-133-(*) handles
12	12″			Split Lockwasher	Used with above screw
12	12″			Plain Washer	Used with above screw
12	12″		USS 24	Hex. Nut	Used with above screw
16	10″	2″	USS 24	Round Head Machine Screw	Secures top part of latch to Chest CH-133(*)
16	10″		USS 24	Hex. Nut	Used with above screw
16	10″			Split Lockwasher	Used with above screw
19	12″	1-1/2″		Flat Head Wood Screw	Secures base assembly CH-133-(*)
8	8″	1-1/2″		Round Head Wood Screw	Secures bottom part of latch to chest platform
4	10″	2-1/2″	USS 24	Round Head Machine Screw	Same as above
4	10″			Lockwasher	Used with the above machine screw
4	10″			Plain Steel Washer	Used with the above machine screw
4	10″		USS 24	Hex. Nut	Used with the above machine screw
1	1/4″		USS 20	Anchor Bolt	Secures exhaust clamp
1	1/4″		USS 20	Wing Nut	Used with the above bolt

5	8″	3/4″		Round Head Wood Screw	Secures battery platform
1	3/8″	11-5/8″	USS 16	Battery Bolt	Secures battery B_1
1	3/8″	11-1/8″	USS 16	Battery Bolt	Secures battery B_1
1	3/8″		USS 16	Hex. Nut	Used with the above bolts
3	3/8″			Plain Washer	Used with the above bolts
8	3/8″			Split Lockwasher	Used with the above bolts
2	3/8″		USS 16	Wing Nuts	Used with the above bolts
24	8″	1-1/8″	USS 32	Round Head Machine Screw	Secures Lord mountings to chest platform
24	8″			Split Lockwasher	Used with the above screw
24	8″		USS 32	Hex. Nut	Used with the above screw
4	1/4″		USS 28	Studs	Secures motor and generator to Lord mountings
4	1/4″		USS 28	Hex. Nut	Used with the above stud
4	1/4″			Split Lockwasher	Used with the above stud

*NOTE: U.S.S. thread now designated as National Coarse Thread
S.A.E. thread now designated as National Fine Thread

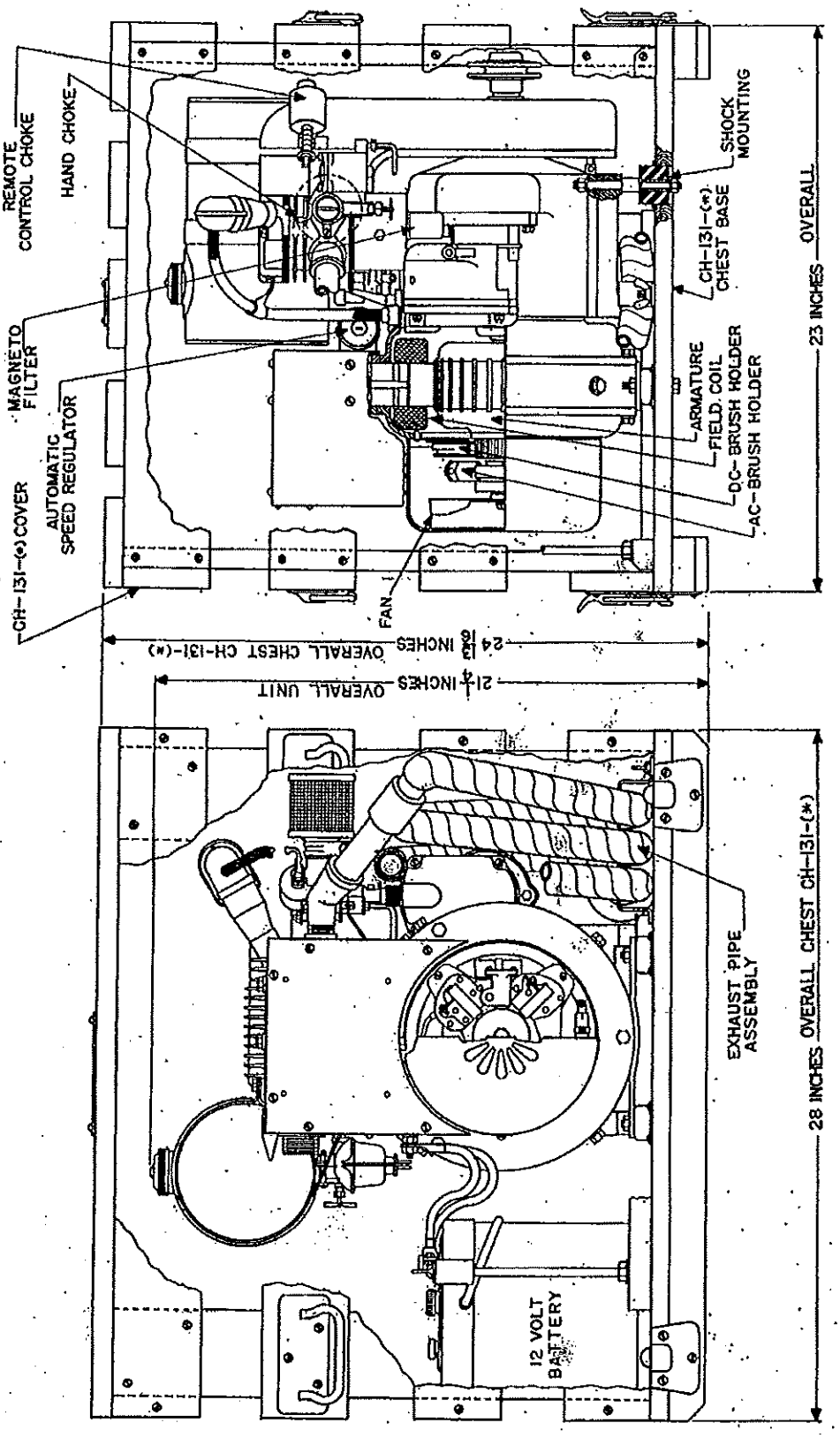

Fig. 53 — Power Unit PE-108-(*) Dimensional Sketch.

49. LIST OF MANUFACTURERS

Symbol	Manufacturer	City
AIRM	Air Maze Corp.	Cleveland, Ohio
APH	American Phenolic Corp.	Chicago, Illinois
CD	Cornell-Dubilier Corp.	South Plainfield, New Jersey
CRAN	Crane Co.	Chicago, Illinois
CSP	Champion Spark Plug Co.	Toledo, Ohio
ELEC	Electra Manufacturing Co.	Kansas City, Missouri
FA	John E. Fast Co.	Chicago, Illinois
FM	Fairbanks-Morse	
GE	General Electric Co.	Schenectady, New York
HUB	Harvey Hubbell Inc.	Chicago, Illinois
IC	Industrial Condenser Corp.	Chicago, Illinois
O	Ohmite Manufacturing Co.	Chicago, Illinois
P	Pioneer Gen-E-Motor	Chicago, Illinois
PRTO	Presto-Lite Battery Co.	Indianapolis, Indiana
RBM	R.B.M. Manufacturing Co.	Logansport, Indiana
SPEN	Spencer Thermostat Co.	Chicago, Illinois
STER	Sterling Manufacturing Co.	Cleveland, Ohio
STROM	Bendix-Stromberg Carburetor Co.	South Bend, Indiana
UNIS	United Specialties Co.	Chicago, Illinois
VORT	Vortex	Chicago, Illinois
WILL	Willard Battery Co.	Cleveland, Ohio
WISC	Wisconsin Motor Corp.	Milwaukee, Wisconsin

AG 300.7 (11 JAN. 44)

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By order of the Secretary of War:

G. C. MARSHALL,
Chief of Staff

Official:
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Major General,
The Adjutant General

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IBn & H4, 44 (5); IC4, 11, 44 (10).
(For explanation of symbols see Fm. 21-6)

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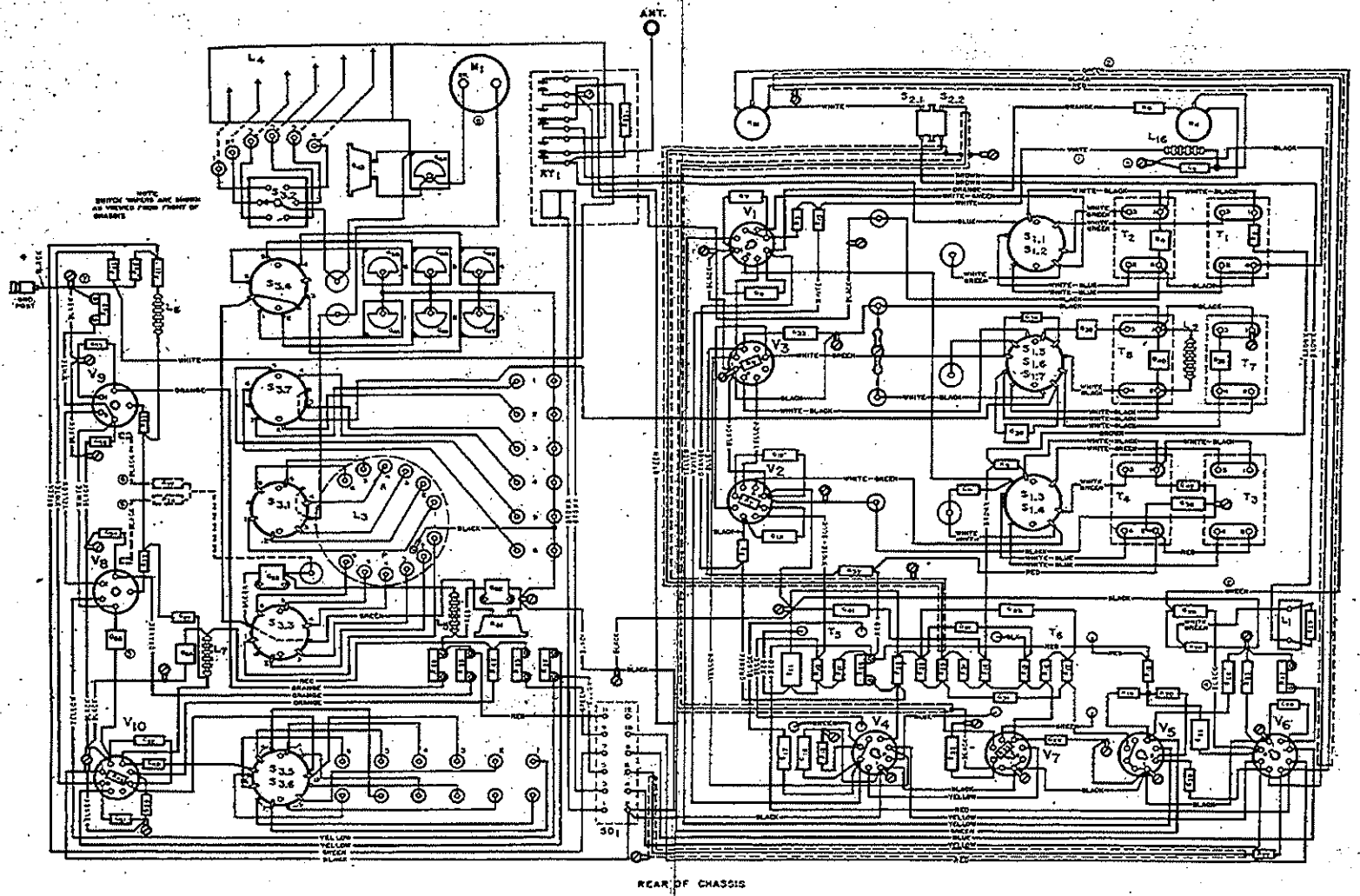

(1) Coded white-red in BC-669-A.
(2) Coded white-green in BC-669-A.
(3) L_{16} not included in BC-669-A.
(4) Coded white in BC-669-A.
(5) C_{28} not included in BC-669-A.
(6) Coded green in BC-669-A.
(7) In BC-669-A, R_{40} connected to ground through same set of contacts in RY_1 as R_{42}.
(8) M_1 connected between L_4 and RY_1 in some BC-669-A units.

Fig. 53 — Radio Receiver and Transmitter BC-669-B.R.F. Section and Receiver, Practical Wiring Diagram.

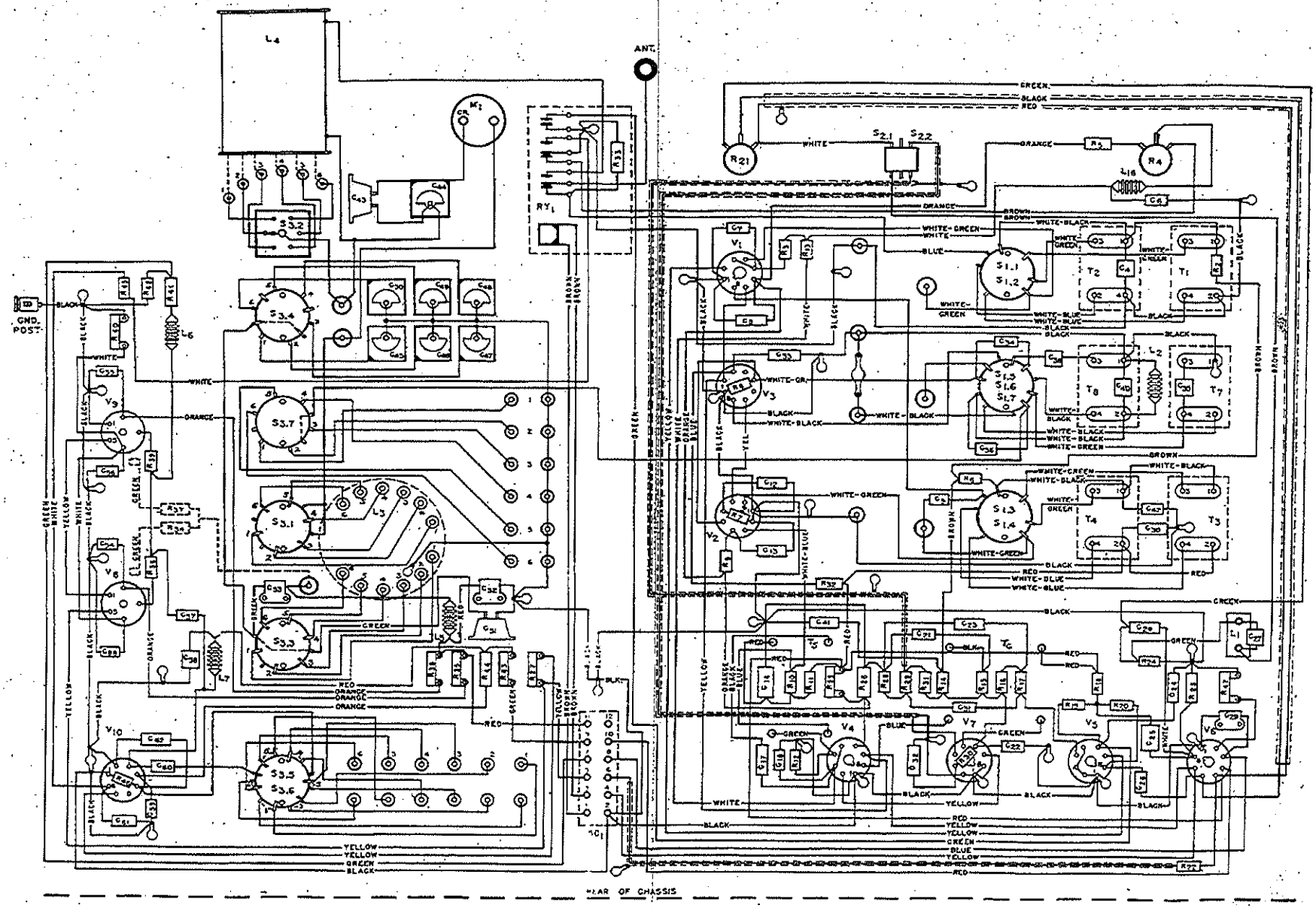

Fig. 34 — Radio Receiver and Transmitter BC-669-B, C R.F. Section and Receiver, Practical Wiring Diagram.