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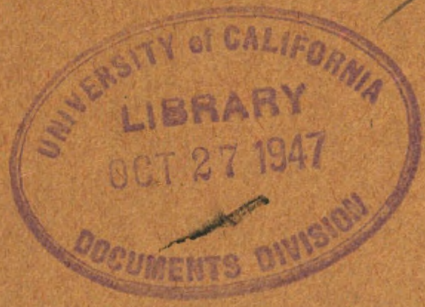
# TM 11-954

WAR DEPARTMENT TECHNICAL MANUAL

U.S. Dept of Army

## RECTIFIER

### RA-43-B



WAR DEPARTMENT • 29 MARCH 1944

ADDENDA SHEET  
for  
TECHNICAL MANUAL  
RECTIFIER RA-43-B

29 MARCH 1944

- Page 37—Ref. No. BR 4. Add Signal Corps stock No. 3H900-12-1.  
Page 37—Ref. No. C 27. Change 3DB1.6110-1 to 3DA100-125.  
Page 37—Ref. No. CD 18. Change 1B816.4 to 3E7148.  
Page 37—Ref. No. H 4. Add Signal Corps stock No. 6Z5007.  
Change JHS to SW.  
Page 37—Ref. No. LK 4. Add Signal Corps stock No. 6Z3640-3.  
Change SW to JHS.  
Page 39—Ref. No. R 33. Change 3Z6500-148 to 3Z6500-59.  
Change description as follows:  
Wire-Wound, ceramic tube, A coating,  
4 watt, 5000-ohm  $\pm$  5%.  
Page 4 —Ref. No. RT 11. Change 2T66 to 2V6F6G.

*WAR DEPARTMENT TECHNICAL MANUAL*  
*TM 11-954*

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# RECTIFIER

## RA-43-B



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*WAR DEPARTMENT • 29 MARCH 1944*

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WAR DEPARTMENT,  
WASHINGTON 25, D. C., 29 March 1944.

TM 11-954, War Department Technical Manual, Rectifier RA-43-B, is published for the information and guidance of all concerned.

[A. G. 300.7 (26 Jan 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

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

DISTRIBUTION:

IBn 1, 11, (2); IC 11(10).  
(For explanation of symbols see FM 21-6.)

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TM 11-95  
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## DESTRUCTION NOTICE

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

**WHEN**—When ordered by your commander.

- HOW** —1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. Cut—Use axes, handaxes, machetes.
3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. Explosives—Use firearms, grenades, TNT.
5. Disposal—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

### USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

- WHAT**—1. Smash—All panels, castings, switch and instrument boards, controls, relays, meters, keys, carrying cases, containers, and all electrical or mechanical parts whether rotating, moving, or fixed.
2. Cut—All connecting wires, cables, etc.
3. Burn—All of the above equipment, training manuals, etc.
4. Bury or scatter—Any or all of the above pieces after destroying them.

## DESTROY EVERYTHING

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## SAFETY NOTICE

This equipment employs relatively high voltages which are dangerous and may be fatal to operating personnel. Always be sure to remove the a-c plug from the power outlet before servicing the equipment or removing the metal cover.

A slight shock may be felt when touching the equipment due to the bypass capacitors used for radio interference elimination. A wire connected between a noninsulated part of the metal cabinet and a grounded object will eliminate this possibility.

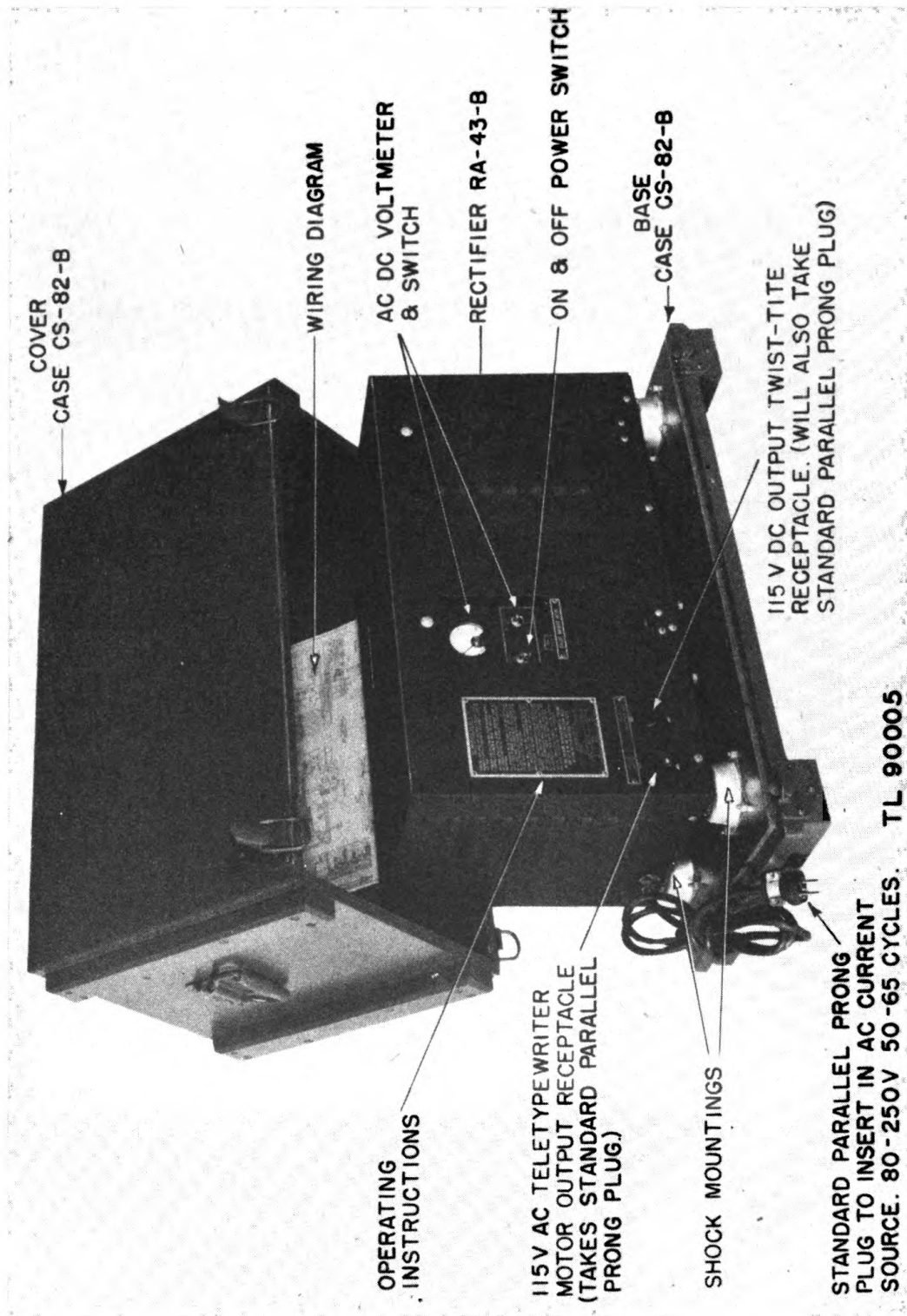


Figure 1. Rectifier RA-43-B, with portable carrying case CS-82-B.



# SECTION I

## Description

### 1. GENERAL

*a.* Rectifier RA-43-B is a portable, self-contained power unit for converting alternating current to direct current for the operation of teletypewriter equipment used with Switchboard BD-100. It also supplies a-c power for the operation of one teletypewriter motor.

*b.* Rectifier RA-43-B is operated from an a-c source of 80- to 100-volt, 100- to 125-volt, or 200- to 250-volt, 50- to 65-cycle single-phase power.

*c.* The rectifier's choke coils and capacitors reduce interference to nearby radio receiving equipment in the supply line, the teletypewriter motor outlet, or the d-c outlet.

*d.* Its resistors are treated with a special moistureproof coating to withstand tropical climate. The plated parts are protected by a zinc chromate finish. This produces a brown color which should not be mistaken for rust.

*e.* Rectifier RA-43-B is strongly constructed and is shock-mounted on a wooden base to protect vital parts from being damaged while in field service.

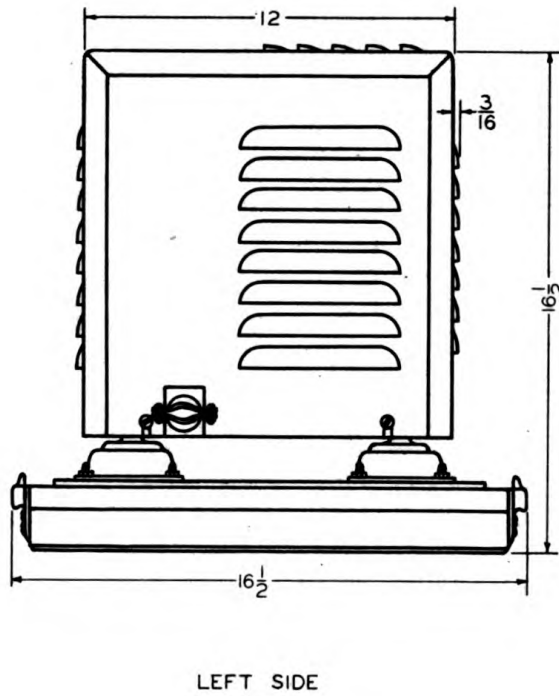
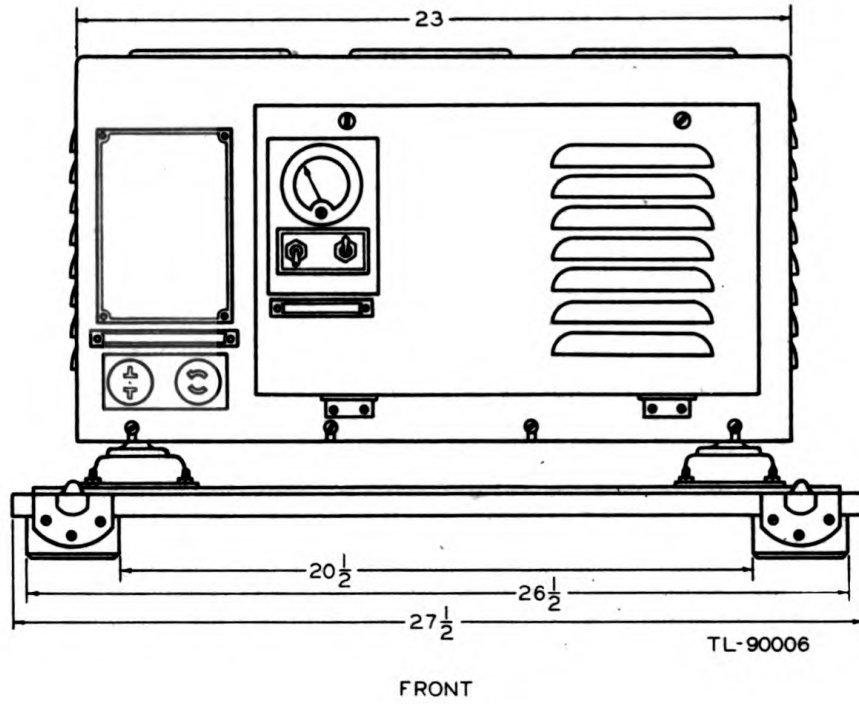
*f.* Operating parts are enclosed in a ventilated steel cabinet. The entire assembly is protected in transportation by a heavy plywood case fitted to the wooden base with fasteners (figs. 1 and 2).

TABLE OF WEIGHTS AND DIMENSIONS

COMPONENT	DIMENSIONS (IN.)			WEIGHT (lbs.)
	LENGTH	WIDTH	HEIGHT	
Rectifier RA-43-B, with base of Case CS-82-B.	27½	16½	16½	145
Top cover of Case CS-82-B.	29½	16½	16½	41

**NOTE:** Rectifier RA-43-B is shipped complete with one set of tubes, and with one spare tube of each type mounted in spare sockets. Two copies of Technical Manual TM 11-954 are also included.

*Rectifier RA-43-B*



*Figure 2. Rectifier RA-43-B, outline dimensional sketch.*

## Description

### 2. POWER.

*a. Input.* Rectifier RA-43-B operates from either a 100- to 125-volt or a 200- to 250-volt, 50- to 65-cycle, single-phase power source. An extra transformer tap helps the rectifier operate properly even under conditions of abnormally low line voltage. This tap is used for an input voltage range of 80 to 100 and can be selected by means of a toggle switch. With a full d-c load and with one teletypewriter motor connected Rectifier RA-43-B requires an input of approximately 1,000 watts.

*b. Output.* Rectifier RA-43-B will supply the following power outputs:

- (1) DIRECT CURRENT. Up to 4.55 amperes at 115 volts.
- (2) ALTERNATING CURRENT. 1.3 amperes at approximately 115 volts (depending upon line voltage).

### 3. DESCRIPTION.

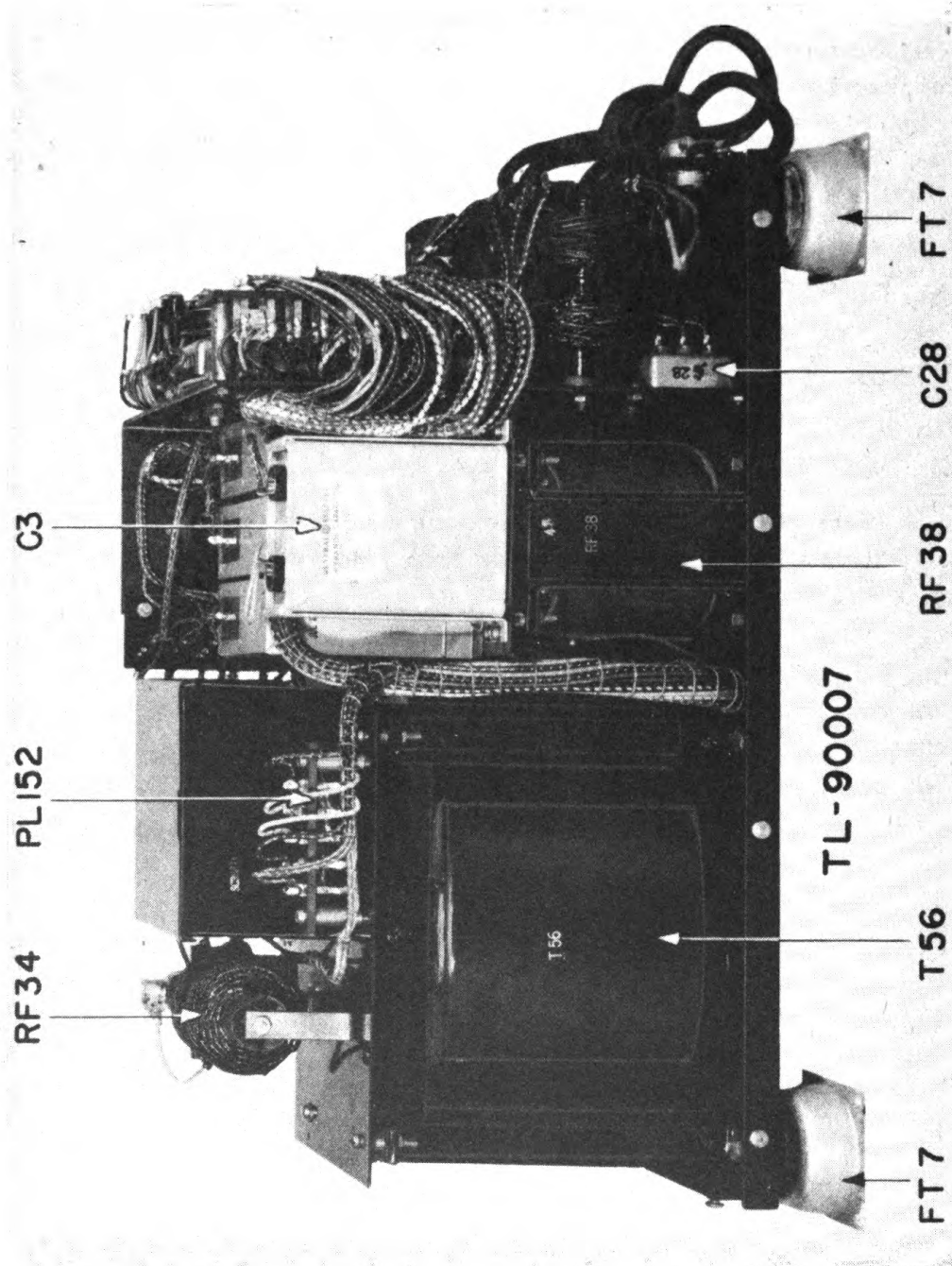
*a. General.* Rectifier RA-43-B is assembled upon a heavy steel base to which are attached the power section, relay box, and control section (figs. 2, 3, and 4).

(1) The power section consists of the plate transformer, the filter choke, the filter and power factor capacitors, and the tube socket sub-base, as shown in figure 5. The base is supported by rubber shock mounts and in turn supports the rubber-mounted tube socket sub-base.

(2) The relay box encloses and protects the relay, thermostatic switch, heater transformer, and relay coil resistor, and is mounted above the power section. The plate choke assembly is mounted on a sub-base attached to the relay box (fig. 6).

(3) The control section subassembly is mounted on a vertical steel panel and includes the voltmeter, circuit breaker, power switch, meter switch, high-low switch, output voltage-adjusting potentiometer and other parts (fig. 7).

*b. Cover.* The entire assembly is covered by a removable steel cover finished in black wrinkle and provided with ventilating louvres. A hinged door in the front of the cover (fig. 2) permits access to the tubes, adjustable taps, circuit breaker, etc. A cut-out in the door exposes the meter, power switch, and meter switch, which are the only accessible control parts during normal operation of the equipment (fig. 4). For output connections, a-c and d-c receptacles are provided in the lower left corner of the front cover. These are designated by a metal nameplate. A larger metal plate above the receptacles gives condensed operating instructions (fig. 1).



*Figure 3. Rectifier RA-43-B, rear assembly view.*

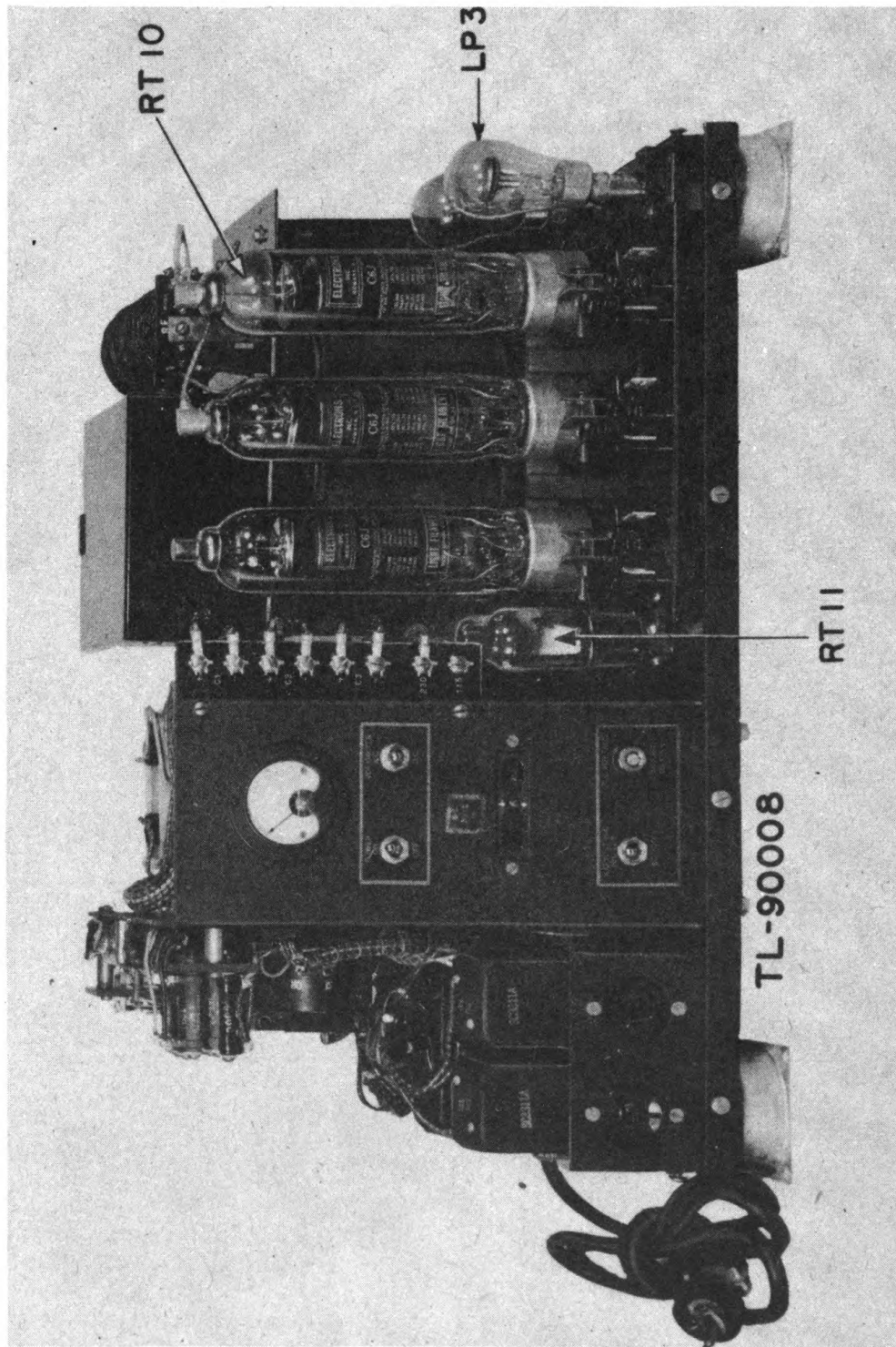
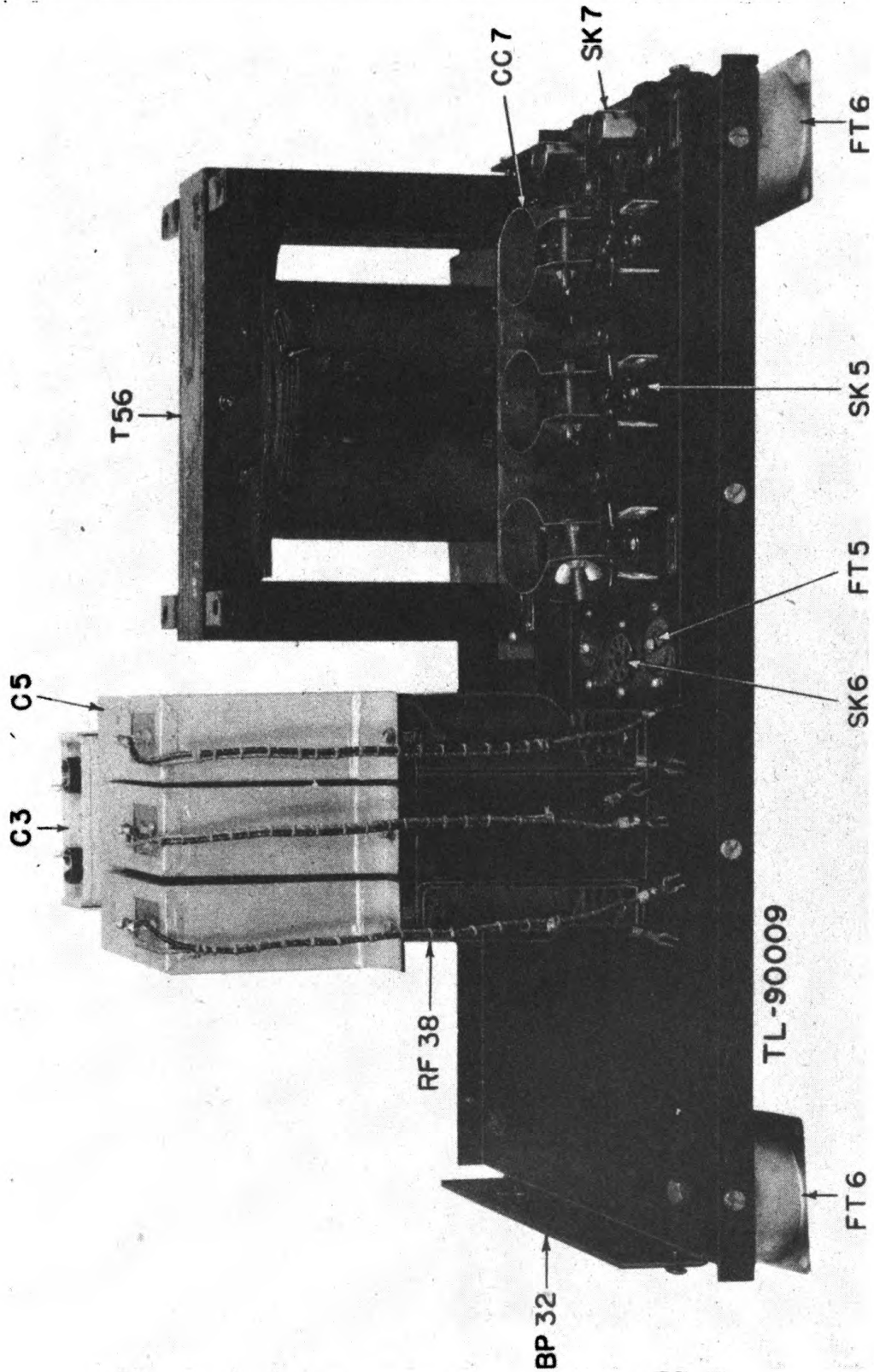


Figure 4. Rectifier RA-43-B, front assembly view.

*Rectifier RA-43-B*



*Figure 5. Rectifier RA-43-B, front view base.*

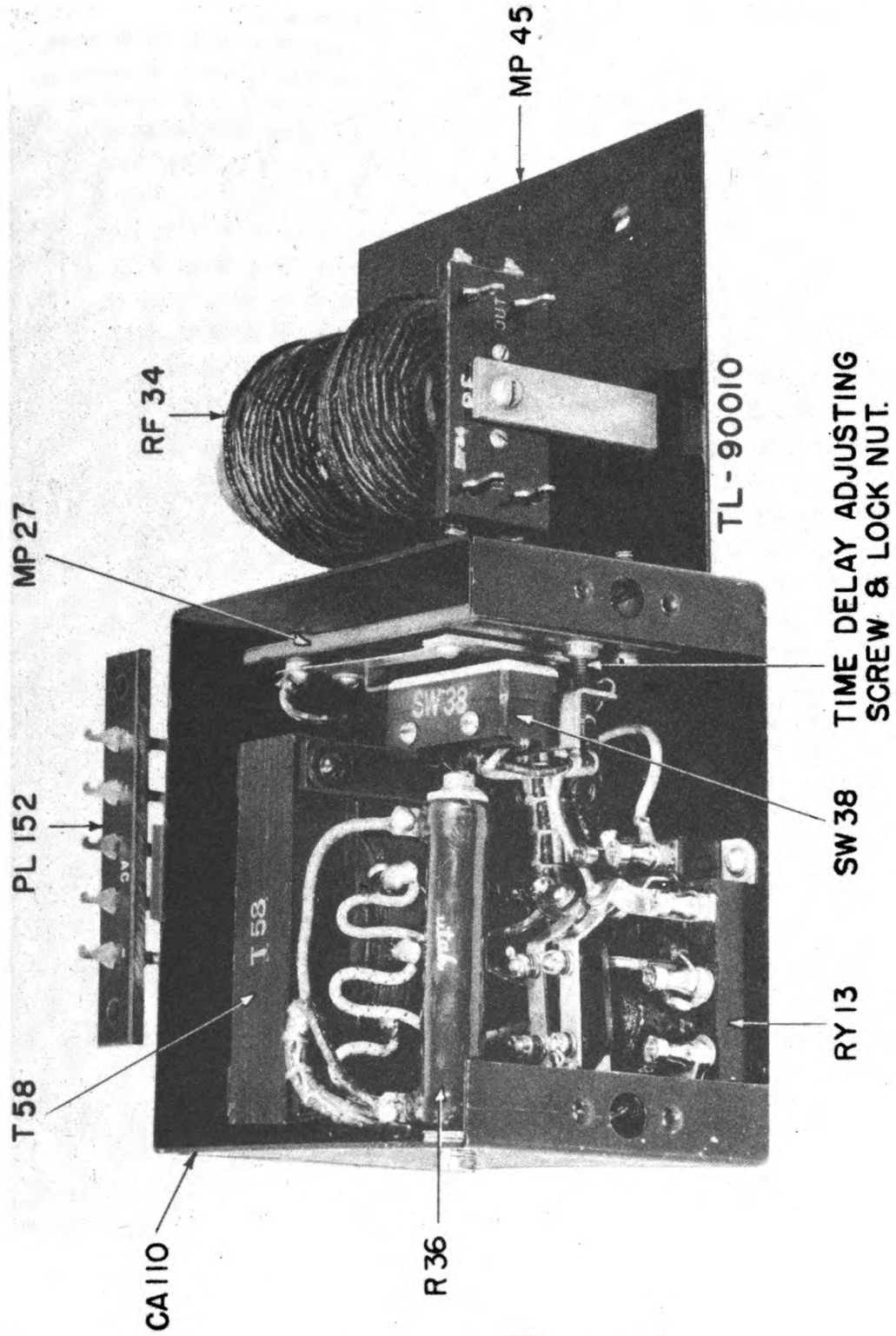


Figure 6. Relay box, subassembly.

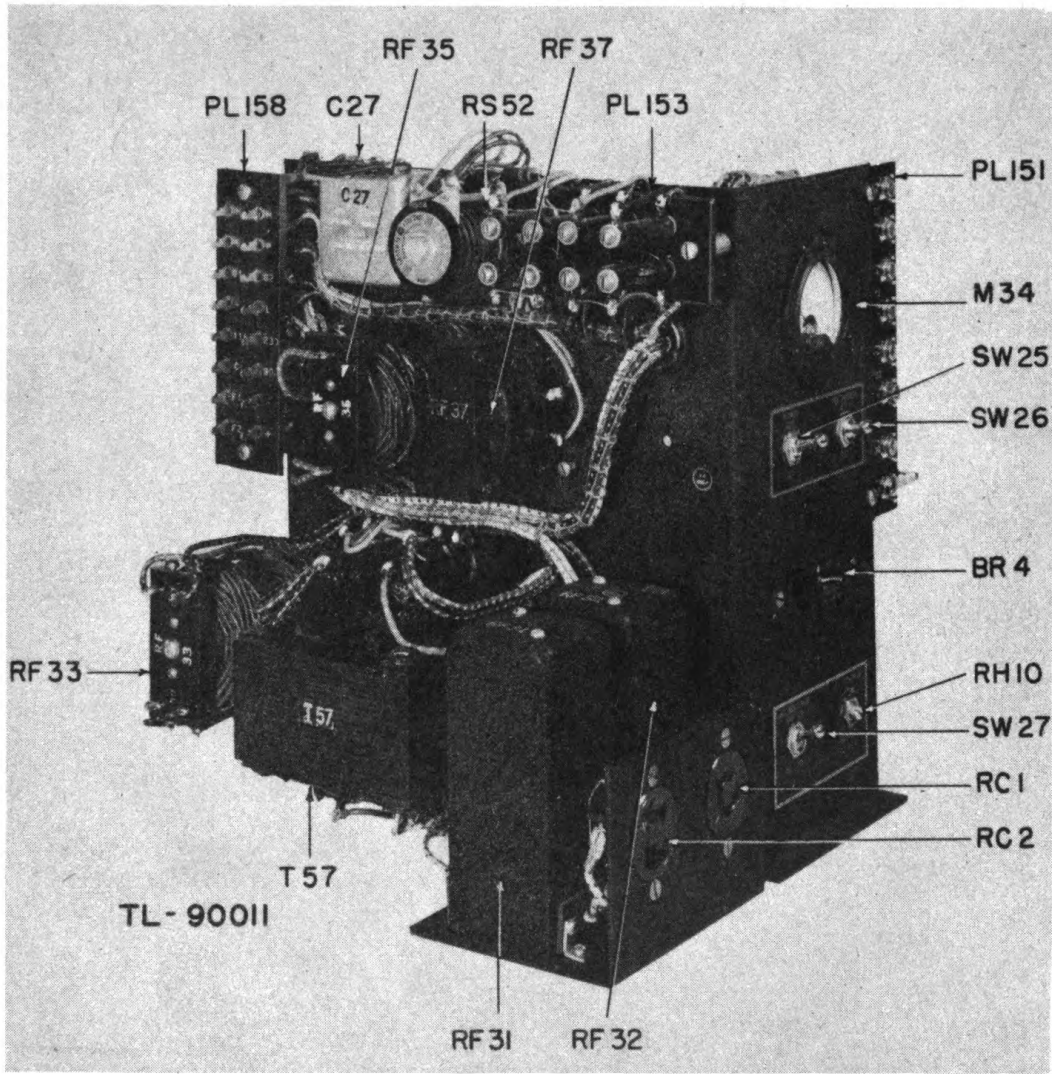


Figure 7. Control section, subassembly.



### *Description*

*c. Electrical.* (1) A-c power is converted to d-c by two grid-controlled, gas-filled triode tubes (type C6J) connected in a full-wave rectifying circuit. The filaments of the tubes are preheated before plate voltage is applied. A thermostatic or bimetal switch is used to provide the required time delay. The pulsating d-c output current from the tubes is filtered by a choke and a bank of three electrolytic capacitors. This reduces the hum or ripple voltage to a low value.

(2) The d-c output voltage is held within plus or minus 5 volts over the ranges of input voltage, frequency, and load (pars. 2*a* and *b*) by a circuit employing a neon voltage regulator tube (LP 3), a type 6F6G amplifier tube (RT 11), and a resistor network. This circuit controls the grid voltages of the rectifier tubes.

(3) A spare tube of each of the three types used is supplied and is mounted in a standard socket located on the tube socket sub-base (figs. 4 and 10).

(4) Radio frequency filter chokes, capacitors in the input and a-c and d-c output circuits, and electrostatic shields in the power and auxiliary transformers reduce radio interference through the power lines (fig. 9).

(5) A special coating on the wire-wound resistors adapts them for use in moist or tropical climates.

(6) A capacitor connected across the secondary of the plate transformer improves the power factor of the rectifier and consequently reduces the required supply-line current for any given d-c output.

#### **4. CASE.**

*a.* Case CS-82-B (fig. 1) is constructed of heavy plywood finished in dull olive drab, and is designed for field service. It has four substantial catches to secure it to the reinforced wooden base on which Rectifier RA-43-B is mounted, and is equipped with two metal carrying handles.

*b.* A wiring diagram, covered with a weatherproof transparent plastic, is mounted inside the top cover of the case. Sufficient space is provided within the case for the input power cord and technical manuals.

## SECTION II

### *Installation and Operation*

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**5. INITIAL PROCEDURE.** Rectifier RA-43-B is enclosed in Case CS-82-B, which is packed in a wooden shipping box in which felt pads are used to support the case and protect it during shipment. To unpack:

*a.* Turn the shipping box upside down and remove the nails from the bottom of the box. Do not cut the steel banding at this time. Carefully turn the box right side up again, cut the steel banding, and lift the box off the case within, grasping it at two diagonally opposite corners. Lift the case from the bottom of the packing box.

*b.* Remove the top cover of Case CS-82-B by opening the four catches at the bottom of the case and lifting the cover off by the two carrying handles. Loosen the two fasteners (fig. 2) at the top of the cabinet door with a screwdriver (turn counterclockwise), open the door, and remove the packing from the tubes. Close the door, tighten the fasteners, and replace Case CS-82-B.

### **6. INSTALLATION.**

*a.* Carry Rectifier RA-43-B by the handles on Case CS-82-B, place it in a location convenient to Switchboard BD-100, with which it is to be used, and to the a-c outlet to which it is to be connected (fig. 8). Open the four catches at the bottom of Case CS-82-B and remove the upper portion of the case.

*b.* Insert the teletypewriter motor a-c cord plug in the left-hand receptacle (of Rectifier RA-43-B) 115 V.A.C. PRINTER. Insert the switchboard d-c cord plug in the right-hand receptacle. This receptacle takes a polarized or a standard parallel prong plug, which should be turned to the right to lock it in place. The slot in the receptacle that has the small notch is the positive d-c connection. *Do not plug in the rectifier a-c input cord at this time.*

### **7. PREPARATION FOR USE.**

*a.* Find out whether the supply-line voltage is within the range of 100 to 125 or 200 to 250 volts. Make sure that the frequency is within the range

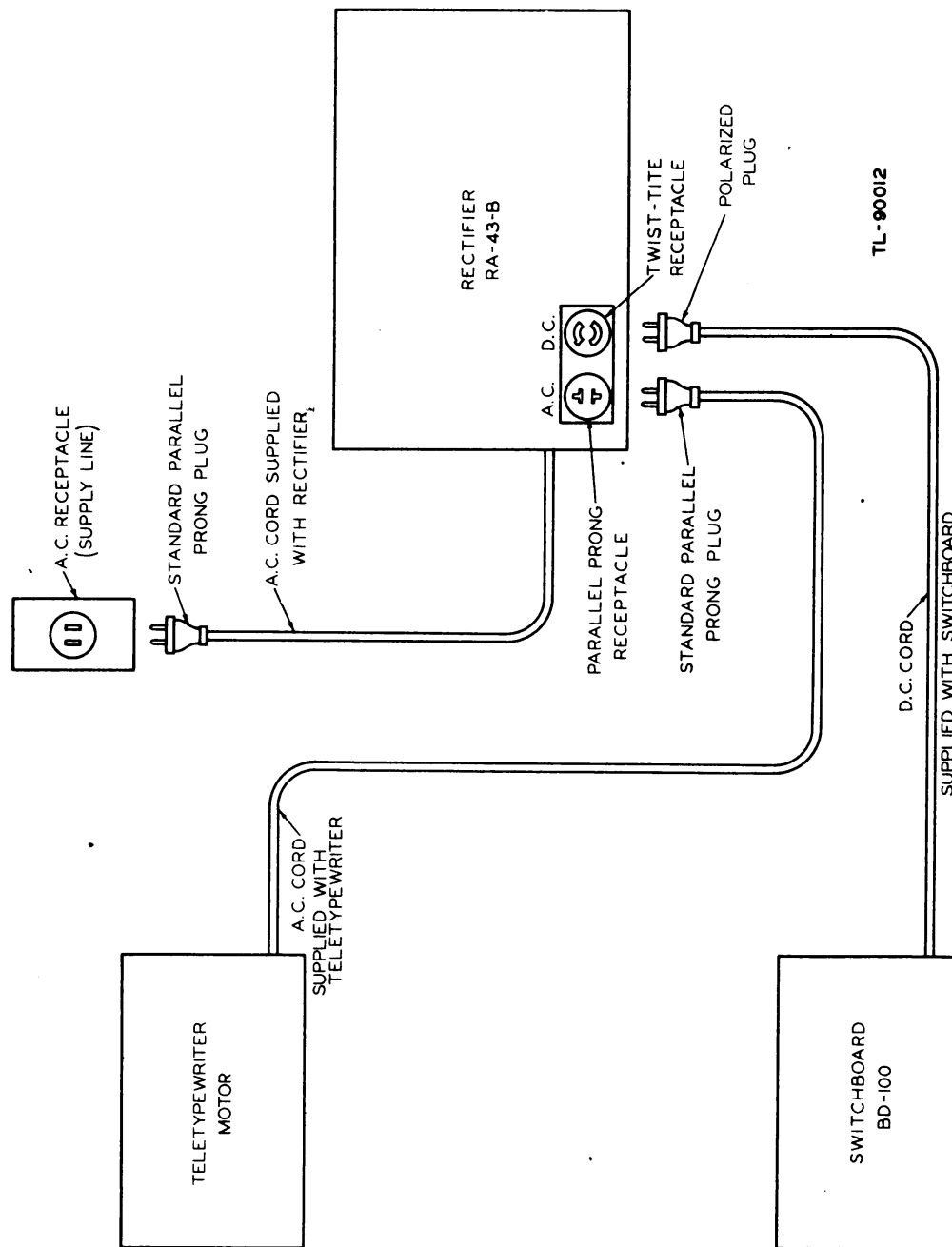


Figure 8. Rectifier RA-43-B, cording diagram.

of 50 to 65 cycles. If there is no portable meter to conveniently measure the supply-line voltage, the meter in the Rectifier RA-43-B may be used for this purpose as follows:

- (1) See that the line tap (flexible lead with spade lug) is connected to the 230-volt terminal.
- (2) Plug in the a-c cord and turn on the circuit breaker and the POWER switch.
- (3) Read the voltmeter, and multiply the scale reading by 2. If the meter reads 110, the actual line voltage is 220. If the meter reads 55, the actual line voltage is 110.
- (4) If the reading is within the range of 100 to 125 (corresponding to an actual line voltage of 200 to 250) leave the line tap on the 230-volt terminal.
- (5) If the meter reads between 50 and 62.5 volts (corresponding to a line voltage of 100 to 125) change the line tap as described in sub-paragraph *d* below.

*b.* Open the door on the front of the rectifier cabinet by turning the two fasteners at the top of the door to the left (use a screwdriver).

*c.* If the supply-line voltage is 200 to 250 volts, see that the line tap (spade lug) is on the terminal marked 230. This is the normal factory connection when shipped (figs. 4 and 11).

*d.* If the supply-line voltage is 100 to 125 volts, loosen the screws in the terminals marked 230 and 115 and transfer the spade lug to the 115 terminal. Tighten both terminal screws. Do not disturb the upper six terminals marked + or — (figs. 4 and 11).

*e.* Place toggle switch AC VOLTAGE in upper position, 110-125 (fig. 4).

*f.* Place toggle switch POWER in lower position, OFF (fig. 4).

*g.* Place circuit breaker handle in right-hand position, ON (fig. 7).

*b.* If desired, the cabinet can be grounded by securing one end of a wire under the head of one of the cabinet screws along the bottom of the rectifier and connecting the other end to a grounded object. Do not connect to the ground connection being used for ground-return signal circuits unless it is a low-resistance connection, such as a water pipe. (See SAFETY NOTICE.)

## **8. OPERATION.**

*a.* Insert the plug on the a-c cord (attached to Rectifier RA-43-B) in supply-line receptacle (fig. 8).

*b.* Place POWER switch in upper position, ON, being careful not to touch any of the exposed connections on the terminal strip or tubes while the cabinet door is open (fig. 4).

*Installation and Operation*

*c.* Note the reading of the voltmeter. If it is between 100 and 125, proceed with the next step (subpar. *d* below). If the meter reads between 80 and 100 and if the line tap (pars. *7c* and *d*) is on the terminal marked 115, place the toggle switch A.C. VOLTAGE in the lower position, 80-100 (fig. 4).

*d.* Wait at least  $1\frac{1}{4}$  minutes for the time-delay switch to operate and apply voltage to the plates of the rectifier tubes. The required time will be shorter in hot climates and longer in cold climates.

*e.* Depress the toggle switch VOLTMETER to the lower position, D.C., and read the meter (fig. 4). There will be no indication if the time-delay switch has not closed. The voltmeter switch is a nonlocking type, and will return to the upper position when released.

*f.* If the meter reads 115 volts (red mark on scale) no further adjustment is necessary. If not, turn screwdriver control D.C. VOLTAGE, while continuing to depress VOLTMETER switch until meter reading is adjusted to 115 (fig. 4). Remove screwdriver from slot in control, and note meter reading again to see that reading has not been changed by accidental misadjustment. Release VOLTMETER switch. If the neon lamp has been removed from its socket and reversed in position  $180^\circ$  during unpacking or otherwise, it may be necessary to readjust the D.C. VOLTAGE control, since the electrodes in the neon lamp are not identical in operation. In general, best operation is obtained when the upper electrode is aglow. If the lower electrode of the neon lamp is aglow, rather than the upper, turn the POWER switch off and remove the a-c line plug from its receptacle. Remove the neon lamp from its socket (press down and turn to the left), turn it halfway around so the terminals on the base of the tube are reversed in position. Then replace it in the socket. Replace the a-c line plug, turn on POWER switch and readjust voltage as described above.

*g.* Close the cabinet door and secure it by turning screwdriver fasteners.

*b.* During normal operation of Rectifier RA-43-B the following conditions will be noted:

(1) After turning on the POWER switch there will be no d-c output voltage from the rectifier for about 55 to 75 seconds (at  $70^\circ$ ). This is because the time-delay micro switch does not close until the bimetal strip is sufficiently heated. This prevents application of plate voltage to the RT-10 rectifier tubes until they have had time to preheat. If d-c output voltage is available in less than 45 seconds after turning on the POWER switch (as shown by the voltmeter when the VOLTMETER toggle switch is depressed) adjustment should be made as described in paragraph 10.

(2) The two active RT-10 rectifier tubes will glow with a purple color, caused by ionization of the gas with which they are filled. This will not be

evident until the time-delay micro switch has closed.

(3) The neon lamp LP-3 will glow with a characteristic orange-red color on one electrode only.

(4) The RT 11 (6F6G) tube will become hot but will show no signs of internal heating of the plate or grid, nor any evidence of glow between the electrodes.

(5) The voltmeter will show a-c line voltage (par. 7a) when the VOLT-METER toggle switch is up, and d-c output voltage when the switch is depressed.

**9. PRECAUTIONS DURING OPERATION.** In hot climates the time-delay micro switch operated by the bimetal strip will close sooner after the POWER switch is turned on than it will in temperate or cold climates. If the micro switch closes in less than 45 seconds, make adjustment as described in paragraph 10.

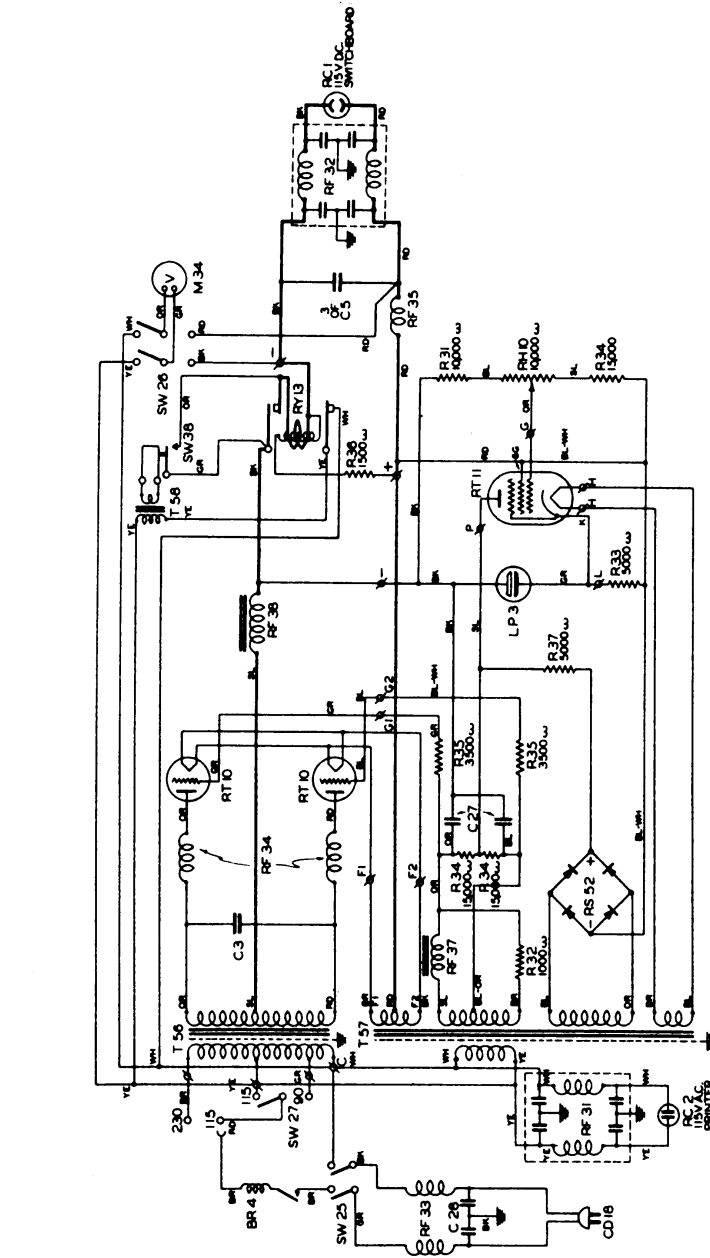
**CAUTION:** Under no conditions should the rectifier be operated with the A.C. VOLTAGE switch in the 80-100 position when the line voltage is above 100. To do so may seriously damage the equipment.

## 10. ADJUSTMENTS FOR FIELD UPKEEP.

a. Other than the adjustments for output voltage and supply-line voltage described in paragraphs 7 and 8 there is but one adjustment provided. This is the setting of the time-delay adjusting screw and locknut on the bimetal switch in the relay box. This screw is adjusted at the factory for a delay of 55 to 75 seconds at approximately 70°. If unusually high ambient or surrounding temperature has caused the delay switch to operate in less than 45 seconds, the adjustment should be changed as described in subparagraph *b* below. In cold climates the delay will be increased. This is not detrimental to the rectifier, but may be undesirable from an operating standpoint.

**NOTE:** In the circuit diagrams of some of the first production units micro switch SW 38 is shown with contacts closed. This switch is normally open when the power switch is turned off. Figure 9 shows the wiring circuit of Rectifier RA-43-B.

b. To adjust the setting of the time-delay adjusting screw and locknut on the bimetal switch, first remove the a-c plug from the power outlet, open cabinet door, remove the two rectifier tubes and one spare tube, and remove the relay box cover. Loosen the locknut (fig. 6) and turn adjusting screw *out* to *increase* time delay or *in* to *decrease* time delay. After adjusting, tighten the locknut.



NOTE:  
 X INDICATES TERMINALS ON  
 AUXILIARY PANEL PL156

TL-90013

Part Qty.	Description
BR 4	Magnetic Circuit Breaker
C 3	10 Mfd. Capacitor
C 5	800 Mfd. Capacitor
C 27	1X1 Mid. Capacitor
C 28	.1X.1 Mid. Capacitor
CC 7	Tube Clamp
CCA	Plate CFS
CD 18	AC Cord Assembly
F 15	Tube Rack Mounts
F 16	Cabinet Mounts (Front)
F 17	Cabinet Mounts (Rear)
LP 3	Neon Lamps
M 34	150V AC Voltmeter
MP 27	Relay Base
PL 151	Capacitor Panel
PL 152	Relay Panel
PL 153	Resistor Panel
PL 158	Auxiliary Panel
R 31	10000 Ω Resistor
R 32	1000 Ω "
R 33	5000 Ω "
R 34	15000 Ω "
R 35	3500 Ω "
R 36	1500 Ω "
R 37	5000 Ω "
RC 1	DC Twist Lock Receptacle
RC 2	AC Receptacle
RF 31	AC Filter
RF 32	DC Filter
RF 33	Double Choke Assembly
RF 34	Plate Choke
RF 35	DC Choke
RF 37	Auxiliary Choke
RF 38	Filter Choke
RH 10	10000 Ω Potentiometer
RS 52	Selenium Rectifier Stack
RT 18	6J1 Tubes
RT 11	6F6G Tubes
RY 13	Output Relay
SK 5	6J1 Tube Sockets
SK 7	Neon Lamp Sockets
SK 6	Octal Socket
SW 25	Power Switch
SW 26	Meter Switch
SW 27	High-Low Switch
SW 38	Micro Switch
T 56	Plate Transformer
T 57	Auxiliary Transformer
T 58	Heater Transformer

Figure 9. Rectifier RA-43-B, schematic wiring diagram.

## SECTION III

### *Functioning of Parts*

---

#### **11. LOCATION OF PARTS (figs. 14 and 15).**

*a.* The plate power transformer T 56, and the filter choke RF 38 are mounted on the steel base plate BP 32 which is supported by four rubber shock mounts FT 6. Also fastened to the base plate is a rubber-supported tube socket platform on which sockets for all operating and spare tubes are mounted (fig. 10). The three filter capacitors C 5 and the power factor correcting capacitor C 3 are attached to the top of the filter choke.

*b.* The control section comprising the manual switching and automatic regulating equipment is assembled on a vertical steel support and mounted on the base plate BP 32. On the front panel of the control section are the voltmeter M 34, the circuit breaker BR 4, the voltage adjusting rheostat RH 10, and the power, voltmeter, and line voltage toggle switches SW 25, SW 26, and SW 27 respectively. On the side of the supporting member are the auxiliary transformer T 57, the power line RF choke RF 33, the auxiliary choke RF 37, the d-c choke assembly RF 35, the selenium rectifier stack RS 52, and the resistor panel PL 153. Assembled on a bracket beside these parts, to the left, are the a-c and d-c filters RF 31 and RF 32 and the d-c and a-c receptacles RC 1 and RC 2.

*c.* Mounted over the plate transformer T 56 are the relay box CA 110 and the plate choke assembly RF 34. Within the relay box are the heater transformer T 58 for the bimetal strip, the outlet relay RY 13, and the micro switch SW 38 with its bimetal actuating strip.

#### **12. PRIMARY CIRCUITS (figs. 9 and 11).**

*a. A-c Input.* Power is supplied to Rectifier RA-43-B through cord CD-18 which connects to the radio interference filter, which consists of chokes RF 33 and capacitor C 28. The other side of this filter is connected through switch SW 25 and circuit breaker BR 4 to plate transformer T 56, auxiliary transformer T 57, and heater transformer T 58.

(1) When the line voltage is within the range of 200 to 250, the 230-volt primary tap on plate transformer T 56 should be used. With the line tap so connected, the primary of T 56 serves as an autotransformer and supplies a voltage equal to half the line voltage to the primaries of T 57 and T 58.

(2) When the line voltage is from 100 to 125 the line tap should be connected to the 115-volt terminal and the HIGH-LOW switch placed in the



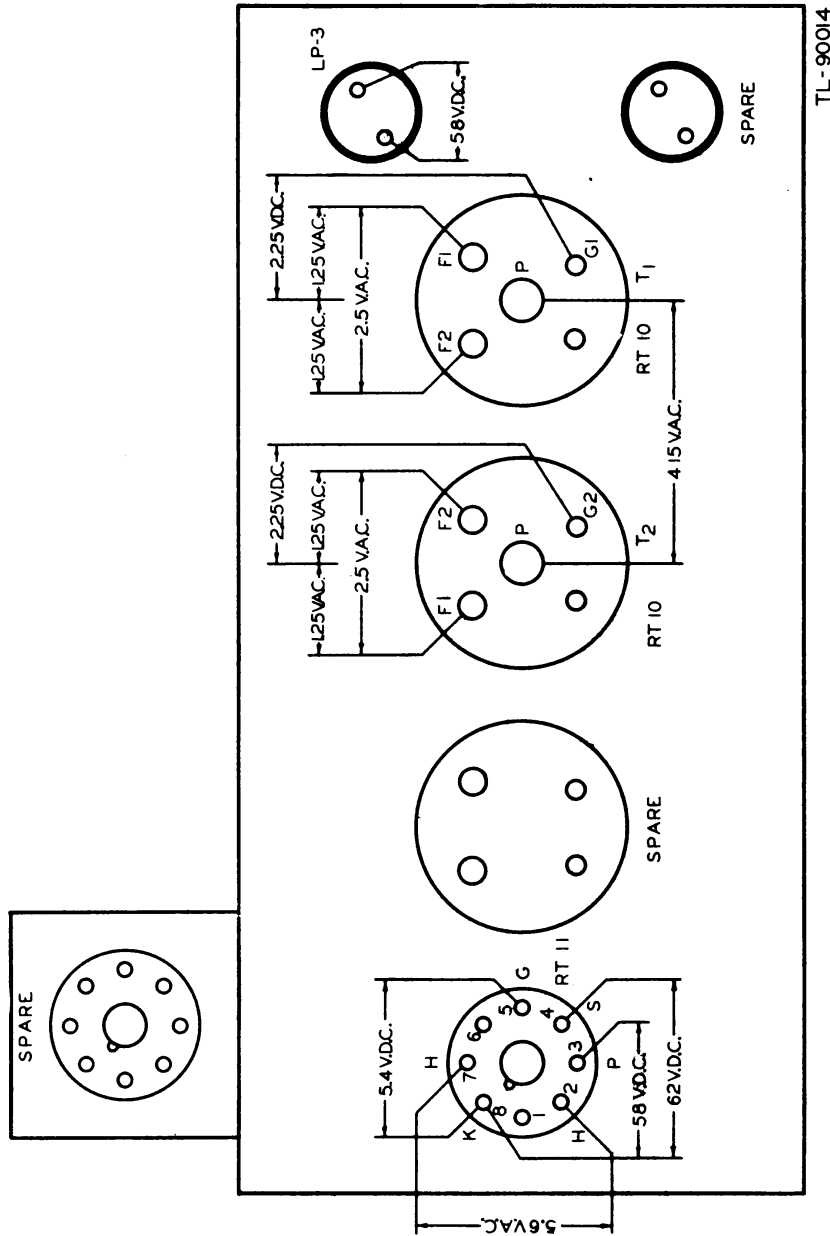
115-volt position. In this case the full line voltage is applied to T 57 and T 58, and to half the primary winding of T 56.

(3) When the line voltage is from 80 to 100 the 115-volt line tap is used as in subparagraph *a*(2) above, but the HIGH-LOW switch is placed in the 90-volt position. Under this condition, the line voltage is stepped up by the autotransformer action of the primary of T 56 so that the proper voltage will be applied to T 57 and T 58.

*b. Teletypewriter Motor Output.* Receptacle RC 2 supplies approximately 115 volts alternating current to a teletypewriter motor (through the filter RF 31) for any of the three line voltage ranges mentioned in subparagraphs *a*(1), (2), and (3) above. The filter helps prevent the transmission of radio interference effects through the teletypewriter motor circuit.

**13. THERMAL AND MAGNETIC CONTROL CIRCUITS (figs. 9 and 11).** To prevent the application of plate voltage to the rectifier tubes RT 10 before the cathodes are thoroughly heated, a bimetal actuated time-delay micro switch and a relay allow preheating for a period of 55 to 75 seconds. The micro switch SW 38 is connected across one pair of contacts of relay RY 13. The bimetal actuating element for SW 38 is connected to the secondary of transformer T 58, the primary of which is connected in series with a second pair of contacts on RY 13, which are normally closed when the supply line to the rectifier is disconnected. When power is applied to auxiliary transformer T 57 and heater transformer T 58, the cathodes of rectifier tubes RT 10 begin to heat, while at the same time the bimetal strip is also heating gradually. After a delay of 55 to 75 seconds the bimetal strip pressure is sufficient to close SW 38, and the RT 10 tubes are hot enough for the application of plate voltage. Closure of SW 38 completes the circuit from the center tap of the secondary of plate transformer T 56 to the center tap of the secondary of T 57, connected to the RT 10 cathodes through the relay-series coil-shunt coil and resistor R 36. Relay RY 13 is thus energized and closed, and the d-c output circuit to receptacle RC 1 is completed. When the relay is energized the primary circuit of T 58 is opened through the second pair of relay contacts and the bimetal strip cools, releasing and opening micro switch SW 38. The relay, however, remains closed because of the shunt coil current, even though there may be no external load. The series coil on the relay holds the relay closed even though a heavy overload or short circuit is applied to the output terminals. In the event of an abnormal load, the circuit breaker BR 4 opens and thus protects the entire equipment from damage. If no series coil was used and the shunt coil of the output relay were connected (as is done with Rectifier RA-43-A), a short circuit at the d-c output terminals would cause the output relay to open and close, or flutter, until the circuit breaker opened. This fluttering would result in arcing and burning of the relay contacts.

*Rectifier RA-43-B*



NOTE: SOCKETS ARE SHOWN AS VIEWED FROM TOP.  
 NOTE: VOLTAGE MEASUREMENTS MADE WITH RECTIFIER OPERATING WITH NO LOAD, 5000 OHMS PER VOLT METER USED FOR D.C. MEASUREMENTS.

Figure 10. Rectifier RA-43-B, tube socket voltage diagram.

**14. ELECTRONIC CONTROL CIRCUITS (figs. 12 and 13).**

a. The output voltage of Rectifier RA-43-B is controlled by varying the control grid voltage of the RT 10 rectifier tubes. The average value of the plate current of the RT 10 tubes depends upon the instant of firing of the tubes (with respect to the start of the positive voltage cycle on the plates), and is increased by making the control grids more positive.

b. In the operation of the RT 10 tubes, plate voltage is applied to the tubes by the secondary winding of transformer T 56, which is center-tapped to provide for full-wave rectification with two tubes. By means of a bridge circuit consisting of a center-tapped secondary winding on transformer T 57, and an auxiliary choke RF 37 and resistor R 32, a lagging control voltage is applied to the RT 10 tube grids. At the same time, a bias voltage which is dependent upon the rectifier output voltage is applied to the RT 10 tube grids. This voltage is obtained from the plate circuit of the amplifier tube RT 11. It adds to the lagging control voltage to produce a resultant bias voltage varying from negative through zero to positive values in such a manner that a decrease in rectifier output voltage results in a more positive grid bias on the RT 10 tubes.

c. The control grid of the amplifier tube RT 11 is biased by a series of bleeder resistors connected across the rectifier output circuit. This bias voltage can be adjusted with the potentiometer RH 10. The cathode of the RT 11 tube is biased positively with respect to the grid by a voltage drop obtained across resistor R 33, which is also connected in series with the neon lamp LP 3. The lamp and resistor just mentioned are connected across the rectifier output in the same manner as the bleeder resistors. Since the voltage drop across the neon lamp is practically unchanged by variation in voltage applied to it and to its series resistor R 33, any change in output voltage of the rectifier appears across the resistor R 33. The change in cathode voltage of the RT 11 tube is therefore considerably greater than the change in its grid voltage as the rectifier output voltage varies. The voltage in the plate circuit of the RT 11 tube, obtained from a center-tapped secondary winding on transformer T 57 and a selenium rectifier stack RS 52, is varied in proportion to its effective grid voltage, so that a small change in rectifier output voltage is reflected as a relatively large change in voltage applied to the control grids of the RT 10 rectifier tubes. A small increase in rectified d-c output voltage, therefore, tends to change the value of the control voltage on the RT 10 tube grids in such a way as to decrease the d-c output voltage. A decrease in rectifier output voltage will affect the RT 10 tube grids so as to increase the d-c output voltage. Consequently, there is a continual and automatic stabilizing influence upon the output voltage of the rectifier which holds it within close limits over a wide range of load current. The stabilizing effect of the electronic control circuit also automatically compensates for variations in the a-c output voltage.

Rectifier RA-43-B

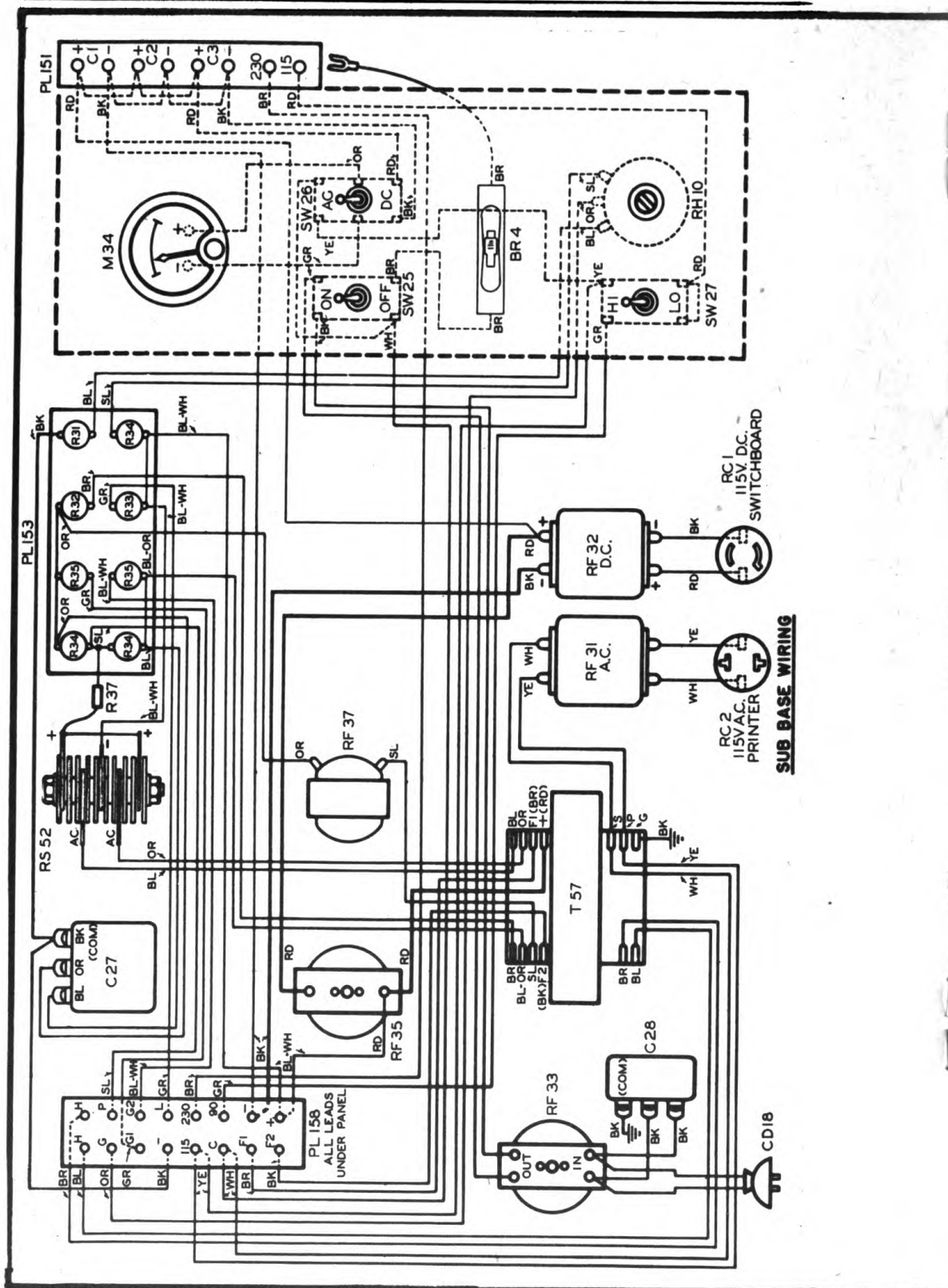
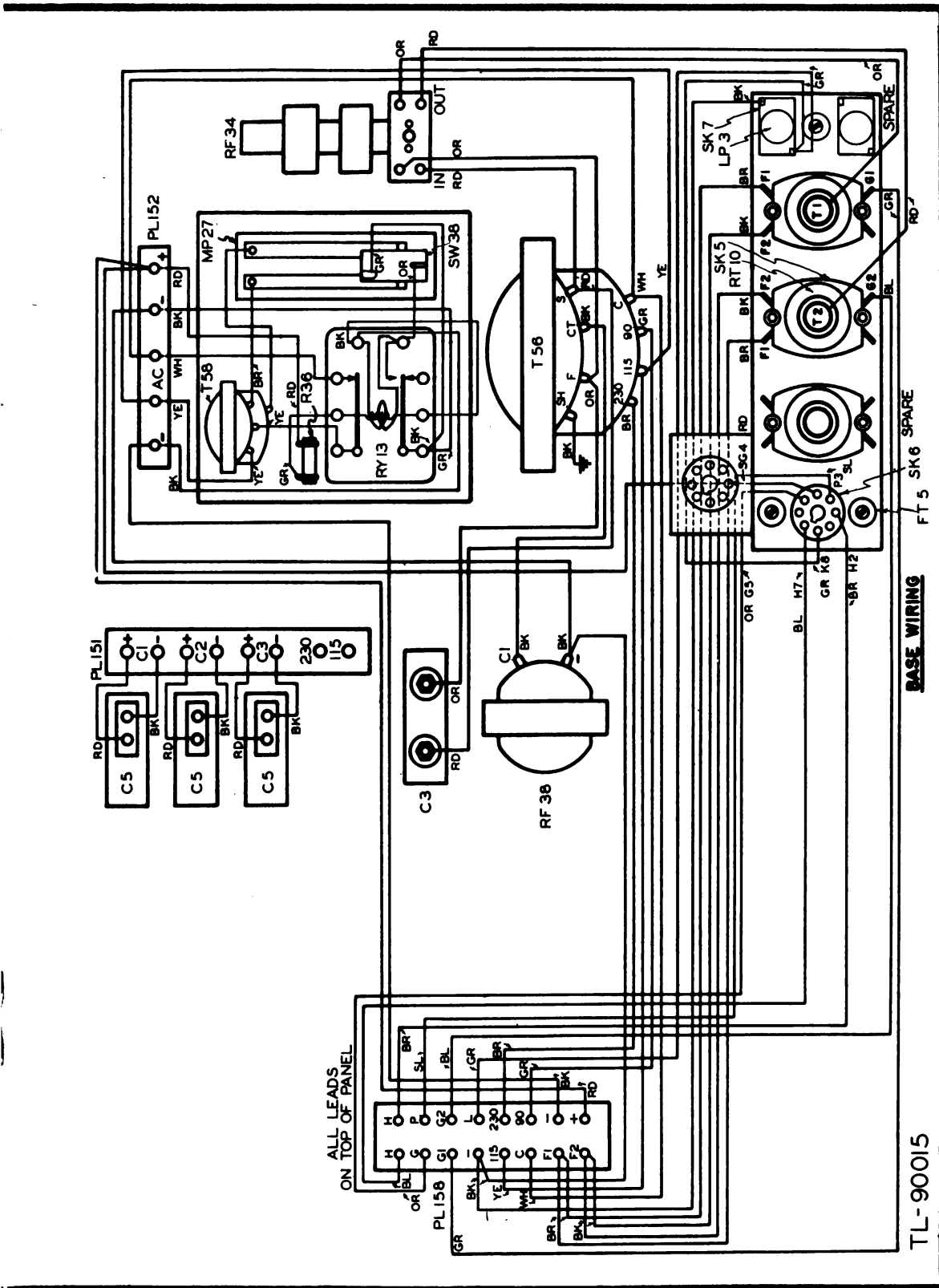


Figure 11.

Functioning of Parts



Rectifier RA-53-B, practical wiring diagram.

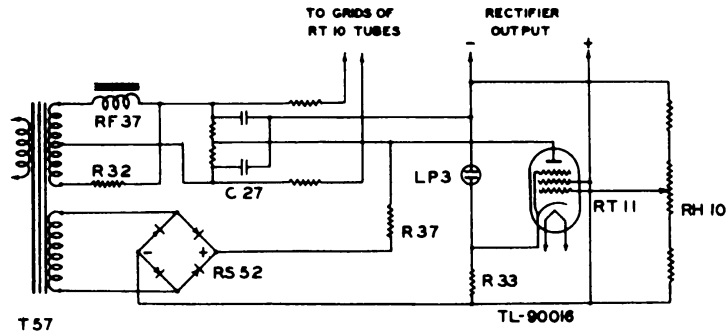


Figure 12. Functional diagram, electronic control circuit.

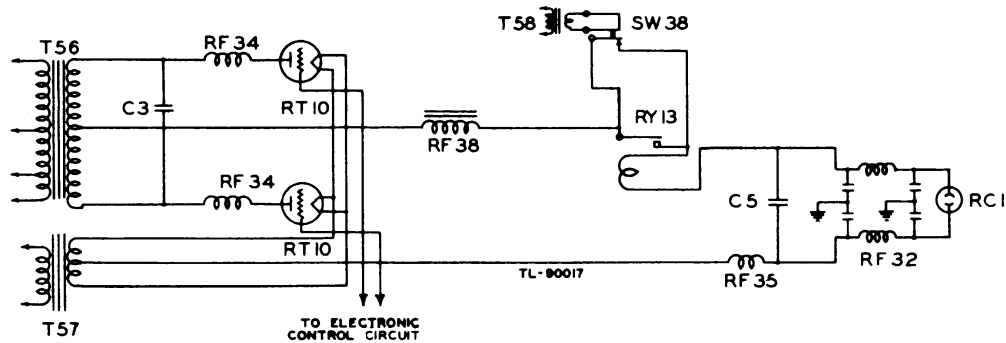


Figure 13. Functional diagram, rectifier tube circuit.

## 15. FUNCTIONAL DIAGRAMS.

a. Figure 13 shows the important components of the rectifier (RT 10) tube circuit. Rectification of the a-c voltage supplied by the center-tapped secondary of T 56 is accomplished by a conventional full-wave arrangement in which each tube conducts during a half-cycle of the a-c wave, the output of the tubes being combined to give full-wave rectified current.

b. Figure 12 shows the control circuits used for automatic adjustment of the rectifier tube grid voltage to regulate the d-c output of Rectifier RA-43-B. The functioning of this circuit is described in paragraph 14.

## SECTION IV

### *Maintenance*

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Unsatisfactory performance of this equipment will be reported immediately on W.D., A.G.O. Form No. 468. If form is not available see TM 38-250.

#### **16. INSPECTION.**

*a. General.* Field inspection and maintenance of Rectifier RA-43-B consists essentially of routine cleaning of the equipment, checking operation of the bimetal switch and output voltage, and replacing of the tubes when necessary.

(1) Clean the rectifier externally and internally at regular intervals. A dry dusting cloth may be used for this purpose. Accumulated dust should be blown out of the unit. The tubes may be removed for cleaning and to provide access to the parts which they may obstruct. In replacing rectifier tubes be sure to push them all the way down into their sockets and to tighten the clamps securely. See paragraph 8f for position of neon lamp in socket.

(2) Check all terminals and screws for tightness. Check tube-cap connecting-clips to make sure they are clean and tight.

(3) Check operation of bimetal switch occasionally to see that it does not operate in less than 45 seconds. To do this, allow the rectifier to stand until it reaches room temperature (if the rectifier has been in service), then depress the VOLTMETER switch and turn on the POWER switch. Time the interval between turning on the POWER switch and the instant the voltmeter needle swings upward on the scale. If the time is less than 45 seconds, make adjustment as required (par. 16b).

(4) Check d-c output voltage occasionally to see that it is maintained at 115 volts. If it is above or below this value, adjust as described in paragraph 8f.

*b. Adjustment of Time-delay Switch.* The adjustment of the time-delay switch for proper operation is described in paragraph 10a and b.

*c. Circuit Breaker.* If the circuit breaker (located on the control panel between the upper and lower toggle switches) should blow or open, it indicates an overload or a short circuit in the rectifier in the external d-c

output circuits. Examine all wiring and other parts (as completely as available test facilities will permit) for any apparent shorts, grounds, or other damage or defect, before resetting circuit breaker to restore to service. The circuit breaker is designed to provide a slight time delay in opening when an overload is applied.

## **17. REPLACEMENT OF TUBES.**

*a.* A sudden decrease in d-c output voltage of the rectifier may indicate a burned out RT 10 (EL-C6J) tube. Defective tubes can be discovered by a visual inspection of the tubes while they are in operation. If replacement is necessary, turn off POWER switch, remove a-c cord plug from supply-line receptacle, open cabinet door, loosen thumbscrew on clamp around defective tube, remove clip from cap of tube, and withdraw tube from socket. Also remove spare tube from left-hand socket (no clip is attached to top of spare tube) in a similar manner. Replace defective tube with spare, attach clip to tube cap and tighten base clamp. Close rectifier cabinet door, replace a-c plug in socket, and turn on POWER switch. Check d-c voltage by depressing VOLTMETER switch.

**NOTE:** If d-c output voltage varies rapidly up and down and RT 10 rectifier tubes flutter, the clips attached to the tube caps are reversed.

*b.* If the d-c output voltage rises to approximately 150 volts at no load the amplifier tube or neon lamp may be defective. Try replacing one, then the other, with spare tubes, checking operation after each change. Be sure to disconnect a-c cord each time before removing any tube or lamp from socket.

*c.* To remove RT 11 (amplifier tube 6F6G), simply pull upward. In replacing this tube be sure to line up the key on the bakelite center pin of the tube base with the corresponding slot in the tube socket. Do not move tube sidewise too far while inserting in or removing from socket, as center pin may be broken off.

*d.* To remove neon lamp LP 3 from socket, press downward and turn to the left. To replace, press downward and turn to right. See paragraph 8f for reversal of tube in socket.

## **18. REMOVAL AND ASSEMBLY OF PARTS (figs. 14 and 15).**

*a. General.* Rectifier RA-43-B has been designed so that all parts are readily accessible for service and replacement. It is composed of several subassemblies, each independent of the others, to facilitate assembly and repair. These subassemblies are shown separately in figures 5, 6, and 7, which indicate the major units into which the rectifier may be divided.



Figures 14 and 15 show the location of the parts. Each assembly is completely wired and provided with a solder lug-type terminal board which connects it to the other assemblies through the main connecting cable. To simplify repairs or replacement it may be desirable at times to remove an entire assembly from the main unit.

*b. Base Subassembly.* Figure 3 shows the plate transformer T 56, the filter choke RF 38, the filter capacitors C 5, the power factor capacitor C 3, and the tube rack. Any of the four capacitors may be removed individually in case of failure, and the rectifier may be operated temporarily with only two (or in some cases one) of the three C 5 capacitors. Replacement should, however, be made as soon as possible. Be sure to observe polarity in replacing C 5 capacitors, since these are of the electrolytic type and will be damaged by improper connection.

*c. Relay Box Subassembly.* The relay box subassembly (fig. 6) contains the relay RY 13, series resistor R 36, micro switch SW 38, and heater transformer T 58. The relay box, together with the plate RF choke RF 34, is mounted on a metal base fastened to the plate transformer with four screws and spacers. The method of taking out any of the parts becomes self evident after removal of the relay box cover, which is removed by turning the two fasteners to the left with a screwdriver.

*d. Control Section Subassembly.* The control section subassembly (fig. 7) contains most of the control network parts and wiring, and, except for the voltmeter, switches, and potentiometer, consists of static parts which are practically trouble-free. Except for breakage or the possible failure of the auxiliary transformer T 57, these static parts will probably never require replacement. Failure of the switches, meter, or potentiometer will be easily recognized and replacement can be made readily if required. In making repairs or replacement of parts on the control section subassembly it is possible to lift it from the base without disconnecting the main cable from panel PL 158. Remove the three pairs of capacitor leads from panel PL 151, then remove the four mounting bolts and slip the power cord through its clamp. This will save labor and avoid the possibility of incorrect wiring which might otherwise necessitate replacing connections.

**19. SERVICE AND REPAIR.** Servicing of Rectifier RA-43-B will be simplified by reference to paragraphs 17, 18, and 19 and to figure 9. Figures 16, 17, 18, and 19 show maintenance parts. Having located the defect by inspection or electrical measurement, repair generally consists of clearing a short circuit, completing an open circuit, or replacing a component part. In some cases it may be found after replacing certain parts that an error in wiring has been made, leading to improper operation of the rectifier. A number of possible cases of this kind follow:

Rectifier RA-43-B

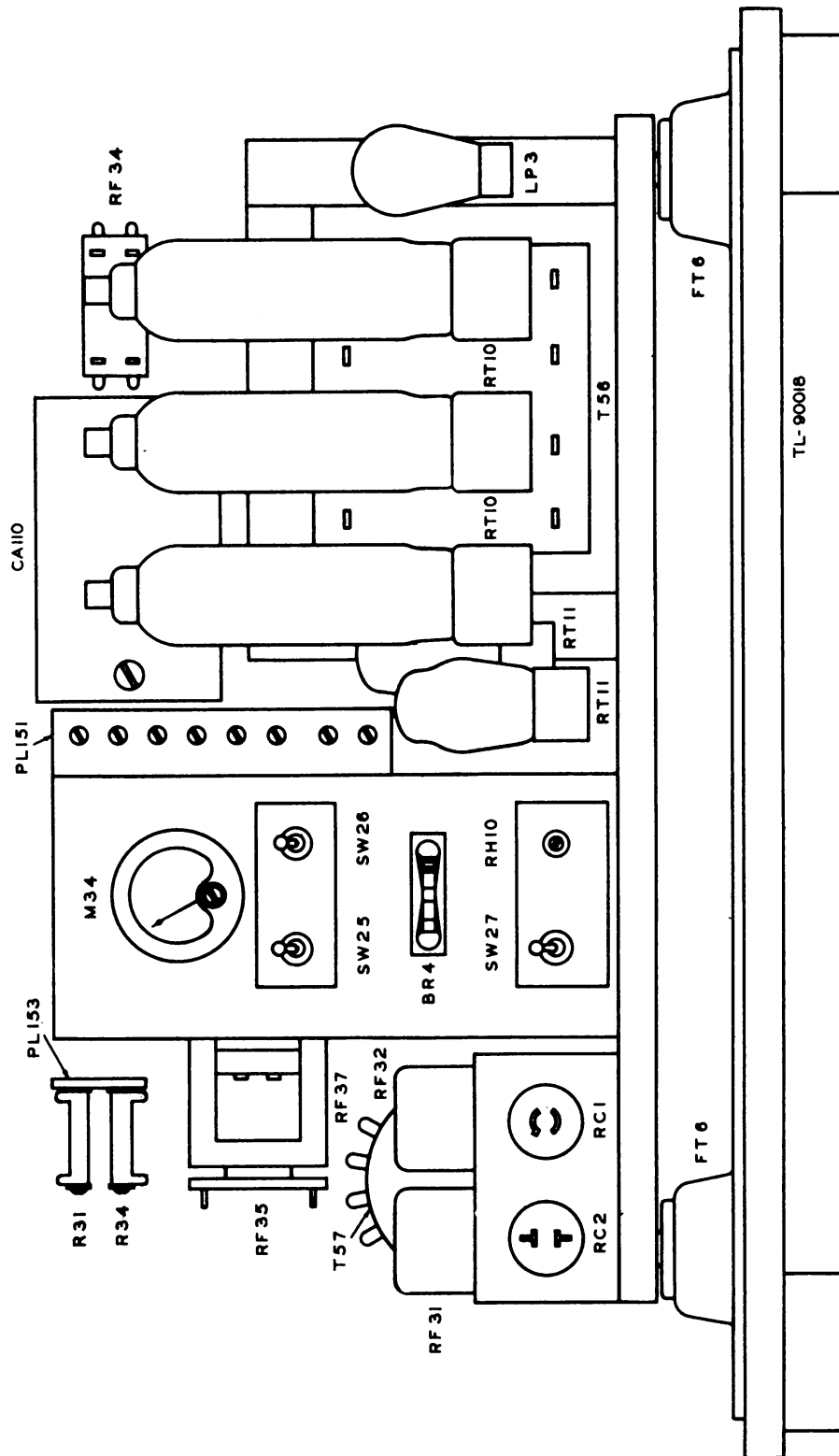


Figure 14. Rectifier RA-43-B, front view, cover removed, parts location diagram.

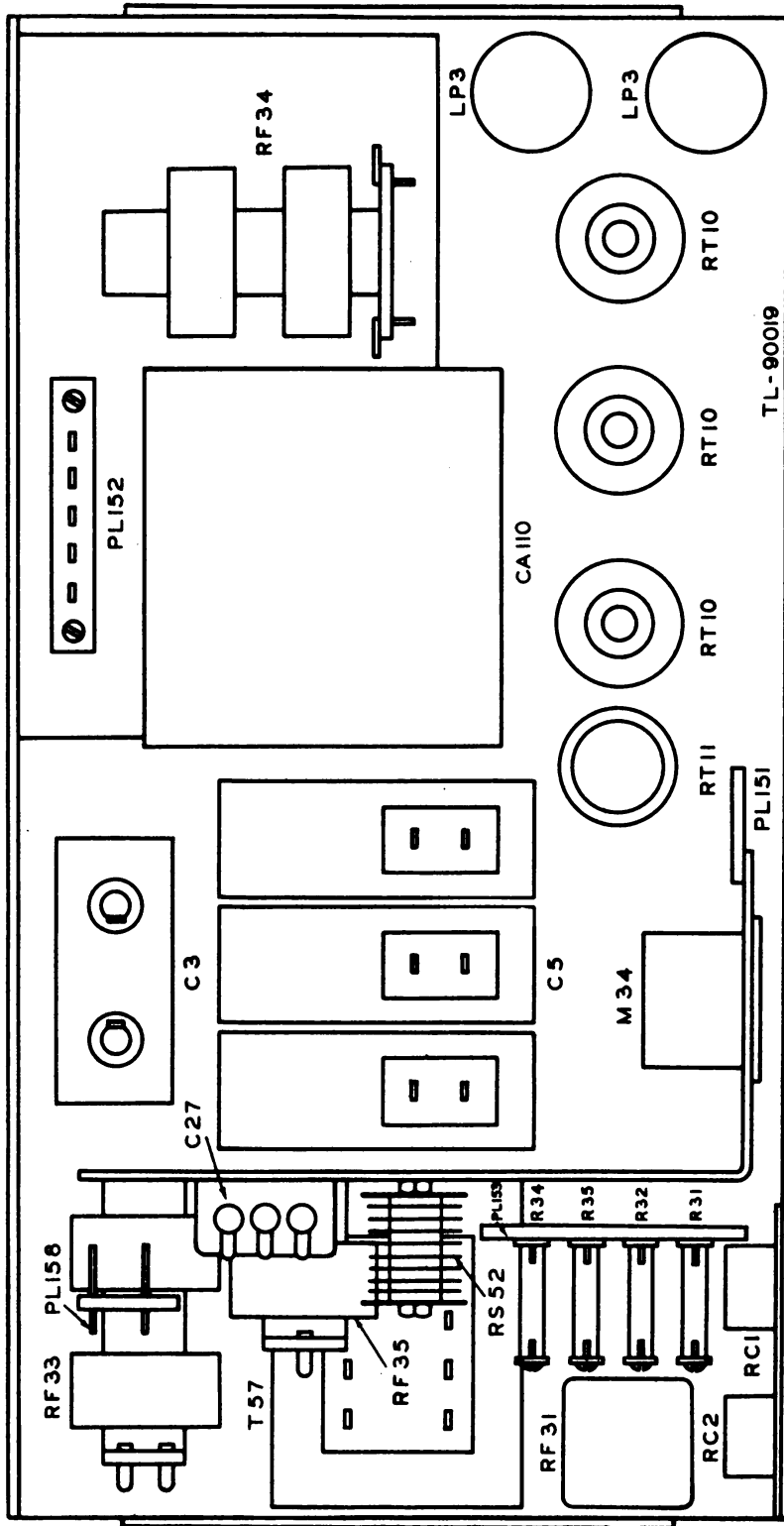


Figure 15. Rectifier RA-43-B, top view, cover removed, parts location diagram.

*a.* If, after replacing plate transformer T 56, auxiliary transformer T 57, or plate choke assembly RF 34, the d-c output varies rapidly up and down and the rectifier tubes flutter, a phase reversal is indicated. This may be corrected by reversing the connections to the primary of transformer T 57 or by reversing the connections at the secondary of transformer T 56 or choke assembly RF 34. If this does not correct the trouble the three leads to the phase-shift winding are probably interchanged. These wires are brown, blue-orange, and slate, respectively, and should be checked with the wiring diagram (fig. 11).

*b.* If, when the rectifier is placed in service after replacing transformer T 56, only one RT 10 rectifier tube glows, the center tap and one of the plate leads of this transformer are reversed and must be interchanged.

*c.* If, after replacing parts or tubes, the d-c output voltage rises to approximately 150 volts at no load, there probably is a defective neon lamp or amplifier tube, or an open in the control network. Another possibility is that the connections to socket SK 6 or SK 7 are interchanged. If the latter is the case the relay will chatter after the micro switch SW 38 opens.

*d.* A decrease in d-c output to approximately 70 volts or an unusually bright glow on the neon lamp electrode after replacing socket SK 6 indicates that control grid lead No. 5 may be interchanged with either plate lead No. 3 or screen grid lead No. 4. In either case amplifier tube RT 11 will probably need replacement.

**20. AVERAGE PERFORMANCE CHARACTERISTICS.** Average performance characteristics are shown below. The data was obtained with the rectifier operating from a 110-volt 60-cycle source.

*a.* D-c output regulation with various constant loads:

D-c output, amps	0	0.5	1.0	2.0	3.0	4.5
D-c output, volts	116.3	115	115	115.5	115.4	115

*b.* Output voltage variation with load interrupted at a frequency of 30 cycles per second is approximately 2.2 volts.

*c.* A-c power input for rated d-c output is approximately 880 watts.

*d.* A-c line current at full d-c load is 9.0 amperes.

*e.* Approximate power factor at full load is 85%.

*f.* Ripple component in output current at full load is approximately 0.5 volt.

**21. TROUBLE LOCATION CHART.** The following list shows probable causes for various troubles which may develop due to use, wear, breakage, or improper repair of Rectifier RA-43-B.

*Maintenance*

<i>Symptom</i>	<i>Probable causes</i>
No a-c output voltage.	Open power cord CD 18. Short-circuited power cord CD 18. Poor plug contact. Open or defective circuit breaker BR 4. Disconnected line tap. Open or defective power switch SW 25. Open or defective HIGH-LOW switch SW 27. Open double choke assembly RF 33. Open a-c filter RF 31. Burned-out plate transformer T 56.
A-c output voltage but no d-c output voltage.	Open transformer T 56 secondary winding. Open plate choke assembly RF 34. Open filter choke RF 38. Open relay RY 13. Open micro switch SW 38. Open heater transformer T 58. Open d-c choke RF 35. Open d-c filter RF 32. Poor contact in receptacle RC 1. Open auxiliary transformer T 57. Shorted power factor capacitor C 3. Shorted filter capacitor C 5.
Excessive d-c output voltage.	Defective rectifier stack RS 52. Defective neon lamp LP 3. Defective amplifier tube RT 11. Open circuit in control network. Reversed connections at socket SK 6 or socket SK 7.
Low d-c output.	Control grid No. 5 interchanged with plate lead No. 3 or screen grid lead No. 4. Excessively low line voltage.
Fluttering output.	Reversed phase in auxiliary transformer T 57, plate transformer T 56, or phase-shifting network.
Poor output regulation.	Double ground; one in resistor circuit and one in neon lamp circuit.

<i>Symptom</i>	<i>Probable causes</i>
One rectifier tube not glowing.	Burned-out tube. Reversed center tap and secondary connections of plate transformer T 56 on one side.
Neon lamp LP 3 does not glow until amplifier tube RT 11 is heated.	Open resistor R 37.
Relay RY 13 chatters after micro switch SW 38 opens.	If resistor R 37 is hot, two of the three connections at the neon lamp are interchanged.
Excessive delay in appearance of d-c output voltage.	Loose connection to bimetal strip in relay box. Improper adjustment of bimetal switch.
Output voltage appears in 5 to 10 seconds.	Relay RY 13 or micro switch SW 38 closed.
Circuit breaker BR 4 blows.	Shorted d-c or a-c output. Shorted power factor capacitor C 3. Shorted filter capacitor C 5. Shorted relay coil RY 13. Shorted plate transformer T 56. Shorted auxiliary transformer T 57. Shorted heater transformer T 58. Defective rectifier stack RS 52.

**22. CONTINUITY TEST TABLE.** The following measurements made with a standard Signal Corps Test Set I-56, were taken with Rectifier RA-43-B adjusted for operation from a 115-volt source, with tubes inserted, but with no input, or a-c or d-c output connections:

*a. Resistance Measurements at Terminal Panel PL 158.*

Terminal designations	Measured resistance (ohms)	Probable cause of incorrect reading
+ to —	2,100.	Shorted C 5. Open or shorted resistor #1 ** or #2, R 36, RH 10, or RY 13.
+ to F 1	0.12	Defective C6J tube or T 57 transformer heater winding.
+ to F 2	0.12	Defective C6J tube or T 57 transformer heater winding.
+ to L	4,800.	Defective resistor #3.
*+ to —	30,000.	Defective resistor #1 or #2, or RH 10.
+ to G 2	15,000.	Defective resistor #5, #7, or #8, R 37, or RS 52, RF 37, or T 57.
+ to G 1	15,000.	Defective resistor #6, #7, or #8, R 37, or RS 52, RF 37, or T 57.
+ to P	9,600.	Defective R 37 or RS 52.
+ to G	14,700.	Defective RH 10 or resistor #1, or incorrect adjustment of RH 10.
C to 90	0.24	Defective winding on transformer T 56.
C to 115	0.27	Defective winding on T 56, T 57, T 58, or RY 13 contacts.
C to 230	0.7	Defective winding on transformer T 56.
H to H	0.33	Defective winding on transformer T 57 or defective 6F6G tube.

\*Measured to negative terminal adjacent to L.

\*\*#Refers to resistor designations on resistor panel PL-153.

**Rectifier RA-43-B**

**b. Resistor Measurements.**

Resistor designation	Measured resistance (ohms)	Probable cause of incorrect reading
Resistor #1	13,000	Defective resistor #1.
Resistor #2	8,900	Defective resistor #2.
Resistor #3	4,200	Defective resistor #1, #2, or #3, or RH 10.
Resistor #4	9.5	Defective resistor #4, or RF 37, or T 57.
Resistor #5	3,400	Defective resistor #5.
Resistor #6	3,400	Defective resistor #6.
Resistor #7	7,500	Defective resistor #7, or #8, or RF 37, or T 57.
Resistor #8	7,500	Defective resistor #7, or #8, or RF 37, or T 57.
R 36	1,400	Defective resistor R 36.
R 37	5,000	Defective resistor R 37.
RH 10	9,000	Defective resistor #1 or #2, or RH 10, R 36, or relay RY 13.

**c. Normal Operating Currents in Various Circuits.**

Circuit or part	Current at zero load on Rectifier RA-43-B (milliamperes)	Current at 4.5 amp. load on Rectifier RA-43-B (milliamperes)
6F6G tube, screen grid.	0.7	0.61
6F6G tube, plate.	3.5	3.0
6F6G tube, cathode.	4.2	3.9
Resistor R 37.	3.2	2.8
Relay RY 13 shunt coil.	58.0	56.0
Neon lamp LP 3.	16.0	15.0



**Maintenance**

**d. Miscellaneous Resistance Measurements.**

Measurements taken between	Measured resistance (ohms)	Probable cause of incorrect winding
Plates of two C6J tubes.	2.4	Defective capacitor C 3 or transformer T 56.
RF 37 choke terminals.	9.0	Defective RF 37, resistor #4, or T 57 winding.
RF 31 terminals, each section.	0.32	Defective RF 31.
RF 32 terminals, each section.	0.15	Defective RF 32.
RF 33 terminals, each section.	0.11	Defective RF 33.
RF 34 terminals, each section.	0.2	Defective RF 34.
RF 35 choke terminals.	0.11	Defective RF 35.
RS 52 a-c terminals.	Approx. 1.5	Defective T 57 or RS 52.
*RS 52 d-c terminals.	Approx. 2500	Defective rectifier RS 52.
SK 7 socket terminals.	34,000	Defective LP 3 or resistor #1, #2, or #3, or RH 10.
RY 13 shunt coil terminals.	700	Defective RY 13.
RY 13 series coil terminals.	0.08	Defective RY 13.
C27 common to either of other terminals.	42,000	Defective C 27, resistor #4, #7, or #8, RF 37 or T 57.
C 27 individual terminals (excluding common).	9.1	Defective C 27, resistor #4, #7, or #8, RF 37 or T 57.

\*Connect + terminal of meter to + terminal of RS 52 when testing.

**23. TABLE OF POINT-TO-POINT VOLTAGES.** The following table shows normal voltages in various circuits of Rectifier RA-43-B with 110 volts 60 cycles applied to the input terminals and with the output adjusted to 115 volts.

Measurements taken between	At no load		At 4.5 amp. load	
	T 1	T 2	T 1	T 2
C6J term. F 1 and CT of fil. transf. winding.	1.1 v ac	1.1 v ac	1.08 v ac	1.04 v ac
C6J term. F 2 and CT of filament winding.	1.5 v ac	1.5 v ac	1.4 v ac	1.4 v ac
C6J term. G (1 or 2) and CT of filament winding.	2.35 v ac	2.4 v ac	1.4 v ac	1.8 v ac
6F6G tube heater terminals.	5.42 v ac		5.3 v ac	
6F6G term. 3 and cathode.	50.0 v dc		55.0 v dc	
6F6G term. 4 and cathode.	55.0 v dc		55.0 v dc	
6F6G term. 5 and cathode.	—4.4 v dc		—5.2 v dc	
Terminals of neon lamp socket SK 7.	63 v dc		63 v dc	
A-c terminals of rectifier stack RS 52.	16.8 v ac		15.0 v ac	
D-c terminals of rectifier stack RS 52.	13.0 v dc		12.0 v dc	

Measurements taken between	At no load		At 4.5 amp. load	
	T 1	T 2	T 1	T 2
Terminals of resistor #1.	48.5 v dc		49.0 v dc	
Terminals of resistor #2.	34.0 v dc		34.0 v dc	
Terminals of resistor #3.	54.0 v dc		54.0 v dc	
Terminals of resistor #4.	6.5 v ac		6.5 v ac	
Terminals of resistor #5.	0.5 v ac		1.1 v ac	
Terminals of resistor #6.	0.7 v ac		1.3 v ac	
Terminals of resistor #7.	3.8 v ac		3.9 v ac	
Terminals of resistor #8.	3.8 v ac		4.0 v ac	
Terminals of resistor R 37.	15.1 v dc		12.1 v dc	
Terminals of resistor R 36.	75.0 v dc		75.0 v dc	
Terminals of capacitor C 3.	415 v ac		382 v ac	
Terminals C and 90 of transformer T 56.	95 v ac		91 v ac	
Terminals C and 115 of transformer T 56.	115 v ac		111 v ac	
Terminals C and 230 of transformer T 56.	220 v ac		210 v ac	
Terminals S and CT of transformer T 56.	210 v ac		190 v ac	
Terminals F and CT of transformer T 56.	210 v ac		190 v ac	

# SECTION V

## Supplementary Data

### 24. TABLE OF REPLACEABLE PARTS.

**NOTE:** Order parts by Signal Corps stock number, name, and description.

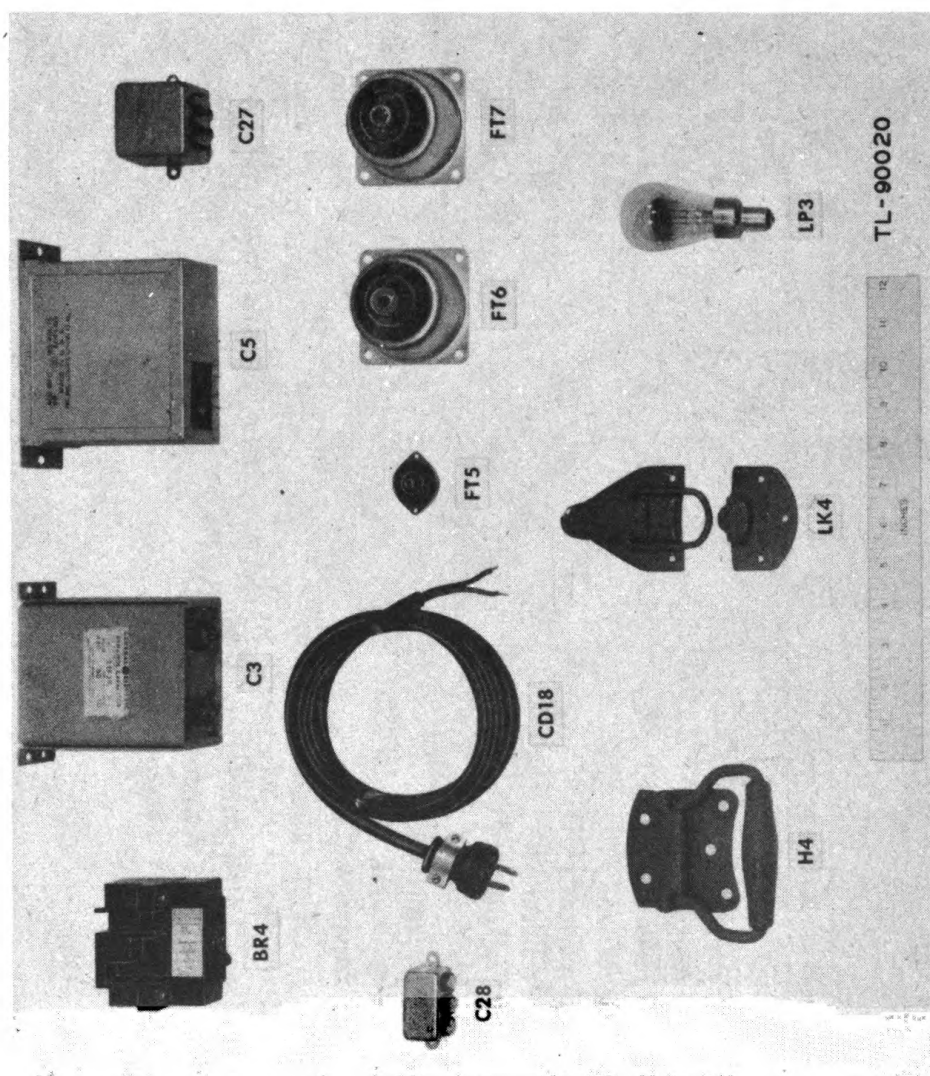
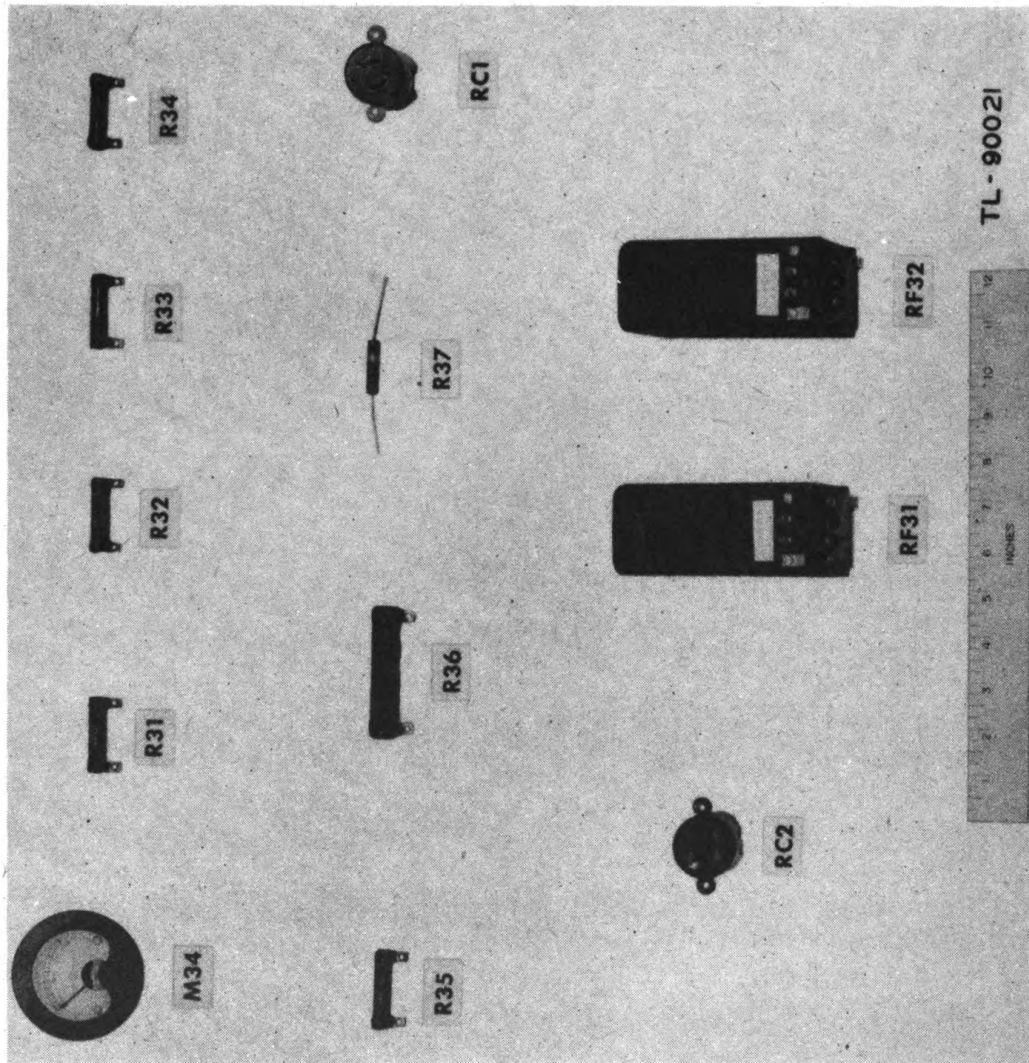


Figure 16. Maintenance parts.

Supplementary Data

TM 11-954  
Par. 24

Ref. No.	Quan. in equip.	Signal Corps. stock no.	Name of part and description	Function	Mfr.
BR 4	1	—	CIRCUIT BREAKER: 12-amp, magnetic trip, curve 3, time delay, No. G111.	Circuit breaker.	HCB
C 3	1	3DB10-36	CAPACITOR: Pyranol oil-filled, 10 mf, 1,000 vdcw, No. 23F17.	Power factor correction.	GED
C 5	3	3DB800	CAPACITOR: electrolytic, 800 mf, 150 vdcw, part C 5 special.	Output filter.	P
C 27	1	3DB1-6110-1	CAPACITOR: oil-filled, 1 mf-1 mf, 2-section, 600 vdcw, DYR-6110.	Bypass in control circuit.	CD
C 28	1	3DA100-91	CAPACITOR: oil-filled 100,000 mmf-100,000 mmf, 2-section, 600 vdcw, DYR-6011.	R-f filter.	CD
CD 18	1	1B816.4	CORD: #16 stranded, RC, 2-conductor, S. J.	A-c power cord.	PE
—	1	6Z7565.3	PLUG CAP: parallel-prong, No. 9940.	Attached to cord CD-18.	PE
FT 5	3	2Z8401PD3	MOUNTING: tube rack, rubber, small diamond shape, No. PD3.	Shock insulator.	LM
FT 6	2	2Z8502PH25	MOUNTING: cabinet, front, large cup type with 25-pound rating, No. 200PH25.	Shock insulator.	LM
FT 7	2	2Z8502PH35	MOUNTING: cabinet, rear, large cup type with 35-pound rating, No. 200PH35.	Shock insulator.	LM
H 4	1 set	Not Stocked	HANDLES: set of 2, No. 1214.	Carry handles for Case CS-82-B.	JHS
LK 4	1 set	—	LATCHES: set of 4, No. 616.	Drawbolts for Case CS-82-B.	SW
LP 3	2	2Z5878	LAMP: neon glow, without internal resistor and with bayonet base soldered to skirt, No. S-14, special.	Constant voltage device.	GEH

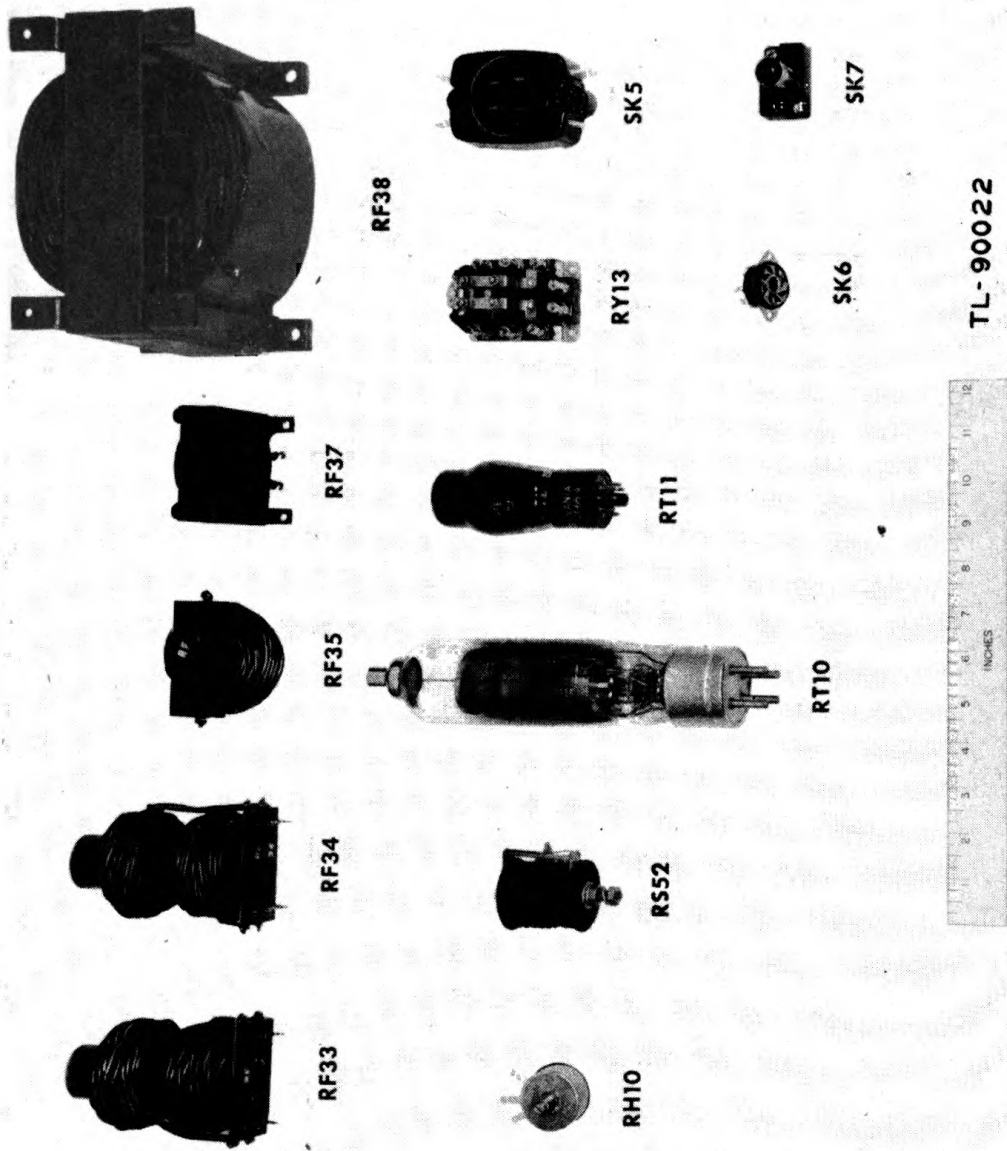


*Figure 17. Maintenance parts.*

Supplementary Data

Ref. No.	Quan. in equip.	Signal Corps stock no.	Name of part and description	Function	Mfr.
M 34	1	3F8150-41	VOLTMETER: 0-150 v, ac, $2\frac{1}{16}$ " round, bakelite case, flush mounting, No. AW41.	For measuring a-c and d-c voltage.	GED
R 31	1	3Z6610-102	RESISTOR: wire-wound, ceramic tube, A coating, 4-watt, 10,000-ohm, $\pm 5\%$ .	Control circuit.	IRC
R 32	1	3Z6100-107	RESISTOR: wire-wound, ceramic tube, A coating, 4-watt, 1,000-ohm, $\pm 5\%$ .	Control circuit.	IRC
R 33	1	3Z6500-148	RESISTOR: wire-wound, ceramic tube, A coating, 5-watt, 5,000-ohm, $\pm 5\%$ .	Control circuit.	IRC
R 34	3	3Z6615-57	RESISTOR: wire-wound, ceramic tube, A coating, 4-watt, 15,000-ohm, $\pm 5\%$ .	Control circuit.	IRC
R 35	2	3Z6350-14	RESISTOR: wire-wound, ceramic tube, A coating, 4-watt, 3,500-ohm, $\pm 5\%$ .	Control circuit.	IRC
R 36	1	3Z6150-55	RESISTOR: wire-wound, ceramic tube, A coating, 12-watt, 1,500-ohm, $\pm 5\%$ .	Relay circuit.	IRC
R 37	1	3Z6500-112	RESISTOR: wire-wound, ceramic tube, A coating, $\frac{1}{2}$ - or 1-watt, 5,000-ohm, $\pm 15\%$ , type BW $\frac{1}{2}$ or BW 1.	Control circuit.	IRC
RC 1	1	6Z7815	RECEPTACLE: flush, twist-tite, 10-amp, 250-v; 15-amp, 125-v, No. 9213.	D-c output connection.	HH
RC 2	1	6Z7789	RECEPTACLE: flush, round, 10-amp, 250-v; 15-amp, 125-v, No. 7331.	A-c output connection.	HH
RF 31	1	3Z1891-7	FILTER ASSEMBLY: RF filter, special, Dwg. No. AP-1297-13.	Filters a-c for teletype-writers.	PE
RF 32	1	3Z1891-7.1	FILTER ASSEMBLY: RF filter, special, Dwg. No. AP-1297-13.	Filters d-c for teletype-writers.	PE

*Rectifier RA-43-B*



TL-90022

*Figure 18. Maintenance parts.*

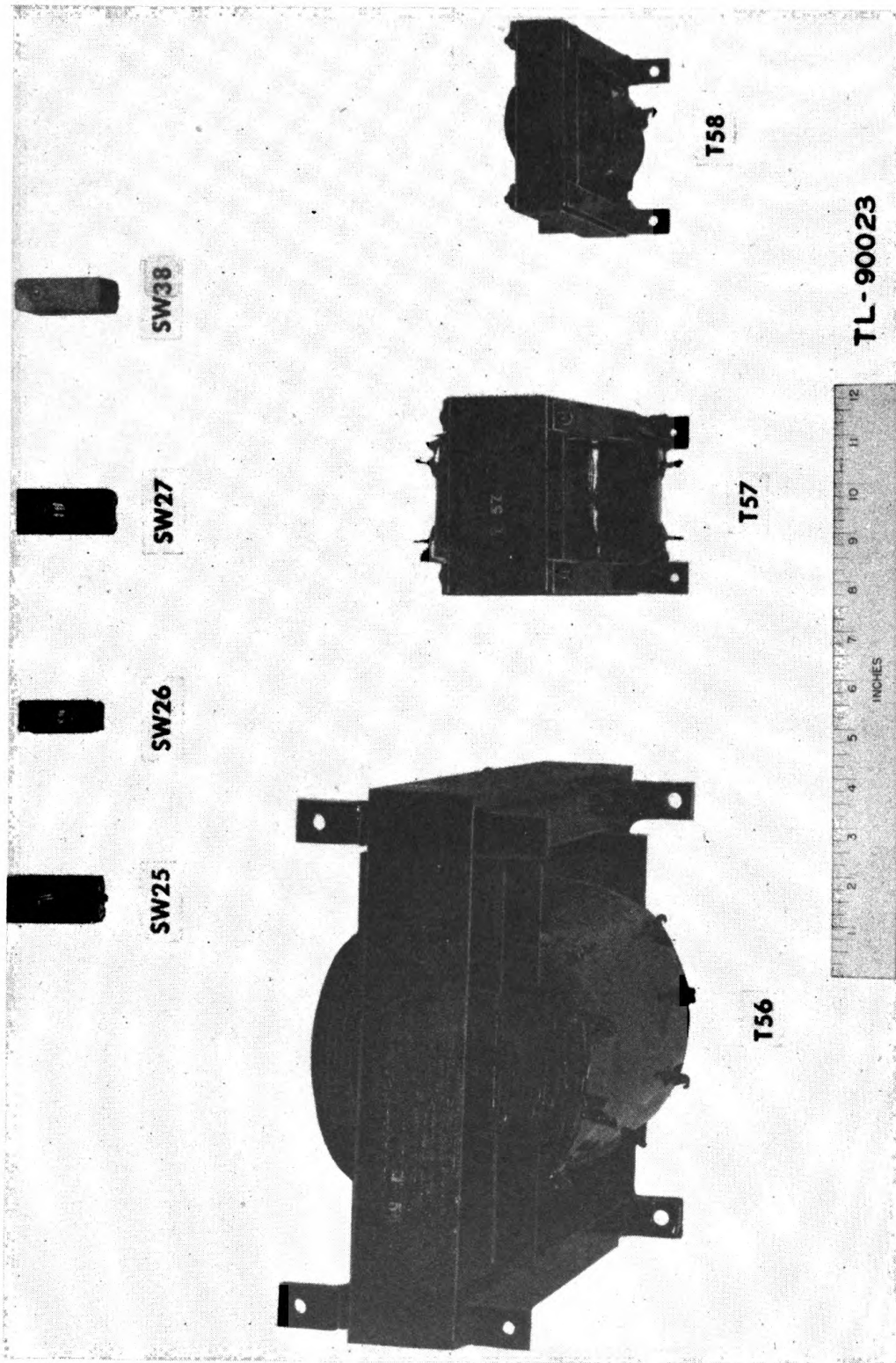


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Ref. No.	Quan. in equip.	Signal Corps stock no.	Name of part and description	Function	Mfr.
RF 33	1	3Z1891-7.2	COIL: choke, RF, 2 coils, 0.065 ohms, 130mh each, assembled with panel. Dwg. No. AP-1297-14.	RF choke for a-c input.	PE
RF 34	1	3Z1891-7.3	COIL: choke, RF, 2 coils, 0.145 ohms, 270mh each, assembled with panel. Dwg. No. AP-1297-14.	RF choke for plate current.	PE
RF 35	1	3Z1891-7.4	COIL: choke, RF, 0.053 ohms, 96mh, assembled with panel. Dwg. No. AP-1297-14.	RF choke for d-c output.	PE
RF 37	1	3C323-3D	COIL: choke, auxiliary, 0.25-h, 8.4-ohm, small iron core, No. RF 37, special.	Phase-shift reactor.	PE
RF 38	1	3C323-3B	COIL: choke, filter, 4.75-h, 2.08-ohm, large iron core, No. RF 38, special.	D-c output filter.	PE
RH 10	1	2Z7280-17	POTENTIOMETER: wire-wound, 10,000-ohm, 2-watt, no taper, with screwdriver slot, type w.	Output voltage control.	IRC
RS 52	1	3H4956-28	RECTIFIER: selenium stack, 36-v a-c input, 6-amp, d-c output, No. 6RS42A1V.	Bias supply and line voltage correction.	GEB
RT 10	3	2VELC6J	TUBE: vacuum, EL-C6J.	Rectifier tube.	EI
RT 11	2	2T66	TUBE: vacuum, 6F6G or 6F6.	Amplifier tube.	SEP
RY 13	1		RELAY-1XAA101, Dunco relay, 50-v, dc coil, 115-v, dc contacts .5-amp.	Delayed d-c current closing.	SDI
SK 5	3	2Z8674.7	SOCKET: tube, large, bakelite, 4-prong, No. 5556072G1.	For rectifier tube.	GEB
SK 6	2	2Z8657.1	SOCKET: tube, 8-prong, octal, midget, No. 88-8.	For amplifier tube.	AB
SK 7	2	2Z5885-1	SOCKET: lamp, double contact, bayonet base, No. 30.	For neon lamp.	FM

*Rectifier RA-43-B*



*Figure 19. Maintenance parts.*

Supplementary Data

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Ref. No.	Quan. in. equip.	Signal Corps. stock no.	Name of part and description	Function	Mfr.
SW 25	1	3Z9858-8.6	SWITCH: toggle, DPST, 15-amp, 125-volt; 10-amp, 250-volt, No. 80602C.	ON-OFF power switch.	AHH
SW 26	1	3Z9858-8.13	SWITCH: toggle, DPDT, non-lock in ON position, 3-amp, 125-volt; 1-amp, 250-volt, No. 81057D.	A-c, d-c meter readings.	AHH
SW 27	1	3Z9858-8.14	SWITCH: toggle, SPDT, 15-amp, 125-volt; 10-amp, 250-volt, No. 80609C.	Emergency low-line switch.	AHH
SW 38	1	3Z9558-11	SWITCH: micro, SPST, normally open, No. YZ-R8.	Time-delay contact.	MS
T 56	1	2Z9607-3	TRANSFORMER: primary 90-, 110-, and 230-volts; secondary 200-200 volts, 1,000 watts, 50-65 cycles, No. T 56, special.	Main power transformer.	PE
T 57	1	2Z9611.60	TRANSFORMER: primary 110 volts, secondaries 5.7 volts at 1 amp, 15.25 volts at .25 amp, 7.6 volts at .25 amp, and 2.5 volts at 36 amps, 100 watts, 50-65 cycles, No. T 57, special.	Filament and auxiliary transformer.	PE
T 58	1	2Z9614-9	TRANSFORMER: primary 110 volts, secondary 0.6 volts at 15 amps, intermittent duty, No. T 58, special.	For heater, time-delay bimetal strip.	PE

Rectifier RA-43-B

Ref. No.	Quan. in equip.	Signal Corps stock no.	Name of part and description	Function	Mfr.
CA 110	1	Not Stocked	RELAY BOX & COVER ASSEMBLY: overall diam $5\frac{3}{4}$ " wide x $5\frac{5}{16}$ " deep x $3\frac{3}{16}$ " high, CA-1297-39.	Enclosure for thermal switch assembly.	PE
CC 7	1	Not Stocked	TUBE CLAMP: consists of 3 steel clamps welded on $2\frac{7}{8}$ " centers to cross-arm $6\frac{1}{2}$ " x $\frac{3}{4}$ " x $\frac{1}{8}$ ", PT-1297-39.	To hold the rectifier tubes securely in place.	PE
CC 8	2	2Z2712	GRID CLIPS: spring-type clip for 9-16" glass-type vacuum tube caps, No. 12.	To connect plate leads to main rectifier tubes.	NAT
MP 45	1	Not Stocked	TRANSFORMER PLATE: overall diam $10\frac{1}{2}$ " x $6\frac{1}{4}$ " with $\frac{1}{2}$ " clip on one end made of $\frac{1}{4}$ " gauge steel, MP-1297-40.	Mounting base for relay box and choke coils.	PE
MP 27	1	Not Stocked	RELAY BASE: black satin bakelite $2\frac{3}{8}$ " x $4$ " x $\frac{3}{16}$ ", two mounting holes, MP-1297-27.	Mounting base for thermal switch assembly.	PE
PL 151	1	Not Stocked	CAPACITOR PANEL: black satin bakelite $1\frac{3}{16}$ " x $6\frac{1}{2}$ " x $\frac{3}{16}$ ", two mounting holes, PL-1297-7.	Terminal panel for capacitors and line-voltage tap.	PE
PL 152	1	Not Stocked	RELAY PANEL: black satin bakelite $\frac{5}{8}$ " x $4\frac{1}{8}$ " x $\frac{3}{16}$ ", two mounting holes, PL-1297-7.	Terminal panel for relay leads.	PE
PL 153	1	Not Stocked	RESISTOR PANEL: black satin bakelite $1\frac{3}{4}$ " x $4\frac{1}{8}$ " x $\frac{3}{16}$ ", two mounting holes, PL-1297-7.	Mounting plate for resistors.	PE
PL 158	1	Not Stocked	AUXILIARY PANEL: black satin bakelite $1\frac{9}{16}$ " x $5\frac{5}{16}$ " x $\frac{3}{16}$ ", two mounting holes, PL-1297-7.	Terminal panel for sub-base wiring.	PE

Supplementary Data

25. GENERAL HARDWARE.

Ref. No.	Quan. in equip.	Signal Corps stock no.	Name of part and description	Function	Mfr.
	26	6L3606-32	NUT: iron, hex; for #6-32 bolt.	Socket panel and time-delay unit mounting.	
	11	6L3608-32	NUT: iron, hex; for #8-32 bolt.	Mounts auxiliary panel resistors and cabinet mounting.	
	17	6L3110-24	NUT: steel, hex; for #10-24 volt.	Mounts R 36, RF 37, RF 33, tube clamps, and terminal strip.	
	2	6L6632-42	SCREW: machine, #6-32 x 1/2", flat head.	Mounts circuit breaker.	
	18	6L6632-5.87	SCREW: machine, #6-32 x 5/16", round head.	Tube panel RF 31, RF 32, and relay mounting.	
	7	6L6632-16.87	SCREW: machine, #6-32 x 1", round head.	Mounts lamp socket and micro switch.	
	4	6L6832.4.3S	SCREW: machine, #8-32 x 1/4", fillister head, steel, parkerized.	Mounts RF 37.	
	8		SCREW: machine, #8-32 x 2 1/4", round head, steel, parkerized.	Mounts tubular resistances.	
	10	6L7032-4.4	SCREW: machine, #10-32 x 1/4", fillister head, steel, parkerized.	Mounts capacitors.	
	9	6L52011	WASHER: phenolic fiber, 0.187" ID, 0.375" OD, 0.06" thick.	Mounts tubular resistances.	
	30	6L72206	WASHER: lock, steel, internal teeth, cadmium plated; for #6 machine screw.	General assembly.	
	11	6L72208	WASHER: lock, steel, internal teeth, cadmium plated; for #8 machine screw.	Mounts tubular resistances and auxiliary panel.	
	22	6L72210	WASHER: lock, steel, internal teeth, cadmium plated; for #10 machine screw.	General assembly.	

**26. LIST OF MANUFACTURERS.**

Mfr. Code	Name	Address
AP	American Phenolic Corporation.....	Chicago, Ill.
AHH	Arrow-Hart & Hegeman Electric Company...	Hartford Conn.
CD	Cornell-Dubilier Electric Company.....	So. Plainfield, N. J.
EI	Electrons, Inc.....	Newark, N. J.
GEB	General Electric Company.....	Bridgeport, Conn.
GED	General Electric Company.....	Detroit, Mich.
GEH	General Electric Company.....	Hoboken, N. J.
HCB	Heinemann Circuit Breaker Company.....	Trenton, N. J.
HH	Harvey Hubbell, Inc.....	Bridgeport, Conn.
IRC	International Resistance Company.....	Philadelphia, Pa.
LM	Lord Manufacturing Company.....	Erie, Pa.
MS	Micro Switch Corporation.....	Freeport, Ill.
FM	Frank W. Morse Company.....	Boston, Mass.
NAT	The National Company.....	Malden, Mass.
PE	Power Equipment Company.....	Detroit, Mich.
JHS	J. H. Sessions & Son.....	Bristol, Conn.
SW	Stanley Works.....	Chicago, Ill.
SDI	Struthers Dunn, Inc.....	Philadelphia, Pa.
SEP	Sylvania Electric Products.....	Emporium, Pa.

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