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1944

TM 11-2529

WAR DEPARTMENT TECHNICAL MANUAL

U.S. Dept. of Army

RECTIFIER PP-125/VT

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AR DEPARTMENT *9 DECEMBER 1944*

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RECTIFIER
PP-125/VT



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WAR DEPARTMENT,
WASHINGTON 25, D. C., 9 December 1944.

TM 11-2529, Rectifier PP-125/VT, is published for the information and guidance of all concerned.

[A. G. 300.7 (31 July 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

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

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

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DESTRUCTION NOTICE

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

WHEN—When ordered by your commander.

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

2. **Cut**—Use axes, handaxes, machetes.

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

4. **Explosives**—Use firearms, grenades, TNT.

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

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—1. **Smash**—Rectifier stack, control switch, transformer, case, a-c supply, choke, capacitor, resistor, terminal panel, pilot lamp.

2. **Cut**—All internal wiring, all rubber-covered cables.

3. **Burn**—Technical manual, circuit label, wiring diagram label.

4. **Bury or scatter**—Any or all of above pieces after smashing.

DESTROY EVERYTHING

SAFETY NOTICE

Always turn control switch to OFF position when unit is not in use.

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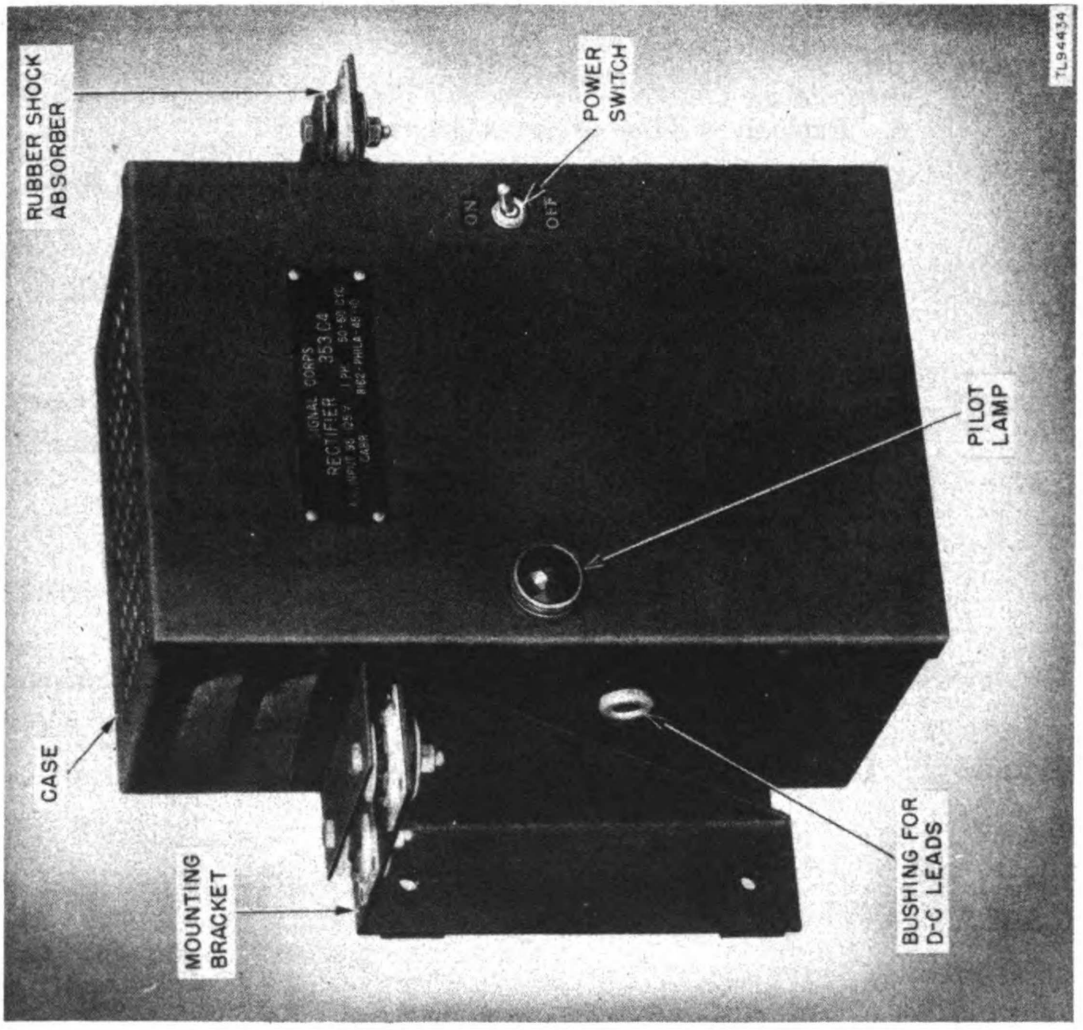


Figure 1. Rectifier PP-125/VT, front view.

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SECTION I

DESCRIPTION

1. GENERAL.

Rectifier PP-125/VT is a full-wave, selenium-disk rectifier capable of converting 95- to 125-volt, single-phase, 60-cycle a-c power into direct current for energizing coils of telephone relays and for pilot lamp circuits, located in mobile fire control trailers. The complete unit (fig. 1) is inclosed in a steel case and equipped with two shock absorbing mounting brackets arranged for wall installation. The weight of the rectifier is 28 pounds, and the over-all dimensions are 12 inches high, 12¼ inches wide (over the mounting brackets), and 6½ inches deep. Two copies of TM 11-2529 should be packed with Rectifier PP-125/VT at all times.

2. POWER.

a. Input. The input circuit of Rectifier PP-125/VT is designed so that it can be connected to a 95- to 125-volt, single-phase, 60-cycle a-c power source.

b. Output. Rectifier PP-125/VT will provide a d-c output of 1½ amperes to no-load with voltage range of approximately 25 to 36. It has a continuous duty d-c output of 1½ amperes at an ambient temperature of 50° C, with voltage range of 25 to 36. A-c power is applied or removed by operating the power switch on the rectifier front panel. Positions of switch are indicated as OFF and ON.

3. COMPONENT PARTS.

a. General. Rectifier PP-125/VT consists of a subassembly including one selenium rectifier stack, one pilot lamp, one resistor, one capacitor, one power switch, one choke, one transformer, and one terminal board, all mounted in an inclosing steel casing as shown in figure 2. On the terminal panel are mounted the a-c and d-c fuses, d-c output terminals, rectifier taps and tap link, and line voltage adjustment taps

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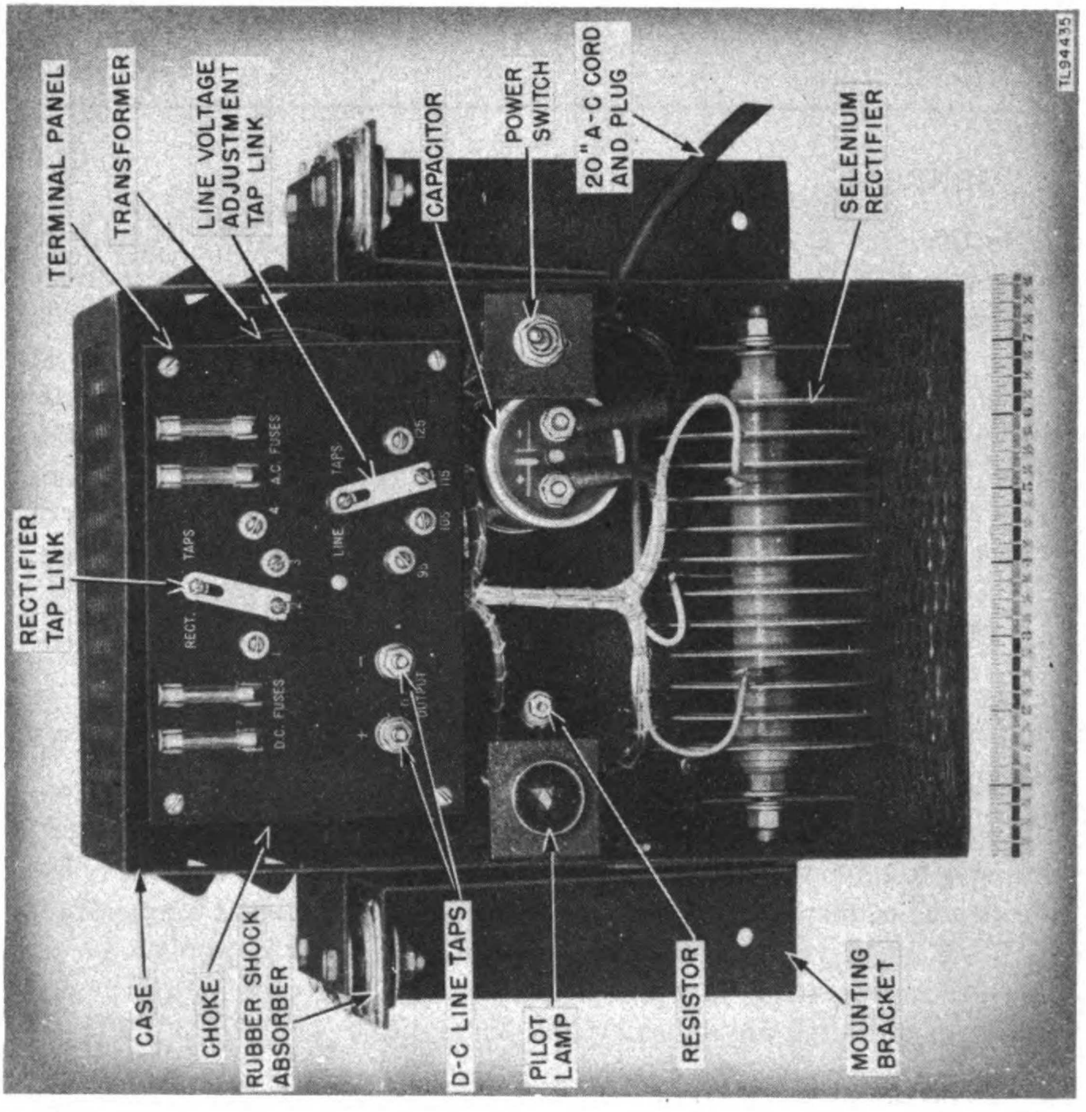


Figure 2. Rectifier PP-125/VT, internal view, with cover removed.

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and adjustment tap link. The double-pole, single-throw power switch and the pilot lamp are mounted behind the front cover with the power switch handle and pilot lamp cover-glass extending through the front cover. The front cover is removable for access to the interior of the unit. A circuit label is mounted on the inside of the front cover.

b. Cording. Rectifier PP-125/VT is provided with a 20-inch a-c input power cord and plug.

SECTION II

INSTALLATION AND OPERATION

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4. GENERAL.

When removing Rectifier PP-125/VT from its packing case, take care to prevent damage to the power switch handle. Place the rectifier in a clean, dry place whenever possible.

5. MOUNTING THE UNIT.

Rectifier PP-125/VT is designed for wall or rack mounting by the mounting brackets located on each side. Secure the mounting brackets to wall or rack with bolts through the four bolt holes provided.

CAUTION: BE SURE THAT RECTIFIER IS MOUNTED AT A SUFFICIENT HEIGHT ABOVE THE FLOOR TO PROVIDE FOR PROPER VENTILATION.

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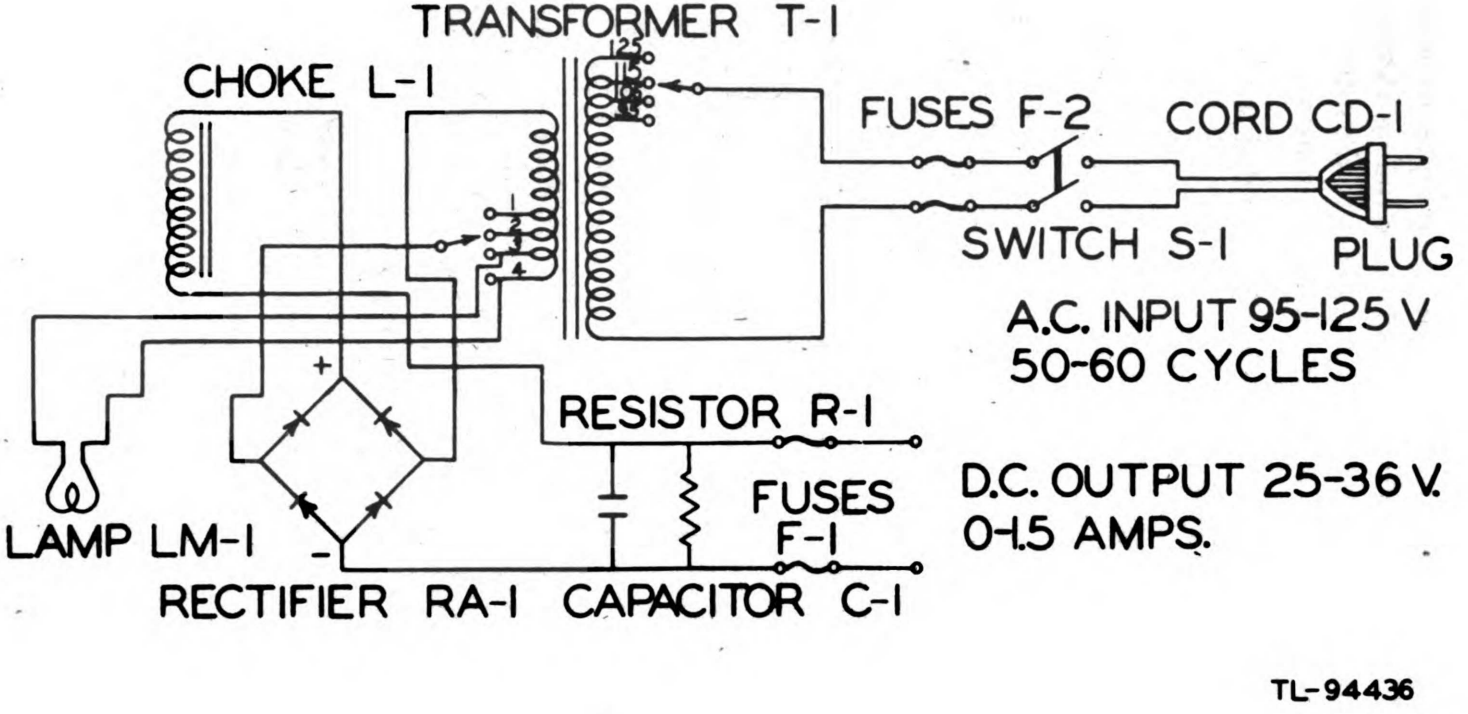


Figure 3. Schematic diagram.

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6. CONNECTIONS FOR A-C SUPPLY.

A terminal panel (fig. 5) mounted over the transformer and choke has mounted thereon the necessary taps for arranging the a-c power input circuit for 95-, 105-, 115-, or 125-volt power. First, verify the input voltage of the power supply. Fasten the line voltage adjustment tap link securely under the correct machine screw (marked 95, 105, 115, or 125) on the terminal panel. The plug on the end of the a-c cord may then be plugged into the a-c power receptacle.

7. CONNECTIONS FOR D-C POWER OUTPUT.

a. The terminal panel (fig. 5) mounted over the transformer and choke also has mounted thereon the D. C. OUTPUT terminals, marked + (positive) and — (negative). Connect wires for d-c supply to these terminals, then extend them through the opening in side panel (fig. 1), and connect them to the proper loads.

b. The taps on the terminal panel (RECT. TAPS) will provide adjustment of output voltage in steps of approximately 3½ volts each with voltage increasing as the tap is moved toward number 4. These taps are provided to offset aging of the rectifier stack proper. Adjustment should be made only when increased age of the rectifier stack requires an adjustment to provide an output voltage of 25-volt direct current at 1½ amperes continuous duty.

> **CAUTION:** ALWAYS BE SURE THAT POWER SWITCH IS SET ON THE OFF POSITION BEFORE CONNECTING OR DISCONNECTING THE D-C OUTPUT TERMINALS AND BEFORE ADJUSTING THE RECTIFIER TAP LINK.

8. PROCEDURE BEFORE OPERATING.

a. Move the power switch to OFF position.

b. Make sure that the fuses are set firmly in their holders and that they are not defective.

c. Be sure that the d-c terminals on the terminal panel are connected to the proper d-c connections on the unit to be supplied with d-c power.

d. Be sure that all connections are tight.

NOTE: Poor connections cause arcing and sparking.

9. NORMAL OPERATING PROCEDURE.

To place Rectifier PP-125/VT in operation, move the power switch to the ON position.

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SECTION III

FUNCTIONING OF PARTS

10. PRINCIPLE OF OPERATION OF RECTIFIER STACKS.

Rectifier PP-125/VT has one selenium rectifier stack in the rectifying circuit consisting of 12 selenium disks mounted on an insulated stud. These disks have the property of passing current in one direction and blocking it in the other. The stack is connected into the circuit in such a way that half of the disks pass current to the battery circuit when the a-c current from the transformer secondary is flowing in one direction, and the other half of the disks pass current when the a-c current is flowing in the opposite direction. In this manner, full-wave rectified direct current is passed continually to the d-c output circuit when the rectifier is operating. Figure 3 is a schematic diagram of the circuit in Rectifier PP-125/VT.

11. FUNCTIONING OF PARTS.

a. Transformer. The function of the transformer is to provide the voltage and power required for the rectifier stack to produce direct current for the d-c output circuit.

(1) PRIMARY CIRCUIT. The primary circuit of the transformer consists of a winding that may be connected for operation from a 95-, 105-, 115-, or 125- volt a-c supply line, as explained in paragraph 6.

(2) SECONDARY CIRCUIT. The secondary circuit of the transformer is a single winding with four taps (aging taps identified as RECT. TAPS) for control of the voltage delivered to the selenium rectifier stack.

b. Rectifier Stack (fig. 4). The stack has four terminals. The wire marked WH (fig. 5) is connected to rectifier terminal through the choke and to the capacitor and resistor to form the positive d-c lead. The wire marked BLK is connected to the rectifier terminal and to the capacitor

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and resistor to form the negative d-c lead. The wire marked OR is connected directly to the transformer secondary, and the wire marked YEL is connected to the transformer secondary through the RECT. TAPS link to provide a-c power to the rectifier stack.

c. Choke. The choke is a swinging-type choke. This type of choke reduces the amount of variation in output voltage when the load varies. The choke acts as a high impedance to the flow of pulsating current and as a low resistance to the flow of direct current.

d. Capacitor. The capacitor provides a low-impedance path across the output for any pulsating current that is passed by the choke. It keeps the current supplied to any fixed load at a nearly constant value.

e. Resistor. The resistor provides a constant load for the rectifier, and thus prevents the output voltage from rising too much when output load is small.

f. Power Switch. The power switch is a double-pole, single-throw switch used to provide or remove the a-c power from the input circuit of the rectifier unit. Switch positions are indicated as ON and OFF.

g. Pilot Lamp. The pilot lamp is connected to the transformer secondary to indicate a-c power provided to the rectifier unit

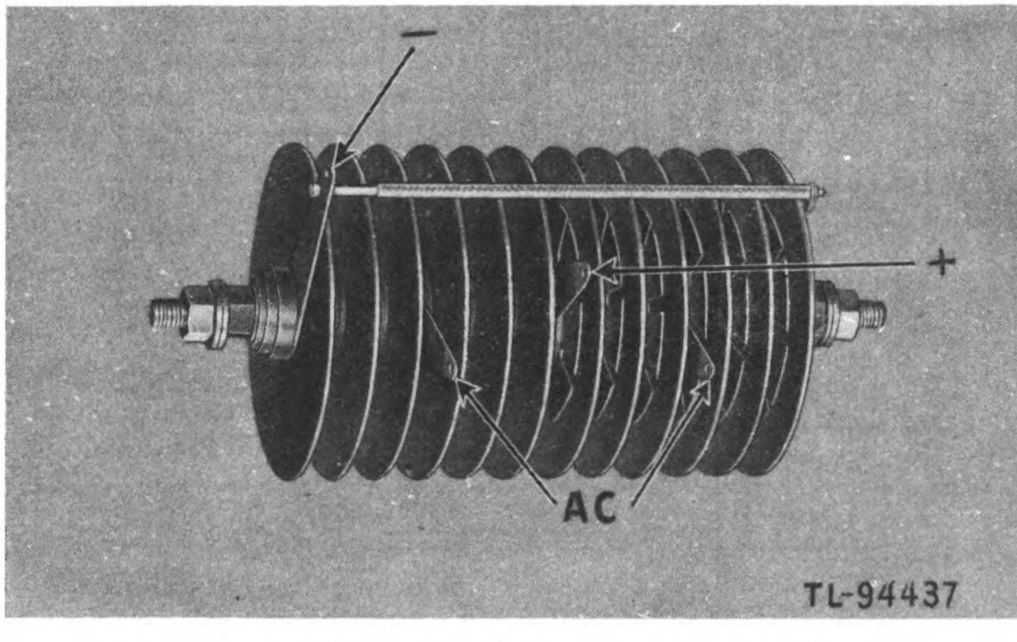


Figure 4. Rectifier stack, showing terminals.

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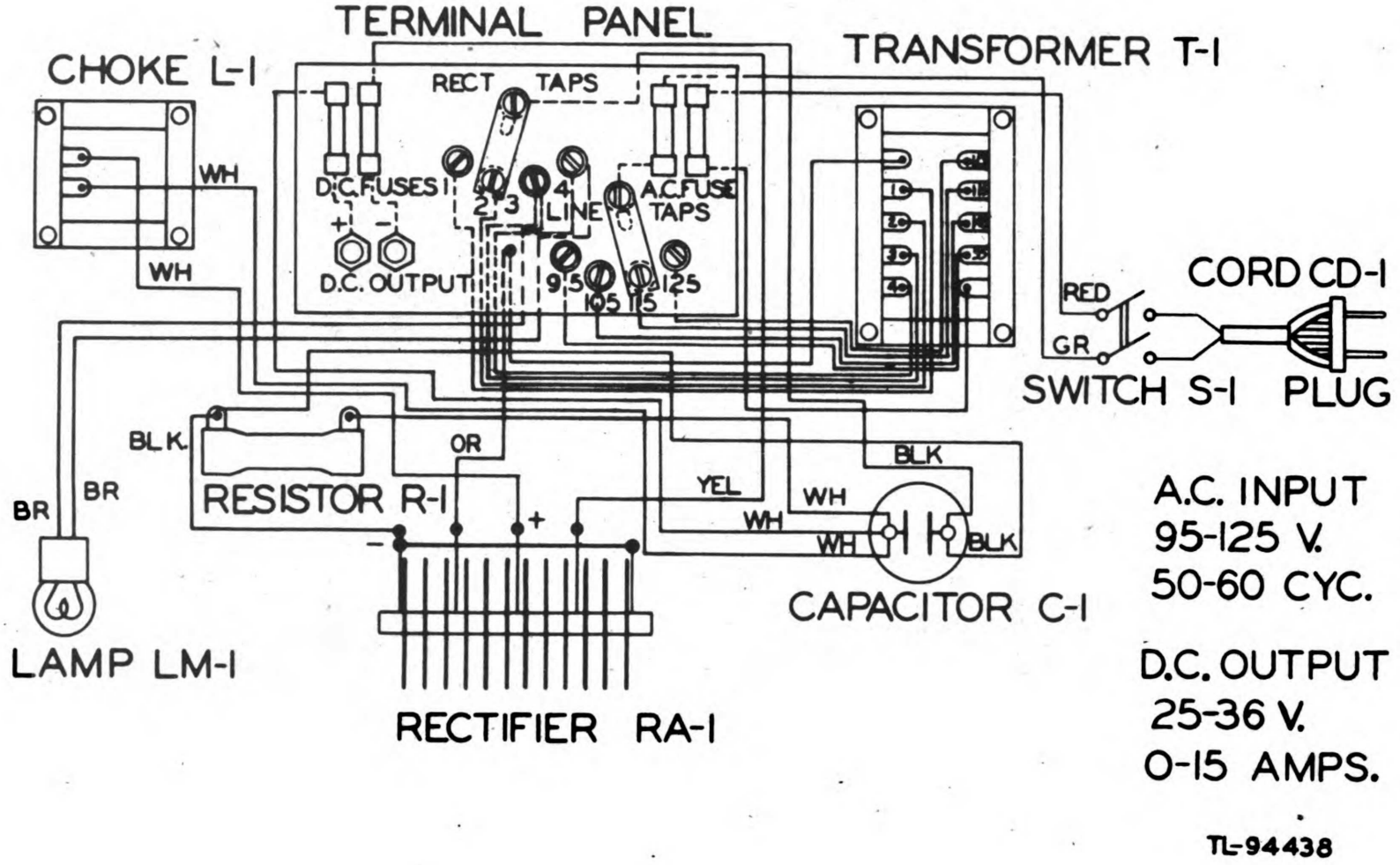


Figure 5. Practical wiring diagram.

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SECTION IV

MAINTENANCE

NOTE: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report). If Form No. 468 is not available, see TM 38-250. Failure or unsatisfactory performance of equipment used by Army Air Forces will be reported on Army Air Forces Form No. 54 (unsatisfactory report).

12. ROUTINE MAINTENANCE.

When properly installed according to instructions in paragraphs 4 through 9, Rectifier PP-125/VT will require little attention as long as it operates properly. Keep the unit dry and free from dirt and dust. Remove the accumulated dust about once every month with compressed air, a bellows, or a long-bristled brush. Be sure to remove all dust and dirt from between the rectifying disks. Check all screws, nuts, and bolts regularly. Tighten them if necessary.

NOTE: Rectifier PP-125/VT must be properly ventilated to prevent overheating. The ventilating grilles should not be allowed to clog under any circumstances.

13. OPERATING TROUBLES AND REMEDIES.

a. No D-c Output.

(1) Check the a-c power source. Be sure the plug is properly connected and that the plug is not defective.

(2) Check connecting d-c wiring for worn or broken places.

(3) Check the internal wiring in the rectifier. Make sure that the leads are tightly connected.

(4) Check the choke between either terminal and ground for grounded condition and between terminals for open circuit.

NOTE: Capacities of choke, capacitor, and resistor are provided in section V, Supplementary Data.

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b. Fuses.

(1) Check both a-c and d-c fuses. Turn power switch to OFF before removing fuses. Both a-c and d-c fuses are located on the terminal panel. A blown fuse generally indicates trouble in the equipment connected to the d-c output terminals. Be sure to check or disconnect this equipment before replacing a blown fuse.

(2) Check for defective rectifier stack. The temperature of the disks will be much higher than normal if the stack is defective. The counter-electrode coating may be pitted, blistered, or melted away from the disk. The varnish coating may be discolored or burnt. Remove and replace the stack immediately.

CAUTION: TAKE PARTICULAR CARE IN SOLDERING THE LEADS TO THE RECTIFIER STACK TERMINALS. A DROP OF SOLDER FALLING BETWEEN THE RADIATING DISKS MAY SHORT OUT A PART OF THE RECTIFIER, CAUSING IT TO OVERHEAT AND FAIL.

14. TESTING THE TRANSFORMER.

To check the transformer for open-circuited conditions, set the LINE TAPS voltage adjustment link (fig. 2) to proper a-c supply voltage. Remove the RECT. TAPS link (fig. 2). Connect an a-c test voltmeter across the secondary terminals of the transformer. Access to these leads can be obtained at the RECT. TAPS positions 1, 2, 3, and 4 (fig. 2). Voltage readings, with no-load on the rectifier, should then be approximately as follows:

A-c power supply	*Secondary tap No.*			
	1	2	3	4
95) 105) 115) 125)	42	46	51	55

NOTE: The no-load current of the transformer is approximately 70 milliamperes.

15. LUBRICATION.

Rectifier PP-125/VT has no moving parts that require lubrication.

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16. MOISTUREPROOFING AND FUNGIPROOFING.

a. General. The operation of Signal Corps equipment in tropical areas where temperature and relative humidity are extremely high requires special attention. The following items represent problems which may be encountered in operation:

(1) Resistors, capacitors, chokes, and transformer windings fail.

(2) Electrolytic action takes place in resistors, coils, chokes, and transformer windings causing eventual break-down.

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

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

b. Treatment. A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied with a spray gun or brush. Refer to TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment, for a detailed description of the varnish-spray method of moistureproofing and fungiproofing and the supplies and equipment required in the treatment.

> **CAUTION:** VARNISH SPRAY MAY HAVE TOXIC EFFECTS IF INHALED. TO AVOID INHALING SPRAY, USE RESPIRATOR IF AVAILABLE; OTHERWISE, FASTEN CHEESECLOTH OR OTHER CLOTH MATERIAL OVER NOSE AND MOUTH.

c. Step-by-step Instructions for Treating Rectifier PP-125/VT.

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

(2) DISASSEMBLY.

(*a*) Remove the front cover by removing the four Phillips head screws holding the cover to the case.

(*b*) Remove all fuses from the fuse clips on the terminal board.

(*c*) Remove the four screws that hold the terminal board in place and allow the terminal board to hang forward, exposing the transformer and choke mounted behind it.

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(*d*) Replace all screws in their respective holes after disassembly.

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

(3) MASKING.

(*a*) Mask the ON-OFF toggle switch.

(*b*) Mask the lamp glass jewel.

(*c*) Mask the D. C. OUTPUT terminals on the terminal board.

(*d*) Mask all the fuse clips on the terminal board.

(*e*) Mask the RECT. TAPS and LINE TAPS contacts on the terminal board.

(*f*) Mask the rubber breather cap at the top of the electrolytic capacitor.

(4) DRYING. Place the equipment in a drying oven and bake for 4 to 6 hours at a temperature of 140° F.

CAUTION: DO NOT EXCEED 140° F. IF THE IMPREGNATES IN ANY OF THE COMPOUNDS SHOULD BEGIN TO MELT, DECREASE THE TEMPERATURE AND INCREASE THE DRYING TIME ONE HOUR FOR EACH 10° F DECREASE IN TEMPERATURE.

(5) VARNISHING.

(*a*) Apply three coats of varnish (Lacquer, Fungus-resistant, Spec No. 71-2202 (Stock No. 6G1005.3) or equal) with spray gun and brush.

(*b*) Spray varnish on all parts within the case, making sure that all wiring is completely covered with varnish.

(6) REASSEMBLY.

(*a*) Remove all masking tape.

(*b*) Reassemble the set and test its operation.

(7) MARKING. Mark the set with "MFP" and the date of treatment.

EXAMPLE: MFP—3 April 1944.

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SECTION V

SUPPLEMENTARY DATA

17. MAINTENANCE PARTS LIST FOR RECTIFIER PP-125/VT.

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Mfrs part and code No.	†Station stock	†Region stock
	2Z1320-6	BUFFER, rubber: ½″ diam x ⅜″ thk.	2	1274(W38)		
	3G1770-44.1	BUSHING, fiber: 7/16″ lg x ⅜″ thk.	1	PEML-2(A66)		
CD-1	3E4495-4	CABLE ASSEMBLY, power: 2-cond with molder plug; 25″ lg.	1	18/2-SJ(C61)		
C-1	3DB250-4	CAPACITOR, fixed: electrolytic; 250 mf; 50 vdcw; with mtg rings.	1	1B216(18)	*	*
	3Z1011	CLIP, fuse: for type 3AG fuse.	8	1011(L3)		
L-1	3C323-90B	COIL, AF: filter choke 0.39 hy at 1.5 amp AC; 1.5 amp maximum DC; 1.385 ohm resistance; layer wound.	1	121CTC(B27)		*
F-1	3Z1927	FUSE, cartridge: 2 amp at 250 v.	2	1042(L3)	*	*
F-2	3Z1926	FUSE, cartridge: 1 amp at 250 v; type 3AG.	2	1040(L3)	*	*

†Parts not stocked in station or region stock are carried in depot stock.
*Indicates stock available.

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17. MAINTENANCE PARTS LIST FOR RECTIFIER PP-125/VT (cont).

Ref symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Mfrs part and code No.	†Station stock	†Region stock
LM-1	2Z5883-190	LAMP ASSEMBLY, incandescent: jewel; 1″ diam hole.	1	804(G17)		
	2Z5878-7	LAMP, incandescent: 6-8 v, 1.5 w; bayonet base.	1	51 Mazda (W4)	*	*
	6Z2379	NUT, lock: 3/8″ diam.	1	(A66)		
	2Z8403-26	MOUNTING, siltenbloc: 1¾″ sq; rubber encased bushing, 1½″ diam.	4	F-150-S-12(G38)		
	3H3995	PANEL, bakelite: black; 6½″ lg x 4⅜″ wd x 3/16″ thk.	1	BL-621A-5-A(B27)		
RA-1	3H4838-14	RECTIFIER, metallic: selenium; twelve plate; 3.307″ diam.	1	2FOB3S1(B27)		
R-1	3Z6050-17	RESISTOR: WW; 500 ohms; 10 w.	1	Br. Dev. (02)	*	*
	6L4302-.31E	RIVET, OH: ⅛″ diam x 5/16″ lg; tubular.	8	13581(T33)		
S-1	3Z9849.179	SWITCH, toggle: DPST; 15 amp, 125 v.	1	8822K5(C18)		*
T-1	2Z9615.21	TRANSFORMER, power: pri 95-125 v, 50-60 cps, 0.7 amp; secd 4 taps, 38 to 50 v, @ 1.6 amp.	1	209CT(B27)		*

†Parts not stocked in station or region stock are carried in depot stock.
*Indicates stock available.

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