

TM 11-5126

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

POWER SUPPLY PP-1104A/G



DEPARTMENT OF THE ARMY • APRIL 1957

WARNING

DANGEROUS VOLTAGES EXIST IN THIS POWER SUPPLY

Always move the circuit breaker lever (fig. 1) to the OFF position before disconnecting the load, changing the link arrangement, or performing maintenance on the interior of the power supply.

POISONOUS FUMES RESULT WHEN SELENIUM RECTIFIERS FAIL

When a strong, unpleasant odor is noted, move the circuit breaker lever to the OFF position and provide additional ventilation immediately. Avoid inhaling the fumes.

POWER SUPPLY PP-1104A/G

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CHAPTER I

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual contains instructions for the installation, operation, and maintenance of Power Supply PP-1104A/G. A description and the theory of the power supply are also included. Power Supply PP-1104A/G is referred to as the power supply in this manual.

b. Forward all comments on this publication to Commanding Officer, U. S. Army Signal Publications Agency, Fort Monmouth, N. J.

2. Forms and Records

a. *Unsatisfactory Equipment Reports.* Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., as prescribed in AR 700-38.

b. *Damaged or Improper Shipment.* Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army).

c. *Preventive Maintenance Forms* (figs. 5 and 6).

- (1) Prepare DA Form 11-238 (Operator First Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication, Direction Finding, Carrier, Radar)) in accordance with instructions on the back of the form.
- (2) Prepare DA Form 11-239 (Second and Third Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication, Direction Finding, Carrier, Radar)) in accordance with instructions on the back of the form.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

Power Supply PP-1104A/G (fig. 1) converts alternating current (ac) to direct current (dc). It is used in maintenance shops as a source of low-voltage dc for maintenance of communication equipment.

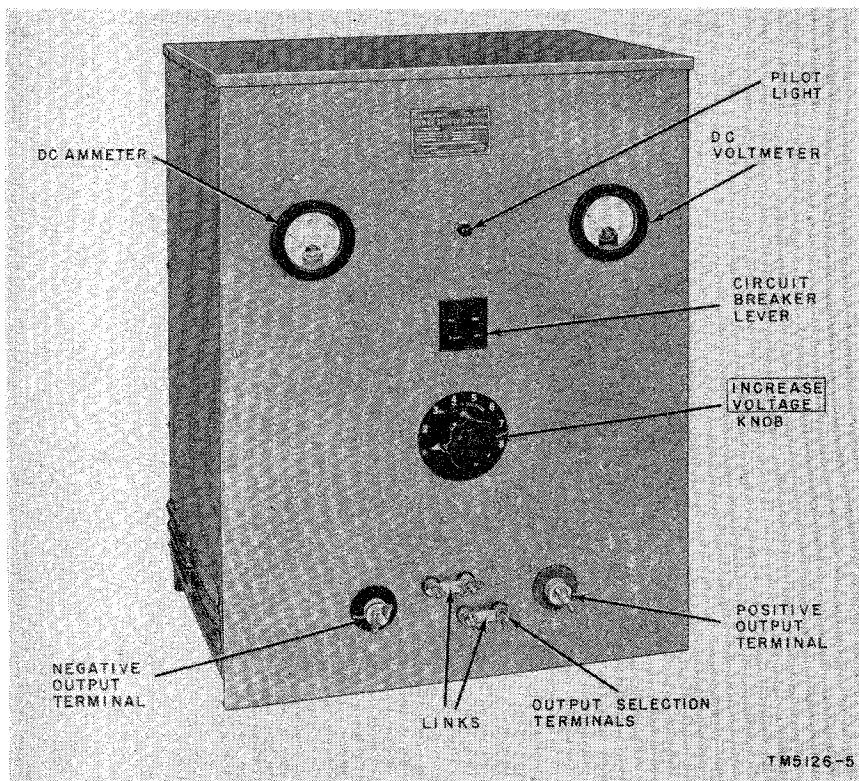


Figure 1. Power Supply PP-1104A/G, less spare lamps.

4. Technical Characteristics

Input:

Voltage 115 or 230 volts.
Frequency 60 cps.
Phase Single.
Current (full load) 28 amperes.

Output:

Voltage 11.5 to 17.5 volts dc (14-volt operation)
or 23 to 35 volts dc (28-volt operation).
Current 100 amperes at 14 volts, 50 amperes at
28 volts.
Ripple voltage9 percent.

5. Description

The power supply is housed in a metal cabinet 27.6 inches high, 22.3 inches wide, and 13.3 inches deep. All operating controls are mounted on the front panel (fig. 1). Louvers on each side and grilles in the back and bottom of the cabinet are provided for air circulation. A metal outlet box is mounted on the rear panel for connection of the input cable. The power supply weighs 210 pounds and includes three spare lamps and two technical manuals.

CHAPTER 2

INSTALLATION AND OPERATION

Section 1. SERVICE UPON RECEIPT OF EQUIPMENT

6. Siting

Select a location that is convenient to the power input source and for connection of the load to the power supply. Provide at least 8 inches of space behind and on each side of the power supply for air circulation. When practicable, transport the power supply to the installation site before unpacking (par. 7).

7. Unpacking (fig. 2)

a. Packaging Data. The power supply is packed for export shipment as shown in figure 2. The wooden packing case is 31 by 26 by 17 inches. The packed power supply weighs approximately 287 pounds and occupies 7.9 cubic feet of space.

- b. Removing Contents.* Unpack the power supply as follows:
- (1) Remove the nails from the top and one side of the wooden packing case with a nail puller. Remove the top and side.
 - (2) Tilt the case toward the open side and slide the case free from the power supply.
 - (3) Open the outer carton, moisture-vaporproof barrier, and the inner carton and remove the power supply.

Caution: Remove the power supply from the cartons carefully to prevent damage to the meters or operating controls on the front panel.

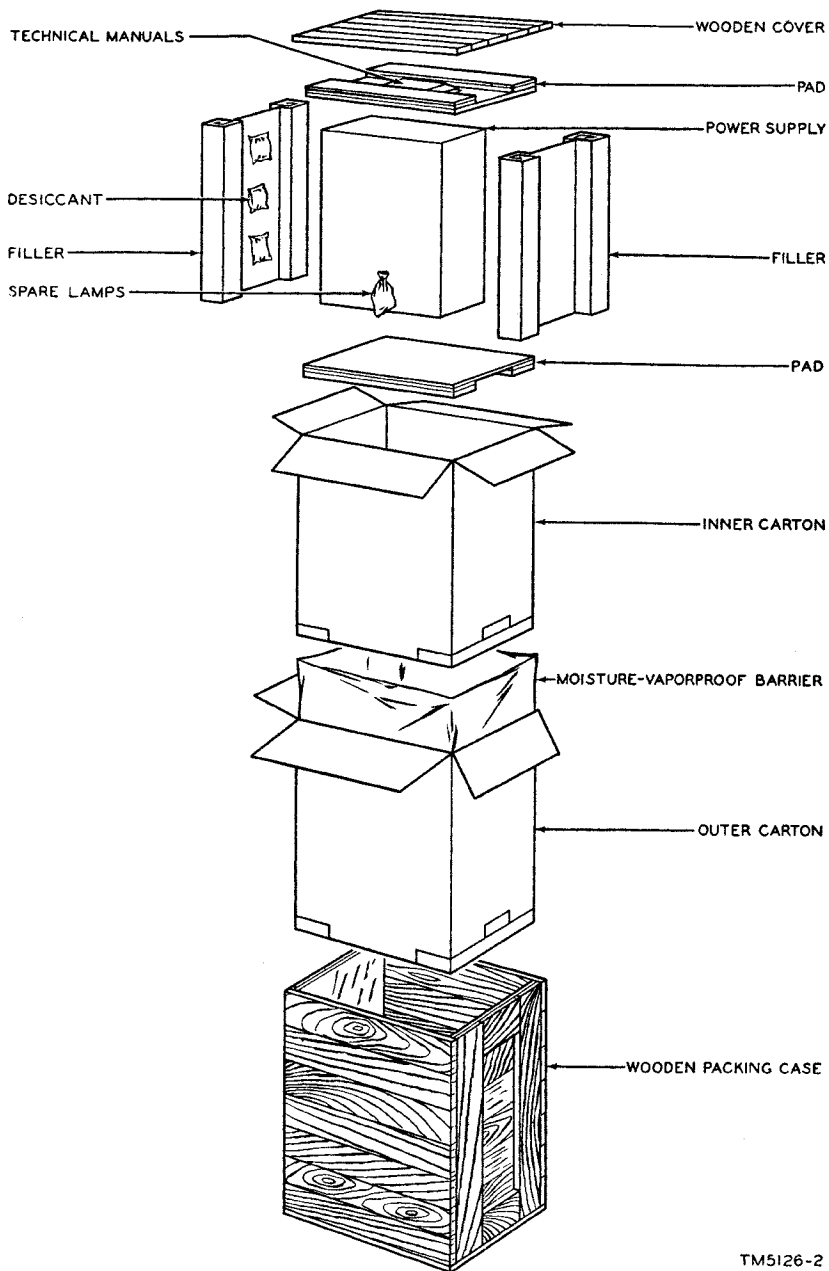
8. Checking

a. Inspect the exterior of the power supply. Examine the meters, switches, and terminals for damage.

b. Remove the top of the cabinet and inspect the interior for loose or damaged components.

c. See that the power supply is complete as listed on the packing slip.

d. If the power supply is damaged or incomplete, follow the instructions in paragraph 2.



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Figure 2. Packaging of Power Supply PP-1104A/G for export shipment.

Section II. INSTALLATION PROCEDURE

9. Preliminary Adjustment

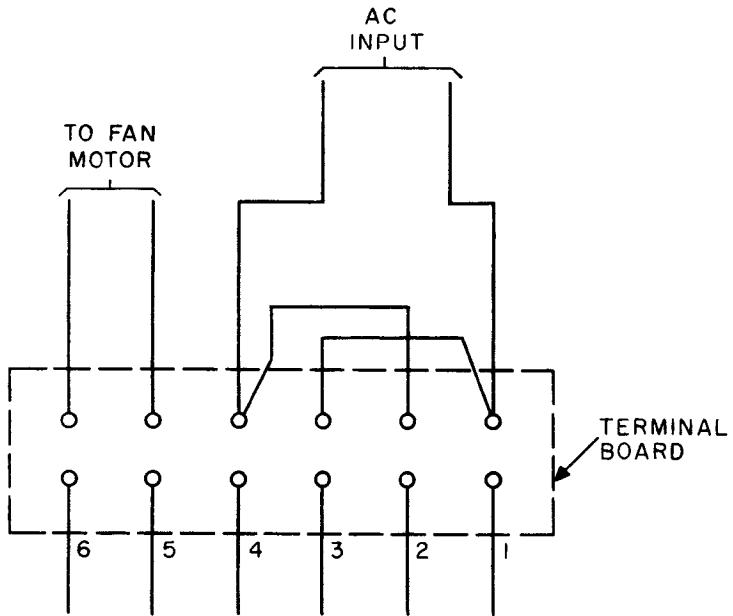
Locate the power supply and connect the power input as follows:

- a. Set the power supply on a level surface at the location (par. 6).
- b. Use wedges to steady the power supply if necessary.
- b. Move the circuit breaker lever on the front panel to OFF (fig. 1). Turn the INCREASE VOLTAGE knob to 1.

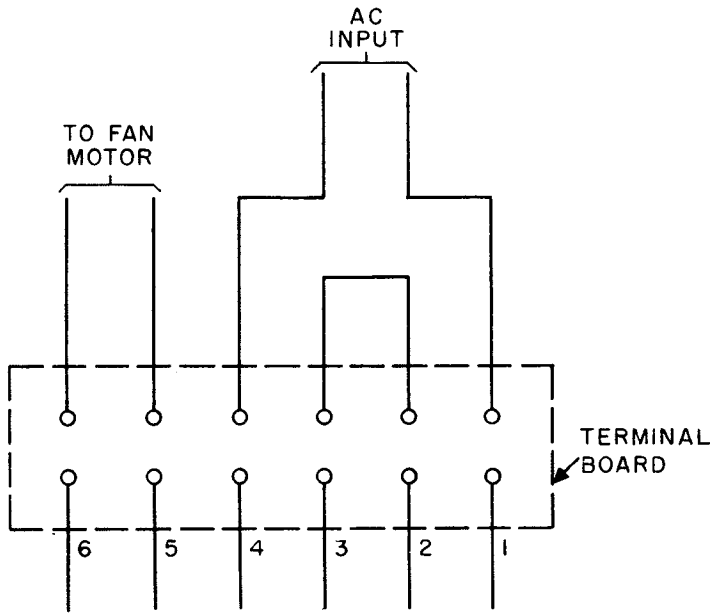
10. Power Input Connections

Note. The power input line should be protected with a 30-ampere fuse and should be controlled by an external switch for convenient removal of power from the power supply during maintenance.

- a. Prepare the power input cable as follows:
 - (1) If armored cable is used, remove approximately 6 inches of armor from the end of the cable. If nonarmored cable is used, remove 6 inches of the outer insulation.
 - (2) Separate the input leads and strip three-fourths inch of the insulation from the end of each lead.
 - (3) Attach a standard cable clamp to the cable.
- b. Remove the panel from the right side of the power supply.
- c. Remove the cover and one of the knockout plugs from the outlet box on the rear of the power supply. Attach the power input cable to the outlet box with the cable clamp.
- d. Pass the input leads through the hole in the rear panel and attach one lead to terminal 1 of the terminal board mounted inside the power supply cabinet adjacent to the outlet box (fig. 3). Attach the other input lead to terminal 4.
- e. If the power input is 115 volts, strap terminal 1 to terminal 3, and terminal 2 to terminal 4 (A, fig. 3).
- f. If the power input is 230 volts, strap terminals 2 and 3 of the terminal board (B, fig. 3).



A. 115-VOLT AC INPUT



B. 230-VOLT AC INPUT

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Figure 3. Input connection arrangements.

Section III. OPERATION

11. Controls and Instruments

(fig. 1)

The following table lists the controls and instruments and their functions:

Item	Function
INCREASE VOLTAGE knob.....	Used to adjust output voltage in 8 equal steps from 11.5 volts to 17.5 volts (14-volt operation) and 23 volts to 35 volts (28-volt operation).
Circuit breaker lever	Used to turn power supply on and off manually. Two circuit breakers fastened to circuit breaker lever shut power supply off automatically when input current is excessive.
Pilot light	Glows when power supply is on.
Dc voltmeter	Indicates output voltage.
Dc ammeter	Indicates output current.

12. Preparation for Operation

Prepare the power supply for operation as follows:

- a. Move the circuit breaker lever to OFF.
- b. Arrange the links for the desired output (fig. 4).

Note. Connect *both* links across the two center terminals for 28-volt operation (B, fig. 4).

c. Connect the load (communication equipment) to the negative and positive output terminals on the front panel of the power supply. Be careful to observe correct polarity.

13. Operating Procedure

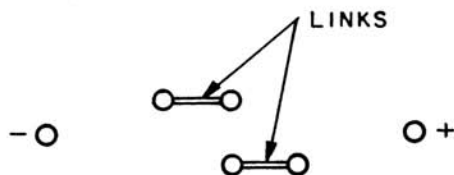
(fig. 1)

a. Start the power supply as follows:

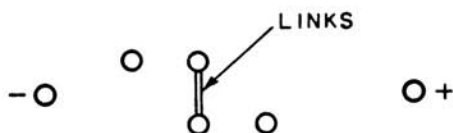
- (1) Turn the INCREASE VOLTAGE knob to 1.
- (2) Move the circuit breaker lever to ON.

b. Observe the dc voltmeter and turn the INCREASE VOLTAGE knob to the right until the desired output voltage is obtained. Turn on the communication equipment connected to the output terminals and readjust the output voltage. Check the output voltage at intervals during operation of the power supply. When necessary, adjust the INCREASE VOLTAGE knob to maintain the desired output voltage.

Warning: If a strong unpleasant odor is noted, move the circuit breaker lever to OFF. (See warning notice at inside of front cover.)



A. 14 VOLTS, 100 AMP



B. 28 VOLTS, 50 AMP

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Figure 4. Link arrangement for 14-volt and 28-volt output.

Caution: A continuous flow of air through the power supply is necessary during operation to prevent damage due to overheating. Do not obstruct the louvers on each side of the power supply or the grille on the rear panel. If the fan should fail, do not continue operation of the power supply.

c. Stop the power supply as follows:

- (1) Turn off the communication equipment.
- (2) Move the circuit breaker lever to OFF. The fan should stop, the pilot light should go out, and the output meters should indicate no output.
- (3) Turn the INCREASE VOLTAGE knob to 1.
- (4) Disconnect the leads connected to the negative and positive output terminals of the power supply.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE

Section I. TOOLS, MATERIALS, AND TEST EQUIPMENT

14. Tools and Materials Required for Organizational Maintenance

a. Tools.

- Brush, CE stock No. 38-2968.100.100
- Pliers TL-126
- Screwdrivers TL-358
- Screw driver, short, 1/8-inch blade
- Soldering Iron TL-120
- Wrench, open end, 3/8- by 7/16-inch

b. Materials.

- Solvent, Dry Cleaning (SD)
- Cleaning cloth

15. Test Equipment Required for Organizational Maintenance

The only test equipment required for organizational maintenance is Multimeter ME-77/U or equivalent such as Multimeter TS-297/U (TM 11-5500). The test equipment must be suitable for making continuity tests and ac and dc voltage tests.

Section II. PREVENTIVE MAINTENANCE

16. Scope of Preventive Maintenance

Preventive maintenance consists of the daily, weekly, and monthly checks described in paragraphs 17 and 18. Instructions for trouble shooting at organizational level are in paragraphs 19 and 20.

17. Daily and Weekly Maintenance

Use DA Form 11-238 (fig. 5) in accordance with the instructions on the back of the form when performing daily and weekly maintenance. Items not applicable to the power supply are lined

OPERATOR FIRST ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT RADIO COMMUNICATION, DIRECTION FINDING, CARRIER, RADAR									
INSTRUCTIONS: See other side									
EQUIPMENT NOMENCLATURE <i>Power Supply 88-1104H16</i>					EQUIPMENT SERIAL NO. <i>138</i>				
LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair or replacement required; ⊕ Defect corrected. NOTE: Strike out items not applicable.									
DAILY									
NO.	ITEM	CONDITION							
		S	M	T	W	T	F	S	S
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT (receiver, transmitter, carrying case, wire and cable, microphone, tubes, spare parts, technical manuals and accessories). PAR. 8	✓	✓	✓	✓	✓	✓	✓	✓
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR. 6	✓	✓	✓	✓	✓	✓	✓	✓
3	CLEAN DIRT AND MOISTURE FROM antennas, microphone, sockets, sheetmetal, wire, plugs, telephones, cables and bags, COMPONENT PANELS.	✓	✓	✓	✓	✓	✓	✓	✓
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: TUBES, LAMPS, CRYSSTALS, FUSES, CONNECTORS, PLUGS IN COILS AND RESISTORS.	✓	✓	✓	✓	✓	✓	✓	✓
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORN OR CHANGED GEARS , MISALIGNMENT, POSITIVE ACTION.	✓	✓	✓	✓	✓	✓	✓	✓
6	CHECK FOR NORMAL OPERATION. PAR. 20	✓	✓	✓	✓	✓	✓	✓	✓
WEEKLY									
NO.	ITEM	CONDITION	NO.	ITEM	CONDITION				
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES, BUSHINGS, BRACKET MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, BAYE GUIDES, AND CABLE CONNECTIONS.	✓	13	INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, LEAKS, PROTECT LEVEL AND SPECIFIC GRAVITY, AND DAMAGED CASES.					
8	INSPECT CASES, MOUNTINGS, ANTENNAS, TUBES , AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE.	✓	14	CLEAN AND POLISH BRASS NAME PLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES.	✓				
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BRUYS, FRAYING, DETRIORATION, KINKS, AND STRAIN.	✓	15	INSPECT METERS FOR DAMAGED GLASS AND CASES.	✓				
10	INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATION AND REFLECTORS.		16	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHER PROOFING.					
11	INSPECT CANNAL STEMS, LEATHER, AND CABLES FOR WORN, TEARS, AND FRAYING.		17	CHECK ANTENNA GUY WIRES FOR LOOSENESS AND PROPER TENSION.					
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, WASHERS, CONNECTORS, ELECTRICAL TRANSFORMERS, POWER STATS, RELAYS, BEARINGS, MOTORS, BLOWERS, CAPACITORS, WRENCHES, AND PILOT LIGHT ASSEMBLIES.	⊕	18	CHECK TERMINAL BOX COVERS FOR GRAPE, LEAKS, DAMAGED CONTACTS, DIRT AND GREASE.	✓				
19	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.								

DA FORM 11-238
3 MAY 51

REPLACES DA AGO FORM 439, 1 DEC 50, WHICH IS OBSOLETE.

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Figure 5. DA Form 11-238.

out. References in the ITEM column are to paragraphs that contain additional information concerning the particular item.

18. Monthly Maintenance

Use DA Form 239 (fig. 6) when performing monthly maintenance.

a. Prepare the power supply as follows:

- (1) Remove power from the power supply (note, par. 10).

SECOND AND THIRD ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT
 RADIO COMMUNICATION, DIRECTION FINDING, CARRIER, RADAR

INSTRUCTIONS—See other side

EQUIPMENT NOMENCLATURE

Power Supply PR-1102A/B

EQUIPMENT SERIAL NO.

138

LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair, or replacement required; ⊙ Defect corrected.
 NOTE: Strike out items not applicable.

NO.	ITEM	PERFORMED	NO.	ITEM	PERFORMED
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT (see manual, spare parts, technical manuals, and accessories) PAR. 8	✓	19	ELECTRON TUBES—INSPECT FOR LOOSE DEVELOPER-CAF CONNECTIONS, CRACKED SOCKETS—INSUFFICIENT SOCKET SPRING TENSION; CLEAN SUCK—AND CAREFULLY CHECK CONNECTION OF RECEIVER TYPE TUBES	
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR. 6	✓	20	INSPECT FIRM CUTOFFS FOR LOOSE PARTS, SWT, MISALIGNMENT, AND CORROSION.	
3	CLEAN DIRT AND MOISTURE FROM APPERINA-MICROPHONE-HEADSETS-CHRYSTALS-KEYS-ARMS-PLUGS-TELEPHONES-CARRYING-BAGS-COMPONENT PANELS.	✓	21	INSPECT FIXED CAPACITORS FOR LEAKS, BULGES, AND DISCOLORATION.	✓
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: TUBES, LAMPS, OPERATORS, FUSES, CONNECTIONS, SUBASSEMBLY PLUGS, COILS, AND RESISTORS.	✓	22	INSPECT MECH AND CIRCUIT BREAKER ASSEMBLIES FOR LOOSE MOUNTINGS, DAMAGED CONTACTS, CORROSION, WEAR OF CONTACTS, SAGS, AND SPRINGS, INSUFFICIENT SPRING TENSION; BINDING OF PLUNGERS AND KING PARTS.	✓
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORK OR SPRING-GAINS; MISALIGNMENT, POSITIVE ACTION.	✓	23	INSPECT VARIABLE CAPACITORS FOR SWT, MOISTURE, MISALIGNMENT OF PLATES, AND LOOSE MOUNTING.	
6	CHECK FOR NORMAL OPERATION. PAR. 20	✓	24	INSPECT RESISTORS, FUSES, AND INSULATORS, FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION, AND MOISTURE.	
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES. BAGS, HOUSINGS, SHOCK MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, WAVE GUIDES, AND CABLE CONNECTIONS.	✓	25	INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR CORROSION, SWT, AND LOOSE CONTACTS.	
8	INSPECT CASES, HOUSINGS, AND SHOCK MOUNTS AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE.	✓	26	CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, AND CASES, AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE.	✓
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BREAKS, FRAYING, DETERIORATION, KINKS, AND STRAIN.	✓	27	INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS, AND BREAKS.	✓
10	INSPECT ANTENNA FOR EGG-HEADS, CORROSION, LOOSE FIT, DAMAGED INSULATORS, AND REFLECTORS.	✓	28	CHECK SETTINGS OF ADJUSTABLE RELAYS.	
11	INSPECT CANVAS, LEATHER, AND GASKING FOR MILDEW, TEARS, AND FRAYING.	✓	29	LUBRICATE EQUIPMENT IN ACCORDANCE WITH APPLICABLE DEPARTMENT OF THE ARMY LUBRICATION ORDER.	
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, JARNS, CONNECTORS, ELECTRICAL TRANSFORMERS, POWERSTATS, HOUSINGS, MOTORS, BLOWERS, CAPACITORS, GENERATORS, AND PILOT LIGHT ASSEMBLIES.	✓	30	INSPECT GENERATORS, AMPHIDINES, DYNAMOTORS, FOR BRUSH WEAR, SPRING TENSION, RIGGING, AND FITTING OF COMMUTATORS.	
13	INSPECT STORAGE BATTERIES FOR SWT, LOOSE TERMINALS, ELECTROLYTE LEVEL, AND SPECIFIC GRAVITY, AND DAMAGED CASES.	✓	31	CLEAN AND TIGHTEN CONNECTIONS AND MOUNTINGS FOR TRANSFORMERS, CHOKES, POTENTIOMETERS, AND REGULATORS.	✓
14	CLEAN AIR FILTERS, BRASS NAMEPLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES.	✓	32	INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS, AND REGULATORS FOR OVERHEATING AND OIL LEAKAGE.	
15	INSPECT METERS FOR DAMAGED GLASS AND CASES.	✓	33	BEFORE CHIPPING OR SCRAPING—REMOVE BATTERIES.	
16	INSPECT SHEETS AND COVERS FOR ADEQUACY OF WEATHER PROOFING.	✓	34	INSPECT CATHODE RAY TUBES FOR BURNED SCREEN SPOTS.	
17	CHECK ANTENNA CRY WIRE FOR LOOSENESS AND PROPER TENSION.	✓	35	INSPECT BATTERIES FOR SHORTS AND DEAD CELLS.	
18	CHECK TERMINAL BOX COVERS FOR CRACKS, LEAKS, DAMAGED GASKETS, DIRT, AND GREASE.	✓	36	INSPECT FOR LEAKING WATER-PROOF GASKETS, WORK OR LOOSE PARTS.	
			37	MOISTURE AND FUNGUS PROOF.	
38	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.				

DA FORM 11-239

Replaces DA AGO Form 419, 1 Dec 50, which is obsolete.

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Figure 6. DA Form 11-239.

(2) Remove the two side panels.

b. Perform all maintenance indicated on figure 6 (except item No. 6) in accordance with the instructions on the back of the form.

c. Replace the two side panels, apply power to the power supply, and check for normal operation (item 6).

Section III. ORGANIZATIONAL TROUBLESHOOTING

19. General

Troubleshooting at organizational level is limited to the location and correction of faulty wiring (loose connections, broken leads, etc.) and the replacement of only those parts authorized the using organization. Use the equipment performance checklist (par. 20) to check the power supply.

20. Equipment Performance Checklist

Step	Item	Action	Normal indication	Corrective action
1	Links (fig. 1)	Arrange for desired output (par. 10).		
2	Load	Connect load (communication equipment) to output terminals. Turn on communication equipment. Move to 1.		
3	INCREASE VOLTAGE knob.			
4	Power input	Apply power (par. 10).		
5	Circuit breaker lever.	Move to ON	Pilot light glows. Fan starts	<p>If pilot light does not glow and fan does not start, check power input.</p> <p>If power input is correct and properly connected, check voltage across top and bottom terminals of each circuit breaker. If input voltage is present across either circuit breaker in ON position, field maintenance is required.</p> <p>If fan starts and pilot light does not glow, check pilot lamp and wire connections to lamp holder. Replace defective lamp.</p>

P R E P A R A T O R Y

S T A R T

S T A R T

EQUIPMENT PERFORMANCE

			<p>Dc voltmeter and dc ammeter indicate output current and voltage.</p>	<p>If pilot light glows and fan does not start, check fan blade for obstruction. Check wire connections to fan. If connections are not faulty, field maintenance is required.</p> <p>If both meters show zero reading, check for loose connection in output circuit.</p> <p>If only one meter shows zero, check connections to that meter. If meter connections are not faulty, field maintenance is required.</p>
6	INCREASE VOLTAGE knob.	Move in steps to position 8.....	Voltage and current readings on dc voltmeter and dc ammeter should increase at each step.	<p>If readings do not increase at each step, check for a short circuit across INCREASE VOLTAGE switch taps. If no short circuits are evident, field maintenance is required.</p>

Step	Item	Action	Normal indication	Corrective action
7	Circuit breaker lever.	Move to OFF	Meters indicate zero, fan stops, and pilot light goes out.	Check for short circuit across circuit breakers. If a short circuit is not evident, field maintenance is required.
8	INCREASE VOLTAGE knob.	Move to position 1.		

S T O P

CHAPTER 4

FIELD MAINTENANCE

Section I. THEORY

21. Input Circuits

(fig. 7)

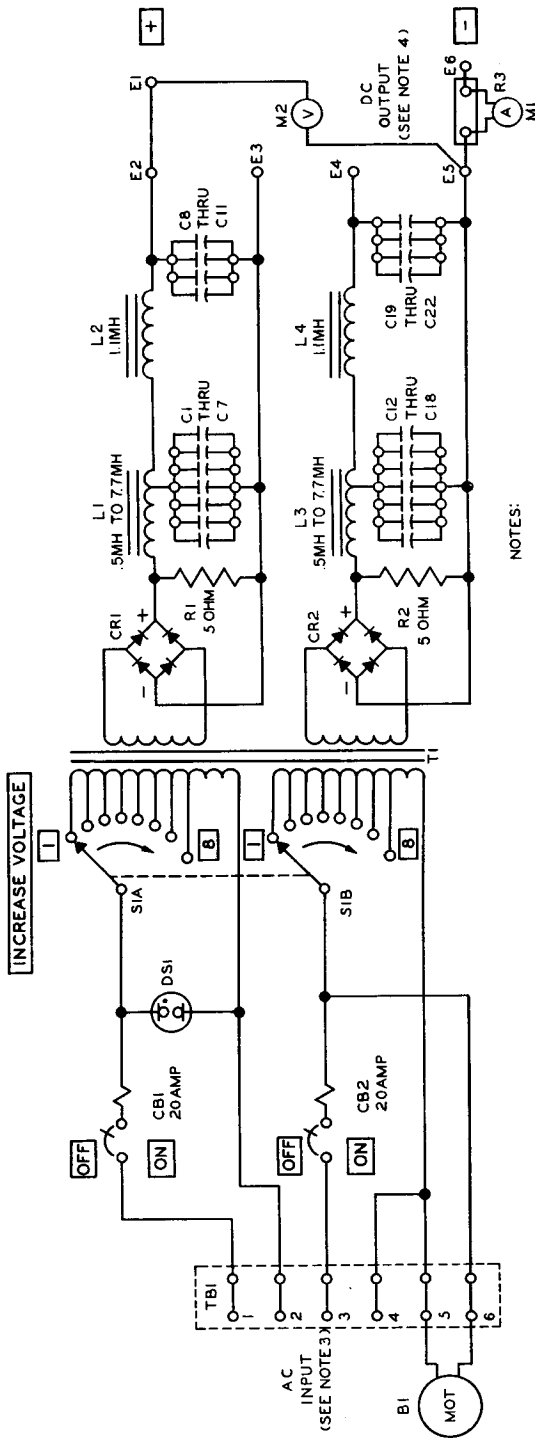
a. 115-Volt Ac Input. When CB1 and CB2 are in the ON position and the power supply is arranged to operate with 115 volts ac, the two primary windings of T1 are connected in parallel across the power input at terminals 1 and 4 of TB1. The position of INCREASE VOLTAGE switch S1 controls the voltage in the secondary windings by controlling the number of turns energized in the primary windings (energized turns decrease and secondary winding voltages increase in equal steps as S1 is moved from position 1 to position 8). Voltage from the secondary windings is applied to CR1 and CR2. The input circuit is opened automatically at CB1 or CB2 when current through either circuit breaker exceeds 20 amperes.

b. 230-Volt Ac Input. When the power supply is arranged to operate with 230 volts ac, the primary windings of T1 are connected in series across power input terminals 1 and 4 of TB1. Approximately half the input voltage is applied across each primary winding.

22. Output Circuits

(fig. 7)

The power supply includes two output circuits. Each circuit provides 14 volts dc and consists of a selenium rectifier in a full-wave bridge circuit and a choke input filter which includes 2 reactors, 11 capacitors, and a bleeder resistor. The filtered output of CR1 is connected to terminals E2 and E3; the output of CR2 is connected to E4 and E5. The output circuits are connected in parallel to obtain 100 amperes at 14 volts, and in series for 50 amperes at 28 volts. Dc voltmeter M2 is connected across the output and dc ammeter M1 in series with the output.



NOTES:

1. INDICATES PANEL MARKING.
2. CAPACITORS C1 THRU C22 ARE 9000 MFD. EACH.
3. TERMINALS 2 AND 3 OF TBI STRAPPED FOR 230-VOLT INPUT; TERMINALS 1 AND 3, 2 AND 4 FOR 115-VOLT INPUT.
4. LOAD CONNECTED TO E1 + AND E6 -. STRAP E3 AND E4 FOR 28-VOLT OUTPUT. STRAP E2 AND E4, E3 AND E5 FOR 14-VOLT OUTPUT.

Figure 7. Power Supply PP-1104A/G, schematic diagram.

TMS126-10

Section II. TOOLS, MATERIALS, AND TEST EQUIPMENT

23. Tools and Materials Required for Field Maintenance

In addition to the tools and maintenance materials listed in paragraph 14, the following tools are required for field maintenance:

- Knife TL-29
- Pliers TL-103
- Screwdriver TL-31
- Wrench, open end, $\frac{1}{16}$ - by $\frac{5}{8}$ -inch

24. Test Equipment Required for Field Maintenance

The following test equipment (or equivalent) is required for repair and final testing of the power supply:

- Ammeter ME-65/U
- Analyzer ZM-3/U or ZM-3A/U
- Insulation Breakdown Test Set AN/GSM-6
- Multimeter ME-77/U with Multirange Shunt MX-1471/U
- Multimeter ME-87/U
- Ohmmeter ZM-21/U
- Variable Power Transformer TF-218/U
- Variable power transformer, Sig C stock No. 2Z9957-34
- Variable resistor, 0-10 ohms, 2,000 watts
- Voltmeter Meter ME-30A/U

Section III. TROUBLESHOOTING AT FIELD MAINTENANCE LEVEL

25. General

Use the equipment performance checklist (par. 20) and the troubleshooting chart (par. 26) to locate faults in the power supply. Remove and replace faulty components as described in paragraphs 28 and 29.

26. Troubleshooting Chart

Item	Symptom	Probable trouble	Remedy
1	Pilot light does not glow, fan does not start.	Defective circuit breaker CB1 or CB2.	Replace CB1 or CB2.
2	Pilot light glows, fan does not start.	Open circuit in fan motor B1.	Replace B1 if defective.
3	Pilot light glows, fan starts, but no output	Open in output circuit (par. 22).	Check for loose connection, broken lead,

Item	Symptom	Probable trouble	Remedy
	voltage is present regardless of position of INCREASE VOLTAGE switch S1.	Open circuit in transformer T1.	or faulty component. Replace faulty component.
4	Output voltage does not change when INCREASE VOLTAGE switch is moved from position 1 to position 8.	Defective switch S1. Short circuit in S1.	Replace T1 if defective. Replace S1 if defective. Remove short circuit. Replace S1 if defective.
5	Extremely unpleasant odor and/or low output voltage.	Defective rectifier CR1 or CR2.	Replace defective rectifier (see warning notice on inside of front cover).
6	Reading on dc voltmeter differs from voltage present at output terminals.	Defective dc voltmeter M2.	Replace M2.
7	Reading on dc ammeter differs from actual current in circuit connected to output terminals.	Defective shunt R3 or dc ammeter M1.	Replace defective component.

Section IV. REPAIR

27. Preliminary Check

Check the power supply before repair as follows:

a. Check for rust or damage to the cabinet finish, meters, switches, and terminals. Clean and repaint damaged surfaces. Clean all terminals on the front of the power supply.

b. Remove the two side panels and check all components for firmness of mounting. Check all wire connections for tightness. Check for insulation damage caused by wires rubbing against an adjacent surface.

c. Check the insulation resistance with Ohmmeter ZM-21/U as described below. If a resistance of less than 1 megohm is measured between any of the test points, check for a faulty part in the power supply.

- (1) Measure the resistance between terminal 1 of TB1 and the cabinet to determine the resistance between the input circuit and ground.
- (2) Measure the resistance between each of the transformer secondary windings and terminals 2 and 4 of TB1 to

determine the resistance between the primary and secondary windings of the power transformer.

- (3) Measure the resistance between the cabinet and the positive and negative output terminals to determine the resistance between the output circuit and ground.

Note. If the power supply has been in extended storage or stored in a humid storage area, moisture may be present in the power supply. Either condition may lower insulation resistance. Place the power supply in an oven heated to 190° F. and measure the resistance hourly to check the drying progress. A drying time of 6 hours in the oven is normally enough to remove all moisture. Remove the power supply when the resistance has increased to 1 megohm.

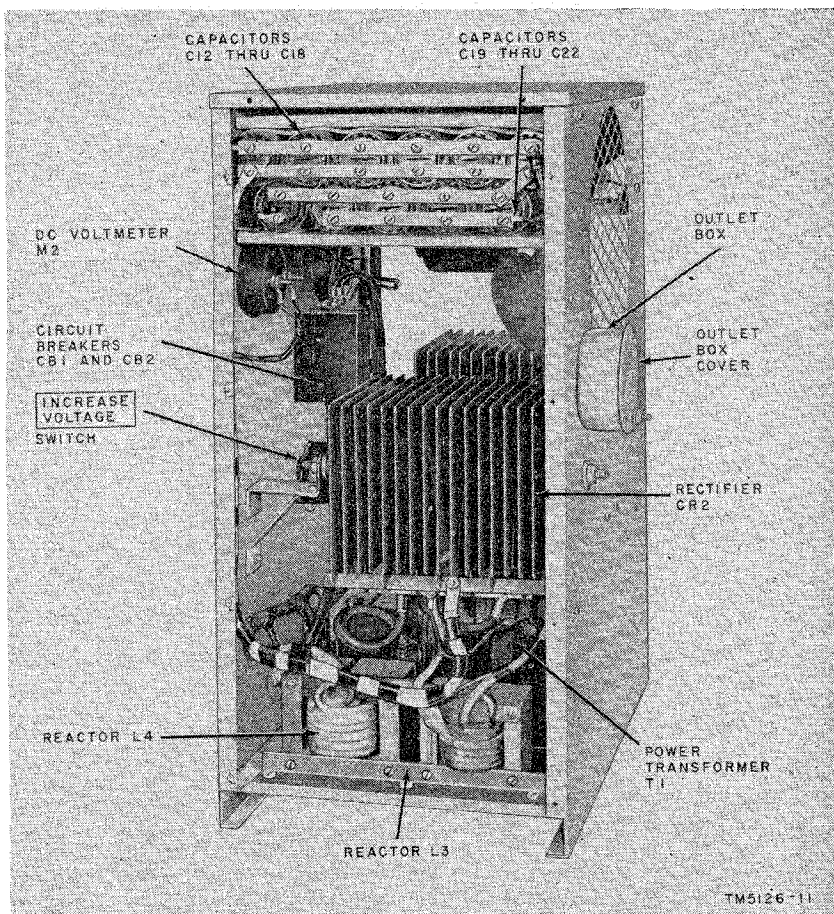


Figure 8. Power supply, right side panel removed.

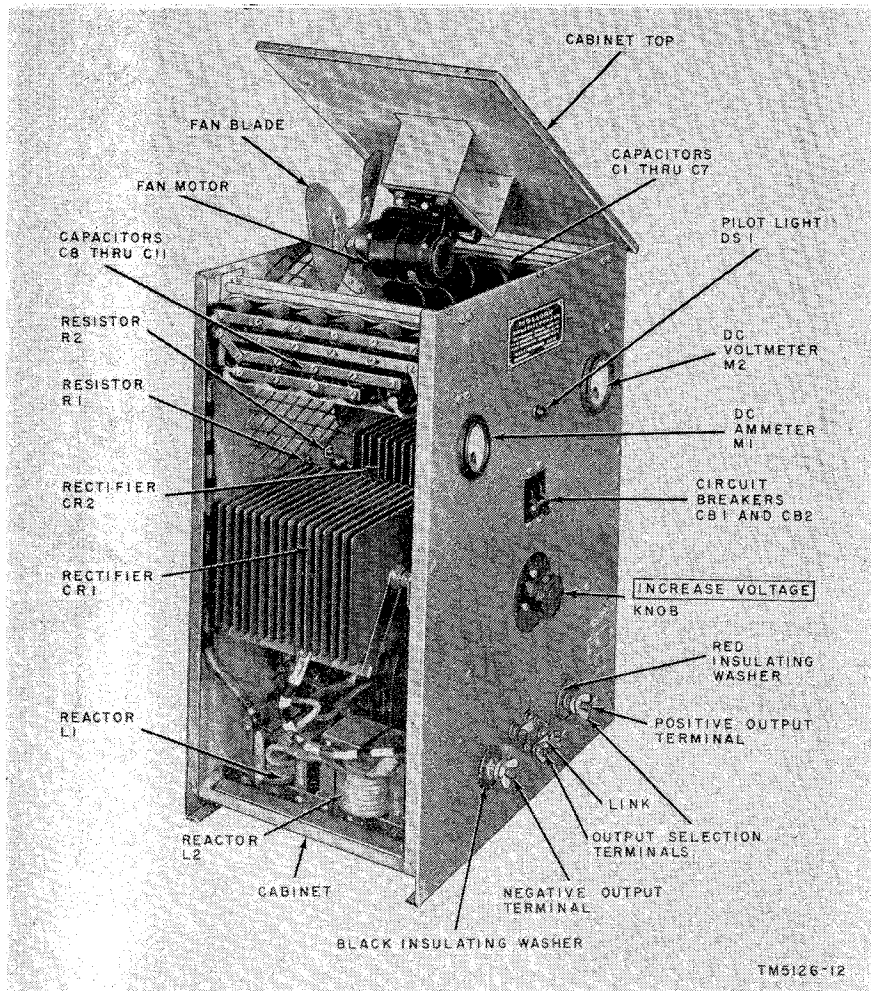


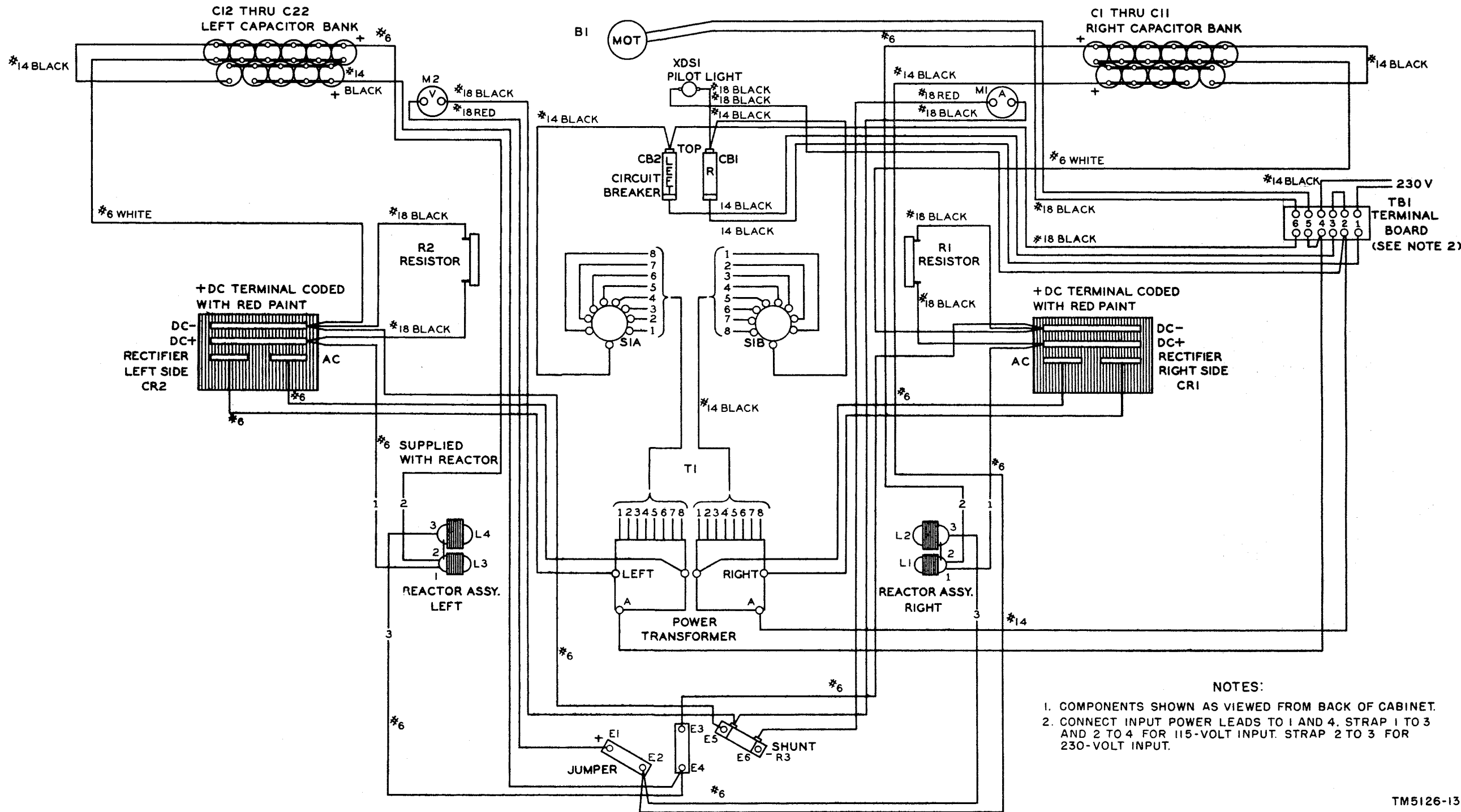
Figure 9. Power supply, left side panel removed.

28. Removal and Replacement Procedures

Procedure for removal and replacement of most maintenance parts is readily apparent upon inspection of the part and the mounting location in the power supply. Refer to figures 8 and 9 for the location of parts. After installation of a part, refer to the wiring diagram (fig. 10) for the electrical connections.

29. Removal, Test and Replacement of Filter Capacitors

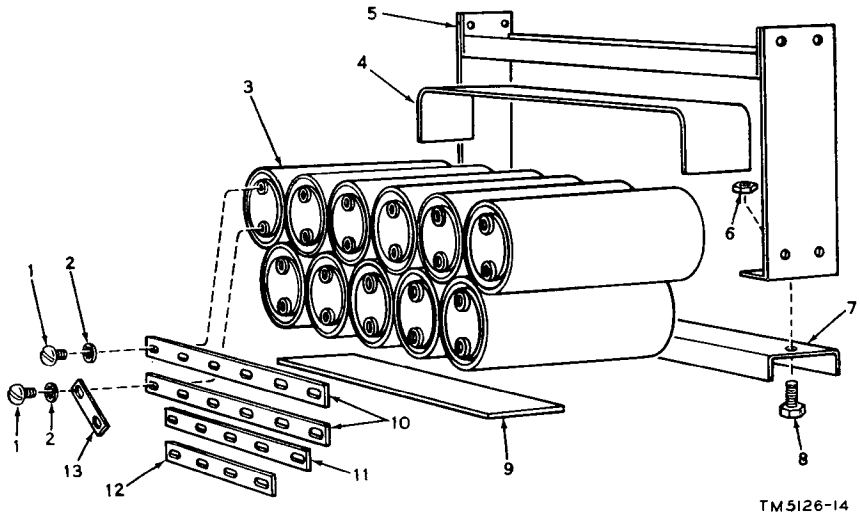
Remove and replace the filter capacitors as shown in figure 11. Each is a 15-volt, 9,000 microfarad (μf) electrolytic capacitor and



- NOTES:
1. COMPONENTS SHOWN AS VIEWED FROM BACK OF CABINET.
 2. CONNECT INPUT POWER LEADS TO 1 AND 4. STRAP 1 TO 3 AND 2 TO 4 FOR 115-VOLT INPUT. STRAP 2 TO 3 FOR 230-VOLT INPUT.

Figure 10. Power Supply PP-1104A/G, wiring diagram.

must have a capacity between 8,100 and 18,000 μf . Test each capacitor with Analyzer ZM-3/U or ZM-3A/U as described in TM 11-5043, Analyzers ZM-3/U and ZM-3A/U. Refer to figures 10 and 12 for connection of the capacitors after installation in the power supply.



- 1 Capacitor terminal screw
- 2 Terminal screw lockwasher
- 3 Capacitor, 15 volts dc, 9,000 μf
- 4 Upper insulation strip
- 5 Mounting bracket
- 6 Clamping bracket nut
- 7 Clamping bracket
- 8 Clamping bracket screw
- 9 Lower insulation strip
- 10 Six-terminal strap
- 11 Five-terminal strap
- 12 Four-terminal strap
- 13 Two-terminal strap

Figure 11. Capacitor assembly, exploded view.

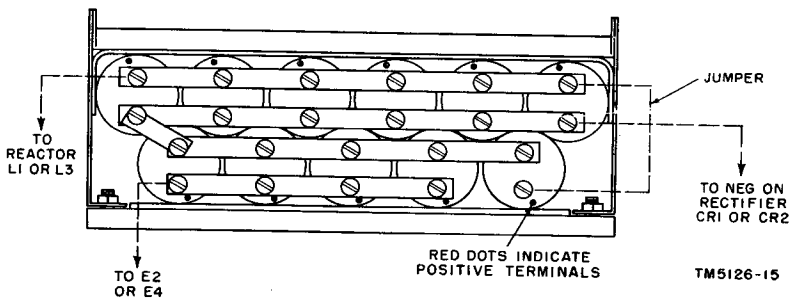


Figure 12. Capacitor assembly, connection arrangement.

Section V. FINAL TESTING

30. Purpose of Final Testing

Power Supply PP-1104A/G must be tested thoroughly after repair to insure that it meets all performance requirements. Use the following tests to measure the performance of the power supply:

Test	Par. ref.
Output voltage tests	31 and 32
Tests with 230-volt input	33
Input current tests	34
Insulation breakdown tests	35
Circuit breaker overload test.....	36

31. Output Voltage Tests (14-Volt Operation)

(fig. 13)

Arrange the power supply for 115-volt input, 14-volt output operation and test the output voltage as follows:

a. Preparation for 14-Volt Output Tests.

- (1) Arrange the links on the front panel for 14-volt operation (A, fig. 4).
- (2) Connect 115 volts ac to the input circuit of Variable Power Transformer TF-218/U. Connect the output circuit of the TF-218/U to terminals 1 and 4 of TB1 on the power supply. Strap terminal 3 to 1, and terminal 2 to 4.
- (3) Set the INCREASE VOLTAGE knob to position 4.
- (4) Connect a series-parallel circuit across the output terminals of the power supply as follows:
 - (a) Connect Multimeter ME-87/U (0- to 150-volt dc scale) in parallel with a 0- to 10-ohm, 2,000-watt variable resistor. Connect the positive side of this arrangement to the positive output terminal of the power supply. Set the variable resistor for maximum resistance.
 - (b) Arrange Multimeter ME-77/U and Multirange Shunt MX-1471/U (or equivalent) to read direct current from 0 to 100 amperes. Connect them in series with the negative output terminal of the power supply and the parallel circuit ((a) above).

b. Voltage Regulation Test (14-Volt Operation). The variation in output voltage must not exceed 9 percent when the power supply is arranged for 14-volt operation, and the output current is varied from 0 to 100 amperes. Test the voltage regulation as follows:

- (1) Arrange the power supply for test (a above) and move the circuit breaker lever to ON.
- (2) Use the TF-218/U and the variable load resistor to adjust the input voltage to 115 volts and the output current to 100 amperes. Record the full-load output voltage reading of the ME-87/U.
- (3) Move the circuit breaker lever to OFF and remove the series-parallel circuit from the power supply output terminals. Connect the ME-87/U across the output terminals and move the circuit breaker lever to ON. Adjust the TF-218/U until the input voltage is 115 volts. Record the no-load output voltage reading of the ME-87/U.
- (4) Compute the percentage of variation as follows:

$$\text{Percentage of variation} = \frac{\text{No-load voltage} - \text{Full-load voltage}}{\text{Full-load voltage}} \times 100.$$

c. Voltage Range Test (14-Volt Operation). When the output current is 100 amperes, the output voltage must be 11.5 volts \pm 10 percent with the INCREASE VOLTAGE knob at 1, and 17.5 volts \pm 10 percent with the knob at 8. Test the voltage range as follows:

- (1) Prepare the power supply for test (b(1) and (2) above).
- (2) Move the INCREASE VOLTAGE knob to 1 and then to 8 and record the output voltage at each position.

d. Ripple Test (14-Volt Operation). The percentage of ripple in the output voltage must not exceed .9 percent when the power supply is arranged for 14-volt operation and the output current is 100 amperes. Determine the percentage of ripple as follows:

- (1) Connect a 0- to 10-ohm, 2,000-watt variable resistor across the output terminals. Move the circuit breaker lever to ON and adjust the variable resistor until the output current is 100 amperes.
- (2) Connect Voltmeter Meter ME-30A/U across the output terminals and record the ripple voltage.
- (3) Record the output voltage indicated on the power supply dc voltmeter.
- (4) Compute the percentage of ripple as follows:

$$\text{Percentage of ripple} = \frac{\text{Ripple voltage reading}}{\text{Output voltage reading}} \times 100$$

32. Output Voltage Tests (28-Volt Operation)

(fig. 13)

Arrange the power supply for 115-volt input, 28-volt output operation and test the output voltage as follows:

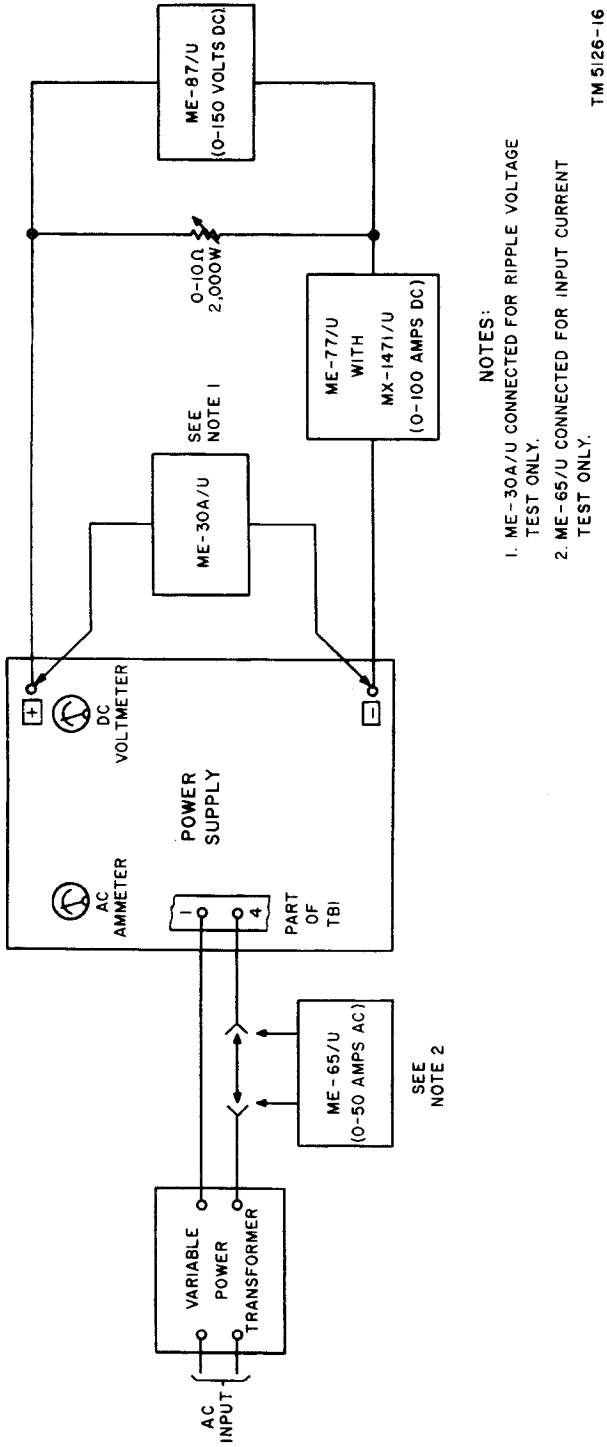


Figure 13. Interconnection diagram for input current and output voltage tests.

a. Preparation for 28-Volt Output Tests.

- (1) Arrange the links on the front panel for 28-volt operation (B, fig. 4).
- (2) Perform the preparatory steps described in paragraph 31a(2) through (4).

b. Voltage Regulation Test (28-Volt Operation). The variation in output voltage must not exceed $7\frac{1}{2}$ percent when the power supply is arranged for 28-volt operation and the output current is varied from 0 to 50 amperes. Test the voltage regulation as follows:

- (1) Arrange the power supply for test (*a* above) and move the circuit breaker lever to ON.
- (2) Use the TF-218/U and the variable load resistor to adjust the input voltage to 115 volts and the output current to 50 amperes. Record the output voltage reading of the ME-87/U.
- (3) Move the circuit breaker lever to OFF and remove the series-parallel circuit from the power supply output terminals. Connect the ME-87/U across the output terminals and move the circuit breaker lever to ON. Adjust the TF-218/U until the input voltage is 115 volts and record the output voltage reading of the ME-87/U.
- (4) Use the equation in paragraph 31b(4) to determine the percentage of variation in the output voltage.

c. Voltage Range Test (28-Volt Operation). When the output current is 50 amperes, the output voltage must be 23 volts \pm 10 percent with the INCREASE VOLTAGE knob at 1, and 35 volts \pm 10 percent with the knob at 8. Test the voltage range as follows:

- (1) Prepare the power for test (*b*(1) and (2) above).
- (2) Move the INCREASE VOLTAGE knob to 1 and then to 8 and record the output voltage at each position.

d. Ripple Test (28-Volt Operation). The percentage of ripple in the output voltage must not exceed .9 percent when the power supply is arranged for 28-volt operation and the output current is 50 amperes. Determine the percentage of ripple as follows:

- (1) Connect a 0- to 10-ohm, 2,000-watt variable resistor across the output terminals. Move the circuit breaker lever to ON and adjust the variable resistor until the output current is 50 amperes.
- (2) Connect Voltmeter Meter, ME-30A/U across the output terminals and record the ripple voltage.
- (3) Record the output voltage as indicated on the power supply dc voltmeter.

- (4) Use the equation in paragraph 31*d*(4) to compute the percentage of ripple in the output voltage.

33. Tests With 230-Volt Input

(fig. 13)

When operating with an input of 230 volts ac, the power supply must meet the following tests:

a. Ripple Test (28-Volt Operation). The percentage of ripple must not exceed .9 percent when the power supply is arranged for 28-volt operation, the input power is 230 volts ac, and the output current is 50 amperes. Test the percentage of ripple as follows:

- (1) Arrange the links on the front panel for 28-volt operation (B, fig. 4).
- (2) Connect 230 volts ac to the input circuit of variable power transformer, Sig C stock No. 2Z9957-34. Connect the output of the transformer to terminals 1 and 4 of TB1 on the power supply. Strap terminals 2 and 3 of TB1.
- (3) Set the INCREASE VOLTAGE knob to position 4.
- (4) Connect a series-parallel circuit across the output terminals of the power supply as described in paragraph 31*a*(4).
- (5) Move the circuit breaker lever to ON. Adjust the transformer and variable load resistor until the input voltage across terminals 1 and 4 of TB1 is exactly 230 volts and the output current is 50 amperes.
- (6) Connect Voltmeter Meter ME-30A/U across the output terminals and record the ripple voltage.
- (7) Record the voltage reading of the ME-87/U.
- (8) Use the equation in paragraph 31*d*(4) to compute the percentage of ripple in the output voltage.

b. Fan Motor and Pilot Light Voltage Tests. When the power supply is arranged for 230-volt operation, the fan motor voltage and the pilot light voltage must be 115 volts ac. Use Multimeter ME-87/U or equivalent to measure the fan motor voltage at terminals 5 and 6 of TB1 and the voltage across the pilot light.

34. Input Current Tests

(fig. 13)

The current drawn by the power supply must not exceed the current limits specified in the following tests:

a. No-Load Test. When operating at no load with either 115 volts or 230 volts ac, the input current must not exceed 3.25 amperes. Arrange the power supply for operation with either

115 volts or 230 volts ac. Connect Ammeter ME-65/U in series in the input circuit. Move the circuit breaker lever to ON and check the input current reading on the ME-65/U.

b. Full-Load Test (115-Volt Ac Input). When operating at full load with 115 volts ac, the input current must not exceed 28 amperes. Arrange the power supply for 14-volt operation with 115 volts ac and connect a 0- to 10-ohm, 2,000-watt variable resistor across the output terminals of the power supply. Connect Ammeter ME-65/U in series in the input circuit and move the circuit breaker lever to ON. Adjust the variable load resistor until the output current is 100 amperes and check the input current reading on the ME-65/U.

c. Full-Load Test (230-Volt Ac Input). When operating at full load with 230 volts ac, the input current must not exceed 14 amperes. Arrange the power supply for 28-volt operation with 230 volts ac and connect a 0- to 10-ohm, 2,000-watt variable resistor across the output terminals of the power supply. Connect Ammeter ME-65/U in series in the input circuit and move the circuit breaker lever to ON. Adjust the variable load resistor until the output current is 50 amperes and check the input current reading on the ME-65/U.

35. Insulation Breakdown Tests

Strap terminal 1 to terminal 3 of TB1, terminal 2 to terminal 4, and perform the following insulation breakdown tests with Insulation Breakdown Test Set AN/GSM-6.

a. Input Circuit to Ground Test. The insulation between the input circuit and the cabinet (ground) must be capable of withstanding 900 volts for 10 seconds without breakdown. Use the AN/GSM-6 to apply 900 volts for 10 seconds across terminal 1 of TB1 and the cabinet to make this test.

b. Transformer Breakdown Test. The insulation between the primary and secondary windings of power transformer T1 must be capable of withstanding 900 volts for 10 seconds without breakdown. Apply 900 volts for 10 seconds across terminal 2 of TB1 and each of the transformer secondary windings to make this test.

c. Output Circuit to Ground Tests. The insulation between the output circuit and the cabinet must be capable of withstanding 400 volts for 10 seconds without breakdown. Apply 400 volts for 10 seconds across the cabinet and the negative and positive output terminals to make this test.

36. Circuit Breaker Overload Test

When moved to the ON position, CB1 and CB2 must remain at ON when the current is below 20 amperes and must move to OFF when the current exceeds 25 amperes. Remove the screw that fastens the circuit breaker lever to CB1 and CB2 and test them as follows:

a. Test Circuit. Arrange a test circuit to consist of a switch-controlled 115-volt ac power source, 0- to 10-ohm, 2,000-watt variable resistor and Ammeter ME-65/U connected in series.

b. CB1 Test. Circuit breaker CB1 is located to the left of CB2 as viewed from the front of the power supply. Disconnect the two wires from the top of CB1. Connect one side of the test circuit to the top of CB1. Connect the other side to terminal 1 of TB1. Adjust the variable resistor to maximum resistance and apply power to the circuit. Observe the ME-65/U while slowly removing resistance from the circuit. Note the current in the circuit when the circuit breaker opens. Replace CB1 if it does not meet the above requirements.

c. CB2 Test. Disconnect the two wires from the top of CB2. Connect one side of the test circuit to the top of CB2. Connect the other side to terminal 3 of TB1. Test the operating current value of CB2 as described in *b* above.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

37. Repackaging for Shipment and Limited Storage

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored. Modify the procedure outlined below as necessary. Repackaging should be as similar as possible to the original packaging described in paragraph 7.

a. Material Requirements. The materials listed below are required for packing the power supply. For stock numbers of the materials, refer to SB 38-100, Preservation, Packaging and Packing Materials, Supplies, and Equipment Used in the Army.

Material	Quantity (approx)
Corrugated single-face flexible paper.....	100 sq ft
Gummed paper tape	30 ft
Pressure-sensitive tape	25 ft
Waterproof paper	80
Wooden packing case (inside dimensions 29 x 24 x 15 in.).....	1

b. Packaging. Prepare the power supply for packing as follows:

- (1) *Main unit.* Cushion the main unit on all sides with pads made of flexible corrugated paper. Secure the cushioning with gummed paper tape. Wrap the cushioned unit with flexible corrugated paper and secure the wrap with gummed paper tape.
- (2) *Spare lamps and technical manuals.* Wrap each lamp in flexible corrugated paper and secure the paper with gummed paper tape. Use flexible corrugated paper and gummed paper tape to wrap the separately cushioned lamps into one package. Wrap the technical manuals in waterproof paper and seal the package with pressure-sensitive tape. Fasten the package containing the technical manuals to the top of the power supply with pressure-sensitive tape. Fasten the spare lamp package

to the rear panel of the main unit with pressure-sensitive tape.

c. Packing. Use waterproof paper and pressure-sensitive tape to make a waterproof liner for the wooden packing case. Place the consolidated package into the wooden packing case, cushion the top with flexible corrugated pads, and seal the top of the waterproof liner with pressure-sensitive tape. Nail the top to the wooden packing case.

38. Demolition

Demolition of the power supply will be accomplished only upon the order of the commander. Use the following methods to demolish the power supply:

a. Smash. Use a sledge, pickaxe, or other heavy tool to smash the cabinet and the meters and controls on the front panel. Remove the top and side panels and smash the internal components.

b. Cut. Use a handaxe or other suitable tool to cut the wiring of the power supply.

c. Burn. Saturate the power supply and technical manuals with any available flammable material such as gasoline or kerosene and ignite it.

d. Dispose. Bury the demolished power supply in trenches, foxholes, or throw it into a lake or stream.

[AG 412.12 (1 Apr 57)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

HERBERT M. JONES,
Major General, United States Army,
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MDW	USA Comm Agency
Armies	WRAMC
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USA Tng Cen	JBUSMC
Ft & Cp	Mil Dist
Gen & Br Svc Sch	Units org under fol TOE:
Gen Depot	11-7 11-500
Sig Sec, Gen Depot	11-16 11-557
Sig Depot	11-57 11-587
POE (OS)	11-127 11-592
Army Terminal	11-128 11-597

NG: State AG; units—same as Active Army.

USAR: None.

For explanation of abbreviations used, see SR 320-50-1.

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