TM 11-6130-247-14-1

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND 6ENERAL SUPPORT,

MAINTENANCE MANUAL

POWER SUPPLY PP-3940A/G

(NSN 6130-00-460-2148)

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
SEPTEMBER 1971

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

High voltages and currents exist in this equipment. Serious injury or death may result from contact with the input or output connections. Reenergize the equipment before connecting or disconnecting the load to be powered.

DON'T TAKE CHANCES!

CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *16 September 1977*

Operator, Organizational, Direct Support,
And General Support Maintenance Manual
POWER SUPPLY PP-3940A/G
(NSN 6130-00460-2148)

TM 11-6130-247-14-1,23 September 1971, is changed as follows:
1. A vertical bar appears opposite new or changed material.
2. Remove and insert pages as indicated in the page list below:

Remove	*hurt*
i	i
l-l and l-2	l-l and 1-2
2-l through 2-4	2-1 through 2-4
3-l through 3-3	3-1 through 3-2
4-l and 4-2	4-1 and 4-2
5-l through 5-5	5-1 hrough 5-4
6-l and 6-2	6-1 and 6-2
8-1	None
A-l	A-1
B-l through B-4	B-1 through B-5

3. File this change sheet in front of the manual for reference purposes.

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

J.C. PENNINGTON
Brigadier Geneml, United Stutes Army
The Adjutant Geneml

Distribution:
To be distributed in accordance with DA Form 12-32, Direct and General Support maintenance requirements for AN/FPA-15 and AN/FPA-16.

TECHNICAL MANUAL
No, 11-6130-247-14-1

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DEPARTMENT OF THE ARMY
WASHINGTON, DC, 23 *September 1971*

Operator, Organizational, Direct Support, *and General* Support, Maintenance Manual
POWER SUPPLY PP-3940A/G
(NSN 6130-00-460-2148)

REPORTING OF ERRORS

You can help improve this manual by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1 Scope (fig. 1-1)

a. This manual describes Power Supply PP-394A/G and provides instruction for installation, operation, function, and maintenance. It includes cleaning and inspection of the equipment, and replacement of parts available to each category of maintenance.

b. Appendix A lists the publications applicable to this equipment. Appendix B lists the maintenance allocation of repair operations to be performed at the appropriate maintenance category.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports

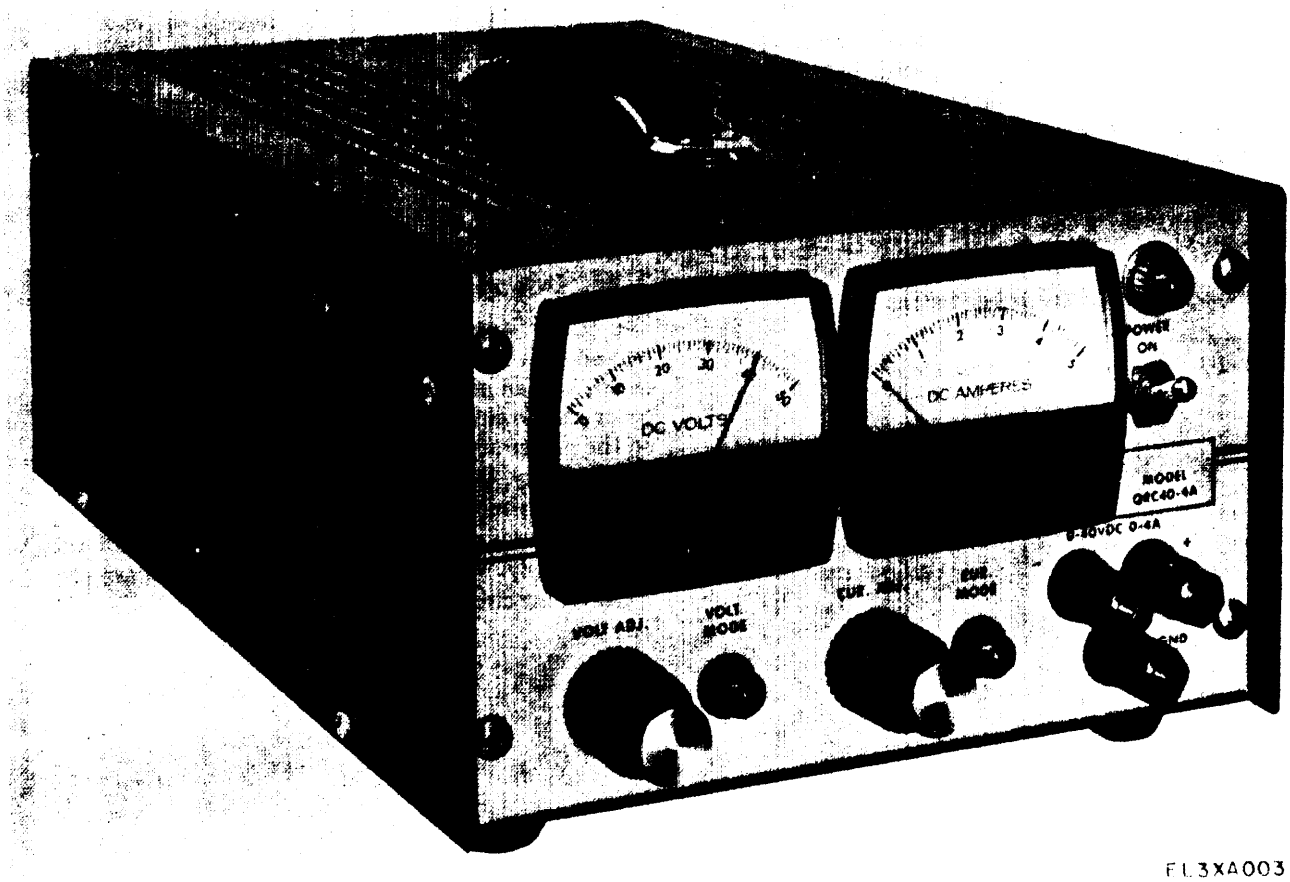


Figure 1-1. Power Supply PP-3940A/G, less running spares

which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750 (Army).

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33 A/AFR 75-18/MCO P461O.19B, and DSAR 4500.15.

1-4. Administrative Storage

For procedures, forms, and records, and inspections required during administrative storage of this equip ment, refer to TM 740-90-1.

1-5. Destruction of Army Materiel

Destruction of Army materiel to prevent enemy use shall be as prescribed in TM 750-244-2.

1-6. Reporting Equipment Improvement Recommendations (EIR).

EIR's will be prepared using DA Form 2407, Maintenance Request Instructions for preparing EIR's are provided in TM 38-750, The Army Maintenance Management System. EIR's should be mailed directly to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

Section II. DESCRIPTION AND DATA

1-7. Purpose and Use

Power Supply PP-3940A/G (fig. 1-1) converts 115-volt alternating current (at) single-phase power, to from 0- to 40-volt direct current (dc) power at a maximum of 4 amperes. The power supply has the additional capabilities of regulating the output voltage at the load rather than at the power supply output terminals (remote sensing); producing specific values of output voltage or current by connecting appropriate resistances to rear terminal board terminals (voltage and current programming). This power supply may be used whenever a precise, regulated voltage (40 volts maximum) or current (4 amperes maximum) supply is specified,

1-8. Technical Characteristics

Power input:
- Voltage . . . . . .115 volts ± 10.
- Phase . . . . . Single.
- Frequency . . . . . 50 to 400 Hz.
- Current. ., ...3.5 amperes maximum.

Power output:
- Voltage . . . . . .0 to 40 volt 4 dc.
- Current . . . . . 0 to 4 amperes.

Regulation . . . . . 0 0l% maximum.
Ripple. . . . . l millivolt rms maximum.
Ambient temperature . . . . . -20 °C(-4° F to 50° C(122° F).
Weight . . . . . 26 pounds.

1-9. Components

a. Component.

Federal stock No.	Component	Quantity	Height (in.)	Depth (in.)	width (in.)	Weight (lb)
6130-460-2148	Power Supply P-394A/NG	1	5	16.1/8	8 1/8	26

b. Running Spares.

Federal stock No.	Quantity	Item
5920-296-1519	1	Fuse, cartridge (F1, 5 ampere)
6240-683-0560	2	Lamp, incandescent (DS2 and DS3)

1-10. Description of Equipment

The power supply is a self-contained, portable unit housed in a metal case with a one-piece top and side cover, and an attached power cable. The top and side cover can be easily removed to facilitate maintenance on the power supply. The power cable is terminated in a heavy-duty, three-wire connector plug. All operating controls are mounted on the front panel. A carrying handle is provided to facilitate repositioning of the power supply. Vents on each side and the top are provialed for air circulation.

CHAPTER 2

INSTALLATION AND OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unpacking (fig. 2-1)

a. *Packaging Data.* When packed for shipment, Power Supply PP-3940A/G is placed in a carton and packed in a 7- by 19- by 11-inch outer corrugated carton. A typical packaging diagram is shown in figure 2-1. The volume is 0.85 cubic foot and the total weight is 35 pounds.

b. Removing Contents.

(1) Cut the waterproof tape that seals the top of the shipping carton.

(2) Remove the inclosed cardboard carton.

(3) Cut the waterproof tape that seals the top of the cardboard carton.

(4) Open the moisture and vapor proof barrier in the cardboard container.

(5) Remove the enclosed cardboard carton.

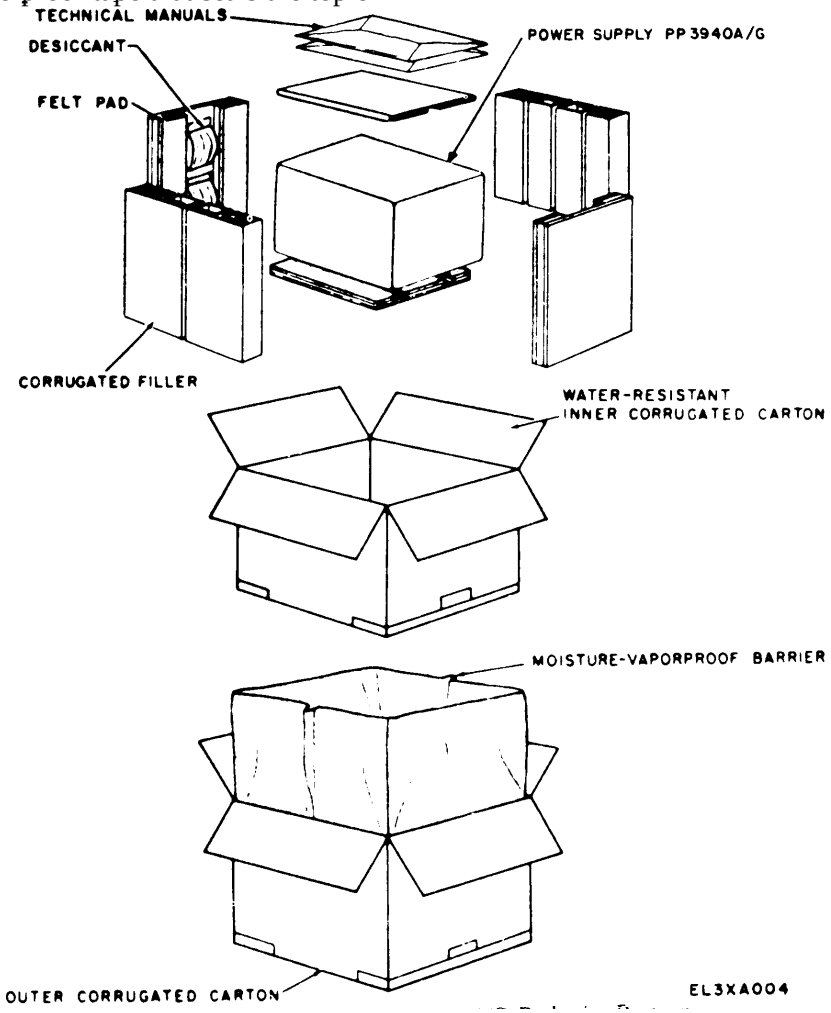
(6) Cut the waterproof tape that seals the tap of the cardboard carton.

(7) Remove the humidity indicator, the desiccant, and the pads.

(8) Remove the power supply.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, re-



Ftgure 2-1, Power Supply PP-3940A/G, Packaging Diagram

port the damage on DD Form 6 (para 1-3).

b. See that the equipment is complete as listed on the packing slip. If- a packing slip is not available, check the equipment against the components data given in paragraph 1-6. Report all discrepancies in accordance with TM 38-750. Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear. on the front panel near the nomenclature plate. If modified, see that any operational instruction changes resulting from the modification have been entered in the equipment manual.

NOTE

Current MWO's applicable to the equipment are listed in DA Pam 310-7.

2-3. Installation

a. All semiconductors, the fuse, terminal board links, and indicator lamps are installed in the power supply when the equipment is shipped.

b. See that a 5.0-ampere fuse is installed in the fuse holder at the rear of power supply (fig, 2-3).

c. See that all terminal board screws are present and links are tightly connected between terminals 1 and 2, 3 and 4, 5 and 6, 8 and 9, and 10 and 11 on rear terminal board (fig. 2-3).

d. The power supply is a bench-type unit and needs no installation.

2-4. Preparation for Use

a. Set POWER switch S1 to off (fig. 2-2).

WARNING

The input power is applied by a line cord with an ac three-prong plug. Connection of the line cord to a 3-wire ac power source grounds the equipment. If 3-wire ac power is not available, an adapter can be used. The user should make sure that the extra wire (coded green) coming out from the adapter is solidly grounded to the ac power source wiring system, preferably soldered.

b. Plug the power cord connector into a 115-volt ac, 60-Hertz (Hz) power source.

c. Make the necessary load connections to the binding posts as specified by the local requirement.

2-5. Terminal Board Links

Terminal board links connect portions of the interior power supply circuitry. When the power supply is used

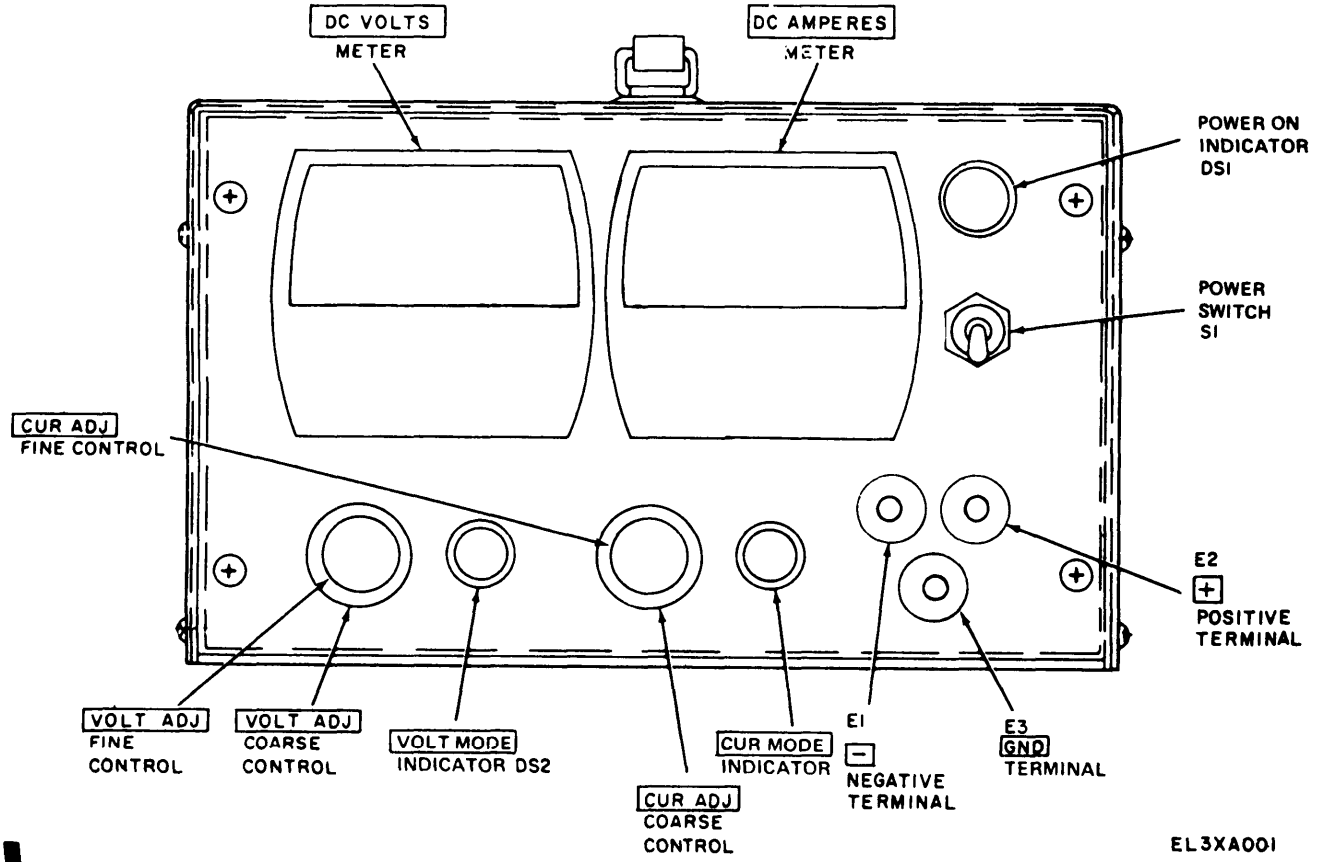


Figure 2-2. Power Supply PP-3940-A/G, Front Panel Controls an Indicators.

in any of its modes of operation, some portions of the internal circuitry must be disconnected by removing specific terminal board links. The operator must insure that the correct combination of links is securely fastened to the proper terminals.

a. Link Combinution for Constant Voltage, Constant Current, or Predetermined Values of Current and Voltage. Inspect the terminal board and insure that links are securely fastened between terminals l and 2, 3 and 4, 5a nd 6, 8 and 9, and 10 and 11.

CAUTION

Do not operate the power supply unless all the links are present and securely fastened.

b. Link Combination for Voltage Programing. Inspect the terminal board and remove the link between terminals 1 and 2. Be sure that links are securely fastened between terminals 3 and 4,5 and 6,8 and 9, and 10 and 11.

CAUTION

Do not operate the power supply with link removed from terminals 1 and 2 unless a resistor is connected across terminals 1 and 3 as specified in paragraph 2-9.

c. *Link Combination for' Current Programing.* Inspect the terminal board and remove the link between terminals 8 and 9. Be sure that links are securely fastened between terminals 1 and 2, 3 and 4, 5 and 6, and 10 and ll.

CAUTION

Do not operate the power supply with link removed from terminals 8 and 9 unless a resistor is connected across terminals 7 and 9 as specified in paragraph 2-10.

d. Link Combination for Remote Voltage Sensing at Load. Inspect the terminal board and remove the links between terminals 3 and 4 and 5 and 6. Be sure that links are securely fastened between terminals 1 and 2, 8 and 9, and 10 and 11.

CAUTION

Do not operate power supply with links removed from terminals 3 and 4 and 5 and 6 unless a load is connected by individual connections to each of these terminals as specified in paragraph 2-11.

Section II. OPERATING INSTRUCTIONS

2-6. Controls and Indicators

a. Front Panel Controls and Indicators (fig. 2-2).

Control or indicator	Function
Voltmeter M2	Indicates output voltage.
Ammeter Ml	Indicates output current.
POWER ON indicator DSl	When lit, indicates primary power is applied.
POWER switch Sl	In ON position, connects 115-volt ac, single-phaae power to power supply,
(+) terminal E2	Positive front panel output con nection.
(-) terminal El	Negative front panel output connection.
GND terminal E3	Ground front panel output connection.
CUR MODE indicator DS3	When lit, indicates power supply is in current mode.
CUR ADJ fine control.	Provides fine current output adjustment.
CUR ADJ coarse control.	Provides coarse current output adjustment.
VOLT MODE indicator DS 2	When lit, indicates power supply is in voltage mode.

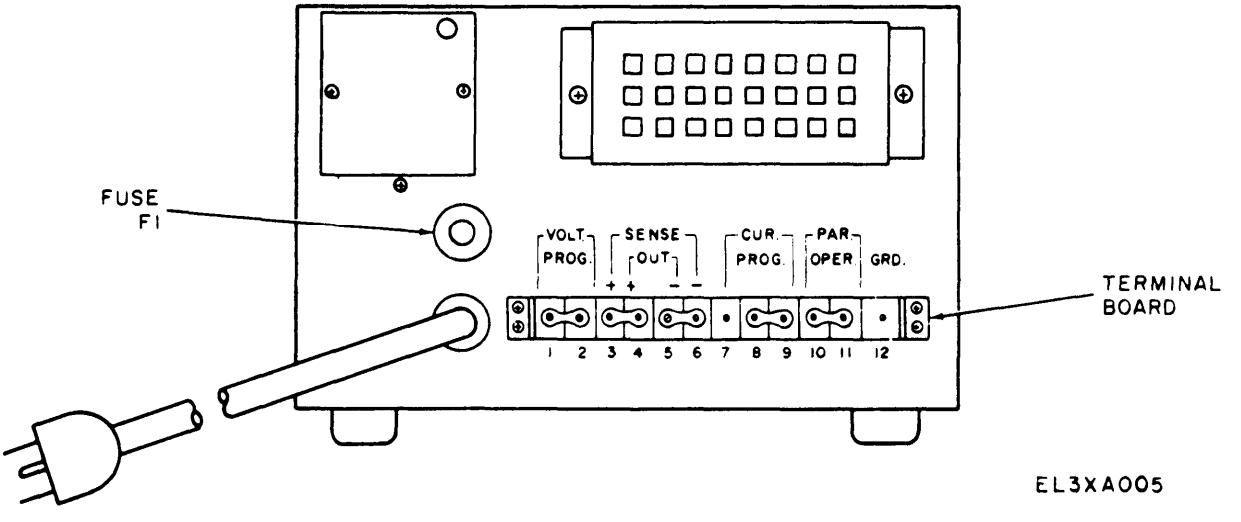


Figure 2-3. Power Supply PP-3940A/G, Rear Panel.

Control or indicator	Function
VOLT ADJ fine control	Provide a fine voltage output adjustment.
VOLT ADJ coarse control	Provides coarse voltage output adjustment.

b. *Rear Panel Controls (fig. 2-3).*

Cotrol	Function
Fuse F1	Protects the ac input power from overload.
Terminal board TB1	Connects various portions of the power supply internal circuitry. Links may be removed for different modes of operation.

2-7. Power Supply Setup Procedures for Constant Voltage Output

If the power supply is to be used as a constant voltage source, proceed as follows:

a. Turn front panel VOLT ADJ and CUR ADJ coarse and fine controls fully counterclockwise and set POWER switch S1 to Off.

b. Be sure terminal board links are connected as stated in paragraph 2-5a.

c. Connect load to front panel binding posts.

d. Set POWER switch S1 to ON and turn front panel CUR ADJ coarse and fine controls fully clockwise.

e. Adjust front panel VOLT ADJ coarse and fine controls for required constant voltage output.

NOTE

The value of the current supplied to the load is a function of the load resistance and the power supply constant output voltage,

2-8. Power Supply Setup Procedures for Constant Current Output

If the power supply is to be used as a constant current source, proceed as follows.

a. Turn front panel VOLT ADJ and CUR ADJ coarse and fine controls fully counterclockwise and set POWER switch S1 to off.

b. Be sure terminal board links are connected as stated in paragraph 2-5a.

c. Connect load to front panel binding posts.

d. Set POWER switch S1 to ON and turn front panel VOLT ADJ coarse and fine controls fully clockwise.

e. Adjust front panel CUR ADJ coarse and from controls for required current output.

NOTE

The value of the voltage supplied to the load is a function of the load resistance and the power supply output constant current.

2-9. Power Supply Setup Procedures for Voltage Programing

Voltage programing is used when the operator wishes to switch from one set constant voltage output to another without returning to the power supply each time. To setup the power supply for voltage programing, proceed as follows.

a. Turn front panel VOLT ADJ and CUR ADJ coarse and from controls fully counterclockwise and set POWER switch S1 to off.

b. Determine the value of voltages to be used; for example, voltage levels of 28 volts dc, 12 volts dc, and 6 volts dc.

c. Multiply the value of each voltage to be used by 100. This will give the value of the resistor that must be placed across terminal board VOLT PROG terminals (terminal numbers 1 and 2). For *example,* from b above, 28 volts x 100 = 2,800 ohms; 12 volts x 100 = 1,200 ohms; 6 volts X 100 = 600 ohms.

NOTE

The programing resistors should be low-temperature, coefficient wire-wound resistors or should be maintained at a constant ambient temperature.

d. Connect the resistors to an external programing switch as shown in figure 2-4.

e. Be sure that terminal board links are connected as stated in paragraph *2-5b* and connect external programing switch and resistors across terminals 1 and 3.

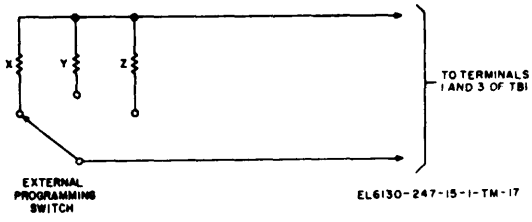


Figure 2-4. Power Supply PP-3940A/G, programing connections.

CAUTION

Never operate the newer supply unless a terminal board link is connected between terminals 1 and 2 or a resistance is connected across terminals 1 and 3.

f. Connect power supply to the load.

g. Set newer supply POWER switch to ON. Adjust front panel CUR ADJ coarse and fine controls fully clockwise.

NOTE

The front panel VOLT ADJ controls are inoperative during voltage programing.

h. Be sure that resistors are removed and terminal board links are reconnected when voltage programing is no longer required.

2-10. Power Supply Setup Procedures for Current Programing

Current programing is used when the operator. wishes to switch from one set output constant current to another, without returning to the power supply each time. To set up the power supply for current programing, proceed as follows :

a. Turn front panel VOLT ADJ and CUR ADJ coarse and fine controls fully counterclockwise and set POWER switch S1 to off.

b. Determine the value of current to be used; for example, current levels of 2.5 amperes dc, 1 ampere dc, and 0.5 ampere dc.

c. Multiply the value of each current to be used by 50. This will give the value of the resistor that must be placed across terminal board CUR PROG terminals (7 and 0.) For *example,* from *b* above, 2.5 x 50 = 125 ohms; 1 x 50 = 50 ohms; 0.5 x 50 = 25 ohms.

NOTE

The programing resistors should be low-temperature, coefficient wire-wound resistors, or should be maintained at a constant ambient temperature.

d. Connect the resistors to an external programing switch as shown in figure 2–4.

e. Be sure that terminal board links are connected as stated in paragraph 2–5c and connect external programing switch across terminals 7 and 9.

CAUTION

Never operate the power supply unless a terminal board link is connected between terminals 8 and 9 or a resistance is connected across terminals 7 and 9.

f. Connect power supply to the load.

g. Set power supply POWER switch to ON Adjust front panel VOLT ADJ coarse and fine controls fully clockwise.

NOTE

The front panel CUR ADJ controls are inoperative during voltage programing.

h. *Be sure* that resistors are removed and terminal board link are reconnected when current programing is no longer required.

2-11. Power Supply Setup Procedures for Remote Sensing at Load

Remote sensing is used to regulate the output voltage at the load rather than at the output terminals of the power supply. To **set** up the power supply for remote sensing, proceed as follows:

a. Turn front panel VOLT ADJ and CUR ADJ coarse and fine controls fully counterclockwise and set POWER switch S1 to off.

b. Be sure that terminal board links are connected as stated in paragraph 2–5d.

c. Connect separate leads from terminals 3 (+SENSE lead) and 4 (+OUT lead) to the positive side of the load, and separate leads from terminals 5 (–OUT lead) and 6 (–SENSE lead) to the negative side of the load (fig. 2-5).

NOTE

The leads (25 feet maximum) from terminals 4 and 5 must be capable of handling 4 amperes of current flow. The

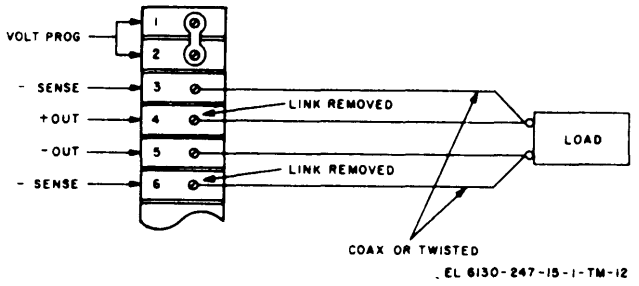


Figure 2-5. Power Supply PP-3940A/G, connections for remote sensing.

leads from terminals 3 and 6 should be either a coaxial pair or twisted pair in order to minimize stray pickup, which might result in power supply instability.

d. Set POWER switch S1 to ON and turn front panel CUR ADJ coarse and fine controls fully clockwise.

e. Adjust front panel VOLT ADJ coarse and fine controls for required. constant voltage output.

2-12. Power Supply Setup Procedures When Specific Values of Voltage and Current Are Required

When power supply output requirements specify both a constant voltage and a specific current that is not to be exceeded, or both a constant current and a specific voltage that is not to be exceeded, proceed as follows.

a. Turn front panel VOLT ADJ and CUR ADJ coarse and fine controls fully counterclockwise and set power supply POWER switch S1 to off.

b. Determine the limits of voltage and current to be supplied by the power supply. For *example,* constant voltage of 28 volts dc with current not to exceed 1.5 ampere dc.

c. Be sure that terminal board links are connected as stated in paragraph 2-5a.

d. Connect load to front panel terminals.

e. Set power supply POWER switch to ON.

f. Set the *not to exceed* value (either current or voltage), using the front ‘panel coarse and fine controls and meter. (For the example given in *b* above, turn the CUR ADJ coarse and fine controls for a reading of 1.5 ampere on ammeter,)

g. Set the constant value (either current or voltage) using the f rent panel coarse and fine controls and meter. (For the example given in *b* above, turn the VOLT ADJ coarse and fine controls for a reading of 28 volts on voltmeter.)

NOTE

When the power supply is set up in this manner, there may be a flickering between VOLT MODE and CUR MODE lamps when operating at the *not to exceed* value.

CHAPTER 3

PREVENTIVE MAINTENANCE INSTRUCTIONS

3-1. Scope of Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 3-2 and 3-3 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services chart (para 3-2) outlines functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the chart indicates what to check, how to check, and the normal indications. The *References* column lists the paragraphs or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective actions listed, higher category of maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

(1) Before *you operate.* Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

(2) *While you operate.* Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

3-2. Preventive Maintenance Checks and Services Chart

B-Before operation D-During Operation A-After operation W-Weekly M–Monthly Q-Qarterly

Item number	Interval: Operator: Daily: B	D	A	Org: W	M	Q	Item to be inspected	Procedure	Reference
1	X	...	...	...	...	...	Completeness	See that equipment incomplete	Para 1-9
2	X	...	...	...	...	...	Panel	Clean and check meter glass and indicator lenses for Cracks.	Para 3-3.
3	X	...	...	...	...	...	Connectors	Check tightness.	
4	...	X	...	...	...	...	(Controls and indicator ..	See that mechanical action is smooth and check meter for sticking or bent pointer.	
5	...	X	...	...	...	...	Operation	Operate equipment according to chapter 2.	
6	...	...	...	X	...	...	Cables, cords, wires	Inspect for chafed, cracked, or frayed insulation. Replace connectors that are broken, arced, stripped, or worn excessively.	
7	...	...	...	X	...	...	Handle	Inspect for looseneas. Replace or tighten as necessary.	
8	...	...	...	X	...	...	Metal surfaces	Inspect for rust and corrosion. Touch up paint as required.	Para 3-4.
9	...	...	...	...	X	...	Pluckout item	Inspect seating.	
10	...	...	...	...	X	...	Jacks	Inspect for snug fit and good contact.	
11	...	...	...	...	X	...	Transformer	Inspect for tight nuts and absence of dirt or corrosion.	
12	...	...	...	...	X	...	Resistors and capacitor .	Inspect for cracks, blistering, or other defects.	
13	...	...	...	...	...	X	Publications	See that all publications are complete, serviceable, and current.	DA Pam 310-4.
14	...	...	...	...	...	X	Modification	Determine if new applicable MWO's have been pub lished. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	TM 38-750 and DA Pam 310-7.
15	...	...	...	...	...	X	Spare parts	Check for general condition and method of storage. No overstock should be evident and all shortages must be on valid requisitions.	Para 1-9b.

3-3. Cleaning

Inspect the exterior of the equipment. The exterior surfaces should be free of dust, grease, and fungus.

a. Remove dust and loose dirt with a clean, soft cloth.

WARNING

The fumes of trichloroethane are toxic. Provide through ventilation whenever used. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame converts the fumes to highly toxic, dangerous gases.

b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with trichloroethane.

c. Remove dirt or dust from plugs and jacks with a brush.

CAUTION

Do not press on the meter face (glass) when cleaning; the meter may become damaged.

d. Clean the front panel, meters, and control knobs; use a soft, clean cloth. If necessary, dampen the cloth with water; mild soap may be used for more effective cleaning.

3-4. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning practices specified in TB 746-10.

3-5. Organizational Troubleshooting

a. General. The troubleshooting procedure will help the repairman to locate the trouble quickly and apply the proper corrective measures. If the measures suggested do not restore normal equipment performance, troubleshooting is required by higher maintenance category repairman. Note on the repair tag what corrective measures were taken and how the equipment performed at the time of failure.

b. Procedure. Perform the steps in c below. Observe the equipment operation and perform any corrective measures necessary.

c. Troubkshooting Procedure

Symptom	Probable cause	Corrective measures
1. POWER ON indicator lamp. does not light.	*a.* Defective fuse F1	*u.* Replace fuse.
	b. Defective power lamp	b. Replace lamp.
	c. Defective transformer	c. Refer to higher category of maintenance.
2. In voltage mode, VOLT MODE indicator lamp does not light.	*a.* Defective lamp	a. Replace lamp.
	b. Defective regulating stage	*b.* Refer to higher category of maintenance.
3. In current mode, CUR MODE indicator lamp does not light.	*a.* Defective lamp	a. Replace lamp.
	b. Defective regulating stage	*b.* Refer to higher category of maintenance.
4. Erratic indicator movement of current or voltage meter.	Defective preregulation.	Refer to higher category Of maintenance

3-6. Removal and Replacement of Lamp

a. VOLT and CUR Mode Indicator Lamps.

NOTE

POWER lamp DS1 replacement is accomplished at higher category of maintenance.

(1) Turn plastic indicator cover counterclockwise and pull out to expose defective lamp.

(2) Unscrew defective lamp.

(3) Install new lamp and reinstall indicator cover.

b. Fuse (F1).

(1) Turn fuse cap counterclockwise and pull it out to expose defective fuse.

(2) Pull defective fuse out and replace it with a new one. push new fuse in and install fuse cap.

CHAPTER 4

FUNCTIONING OF EQUIPMENT

4-1. General

a. The power supply is a variable-output, voltage regulated, current-regulated dc supply. The characteristic of this type of regulated power supply exhibits a crossover point at which the supply switches from voltage regulation, indicated by the front panel VOLT MODE indicator being lit, to current regulation, indicated by the front panel CUR MODE indicator being lit. Figure 4-1 indicates this crossover point as a function of the preset value of the front panel VOLT ADJ and CUR ADJ controls. For *example*, setting the front panel controls for 20 volts dc and 2 amperes and Using Ohm's Law

$$R = \frac{E}{I} = \frac{20}{2} = 10 \text{ ohms.}$$

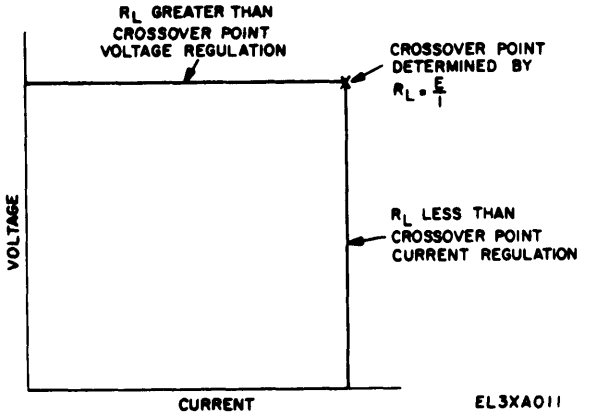


Figure 4-1. Power Supply PP-3940A/G, crossover characteristics.

b. If the value of the load resistance is 10 ohms or more, the power supply will regulate the output voltage at 20 volts dc and the VOLT MODE indicator will be lit. If the load resistance is less than 10 ohms, the power supply must produce more than 2 amperes of current to regulate the output to 20 volts dc. At this point, the VOLT MODE indicator extinguishes, the CUR MODE indicator lights, and the current is regulated to the set value of 2 amperes.

4-2. Block Diagram Analysis (fig. 4-2)

a. Input power is applied to the primary side of transformers T1 and T2. The secondary voltage of T1 is applied to a full-wave, solid-state rectifier with capacitor filtering. The rectified voltage is applied to a dc switching-type preregulator which breaks up the dc voltage into pulses. The output voltage is determined by the relation of on-time to off-time of this switch. The series switch arrangement is a very efficient device, but it has a slow response time to any detected errors in the output. The response time is increased by providing a linear series passing network which provides instantaneous correction for output error.

b. Under normal conditions, a short circuit across the output will drive the series regulator into current mode operation, holding the short circuit current to the preset value of the CUR ADJ controls. However, if a series passing stage in the series regulator is shorted, in addition to the external short circuit, the combination will produce a damaging amount of current through the preregulators. An overcurrent protection network is provided to sense this condition and will short out the preregulator circuitry, relieving the preregulator elements of all current.

c. The ability of the voltage and current regulating circuitry to detect errors is dependent upon the ability of the reference supply to provide precise voltages to the regulating circuitry. The regulating circuits are differential amplifiers which depend on a constant voltage being supplied to one side of the circuit to detect errors in the output.

4-3. Detailed Circuit Analysis

a. Rectification and Preregulution. The 115-volt ac, single-phase, 60- to 400-Hertz input is applied through POWER switch S1 and fuse F1 to primary of transformers T1 and T2. The secondary of T1 is connected to full-wave rectifier

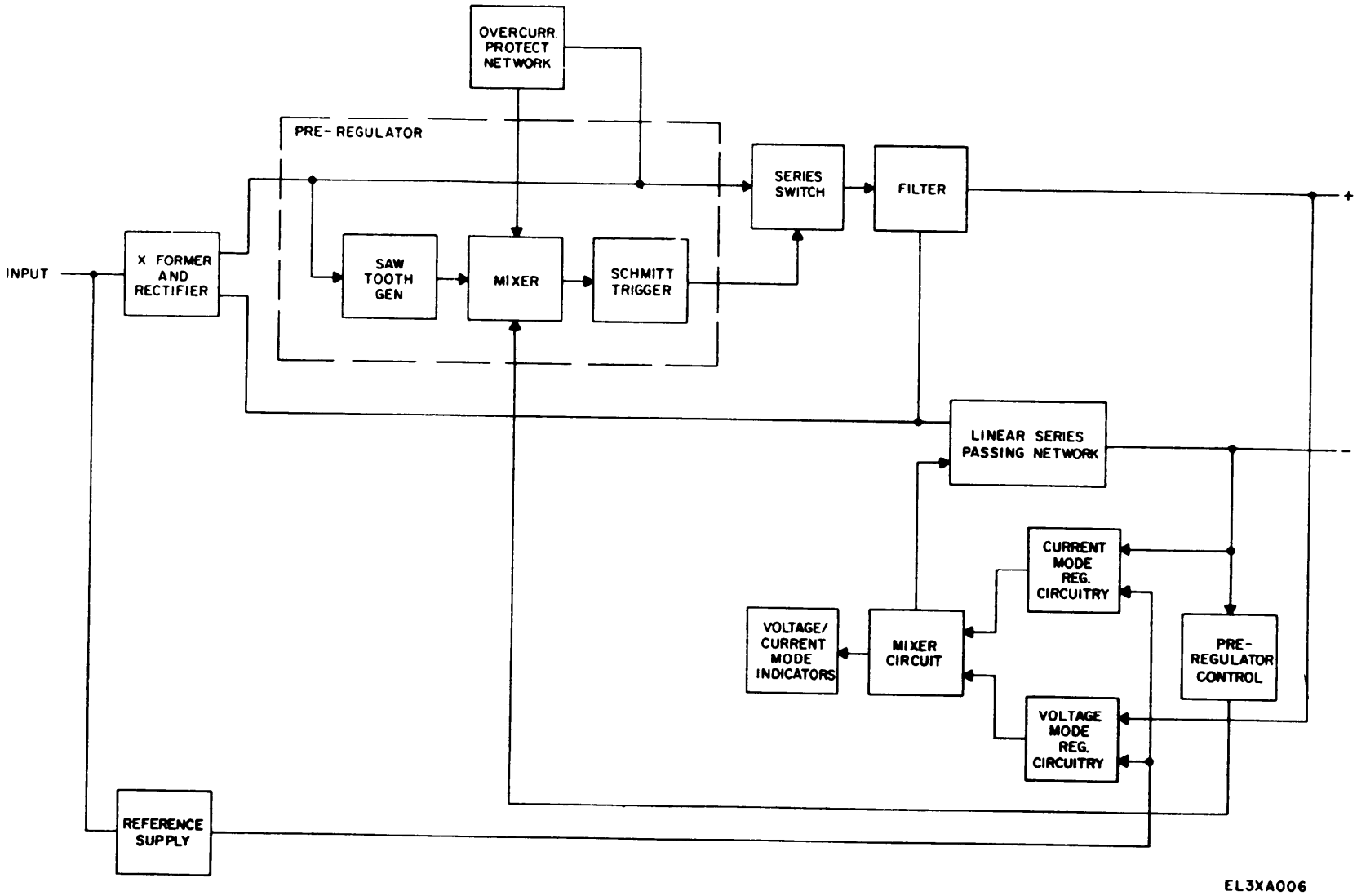


Figure 4-2. Power Supply PP-3940A/G,block diagram.

and filter circuit C1, CR1 through CR4, and C2. There are three secondary windings of transformer T2. One secondary winding (pins 10, 12, and 14) supplies bias to the Darlington connection of series switch transistors Q10 and Q9. The second secondary winding (pins 6, 7, and 8) of transformer T2 supplies back bias to the Darlington connection of Q15, Q14 and Q13. The third secondary winding (pins 4, 5 and 15) of transformer T2 supplies power to the auxiliary power supply consisting of differential amplifier A3Q25 and associated circuitry, second differential amplifier A3Q23, A3Q24 and associated circuitry and series regulator circuit A3Q22, A3Q21 and associated circuitry. The output of the full-wave rectifier is used to supply operating voltage to the preregulator by applying the rectified voltage to zener diode A4CR29 and resistor A1R90 in series. This produces a 15-volt dc potential to be used by the preregulator without disturbing the full output voltage of the rectified dc. Resistor A4R2 provides bias for unijunction transistor A4Q1 which will be used as an oscillator. Resistors A4R3 and A4R4 and capacitor A4C4 produce a charging time constant to the gate of A4Q1. As the positive charge on A4C4 increases, a point is reached which forward biases A4Q1. Capacitor A4C4 then discharges through A4Q1 which reduces the positive charge of capacitor A4C4. Transistor A4Q1 turns off and the cycle is repeated. Resistor A4R4 is used to vary the time required for A4C4 to charge to the forward bias point. This sawtooth output of capacitor A4C4 is coupled through resistor A4R5 to emitter-follower transistor A4Q2 and its associated circuitry. The signal output across resistor A4R7 is coupled to the mixer amplifier circuitry by capacitor A4C7. Mixer amplifiers A4Q3 and A4-Q4 and associated circuitry provide a means of injecting a dc bias, proportional to detected error in output voltage or current; to control the time required for the dc signal combined with the sawtooth signal, to fire the Schmitt trigger composed of A4Q5, A4Q6, and associated circuitry. The output frequency of the Schmitt trigger will remain constant (that is, same as the sawtooth frequency), but the pulse width will vary. The Schmitt trigger output pulses are amplified by transistor A4Q7 and applied to driver transistor A4Q8 which will switch Darlington-connected series switch transistors Q10 and Q9 on and off. As the on time of the series switch transistors increases, the output voltage and current increase. The switched output is filtered by inductor L1 and series resistance-capacitance (rc) network R33 and C13. Resistor R36 maintains a minimum load across the preregulator output.

b. Current Overload Protection. If a series regulator passing stage develops a short circuit, a heavy load or short circuit at the output of the power supply will result in a significant increase in the current through the series switch. This increase in current is sensed by resistor R28. The voltage drop across R28 increases and forward-biases transistor A4Q38 which then applies a positive voltage to the Schmitt trigger input, shutting it off. The reaction time of this circuit is in microseconds. If the transient or short circuit persists, capacitor A4C41 begins charging. When the positive charge across A4C41 reaches the breakdown voltage of Zener diode A4CR32, the zener diode allows this positive voltage to be applied to the control gate of silicon-controlled rectifier A4CR31, allowing it to conduct. A4CR31 then shorts out the preregulator, removes all current from series switch transistors Q9 and Q10, and drops the output voltage and current to zero. The only way A4CR31 can be reset is to remove input power.

c. Voltage Regulation Circuitry. The power supply output voltages is sensed by voltage divider R59A and R59B, which are the front panel VOLT ADJ controls, and A3R60. This divided-down sample of the output voltage is applied to A3Q-36, which is one-half of a differential amplifier. The other half, A3Q35, is supplied with a constant reference voltage. The bases of transistors A3Q35 and A3Q36 receive a constant current supply from transistor A3Q34 and associated circuitry. Any error sensed by the differential amplifier is applied to a second differential amplifier composed of A3Q32, A3Q33 and associated circuitry. Capacitors A3C24 and A3C25 are used to insure that the differential amplifier will not oscillate under any line of load conditions. Variations in A3Q32 collector current are coupled via A3Q31 into the base of Q15. The base bias of Q15 is constant current generator A3Q30 and its associated circuitry. Transistor A3Q31 operates in the saturated condition during voltage mode operation and has no affect on Q15 bias. The change in Q15 bias controls the drive current for the Darlington connection linear series regulator, changing the impedance of Q13. This provides instantaneous correction of an existing error, and thus holds the output voltage constant. To provide proper voltage drop across series pass regulator Q13 without excessive heating, it is necessary to maintain the Q13 voltage drop essentially

constant at S volts dc. (A3Q20 and A4Q4 act to detect any voltage variation across Q13 network R37, Q13, R39, and R52.) The A3Q20 base is biased by a reference voltage (A3CR20 and potentiometer A3R57) at approximately 5 volts dc below the output voltage.

The emitter of A3Q20 transfers this voltage. to the base of Q4. The emitter of A4Q4 senses the input voltage to the series regulator stage at the junction of R33 and R37. Any difference between the base and emitter voltages of A4Q4 will be proportional to the error existing between the A3Q20 reference voltage and series stage voltage drop. The collector of A4Q4 determines the dc bias to the Schmitt trigger which determines the proper on-off time of the series switch. Thus, the preregulator output voltage is corrected so that the Q13 voltage drop is held constant at 5 volts dc.

d. Current Regulation Circuitry. Current is regulated by sensing the voltage drop across resistor R52. Since resistor R52 is in series with the output load, the amount of current flowing through the load also flows through this close tolerance resistor. The voltage drop across resistor R52 then represents the current through the load. This voltage drop is compared to a reference voltage (voltage divider R53A and R53B, the front panel CUR ADJ controls, and R54 and A3R55, across zener diode A3CR20). The reference voltage is applied to A3Q1.9 which is one half of differential amplifier A3Q18, A3Q19, and associated circuitry. The R52 voltage drop is applied to A3Q18. Resistor A3R50 is used to balance the differential amplifier. Any detected error is applied to a second differential amplifier composed of A3Q16, A3Q17, and associated circuitry. The amplifier error signal changes the collector potential of A3Q16, which changes the bias of A3Q31 through diodes A3CR24A and A3CR24B. Changing the bias of A3Q31 affects the bias of Q15, which is the driver of the Darlington-connected linear series regulator, changing the impedance of Q13. Transistor Q13 provides instantaneous correction of the error and thus holds the current constant. The voltage drop across Q13 is held constant by the same method discussed in c above

CHAPTER 5

DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE

WARNING

When servicing the power supply, be extremely careful of the high voltages.

5-1. Scope of Maintenance

Troubleshooting at the direct support, general support, and depot maintenance categories includes all the techniques outlined for organizational maintenance and any special or additional techniques required to isolate a defective part. Paragraph 5-4d provides the troubleshooting chart to be used by the repairman.

5-2. Test Equipment Required

The tools and test equipment required for troubleshooting the PP-3940A/G are listed in section III of the Maintenance Allocation Chart (appx B).

5-3 Sectionalization, Localization, and isolation

a. Sectionalization. The first step in servicing is to sectionalize the fault to a circuit of the power supply. The circuit at fault can be located by the following methods.

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring circuits. Through inspection alone the repairman frequently may discover the trouble or determine the circuit in which the trouble exists.

(2) *Testing.* The tests described in this chapter frequently indicate the general location of the fault.

b. Localization. Once the circuit that is at fault has been determined, the trouble must be further localized to the defective component within the circuit. This can best be accomplished by isolation.

c. Isolation. The next step is to isolate the trouble to the defective part responsible for the abnormal condition. Equipment trouble can usually be isolated to dirty contacts or improper adjustment. Some faults, such as burned out resistors and arcing, can be located by means of sight, sound, or smell. The majority of faults, however, must be isolated by making voltage and resistance checks. Tests that should minimize the amount of work involved in isolating a trouble within a defective unit are contained in (1) through (4) below.

(1) *Visual inspection. The* purpose of visual inspection is to quickly locate a fault without testing or measuring circuits. By this approach, maintenance personnel can frequently discover the trouble or determine the circuit in which the trouble exists.

(2) *Testing.* Maintenance personnel should perform the tests located in this chapter. The tests will indicate the general location of the fault and help determine the exact nature of the trouble.

(3) *Intermittent troubles. The* possibility exists that intermittent troubles can occur. If present, this type of trouble can occur. If present, this type of trouble can often be located by tapping or jarring the equipment. For this type of condition, the wiring and connections to the unit must be checked for defects.

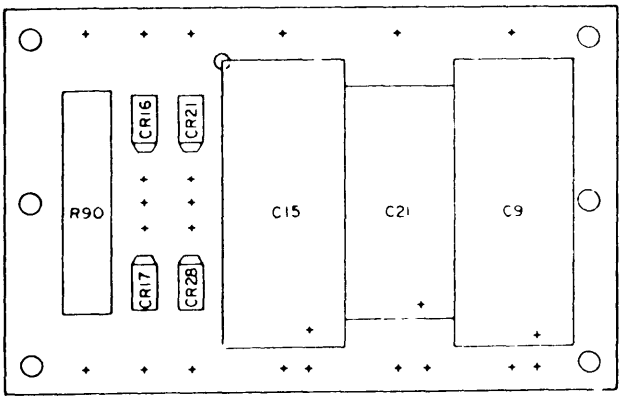
(4) *Voltage and resistance measurements.* When measuring voltages, use tape or sleeving to insulate the entire test probe, except for the extreme tip.

5-4. Maintenance Aids

a.. Parts Location Diagrams. Parts location diagrams (figs. 5-1 through 5-4 and 8-2) are provided for the power supply and to identify the individual components as an aid in troubleshooting.

b. Schematic Diagrams. Figure 8-3 is a schematic diagram of the power supply.

c. Resistor and Capacitor Color Code Diagram. Figure 8-1 is the color code diagram for resistors, and capacitors, Figure 8-1 provides pertinent resistance, voltage rating, and tolerance information.



NOTE :
PARTIAL REFERENCE DESIGNATIONS ARE SHOWN PREFIX THE DESIGNATIONS WITH ASSEMBLY DESIGNATION A1.

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Figure 5-1. Power Supply PP-3940A/G, Component Board A1, Parts Location *Diagram,*

d. Troubleshooting Chart.

Malfunction	Probable cause	Corrtrol action
1. VOLT MODE and CUR MODE indicators not lit.	Defective lamp.	Determine mode of operation and replace appropriate lamp.
2. Fuse F1 blown	*a. Shorted di?? main rectifier CR1-CR4* *b.* Defective switching stage Q? and Q10 . . . c. Filter capacitor C1, C2, or C13 shorted . . d. Defective passing stage Q13, Q14 or Q15.	a. Replace defective diode, b. Replace defective component. c. Replace defective component. *d.* Replace defective component.
3. Low output or no output voltage. . . .	*a.* Open PAR OPER. terminals (between pins 10 and 11 on TR1) b. Switch S1 defective..... c. Fuse F1 blown . . . . . . d. Defective switching stage Q9 and Q1O e. Defective Schmitt trigger A4Q5 and A4Q6. f. Defective transformer T1	a. Check wiring for open or loose link. *b.* Replace switch. c. See 2 above. d. Replace defective component. e. Replace defective component. f. Replace transformer.
4. Highoutput voltage	*a.* Open SENSE connection . . . . . . *b.* Relaxation oscillator frequency adjust potentiometer A4R4 misadjusted. *c.* Defective Schmitt trigger A4Q5 and A4Q6. *d.* Voltage regulation circuits A3Q36, A3Q35, A3Q33, or A3Q32 defective. *e.* Defective VOLT ADJ potentiometer R59A or R59B. *f.* Preregulator control potentiometer A3R57 or amplifier A3Q20 defective.	a. Check wiring for open or loose link. b. Check oscillator frequency and adjust if required. c. Replace defective component. d. Replace defective component. e. Replace defective component. f. Replace defective unit and readjust preregulator.
5. No current limiting	a. Loose connection at CUR PROG terminals. b. Defective CUR ADJ potentiometer R53A or R53B. c. Defective balance adjust potentiometer A3R50. d. Current regulation circuit A3Q18, A3Q19, A3Q16, or A3Q17 defective. e. Defective temperature compensation network A4Q38, A4C41, R28, or A4R99.	a. Check and tighten if necessary, b. Replace defective component. c. Replace defective component. d. Replace defective component. e. Replace defective component. *NOTE.* Overcurrent protection check (para 5-9) must be accomplished if A4Q38 or R28 is found to be defective.

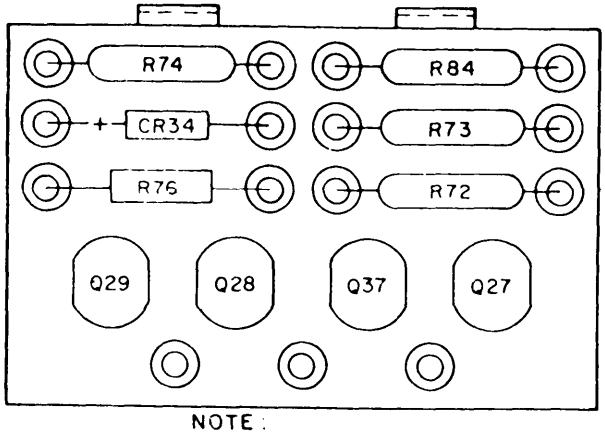


Figure 5-2 Power Supply PP-3940A/G, Component Board A2, Parts Location Diagram.

5-5. Initial Settings for Adjustments

a. Remove screws holding one-piece top and side cover from power supply, exposing interior of power supply.

b. Set printed board potentiometers A4R4, A3R50, and A3R57 to their midpoint positions.

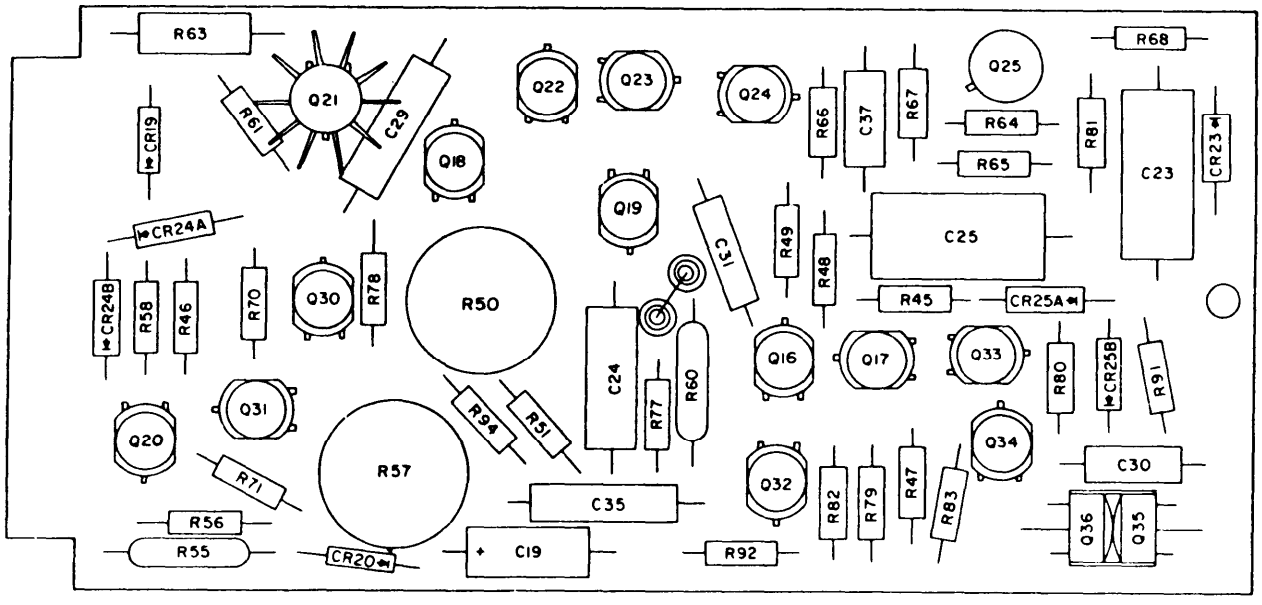
c. Set front panel CUR ADJ fine and coarse control potentiometers R53A and R53B and VOLT ADJ coarse and fine control potentiometers R59A and R59B to the midpoint position.

d. Set internal potentiometers R54 and R69 to their midpoint positions.

e. Be sure that terminal board links are connected as stated in paragraph 2-5a.

f. Connected load (variable resistor 5- to 50-ohm, 200-watt) to power supply front panel binding posts. Set variable resistor to midposition.

g. Connect power supply to variable power transformer (TF-171A/U).



NOTE :
PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE DESIGNATIONS WITH ASSEMBLY DESIGNATION A3.

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Figure 5-3. Power Supply PP-3940A/G, Component Board A3, Parts Location Diagram.

h. Connect variable power transformers to the 115-volt, 1-phase, 60-Hz source. Adjust variable power transformer to 115-volt output as viewed on Multimeter TS-352B/U.

5-6. Preregulator and Reference Supply Adjustment

a. Set POWER switch S1 to ON and observe that POWER ON indicator and VOLT MODE lamp light.

b. Connect frequency counter (N/USM-207A) across resistor A4R7 and adjust potentiometer A4R4 to frequency of 4,000 Hertz ± 400.

c. Gyptol potentiometer A4R4.

d. Remove frequency counter.

e. Connect oscilloscope (AN/USM-281) across resistor A4R25. Check for clean square wave driving pulse across entire duty cycle range. If pulse is not a clean square wave, troubleshoot components on circuit board A4.

f. Remove oscilloscope.

g. Place voltmeter (AN/GSM-64) across capacitor A3C23 and adjust potentiometer R69 so that voltmeter indicates 12.0 to 12,2 volts.

NOTE

Do not use Gyptol on potentiometer R69 at this time. Further adjustments are required.

h. Vary input line from 105 to 125 volts ac using variable transformer. The regulation should be 0.5 millivolt or less.

i. Set CUR ADJ coarse and fine control potentiometers R53A and R53B and VOLT ADJ coarse and fine control potentiometers R59A and R59B maximum clockwise.

j. Connect voltmeter (AN/GSM-64) between terminal E2 and the junction of resistors R37 and R36.

k. Set A3R57 so that voltmeter indicates approximately 5 volts.

l. With the output voltage set to 40 volts dc and the input line set to 105 volts ac, gradually increase the load to full current output (4 amperes).

m. At this load setting, reset potentiometer A3R57 to 5.0 Volta ± 0.1.

n. Lock with Gyptol.

NOTE

If output current level cannot be reached, gradually and with caution adjust potentiometer R54 until proper output current is obtained.

3-7. Current Mode Range Adjustment

a. Set POWER switch S1 to off and insert an ammeter (Multimeter ME-452) in series with the load.

b. Set CUR ADJ coarse and fine controls fully counterclockwise.

c. Set POWER switch S1 to ON and adjust potentiometer A3R50 as follows.

(1) Set potentiometer A3R50 until load current is set as close as possible to zero but some current is still indicated.

(2) Continue to turn potentiometer A3R50 1 or 2

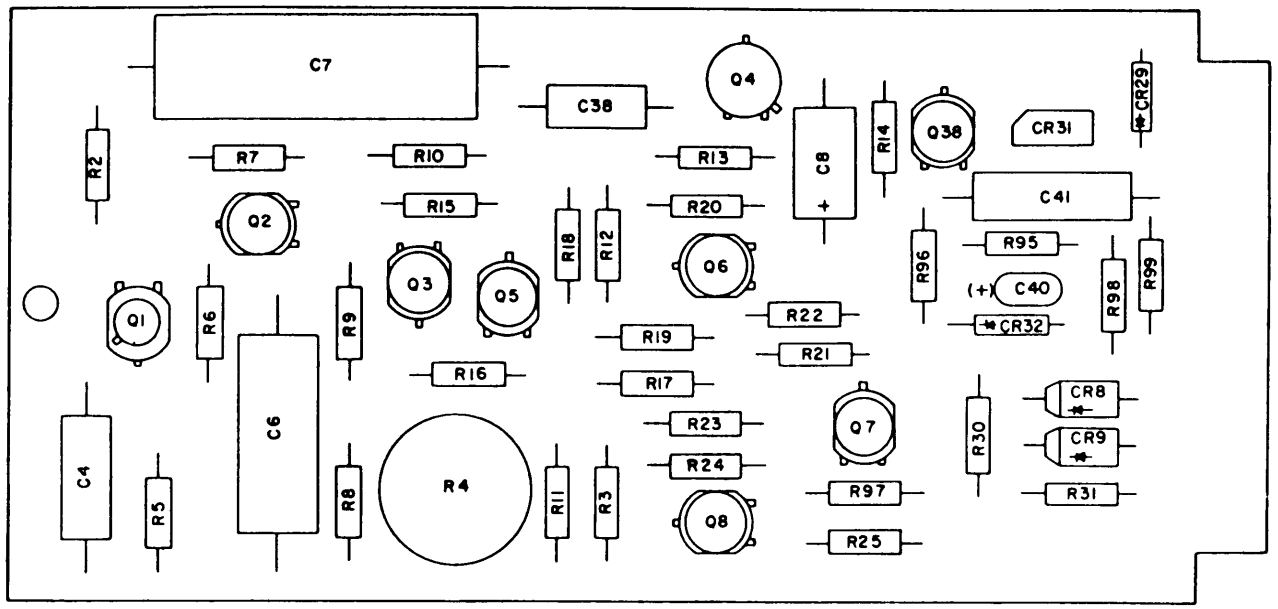


Figure 5-4. Power Supply PP-3940A/G, Component Board A4, Parts Location Diagram.

wire turns further until meter indicates zero.

(3) Lock potentiometer A3R50 with Gyptol.

d. Set CUR ADJ coarse and fine control potentiometers R53A and R53B maximum clockwise, and adjust load to between 4.15 and 4.25 amperes. CUR MODE indicator DS3 should not light.

e. If CUR MODE indicator DS3 lights, rotate potentiometer R54 until VOLT MODE indicator lights and CUR MODE indicator extinguishes.

f. Readjust potentiometer R54 until CUR MODE indicator lights and current drops slightly (but remains within the 4.15- to 4.25-ampere range).

g. Lock with Gyptol.

5-8. Voltage Programing Adjustment

a. Set POWER switch S1 to off and remove load and ammeter.

b. Remove link between terminal board terminals 1 and 2 and insert Resistor, Decode ZM-16/U between terminals 1 and 3 (voltage programing), adjusting ZM-16/U for exactly 4,000 ohms.

c. Set POWER switch S1 to ON and adjust potentiometer R69 to give an output voltage of 40 volts dc &0.20, This calibrates the voltage programing to 100 ohms/volt.

d. Turn the power off, remove ZM-16/U, and replace link between terminals 1 and 2.

e. Lack potentiometer R69 with Gyptol.

f. Apply input power and set VOLT ADJ coarse and fine control potentiometers maximum counterclockwise. Indicator should be 0 volt ± 0.1.

5-9. Overcurrent Protection Network Adjustment

Perform the following whenever transistor A4Q38 is replaced:

a. Set power supply POWER switch S1 to off and VOLT ADJ coarse and fine controls fully counterclockwise.

b. Connect load set at 5 ohms across terminals 4 and 5 on terminal board at rear of power supply.

c. Unsolder resistor A4R99 and remove transistor A3Q16 from its snap out socket.

d. Insert ZM-16/U in place of resistor A4R99 with an initial setting of approximately 100 ohms.

e. Set power supply POWER switch S1 to ON.

f. Slowly turn VOLT ADJ coarse and fine controls until the output current rises to 135 percent of the nominal value (5.4 amperes).

g. Adjust ZM-16/U until the power supply shuts off.

h. Set power supply POWER switch S1 to off. Insert the nearest standard resistor value for the ZM-16/U resistance reading (22 to 100 ohms).

i. Perform e and *f* above. Power supply should turn off when the current reaches 130 to 140 percent of nominal value (5.2 to 5.6 amperes).

j. Set power supply POWER switch S1 to off. Remove load and reinstall A3Q16.

CHAPTER 6

GENERAL SUPPORT TEST PROCEDURES

6-1. General

This chapter contains the necessary information to test the line and load regulation and ripple of the power supply. The information consists of test equipment required (para 6-2), preliminary setup procedures (para 6-3), and voltage and current test (para 6-4).

6-2. Tools and Test Equipment Required

The tools and test equipment required for testing the PP-3940A/G at the general support maintenance level are listed in section III of the Maintenance Allocation Chart (MAC) (appx B).

6-3. Preliminary Setup Procedure

a. Set the power supply POWER switch to the off (down) position.

b. Connect the power supply ac powerline cord to the CN-16A/U. Set the CN-16A/U control fully counterclockwise.

c. Connect the AN/GSM-64, AN/USM-265, DA-638/U, AN/USM-223, knife switch, and ME-452/U as shown in figure 6-1. Be sure that the links of the power supply are connected between terminals 1 and 2, 3 and 4, 5 and 6, 8 and 9, and 10 and 11.

d. Connect the CN-16A/U line cord to a source of 115-volt ac power.

e. Set the knife switch to the open position and adjust the DA-638/U for a load of 10 ohms.

6-4. Voltage and Current Test

a. Adjust the CN-16A/U control until the AN/USM-223/U indicates 115 volts ac.

b. Set the power supply POWER switch to ON.

c. Set the knife switch to the closed position.

d. Set the power supply VOLT ADJ coarse and fine controls (fig. 2-2) to indicate 40 volts dc on the AN/GSM-64. The power supply DC VOLTS mete should indicate between 39.6 and 40.4 volts.

e. Adjust the power supply CUR MODE coarse and fine controls to indicate 4 amperes on the ME-452/U The power supply DC AMPERES meter should indicate between 3.6 and 4.4. amperes. The AN/USM-265 should indicate less than 1 millivolt.

f. Adjust the CN-16A/U control until the AN/USM-223 indicates 125 volts ac. The AN/GSM-64 should indicate between 39.96 and 40.04 volts.

g. Adjust the CN-16A/U control until the AN/USM-223 indicates 105 volts ac. The AN/GSM-64 should still indicate between 39.96 and 40.04 volts Set the power supply POWER switch to the off (down position.

h. Disconnect the AN/GSM-64, AN/USM-265 ME-452/U, knife switch, and DA-638/U from the power supply.

i. Connect a No. 18 AWG wire between terminals 4 and 5 of the power supply.

j. Set the power supply POWER switch to ON. The power supply DC AMPERES meter should indicate between 3.6 and 4.4 amperes.

k. Set the power supply POWER switch to the of (down) position. Disconnect all equipment.

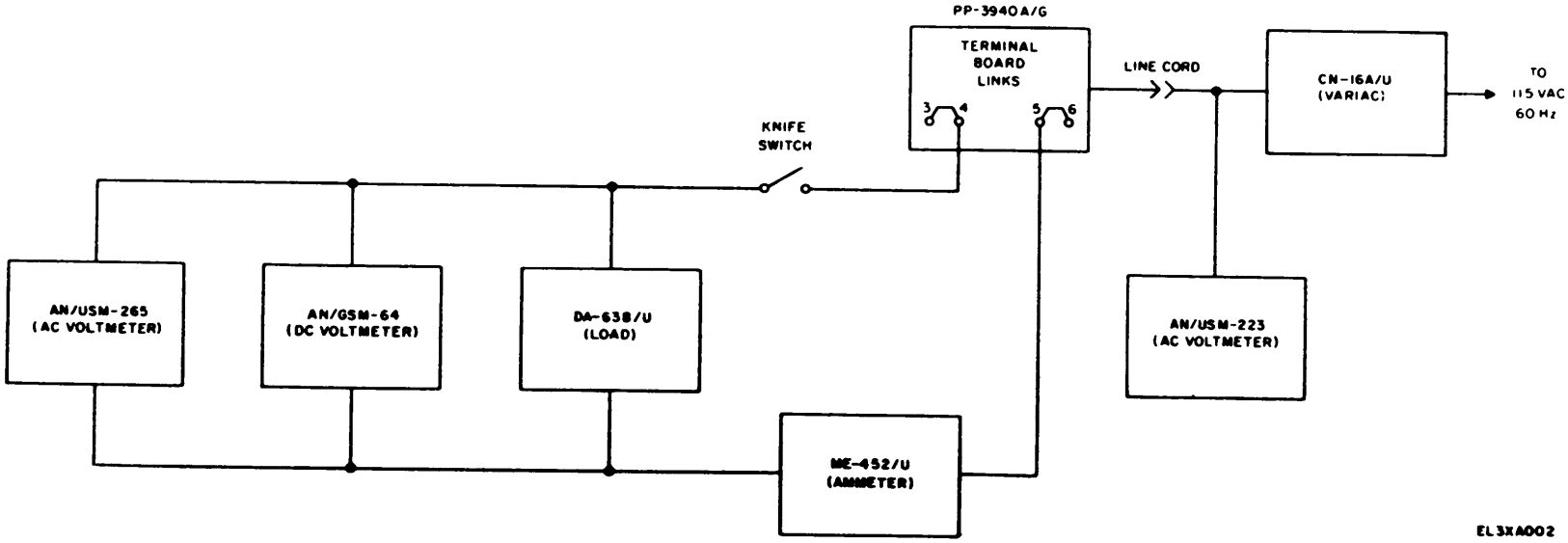


Figure 6-1. Test set-up for voltage and current test.

CHAPTER 7

DEPOT OVERHAUL STANDARDS

7-1. Applicability of Depot Overhaul Standards

Tests outlined in this chapter are designed to measure the performance capability of a required equipment. Equipment that is to be returned to stock should meet standards given in these tests.

7-2. Applicable References

a. Repair Standards. Applicable procedures of depots which perform these tests, and the general standards for repaired electronic equipment given in TB SIG 355-1, TB SIG 355-2, and TB SIG 355-3 form apart of requirements for testing this equipment.

b. Modification Work Orders. Perform all modification work orders applicable to this equipment before making tests specified, DA Pam S10-7 lists all available MWO's.

7-3. Test Facilities Required

Items required for depot testing are the same as those given in paragraph 6–2.

7-4. Tests

The depot overhaul standards test procedures are the same as those given for genera] support (para 6-3 and 6-4). Equipment that meets the performance standards stated in these tests will furnish satisfactory operation equivalent to that of new equipment.

APPENDIX A

REFERENCES

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Equipment Index of Modification Work Orders.
TM 11-5102	Resistors, Decade ZM-16/U, ZM-16A/U, and ZM-16B/U (T0 33AA6-6-1).
TM 11-6625-203-12	Operator and Organizational Maintenance Manual: Multimeter AN/URM-105, Including Multimeter ME-77/U.
TM 11-6625-444-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Digital Voltmeter AN/GSM-64.
TM 11-6625 -539-15-2	Operator's, Organizational, Direct Support, General Support, Maintenance Manual Including Repair Parts and Special Tools List Test Set, Transistor TS-1836B/U.
TM 11-6625-654-14	Operator, Organizational, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Multimeter AN/USM-223.
TM 11-6625-700-14-1	Operator, Organizational, Direct Support and General Support Maintenance Manual Including Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools): Digital Readout Electronic Counter AN/USM-207(A).
TM 11-6625-1538-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Voltmeter, Electronic AN/USM-265 (Hewlett-Packard Model 400EL).
TM 11-6625-1703-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tools Lists: Oscilloscope AN/USM-281A.
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

APPENDIX B

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General.

This appendix provides a summary of the maintenance operations for PP-3940A/G. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix maybe used as an aid in planning maintenance operations.

B-2. Maintenance Function.

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an tern by comparing its physical, mechanical, and/or electrical characteristic with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (de-'contaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting he operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an tern to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instruments being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of he equipment or system.

h. Replace, The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance servica (inspect, test, service, adjust, align, calibrate, replace or other maintenance actions (welding, grinding, rivet ing, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly) end item, or system. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning tc zero those age measurement (hours, miles, etc.) considered in classifying Army equipments/components.

B-3. Column Entries.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, sub assemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in col-

umn 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate 'worktime" figures will be shown for each category. The number of task-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, and item or system) to a serviceable condition under typical field operating conditions. This time includes reparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. SubColumns of column 4 are as follows:

C–Operator/Crew
O–Organizational
F–Direct Support
H–General Support
D–Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. Tool and Test Equipment Requirements (Sec III).

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the number used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to *perform the* maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

B-5. Remarks (Sec IV).

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

(Next printed page is B-3.)

SECTON II MAINTENANCE ALLOCATION CHART
FOR

POWER SUPPLY PP-3940A/G

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT.	(6) REMARKS
00	POWER SUPPLY PP-3940A/G	Inspect	0.1						A
		Service	0.1						A
		Adjust	0.1						B
		Replace	0.1						C
		Inspect		0.1				1	
		Test		0.1				2	B
		Service		0.2				1	
		Test			.0			3 thru 12	
		Repair			1.0			3	
		Test				1.0		3 thru 14	
		Repair				2.0		3	
		Overhaul					12	3 thru 14	
01	COMPONENT BOARD A-2	Test			0.2			4 thru 12	
		Replace			0.2			3	
		Repair				0.4		3	
02	COMPONENT BOARD A-2	Test			0.2			4 thru 12	
		Replace			0.2			3	
		Repair				0.6		3	
03	COMPONENT BOARD A-3	Test			0.5			4 thru 12	
		Adjust			0.3			3 thru 9	
		Replace			0.2			3	
		Repair				1.0		3	
04	COMPONENT BOARD A-4	Test			0.5			4 thru 12	
		Adjust			0.3			3 thru 9	
		Replace			0.2			3	
		Repair				1.0		3	

SBCTiON III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
POWER SUPPLY PP-3940A/G

TOOL OR TEST EQUIPMENT REF COOE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL~NATO STOCK NUMBER	TOOL NUMBER
1	O	TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5171	
2	O	MULTIMETER, AN/URM-105	6625-00-581-2036	
3	F, H, D	TOOL KIT, ELECTRONIC EQUIPKEMT TK-105/G	5180-00-610-8177	
4	F, H, D	MULTIMETER, AN/USM-223/U (Rs TS-352B/U)	6625-00-999-7465	
5	F, H, D	COUNTER, ELECTRONIC DIGITAL AN/USM-207	6625-00-044-3228	
6	F, H, D	DUMMY LOAD, ELECTRICAL DA-638/U	6625-00-422-2111	
7	F,H,D	OSCILLOSCOPE, AN/USM-281	6625-00-053-3112	
8	F, H, D	TRANSFORMER, VARIABLE POWER CN-16A/U	5950-00-235-2086	
9	F, H, D	VOLTMETER, DIGITAL AN/GSM-64	6625-00-022-7891	
10	F, H, D	MULTIMETER, ME-452/U (Rs Weston Ammeter 281)	6625-09-519-2493	
11	F, H, D	RESISTOR, DECADE ZM-16( )/U	6625-00-669-0266	
12	F, H, D	TEST SET, TRANSISTOR TS-1836( )/U	6625-00-893-2628	
13	H,D	VOLTMETER, ELECTRONIC AN/USM-265 (Rs ME-30)	6625-00-054-3487	
14	H, D	SWITCH, KNIFE	5930-00-224-4928	

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	Exterior.
B	Operational.
C	Running Spares.

By Order of the Secretary of the Army:

W. C. WESTMORELAND
General, *United States Army,*
Chief of Staff.

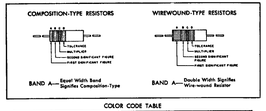
OFFICIAL:
VERNE L. BOWERS
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12–32, direct and general support maintenance requirements for the AN/FPA-15 and AN/FPA–16 systems.

*U.S. GOVERNMENT PRINTING OFFICE : 1994 - 388-421 (01277)

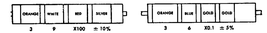
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS



COLOR CODE TABLE

BAND A	BAND B	BAND C	BAND D*	
COLOR	1st SIGNIFICANT FIGURE	COLOR	2nd SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1		
BROWN	1	BROWN	1	BROWN	10		
RED	2	RED	2	RED	100		
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	SILVER	0.01		
WHITE	9	WHITE	9	GOLD	0.1		

EXAMPLES OF COLOR CODING



NOMINAL RESISTANCE 2,900 Ohms

RESISTANCE TOLERANCE ± 10 percent

3.6 Ohms

± 5 percent

*If Band D is omitted, the resistor tolerance is ± 20%, and the resistor is not MIL-Std.

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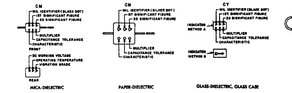
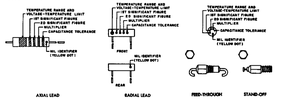
COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

GROUP I Capacitors, Fixed, Various-Dielectrics, Styles CM, CN, CY, and CB



GROUP II Capacitors, Fixed Ceramic-Dielectric (General Purpose) Style CK



GROUP III Capacitors, Fixed, Ceramic-Dielectric (Temperature Compensating) Style CC

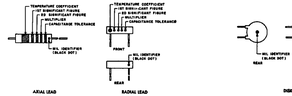


Figure 8-2. Color code marking for resistors and capacitors.

COLOR CODE TABLES

TABLE I – For use with Group I, Styles CM, CN, CY and CB

COLOR	MIL ID	1st SIG FIG	2nd SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE			CHARACTERISTIC*				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CN	CM
BLACK	CM, CY, CB	0	0	1			± 20%	± 20%	A				+ 25° to + 70°C	10-55 cps
BROWN		1	1	10					B	B	B			
RED		2	2	100	± 1%		± 2%	± 2%	C		C		+ 25° to + 85°C	
ORANGE		3	3	1,000		± 30%								
YELLOW		4	4	10,000					E		E		+ 25° to + 125°C	10-2,000 cps
GREEN		5	5		± 5%				F		F			
BLUE		6	6										+ 25° to + 150°C	
PURPLE (VIOLET)		7	7											
GREY		8	8											
WHITE		9	9											
GOLD				0.1			± 5%	± 5%						
SILVER		CK			± 10%	± 10%	± 10%	± 10%						

TABLE II – For use with Group II, General Purpose, Style CK

COLOR	TEMP RANGE AND VOLTAGE LIMIT	1st SIG FIG	2nd SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	± 20%	
BROWN	–55°	1	1	10	± 1%	CC
RED	+5	2	2	100		
ORANGE	85	3	3	1,000		
YELLOW	+5°	4	4	10,000		CK
GREEN	15	5	5			
BLUE	25°	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD			0.1			
SILVER			0.01			

TABLE III – For use with Group III, Temperature Compensating, Style CC

COLOR	TEMPERATURE COEFFICIENT	1st SIG FIG	2nd SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCES	
					Capacitance Over 10pF	Capacitance 10pF or less
BLACK	0	0	0	1		± 2.0pF
BROWN	–30	1	1	10	± 1%	
RED	–50	2	2	100	± 2%	± 0.25pF
ORANGE	–150	3	3	1,000		
YELLOW	–220	4	4			
GREEN	–330	5	5		± 5%	± 0.5pF
BLUE	–470	6	6			
PURPLE (VIOLET)	–750	7	7			
GREY		8	8	0.01		
WHITE		9	9	0.1	± 10%	
GOLD	–100					± 1.0pF
SILVER						

1. The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in mF.
2. Letters indicate the Characteristics designated in applicable specifications: MIL-C-5, MIL-C-91, MIL-C-11272, and MIL-C-19978 respectively.
3. Letters indicate the temperature range and voltage-temperature limits designated in MIL-C-11015.
4. Temperature coefficient in parts per million per degree centigrade.

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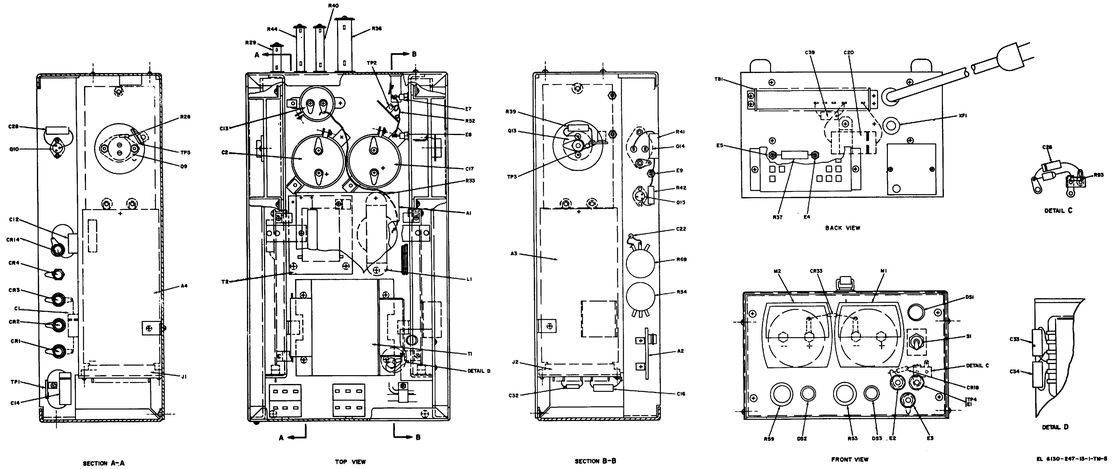
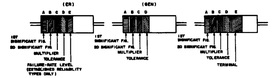


Figure 8-2. Power Supply PP-3910A/G, chassis parts location diagram.



COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS. COLOR-CODE MARKING FOR FILM-TYPE RESISTORS.

TABLE I
COLOR CODE FOR COMPOSITION TYPE AND FILM TYPE RESISTORS.

BAND A		BAND B		BAND C		BAND D		BAND E	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)	COLOR	FAILURE RATE LEVEL PERCENT
BLACK	0	BLACK	0	BLACK	1			BROWN	1.0
BROWN	1	BROWN	1	BROWN	10			RED	0.1
RED	2	RED	2	RED	100			ORANGE	0.01
ORANGE	3	ORANGE	3	ORANGE	1,000			YELLOW	0.001
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	± 10 (1 OHM AND OVER)	WHITE	0.0001
GREEN	5	GREEN	5	GREEN	100,000	GOLD	± 5		SOLD ± STAKE
BLUE	6	BLUE	6	BLUE	1,000,000	RED	± 2 (1 OHM UP-PLICABLE TO ESTABLISHED RELIABILITY)		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7						
GRAY	8	GRAY	8	SILVER	0.01				
WHITE	9	WHITE	9	GOLD	0.1				

BAND A — THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (THE COLOR OF BAND A IS TWICE THE WIDTH OF THE OTHER BANDS).

BAND B — THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C — THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL RESISTANCE VALUE.)

BAND D — THE RESISTANCE TOLERANCE.

BAND E — WHEN USED ON COMPOSITION RESISTORS, GIVES A MEASURE OF THE RELIABILITY IN TERMS OF PERCENT FAILURE PER 1,000 HOURS; ON FILM RESISTORS, THIS BAND WILL BE APPROXIMATELY 1½ TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL.

RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS (THESE ARE NOT COLOR CODED.)

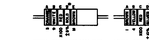
SOME RESISTORS ARE IDENTIFIED BY A THREE-PART ALPHA NUMERIC DESIGNATION. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

2R7 = 2.7 OHMS 10R0 = 10.0 OHMS

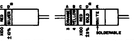
FOR WIRE-WOUND-TYPE RESISTORS COLOR CODING IS NOT USED, IDENTIFICATION MARKING IS SPECIFIED ON EACH OF THE APPLICABLE SPECIFICATIONS.

EXAMPLES OF COLOR CODING

(EIA)

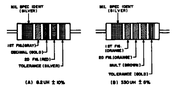


(MIL)



COMPOSITION-TYPE RESISTORS FILM-TYPE RESISTORS

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.



(A) 8.2UH ± 10%

(B) 330UH ± 5%

COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES, 1ST & 2ND EXAMPLE OF THE CODING FOR AN 8.2UH CHOKE IS SHOWN. AT B, THE COLOR BANDS FOR A 330UH INDUCTOR ARE ILLUSTRATED.

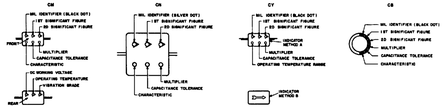
TABLE II
COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES.

COLOR	1ST SIGNIFICANT FIGURE	2D SIGNIFICANT FIGURE	MULTIPLIER	TOLERANCE (PERCENT)
BLACK	0	0	1	
BROWN	1	1	10	1
RED	2	2	100	2
ORANGE	3	3	1,000	3
YELLOW	4	4		
GREEN	5	5		
BLUE	6	6		
VIOLET	7	7		
GRAY	8	8		
WHITE	9	9		
GOLD				5
SILVER				10
NO BAND				20

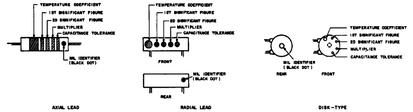
MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDICTANCE VALUE OF THE CHOKE COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

CAPACITORS, FIXED, VARIOUS-DIELECTRICS, STYLES CM, CN, CY, AND CB.



MICA-DIELECTRIC PAPER-DIELECTRIC GLASS-DIELECTRIC, GLASS CASE MICA, BUTTON TYPE



C. COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS.

TABLE III — FOR USE WITH STYLES CM, CN, CY AND CB.

COLOR	1ST SIG FIG	2D SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE				CHARACTERISTIC		DC WORKING VOLTAGE	OPERATING TEMPERATURE RANGE	VIBRATION GRADE
				CM	CN	CY	CB	CN	CB	CM	CN	CB
BLACK	0	0	1			20%	20%		A		55°C to 70°C	10-55 c.p.s.
BROWN	1	1	10					B	B	B		
RED	2	2	100	2%		2%	2%	C			55°C to 125°C	
ORANGE	3	3	1,000		3%			D	D	D	55°C to 150°C	10-2,000 c.p.s.
YELLOW	4	4	10,000					E			125°C to 150°C	10-2,000 c.p.s.
GREEN	5	5		5%				F		500		
BLUE	6	6									150°C to 175°C	
PURPLE (VIOLET)	7	7										
GRAY	8	8										
WHITE	9	9										
GOLD			0.1	5%	5%							
SILVER	CN			10%	10%	10%	10%					

TABLE IV — TEMPERATURE COMPENSATING, STYLE CC.

COLOR	TEMPERATURE COEFFICIENT	1ST SIG FIG	2D SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE			
					CAPACITANCES 10 UUF OR LESS		CAPACITANCES OVER 10 UUF OR LESS	
BLACK	0	0	0	1		± 2.0 UUF		20
BROWN	−30	1	1	10	± 1%		± 2.0 UUF	
RED	−80	2	2	100	± 2 %			
ORANGE	−150	3	3	1,000				
YELLOW	−220	4	4					
GREEN	−330	5	5		± 5 %		± 5 % UUF	
BLUE	−470	6	6					
PURPLE (VIOLET)	−750	7	7					
GREY		8	8	0.01				
WHITE		9	9	0.1	± 10%			
GOLD	+100					± 1.0 UUF		
SILVER								

1. THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF.
2. LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS MIL-C-5, MIL-C-1950, MIL-C-10727, AND MIL-C-10950C RESPECTIVELY.
3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D.
4. TEMPERATURE COEFFICIENT IS PARTS PER MILLION PER DEGREE CENTIGRADE.

ESC-FM 17-94-71

Figure 9-1. MIL-STD resistor, inductor, and capacitor color code markings.