TM 11-6130-247-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS)

POWER SUPPLY PP-3940/G

(INCLUDING REPAIR PARTS AND SPECIAL TOOL LISTS)

This reprint includes all changes in effect at the time of publication; changes 1 and 2.

HEADQUATERS, DEPARTMENT OF THE ARMY

28 February 1966

CHANGE No. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *14 December 1966*

Organizational, DS, GS, and Depot Maintenance Manual (Including Repair Parts and Special Tool Lists)
POWER SUPPLY PP-3940/G

TM 11-6130-247-15, 28 February 1966, is changed as follows:

Page 1-1, paragraph 1-3. Delete subparagraph *c* and substitute:

c. Reporting of Equipment Manual Improvements. Report of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-NMP-AD, Fort Monmouth, N.J. 07703.

Page A2-2, appendix II, section II, Description column, "TRANSISTOR."

Federal stock number column, add 5961-933-9441.

Page A4-2, appendix IV, section II, Description column, "TRANSISTOR"; delete (M5RC44-A159). Federal stock number column, add 5961-933-9441.

Page A4-4. Section III. Delete Mailroom number appearing in Description column and add Federal stock number for the following items:

Page	Item	Description column—delete—	Federal stock number column—add—
A4-4	AMMETER	(M5RC44-A055)	6625-933-9439
	CAPACITOR, FIXED, CERAMIC DIELECTRIC	(M5RC44-A077)	5910-933-9204
	CAPACITOR, FIXED, ELECTROLYTIC	(M5RC44-A091)	5910-933-9201
	CAPACITOR, FIXED, ELECTROLYTIC	(M5RC44-A092)	5910-933-9203
	CAPACITOR, FIXED, PAPER DIELECTRIC	(M5RC44-A107)	5910-842-1972
	CAPACITOR, FIXED, PAPER DIELECTRIC	(M5RC44-A109)	5910-933-9199
A4-5	CAPACITOR, FIXED	(M5RC44-A061)	5910-933-9202
	CAPACITOR, FIXED	(M5RC44-A141)	5910-985-4382
	CAPACITOR, FIXED	(M5RC44-A143)	5910-933-9200
	CORD, LINE	(M5RC44-A008)	6130-933-9311
	KNOB	(M5RC44-A029)	5355-937-0068
	KNOB	(M5RC44-A056)	5355-937-0069
	RESISTOR, FIXED, COMPOSITION	(M5RC44-A036)	5905-933-9209
	RESISTOR, FIXED, COMPOSITION	(M5RC44-A147)	5905-933-9306
A4-6	RESISTOR, FIXED, COMPOSITION	(M5RC44-A126)	5905-933-9307
	RESISTOR, FIXED, COMPOSITION	(M5RC44-A115)	5905-838-9624
	RESISTOR, FIXED, COMPOSITION	(M5RC44-A124)	5905-171-1999
	RESISTOR, FIXED, COMPOSITION	(M5RC44-A122)	5905-933-9213
	RESISTOR, FIXED, COMPOSITION	(M5RC44-A123)	5905-823-3412
	RESISTOR, FIXED, COMPOSITION	(M5RC44-A115)	5905-279-1876
A4-7	RESISTOR, FIXED, COMPOSITION	(M5RC44-A110)	5905-933-9214
	RESISTOR, VARIABLE	(M5RC44-A048)	5905-681-3390
A4-8	SEMICONDUCTOR DEVICE, DIODE	(M5RC44-A051)	5961-819-3023
	SOCKET, DIODE	(M5RC44-A130)	5935-476-1356
	SOCKET, TRANSISTOR	(M5RC44-A135)	5961-933-9440
	TRANSFORMER, POWER	(M5RC44-A070)	5950-933-9411
	TRANSFORMER, POWER	(M5RC44-A078)	5950-933-9410
	TRANSFORMER, VARIABLE	(M5RC44-A050)	5950-933-9412
	TRANSISTOR	(M5RC44-A159)	5961-933-9441
	VOLTMETER	(M5RC44-A021)	6625-933-9311

Page A4-5, Federal stock number column, "5910-933-9202," "5910-985-4382," and "5910-933-9200." Description column, change CAPACITOR, FIXED to CAPACITOR, FIXED, ELECTROLYTIC.

Page A4-6, Federal stock number column, "5905-838-9624." Description column, change 3X300WL to BX300WL.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-32, Section III requirements for Direct and General Support Maintenance literature for the AN/FPA-15 and AN/FPA-16 systems, plus USASCS (40) and USAADS (30).

GPO 907-894

Change
No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 5 *November 1973*

Operator's, Organizational, Direct Support General Support, and Depot Maintenance Manual (Including Repair Parts and Special Tools List) POWER SUPPLY PP-3940/G

TM 11-6130-247-15, 28 February 1966, is changed as follows:

The title of this manual is changed as shown above.

Page 1-1, paragraph 1-2. Delete paragraph 1-2 and Substitute

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.

Paragraph 1-3. Delete and substitute:

1-3. Forms and Records

a. Reports of Maintenance *and Unsatisfactory Equipment.* Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army)/ NAVSUP PUB 378 (Navy)/AFR 71-4 (Air Force)/and MCO P4030.29 (Marine Corps).

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 (Army/NAVSUP PUB 459 (Navy)/AFM 75-34 (Air Force)/and MCO P4610.19 (Marine Corps).

After paragraph 1-3 add:

1-3.1. Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-C, Fort Monmouth, NJ 07703.

Page 1-3. After paragraph 1-4 add:

1-5. Item Comprising an Operable Power Supply PP-3940/G

Power Supply PP-3940/G (FSN 6130-985-8136) comprises an operable equipment and is shown in figure 1-1.

Page A2-1, appendix II. Delete appendix II in its entirety.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
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.

TM 11-6130-247-15

TECHNICAL MANUAL

No. 11-6130-247-15

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D. C 20315, *28 February 1966*

POWER SUPPLY PP-3940/G

CHAPTER 1

INTRODUCTION

1-1. Scope

This manual describes Power Supply PP-3940/G (power supply) and provides instruction for installation, operation, organizational maintenance, and direct and general support and depot maintenance.

1-2. Index of Equipment Publications

Refer to the latest issue of DA Pamphlet 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. Department of the Army Pamphlet No. 310-4 is an index of current technical manuals, technical bulletins, supply manuals (types 7, 8, and 9), supply bulletins, lubrication orders, and modification work orders available through publications supply channels. The index lists the individual parts (-10, -20, -35, etc) and the latest changes to and revisions of each publication.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAWSAN-DA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Reporting of Equipment Manual Improvements. The direct reporting of errors, omissions, and recommendations for improving this equipment manual by the individual user, is authorized and encouraged. DA Form 2028 will be used for reporting these improvements. This form may be completed by use of pencil, pen, or typewriter. DA Form 2028 will be completed by the individual using this manual and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-(NMP)-MA, Fort Monmouth, New Jersey 07703.

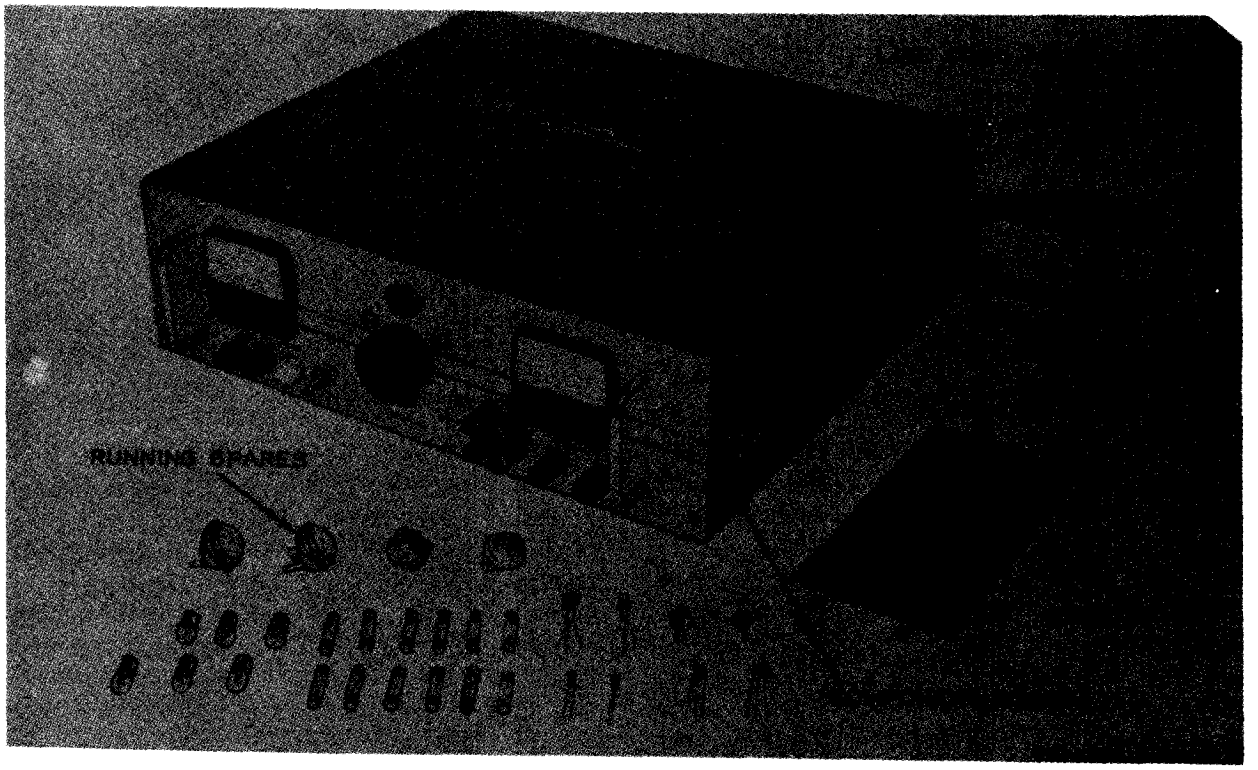

Figure 1-1. Power supply PP-3940/G and running spares.

1-4. Specifications

a. General Characteristics. Power Supply PP-3940/G is transistorized with a continuously variable, wide range output.

Input power	Range 105 to 125 vac.
Frequency	50-400 cy.
Nominal	60 cycles
Current	3.2 amp.
Output voltage	0-36 vdc.
Dc current	0-4 amp.
% Regulation[1]	
Line ampersand & load combined	± (.02% + 1 mv).
Ripple 60 cy	0.5 mv rms.
Response time	50 microsec.
Ambient temperature	0°C (32°F) to 40°C (104°F)[2].
Cabinet size	Width 17 in., depth 14 in., height 5 in.
Rach height	5-1/4 in.
Weight (net)	45 lb.
Output terminals	Binding post (front) and terminal board (rear).
Meters	Voltmeter and ammeter (standard 2% accuracy).
Protective devices	Input and output fuse.

[1]Regulation accuracy guaranteed at the output terminals only, not at load input connections. (Refer to method of sensing (para 2-9 and 2-10).)

[2]Regulation not guaranteed with ambient changes (15° C to 35° C output change for fixed line and load 0.03%° C typical).

b. Input Frequency. Power Supply PP-3940/G may be operated over an input range from 50 to 400 cycles per second (cps); however, all specifications are only at the nominal input frequency of 60 cps. The ripple voltage will increase as the frequency varies from 60 cps, becoming higher at the lower frequency extreme. The regulation accuracy and output voltage range are also affected by the input frequency; their specifications are only at 60 cps.

c. Response Time. When an abrupt change occurs in the input voltage or output load, an instantaneous change in output voltage occurs. This instantaneous change is quickly suppressed by the regulating action of the equipment. Recovery time is a measure of how fast this change is suppressed. It is defined as the time necessary for the output voltage to affect a 63-percent recovery from the percent maximum deviated value, based on a 10-percent line voltage change, or a 50-percent step change in load.

d. Typical Overshot PP-3940/G.

	36V	30V	20V	15V	10V	2V	0V
Starting	0	0	0	0	1.6V	3V	6V
Turn off	0	0	0	0	0	0	0

Note: Voltage drop between front and rear output terminals is approximately 95 millivolts.

e. Short-Term Drift. Short-term drift after 15-minute warmup 0.05 percent typical.

CHAPTER 2

INSTALLATION AND OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unpacking

a. Cut the waterproof tape that seals the top of the shipping carton.

b. Remove the enclosed cardboard carton.

c. Cut the waterproof tape that seals the top of the cardboard carton.

d. Open the moisture-vaporproof barrier in the cardboard container.

e. Remove the enclosed cardboard carton.

f. Cut the waterproof tape that seals the top of the cardboard carton.

g. Remove the humidity indicator, the desiccant, and the pads.

h. Remove the power supply.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, refer to paragraph 1-3.

b. Check the equipment against the packing list. When no packing list accompanies the equipment, use the table of components as a general check.

2-3. Installation

a. All semiconductors, the fuse, and the power indicator lamp are installed in the power supply when the equipment is shipped.

b. The power supply is to be installed as a bench-type unit for use.

2-4. Preparation for use

a. POWER ON-OFF switch S1 should be OFF (fig. 2-1).

b. Plug the power cord into a 115-volt ac, 60-cps power source.

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

Section II. INITIAL ADJUSTMENT OF EQUIPMENT

2-5. Extent of Initial adjustments

Initial adjustment of this equipment is accomplished by the COARSE ADJ. and FINE ADJ. front panel controls (fig. 2-1).

2-6. Initial Adjustments

Adjust the COARSE ADJ. and the FINE ADJ. front panel controls to obtain the required output voltage to a load.

Section III. Operating Instructions

2-7. Terminals and Controls

a. Input Power Connections. The input power is applied by a line cord with a 120-volt alternating-current (ac) polarized three-prong plug. Since the third prong is connected to the chassis, connection of the line cord to the appropriate receptacle automatically grounds the equipment. If the user does not have three-prong outlets 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 powerline wiring system, preferably soldered. This procedure should be carried out for safety reasons.

b. Output Power Connections. The direct current (dc) output is available at the two binding posts located on the front panel or at the terminal board located at the rear of the instrument. Ground terminals are also provided for safety purposes. Since the output is floating, either output terminal may be grounded.

c. POWER ON-OFF Switch S1. Switch S1 is located on the front panel.

d. Dc Voltage Control.

(1) A coarse dc voltage control knob which is provided on the front panel actuates a variable autotrasform-

er. This transformer gives full output voltage adjustment from zero to the rated dc output.

(2) A fine dc voltage control knob allows for more minute adjustment of the output voltage.

2-8. Fuses and Protective Devices

a. Ac protective fuse F1 protects the internal variable autotransformer (voltage control) and other components from damage due to internal short circuits. This fuse, under most circumstances, never needs replacing.

b. Dc output overcurrent protective fuse F2 protects the instrument against short circuits.

Caution: **Always replace fuses with, an exactly rated duplicate. An oversize fuse may cause breakdown of components.**

2-9. Local Sensing

For specified regulation accuracy, load wires and sensing leads *both* must be connected either at the front panel or at the rear output terminals.

a. When taking power from the front panel terminals:

(1) There *must not* be any links or jumpers between the *rear* remote sensing terminals and the rear output terminals.

(2) There *must be* links (tightly secured) connecting the front remote sensing terminals and the front output terminals.

b. When taking power from the rear output terminals:

(1) The sensing leads must be open at the *front* panel.

(2) There *must be* jumpers (tightly secured) connecting the *rear* remote sensing terminals and the rear output terminals.

2-10. Remote Sensing

Note: Voltage drop in remote sensing leads must be less than 0.40 volt for proper operation.

a. There must be *no* links or jumpers connecting remote sensing terminals and output terminals front or rear.

b. Connect load wires to either the front or rear output terminals.

c. If load wires are attached to the *front* output terminals, connect two sensing leads from the *front* remote sensing terminals directly to the load. If load wires are attached to the *rear* remote sensing terminals directly to the load.

Note: Load connections and sensing leads must always be attached at the same position, that is, all four wires at the front panel or all four wires at the rear terminals. Unless this is done, poor regulation will result.

Caution: **Make sure that sensing link and sensing lead connections are kept tightly secured at all times of operation of the power supply. This condition protects transistors in the amplifier.**

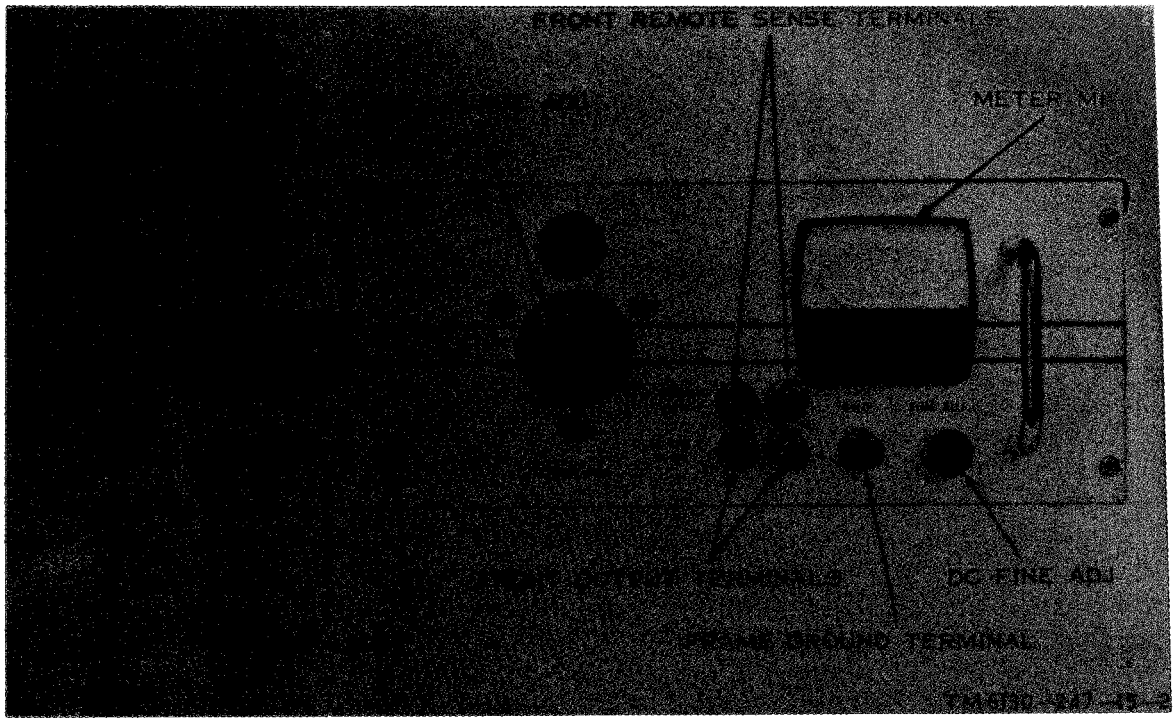

Figure 2-1. Power Supply PP-3940/G, controls and indicators.

CHAPTER 3

PREVENTIVE MAINTENANCE INSTRUCTIONS

3-1. Scope of Maintenance

The maintenance duties assigned to organizational maintenance personnel of the equipment are listed below together with a reference to the paragraphs covering the specific maintenance functions.

a. Daily preventive maintenance checks and services (para 3-4).

b. Weekly preventive maintenance checks and services (para 3-5).

c. Monthly preventive maintenance checks and services (para 3-6).

d. Quarterly preventive maintenance checks and services (para 3-7).

e. Cleaning (para 3-8).

f. Touchup painting (para 3-9).

3-2. 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 pragraphs 3-4 through 3-9 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 charts (para 3-4 through 3-7) outline 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 charts indicate what to check, how to check, and what the normal conditions are; the *References* column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective actions listed, higher level maintenance or repair is rquired. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

3-3. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the equipment are required daily, weekly, monthly, and quarterly.

a. Paragraph 3-4 specified the checks and services that must be accomplished daily (or at least once each week if the equipment is maintained in standby condition).

b. Paragraphs 3-5, 3-6, and 3-7 specify *additional* checks and services that must be performed on a weekly, monthly, and quarterly basis, respectively.

3-4. Organizational Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be Inspected	Procedures	References
1	Completeness	See that the equipment is complete (appx II).	None.
2	Exterior surfaces.	Clean the exterior surfaces, including the panel and meter glass (para 3-8). Check meter glass and indicator lenses for cracks.	None.
3	Connectors	Check the tightness of all connectors.	None.
4	Controls and indicators.	While making the operating checks (item 5), observe that the mechanical action of each knob, dial, and switch is smooth and free of external or internal binding, and that there is no excessive looseness. Also, check the meter for sticking or bent pointer.	None.
5	Operation	Operate the equipment according to chapter 2.	None.

3-5. Organizational Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be Inspected	Procedures	References
1	Cables	Inspect cords, cables, and wires for chafed, cracked, or frayed insulation. Replace connectors that are broken, arced, stripped, or worn excessively.	None.
2	Handle	Inspect the handle for looseness. Replace or tighten as necessary.	None.
3	Metal surfaces.	Inspect exposed metal surfaces for rust and corrosion. Touchup paint as required (para 3-9).	None.

3-6. Organizational Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be Inspected	Procedures	References
1	Pluckout items.	Inspect seating of pluckout items.	None.
2	Jacks	Inspect jacks for snug fit and good contact.	None.
3	Transformer	Inspect the power transformer. All nuts must be tight. There should be no evidence of dirt or corrosion.	None.
4	Resistors and capacitors.	Inspect resistors and capacitors for cracks, blistering, or other detrimental defects.	None.

3-7. Organizational Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be Inspected	Procedures	References
1	Publications	See that all publications are complete, serviceable, and current.	DA Pam 310-4.
2	Modifications	Check DA Pam 310-4 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	TM 38-750 and DA Pam 310-4.
3	Spare parts	Check all spare parts (operator and organizational) for general condition and method of storage. No overstock should be evident and all shortage must be on valid requisitions.	Appx II.

3-8. 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: **Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. Do not use near a flame.**

b. Remove grease, fungus, and ground-in dirt from the cases; use a cloth dampened (not wet) with Cleaning Compound (Federal stock No. 7930-395-9542).

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

3-9. 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 and refinishing practices specified in TM 9-213 and TB SIG 364.

CHAPTER 4
FUNCTIONING OF EQUIPMENT

4-1. Basic Principles of Operation

(fig. 4-1)

The input power is applied to the primary sides of variable autotransformer (variac) T1 and to transformer T3 of the auxiliary power supply. The secondary voltage of autotransformer T1 is applied to the primary side of main power rectifier transformer T2. The secondary circuit of transformer T2 forms a full-wave solid-state rectifier circuit with resistor-capacitor filtering. The positive side of the main rectifier is applied to a slave passing transistor stage which is in series with a master passing transistor stage. The two transistor stages act similar to vacuum tube pass. ing stages of conventional regulated power supplies. The series impedance of the two passing stages serves as the main regulating function of the power supply. The negative side of the main power rectifier is connected to the negative end of the load termination. A Zener diode reference circuit is provided to sense any changes in the output level of the power supply. The output of the reference circuit will control the action of a master controller unit which, in turn, will adjust the base bias applied to the master passing transistors. Within the master passing stage, there is a circuit which senses the impedance across the master transistors. This sensing circuit will control the action of the slave controller circuitry. A change in the master passing impedance will cause a change in the slave passing stage impedance. The design of the controller circuits till assure the safe operation of the passing transistor stages under dynamic operating conditions. To prevent thermal dissipation troubles (runaway) in the passing and control stages, a static protective bias is provided by several independent rectifier circuits on the secondary side of auxiliary power supply transformer T3. This protective bias is distributed to the slave controller, the master controller, the slave passing stage, and the master passing stage. Although it is *not* apparent on figure 4-1, the main rectifier, the passing transistors, the Zener diode reference circuit, the regulated reference supply, and the load resistance form a bridge-type circuit. A bridge circuit is a practical method for reducing the load voltage to zero while maintaining the proper protective currents on passing stage transistors, Q1 through Q6.

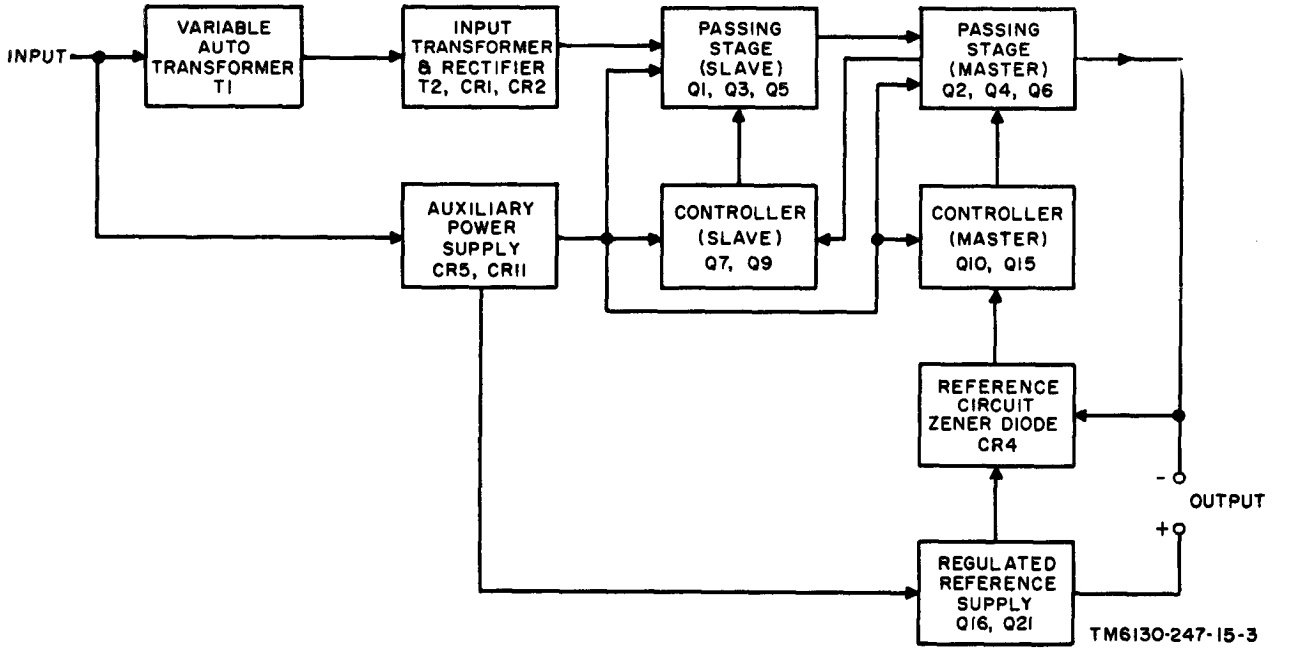

Figure 4-1. *Power Supply PP-3940/G block diagram.*

4-2. Detailed Circuit Functions (fig. 4-2)

a. The main rectifier unit, the bleeder resister, the series-paralleled passing transistors (Q1 through Q6), and the load terminals (with a load resistor attached) form the upper branch of a bridge circuit. The auxiliary power unit transformer secondary (T3) with diodes CR10 and CR11 form a full-wave rectifier with a regulated output. The regulated voltage appears between the REMOTE SENSE binding post and the junction of resistor R45 and Zerner diode CR12. In series with the negative end of this supply are potentiometers R30 and R31. The circuit continues to the junction of Zener diode CR4 and resistors R24, R25 and out the top of this bridge circuit at the junction of resistors R21 and R22 to the REMOTE SENSE + binding post.

b. The second circuit will form the lower branch of the bridge. The OUTPUT + and the REMOTE SENSE + binding posts (as well as the OUTPUT — and the REMOTE SENSE — binding posts) are strapped locally. With the load impedance applied as shown, the load voltage and current will depend on the electrical ratios in the branches of the bridge.

c. One of two electrical ratios is established by the regulated dc output of the reference rectifier (between R34 to bottom of R30), and by the output of the main rectifier (across bleeder resistor R46). A second electrical ratio is formed by the impedances of the passing transistor stages and by the sensing bridge (R21 through R25 and CR4) to include potentiometers R31 and R30. The voltage across the load resistor can be reduced close to zero by balancing the bridge circuit.

d. The rotor shaft of potentiometer R30 (in the lower right branch of the bridge) is ganged to the shaft of variable transformer T1 (in the upper left branch of the bridge). The applied voltage at the primary of T2 is not reduced to zero to bring the de output voltage to zero. There always will be some voltage ratio between the main rectifier and the regulated reference rectifier.

e. As potentiometer R30 is changed, there will be an impedance change in the lower right branch of the bridge. The sensing bridge circuit in the lower right branch will send a signal to the control amplifier (controller, master) which, in turn, will adjust the base bias of the master passing transistors. The slave controller will automatically adjust the base bias of the slave passing stage.

f. The impedance ratio of the right branches of the bridge as compared to the voltage ratio of the left branches of the bridge will adjust the voltage which will appear across the load resistance. As in any bridge circuit, if one branch is held electrically constant, a change in any one of the other branches will affect the other two branches.

g. In the circuit of figure 4-3, a change in the load impedance will affect the loop currents in the passing stages as well as in the sensing bridge. The master and slave control circuits will adjust the base bias current in the passing transistors to hold the load voltage constant.

h. A change in the input power level will likewise affect the voltage ratio in the bridge circuit. This change will be sensed the same as a load change. The reference rectifier is designed to compensate for input power changes; therefore, the output will be held constant.

i. There are three independent bias rectifier circuits in the auxiliary power supply. The output level of these circuits will change with input power changes. By the design of the control circuits, these bias voltages will aid in the regulating action of the system.

j. The response of the regulatory circuits is extremely fast. High gain amplification is one of the methods which can achieve this action together with the normal sensitivity of the bridge-type circuits. The sensing bridge of the master control amplifier provides inputs to the differential amplifiers within the master control unit. The master passing stage impedance, the bridge ratios, and the slave passing bias will lock the circuit to the new impedance level.

k. Troubleshooting of the circuits is performed by conventional methods. Once a trouble is isolated to a transistor unit, a quick check of the voltage between base to emitter will determine the condition of the transistor.

On germanium transistors, this voltage should be close to one-fourth volt. On silicon transistors, the voltage should be close to one-half volt. In replacing power transistors or silicon-diode rectifiers which are mounted on heat sinks, use the proper grade of silicon grease on mica insulators to insure proper heat transfer to the sink from the transistor body.

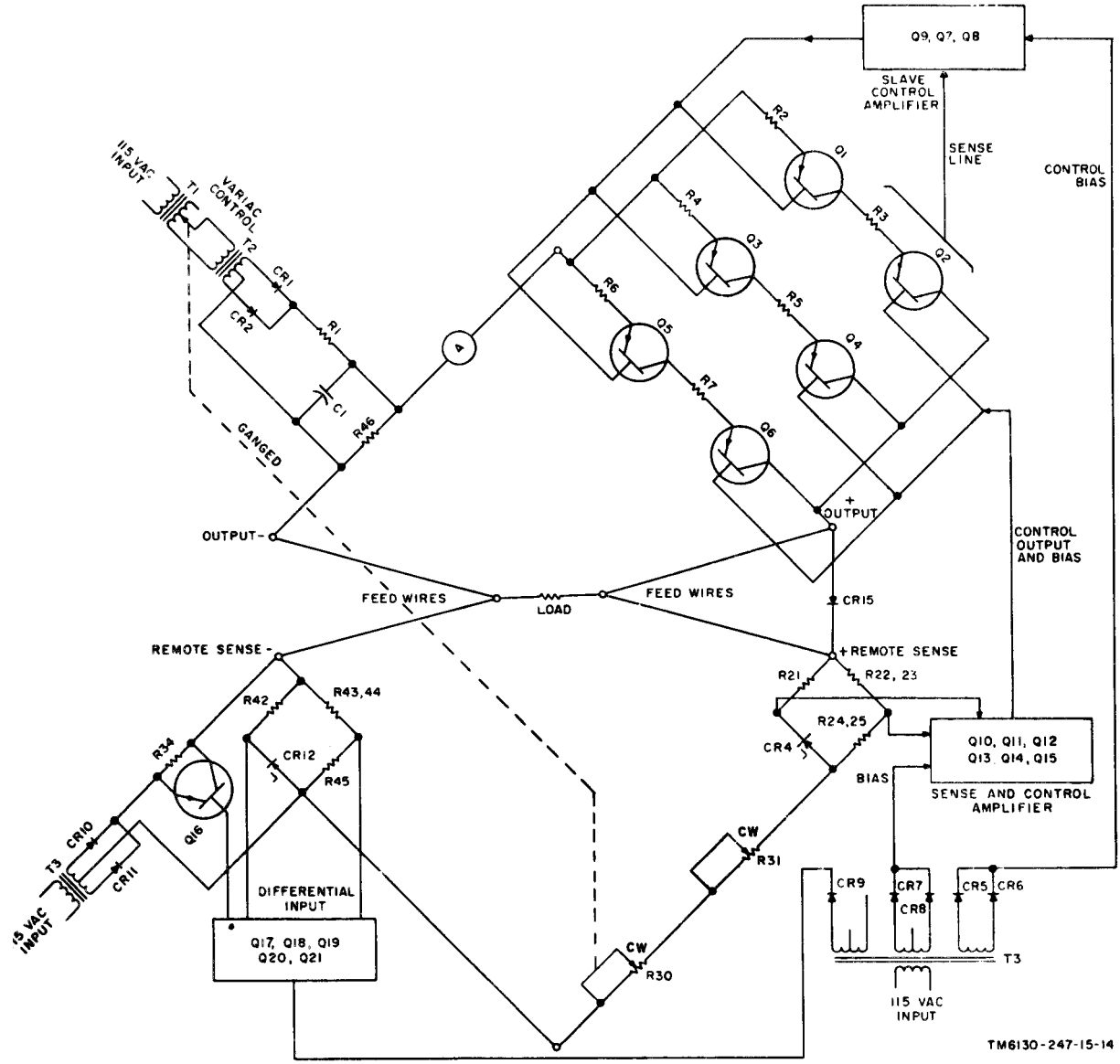

Figure 4-2. Power supply PP-3940/G, simplified schematic diagram.

4-3. Detailed Function of Main Control Amplifier (fig. 4-3)

A bridge circuit, consisting of R21-R25 and CR4, sensing in the output of the unit, controls the first differential amplifier stage (Q14 and Q15). The base of Q14 varies with the output. Since the emitters of Q14 and Q15 are connected, any variation in the output voltage changes the base emitter voltage of Q14 and Q15. If the output tries to rise, because of line or load change, the base of Q14 tends to rise and thus causes more current to flow in this transistor. The emitters of Q14 and Q15 go to a higher potential. Since the base of Q15 is held constant by reference diode CR4, this transistor tends to cut off. Less current will flow in Q15 and in collector resistor R20. The collector of Q15 is now at a high-

er potential and therefore the base of Q13 is also at a higher potential. This causes more current to flow in Q13 and tends to raise the voltage at Q12 and Q13 emitters. Since the current in Q14 tends to rise, the current in collector resistor R18 also tends to rise. This action brings the collector of Q14 and the base of Q12 to a lower potential. Since the base potential went down and the emitter potential went up, Q12 tends to cut off, and there is less current available to the bases of Q10 and Q11. Less current flows in Q10 and therefore less positive bias is applied to the base of the passing transistors in the *master* passing stage (Q2, Q4, Q6) (fig. 4-2). The impedance of these transistors goes up and thus restores the output voltage. If the output falls, because of line or load change, the base of Q14 tends to fall and less current flows in this transistor and its collector resistor R18. The potential at the collector of Q14 and the base of Q12 tends to rise. The emitters of Q14 and Q15 go to a lower potential and since the base of Q15 is held constant, by reference diode CR4, more current flows in Q15 and its collector resistor R20. The collector of Q15 and the base of Q13 tend to go down, causing less current to flow in Q13. The emitters of Q12 and Q13 are now at a lower potential, and because the base of Q12 went up, more current flows in this transistor. This action causes more current to flow in the base circuits of Q10 and Q11. More current now flows in Q10, and more positive bias is applied to the base of the passing transistors, in the *master* passing stage (Q2, Q4, Q6, fig. 4-2). The impedance of this stage is thus lowered, restoring the output voltage. The differential amplifier develops a regulated voltage across R22-R25. This voltage maintains constant current through the sensing circuit, with R30 and R31. The value of R30 and R31 adjusts the output voltage. Capacitor C17 presents a low impedance to the ripple current, and a low impedance path for the ac signal to the main amplifier.

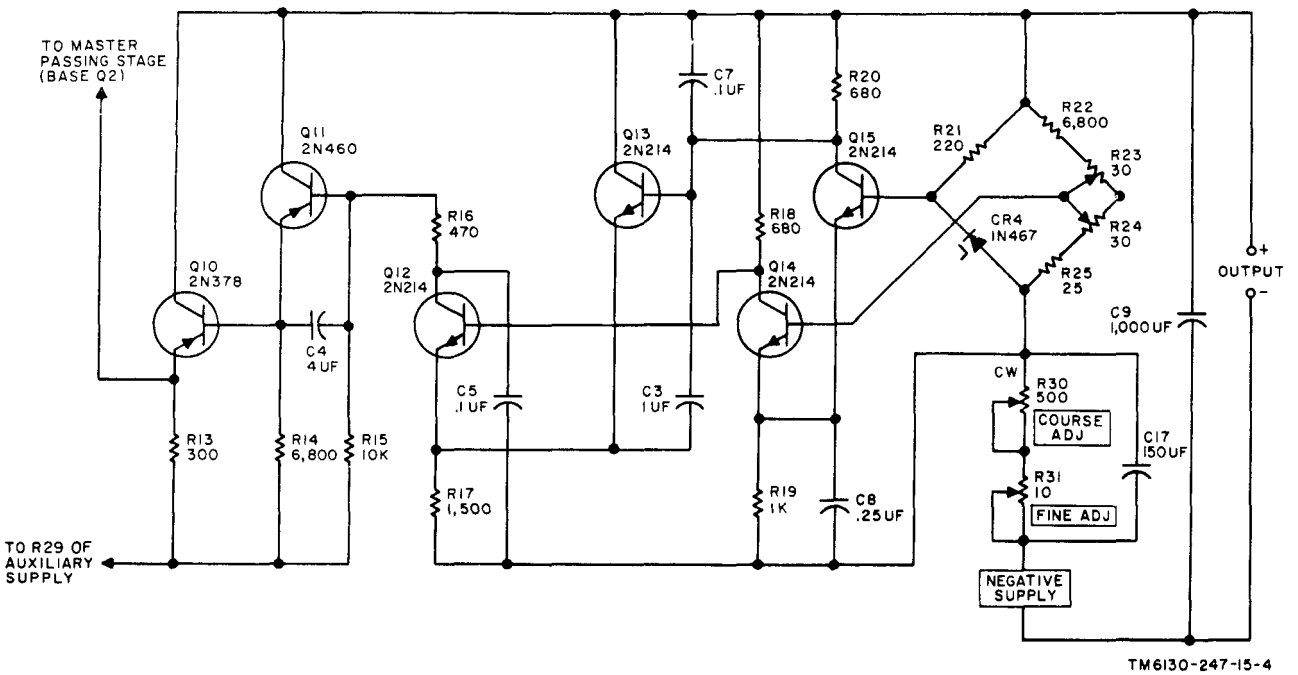

Figure 4-3. *Main control circuit, simplified schematic diagram.*

CHAPTER 5

TROUBLESHOOTING

5-1. Preparation for Troubleshooting

a. Remove the top cover from the unit.

b. Remove the rear terminal strip from the heat sink assembly and lay it to one side (to clear the heat sink).

c. Remove the four mounting screws that hold the center chassis assembly to the cabinet (fig. 5-1).

d. Carefully raise the center chassis assembly and slide the heat sink assembly to the rear of the unit as far as the cable harness will allow.

e. Remove the four screws that hold the inner and outer component board bracket to the center chassis assembly (fig. 5-1).

f. Lay the component board assembly to the side of the cabinet as far as the cable harness will allow it to go.

Note: The above procedure will permit the maintenance man to have access to the various test points called out by the troubleshooting instructions, as well as by the inspection standards outlined in paragraphs 6-1 through 6-11.

5-2. Troubleshooting Chart

Symptom	Probable cause	Procedure
1. No output to load (COARSE ADJ. control at max clockwise).	Fuse F1 blown	Replace fuse F1.
2. No output to load (meter M1 at zero and meter M2 reading negative).	Fuse F2 blown	Replace fuse F2.
3. Low output (less than 36 volts with COARSE ADJ. control completely clockwise).	Transistor Q13 or Q14 shorted. Check resistors R17 and R19 for overheating.	Replace transistors with same type.
	Low Zener diode voltage (CR4).	Replace Zener diode with same type and rating.
	Improper alignment of reference supply. Voltage across capacitor C1 is low.	Adjust as described in paragraph 5-3. Check ac voltages at primary and secondaries of transformers T1, T2, and T3. Check rectifiers CR1 and CR2.
4. Incorrect output range (para 5-3).	Reference supply faulty	Check all transistors (Q16, Q17, Q18, Q19, Q20, and Q21) and Zener diode CR12.
	Shaft coupling on ganged T1 and R30 loose.	Follow adjustment procedures (para 5-3).
High output (over 36 volts dc when COARSE ADJ. control is max clockwise).	Passing transistor shorted (Q1, Q2, Q3, Q4, Q5, or Q6) or overloaded.	Remove transistors Q12, Q13, Q18, and Q19 from their sockets. *a*. If output voltage does not fall, check passing stages. *b*. If output voltage does fall, check control amplifiers Q12, Q13, Q14, and Q15.
5. High output with resistor R13 overheating. (Feel for heat).	Transistor Q10 shorted	Replace transistor.
6. High output with resistor R14 overheating.	Transistor Q11 shorted	Replace transistor.
7. High output with resistors R16 and R17 overheating.	Transistor Q12 shorted	Replace transistor.
8. High output with resistors R20 and R19 overheating.	Shorted transistor Q15	Replace transistor.

Symptom	Probable cause	Procedure
9. High output unable to be reduced to zero.	Open Zener diode CR4	Replace diode.
10. Poor regulation in output (master-slave stages). (Results of test given in para 6-7.)	Low gain in one of control amplifiers (Q10, Q11, Q12, Q13, Q14, or Q15).	Check individual stages and replace as needed.
11. Poor regulation in reference supply. (This symptom may be checked by the test given in para 5-3b (3).)	Low gain in one of the reference supply stages (Q16, Q17, Q18, Q19, Q20, or Q21) or reference Zener diode CR12.	Check individual stages and replace as needed.
12. Poor regulation with R36 overheating.	Shorted transistor Q7	Replace transistor.
13. Poor regulation with R9 overheating.	Shorted transistor Q8	Replace transistor.
14. Poor regulation with R47 and R10 overheating.	Shorted transistor Q9	Replace transistor.
15. High ripple as measured at the load terminals. **Note:** measured ripple should be 0.5 millivolts rms.	Filter capacitor C1, C9, C13, C16, or C17 are faulty. Faulty rectifier doide CR1 or CR2 or both. Response time of control amplifiers not adequate because of low gain on a stage, or poor response on a passing stage. Loose connections in power supply. Open in one side of input transformed secondary (T2).	Check for leakage, capacity change, or opens. Unsolder leads to check for open or shorts; replace. Check individual transistors for alpha on a suitable tester. (In-circuit tests may be made. Refer to applicable transistor manual.) Perform visual check and tighten. Unsolder leads at diodes CR1 and CR2 and check continuity at transformer secondaries.

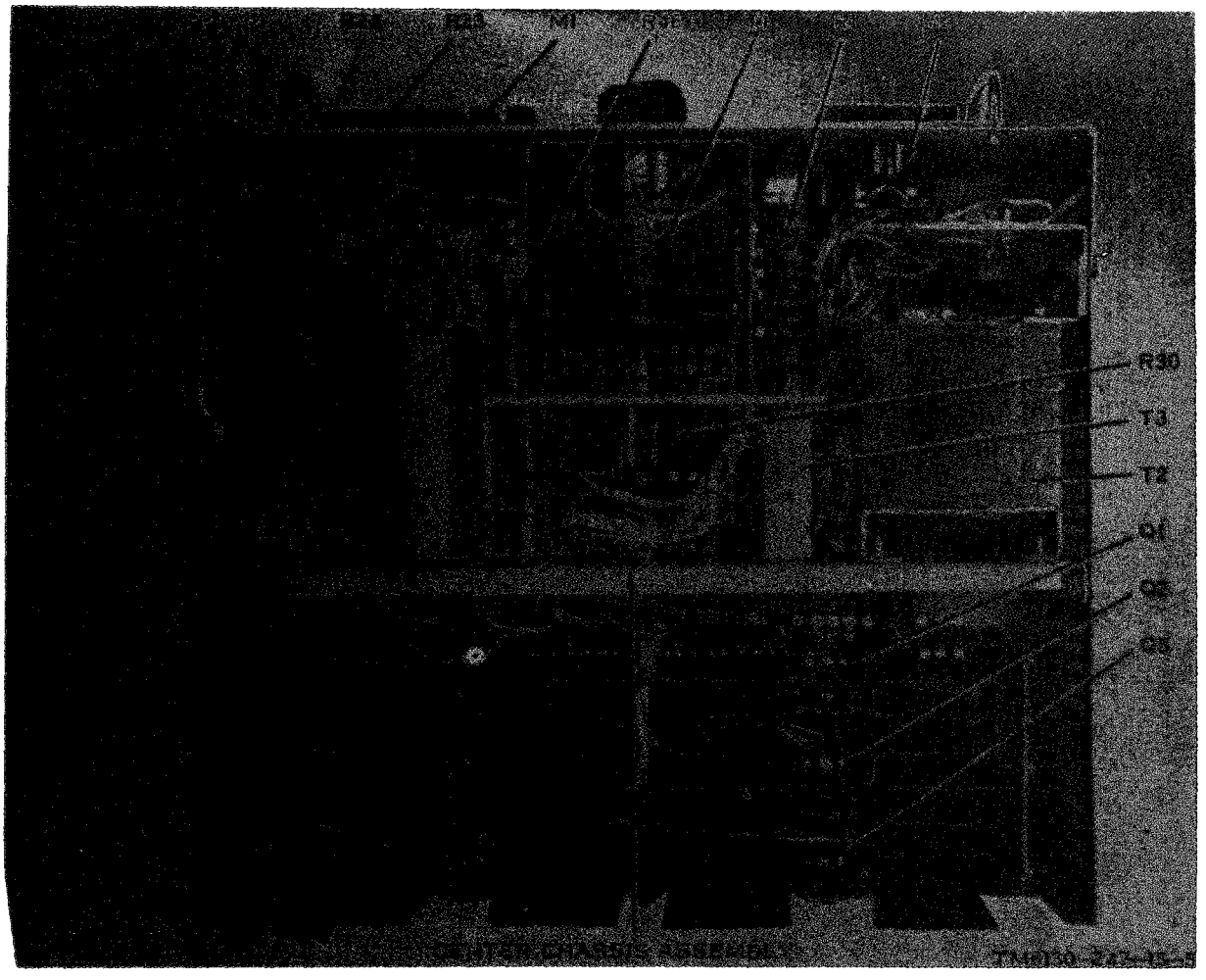

Figure 5-1. *Power Supply PP-3940/G, top view.*

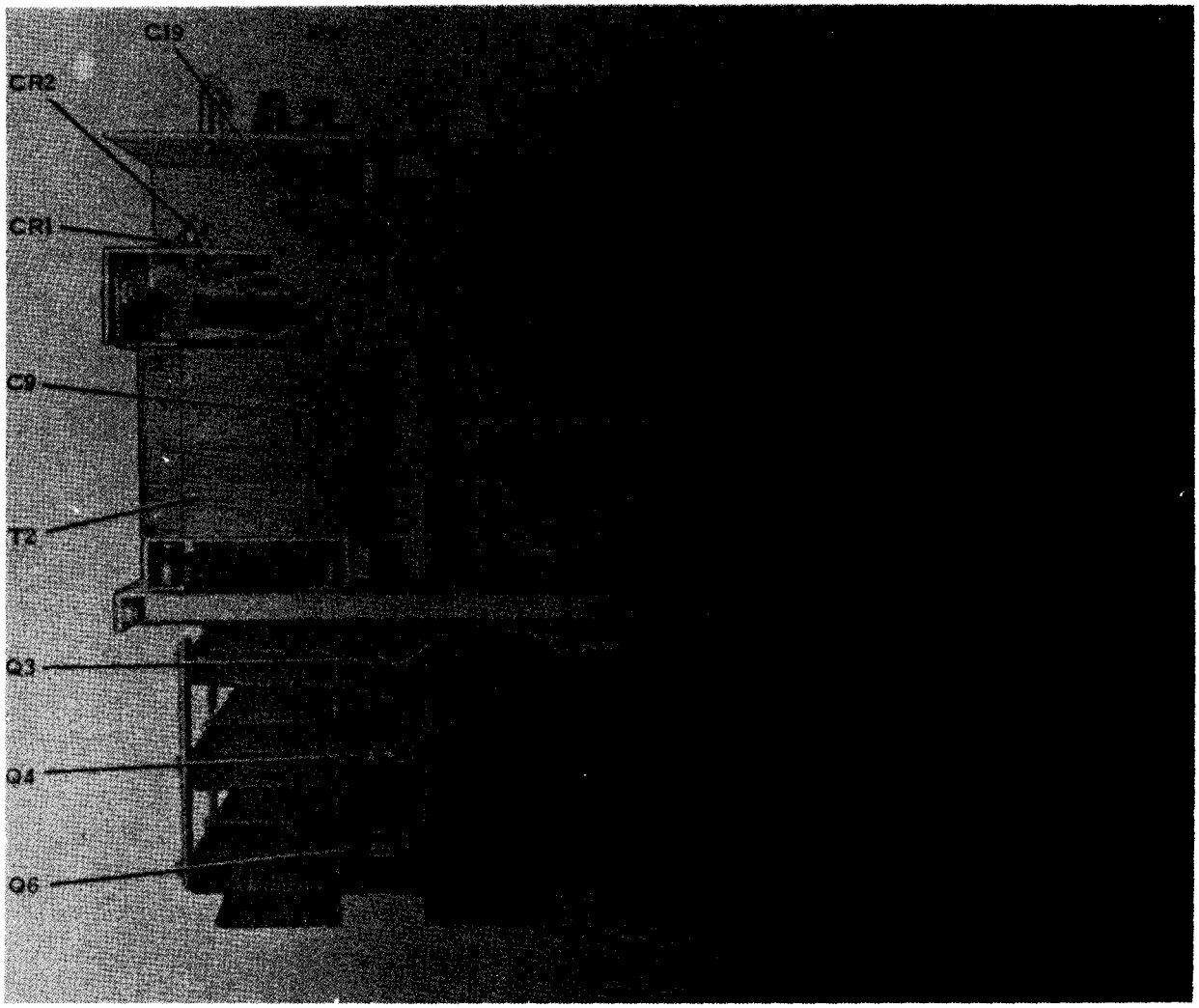

Figure 5-2. *Power Supply PP-3940/G, bottom view.*

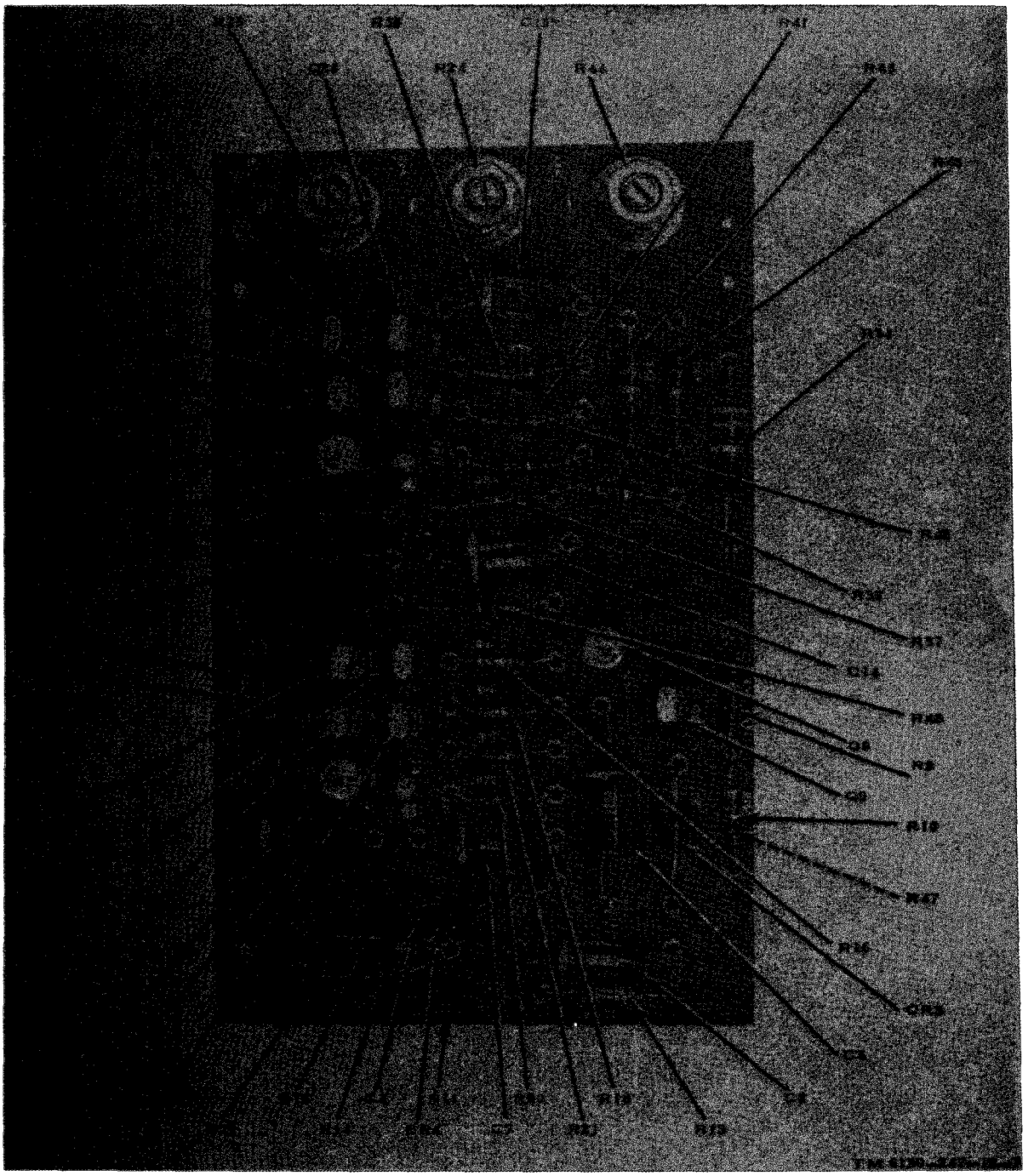

Figure 5-3. *Power Supply PP-3940/G, onter component board.*

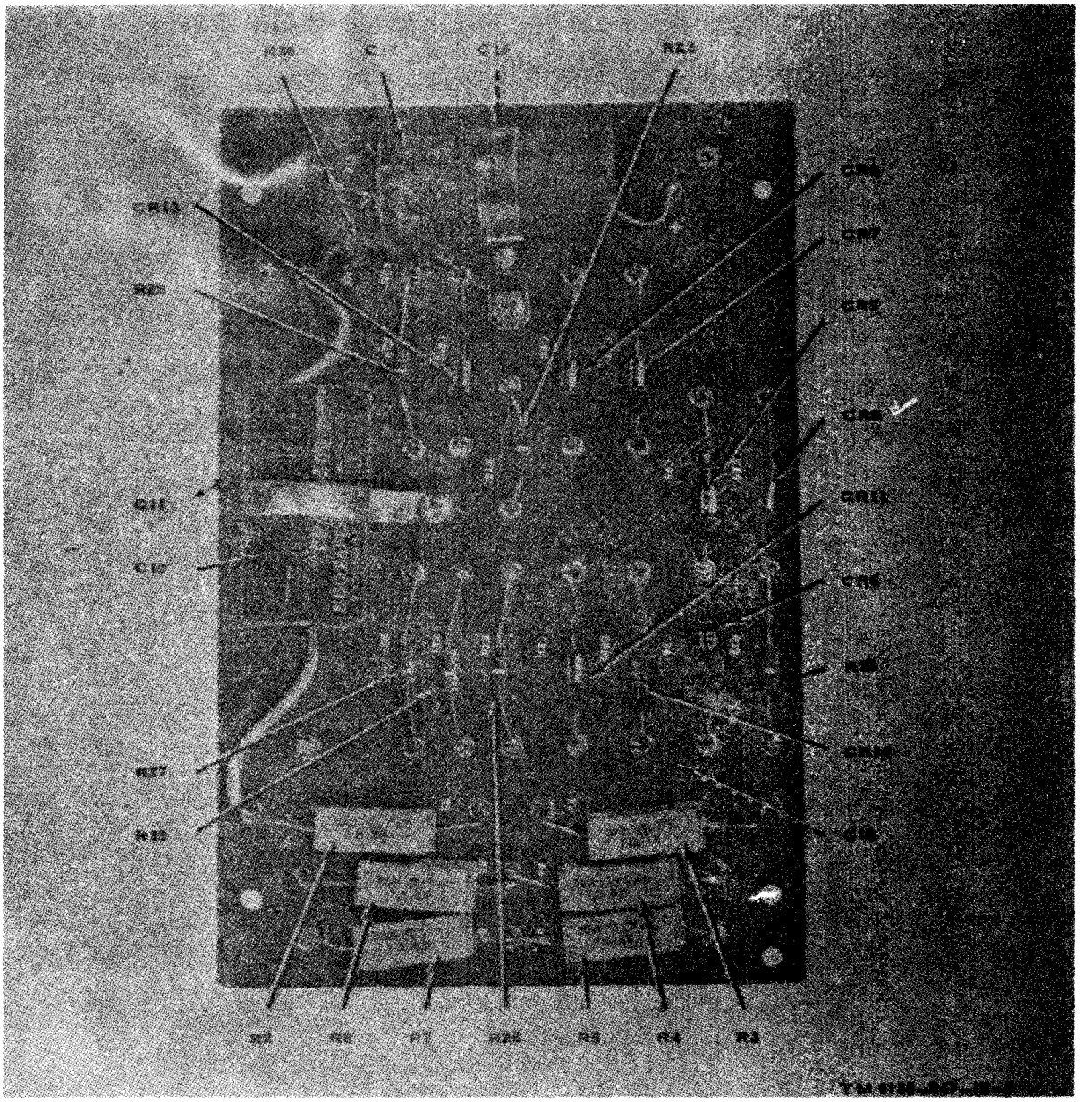

Figure 5-4. Power Supply PP-3940/G, inner component board.

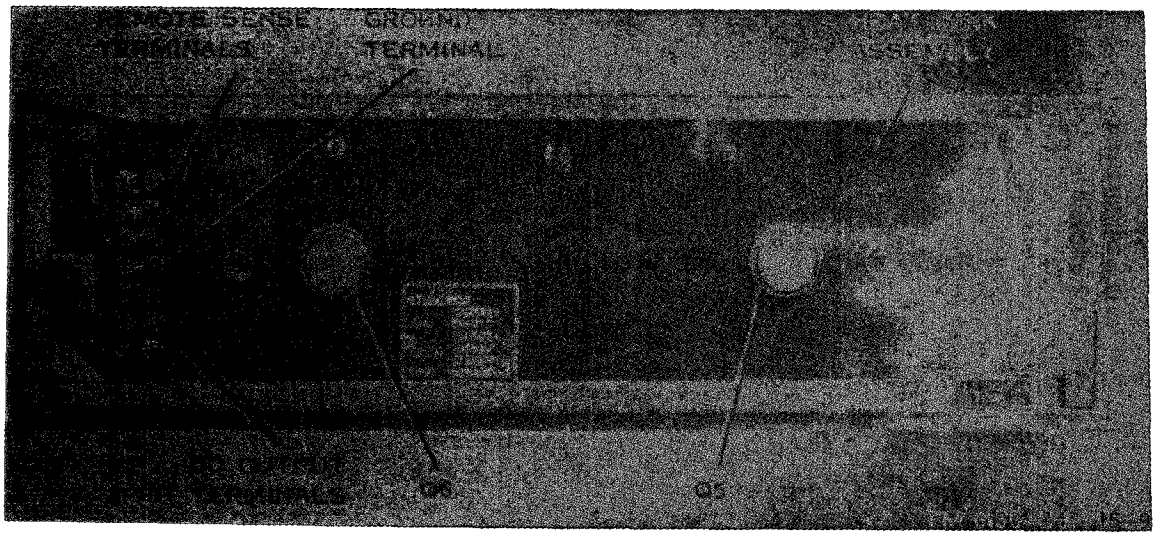

Figure 5-5. *Power Supply PP-3940/G, rear view.*

5-3. Adjustment Procedures

Note: **Perform the procedures given in paragraph 5-1 before peforming these instructions. These procedures should be performed whenever it is necessary to replace faulty (fig. 5-1 and 5-2) transistors.**

a. Initial Requirements.

(1) Be sure that a coating of heat-transferring silicon grease is used between the power transistor insulators and their heat sink (applicable to transistors Q7, Q10, and Q16 and passing stages).

(2) Check all terminals of transistor Q7, Q10, or Q16 for continuity to the best sink before connecting any wires to the transistor collector, emitter, and base terminals. All elements of these transistors should be electrically insulated from the heat sink assembly.

(3) In replacing the passing stage power transistors, observe the same precautions as described above. (All transistors must float above chassis ground.)

b. Initial Control Settings.

(1) Turn the COARSE ADJ. control fully counterclockwise (fig. 2-1).

(2) Loosen the shaft coupling setscrews between variac T1 and variable resistor 30 (fig. 5-1).

(3) Set the FINE ADJ. control fully counterclockwise (fig. 2-1).

(4) Set controls R23, R24, and R44 to their midrange position (fig. 5-3).

c. Procedure.

(1) Connect the dc voltmeter test leads between the right side of resistor R45 on the outer component board and to the left (negative) terminal of dc voltmeter M2 (fig. 5-3).

(2) Connect the ac voltmeter test leads to the terminals indicated in (1) above.

(3) Set the ac voltmeter dc range switch to 50-volt range. (Set up the meter for normal vacuum-tube voltmeter (vtvm) operation as described in TM 11-6625-438-10.)

(4) Set the ac voltmeter range switch to the lowest ac volt range (0.001 volt).

(5) Turn the power supply POWER switch S1 to ON.

(6) Adjust resistor R44 for a dc reading of 6.0 to 6.1 volts on the dc voltmeter. The meter reading should be not higher than 50 microvolt root mean square (rms).

(7) Connect the power supply power line cord to the output of the variac. Use Multimeter TS-352/U across the variac secondary to monitor the ac voltage.

(8) Connect the variac to a power source and turn on the power supply POWER switch.

(9) Vary the variac form 105 to 125 volts ac.

(10) The reading on the dc voltmeter as connected in (6) above shouls not vary from its original reading by more than 1 millivolt (-6,0 to 6.1 volts ± 0.001).

(11) Adjust the variac for an input to the power supply of 115 volts ac.

(12) Remove the dc voltmeter test leads from R45 and meter M2 and connect the leads across the terminals of capacitor- C1 (fig. 5-1).

(13) Adjust the COARSE ADJ. control clockwise until the dc voltmeter indicates a voltage from 20 to 21 volts dc. (Do not allow the shaft of control R30 to turn with the variac control. If necessary, hold the shaft of R30 steady during this adjustment.)

(14) Turn POWER switch S1 to OFF and lock the coupling setscrews on the variac to the R30 shaft.

(15) Turn POWER switch S1 to ON and recheck the voltage ((13) above) . If necessary, readjust the shaft coupling to meet the 20- to 21-volt requirement.

(16) Remove the dc voltmeter from across C1 and set the range selector switch to 50 volts.

(17) Connect the dc voltmeter test leads to the output terminals on the front panel of the power supply (fig. 2-1).

(18) Rotate the COARSE ADJ. control maximum clockwise.

(19) Adjust control R24 on the outer component panel to provide a reading of 35.7 to 36.3 volts dc (fig. 5-3).

(20) Rotate the COARSE ADJ. control maximum counterclockwise.

(21) Adjust the dc voltmeter range to the 0.5-volt range and center the meter before making the next test.

(22) Adjust control R23 on the outer component panel until the dc voltmeter indicates approximately 1 or 2 divisions below zero (negative output voltage) (fig. 5-3).

(23) If these requirements cannot be met in the first series of adjustments, repeat the procedures given in (18) through (22) above.

(24) The required voltage range as measured at the output terminals at the end of the test is from -0.02 volt to a maximum of 36 volts dc ± 0.3.

(25) Rotate the COARSE ADJ. control to its maximum counterclockwise position (fig. 2-1).

(26) Change the dc voltmeter range switch to the 0.5-volt range.

(27) Rotate the FINE ADJ. control through its range. The dc voltage at the output terminals should go through a range of 0.8 volt dc.

Note: Add the meter readings algebraically to obtain the given range. The actual range as indicated on the meter may seem to give a value of 1 volt; however, a manipulation of the signed quantities should give a 0.8-volt range.

(28) Remove all test equipment and restore the equipment to its normal condition.

CHAPTER 6

DEPOT INSPECTION STANDARDS

6-1. Applicability of Depot Inspection Standards

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

6-2. Applicable References

a. Repair Standards. Applicable procedures of the depots performing 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 a part of the requirements for testing this equipment.

b. Technical Publications. This is the only publication applicable to this equipment.

c. Modification Work Orders. Perform all modification work orders applicable to this equipment before making the tests specified. DA Pam 310-4 lists all available MWO's.

6-3. Test Facilities Required

The following items of equipment are required for depot testing:

Item	Technical manual	Common name
Voltmeter, Meter ME-30(*)/U[a]	TM 11-6625-320-12	Ac voltmeter
Voltmeter, Electronic AN/USM-98	TM 11-6625-438-10	Dc voltmeter
Multimeter TS-352(“)/U[b]	TM 11-5527	Multimeter
Variable Power Transformer TF-1-1A/USM	TM 11-5950-203-15P	Variac

[a]Indicates Voltmeter, Meter ME-30A/U and Voltmeters, Electronic ME-30B/U, ME-30C/U, and ME-30E/U.

[b]Indicates Multimeters TS-352/U, TS-352A/U, and TS-352B/U.

6-4. General Test Requirements

Most of the tests will be performed under the conditions given below and illustrated in figure 6-1. Testing will be simplified if connections and panel control settings are made initially, and modifications are made as required for the individual tests.

a. Connect the ac power cord to the variac and connect the variac input cord to a 115-volt ac 60-cps power source.

b. Remove the top cover from the unit.

c. Remove the rear terminal strip from the heat sink assembly and lay it to one side (to clear the heat sink).

d. Remove the four mounting screws that hold the center chassis assembly to the cabinet (fig. 5-1).

e. Carefully raise the center chassis assembly and slide the heat sink assembly to the rear of the unit as far as the cable harness will allow.

f. Remove the four screws that hold the inner and outer component panel bracket to the center chassis assembly (fig. 5-1).

g. Lay the component board assembly to the inside of the cabinet as far as the cable harness will allow it to go.

h. Insure that the front panel links are connected as follows:

Binding post	
0-36 V.D.C.-0-4A	To remote sense
—	—
+	+

Note. Metal links are provided with the equipment.

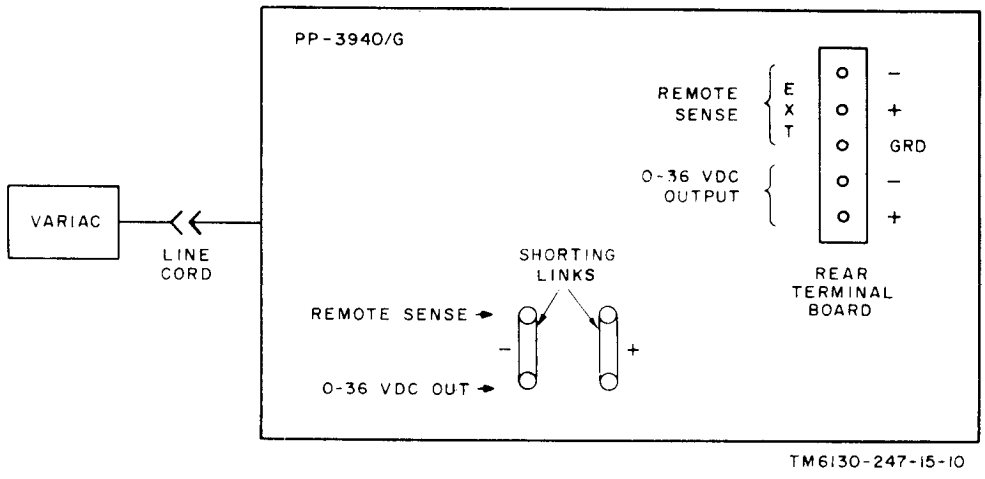

Figure 6-1. *Connections for final testing.*

6-5. Regulated Reference Supply Test

Connect the equipment and set the controls outlined in paragraph 6-4.

a. Set up the dc voltmeter as a conventional vtvm. Refer to paragraphs 11 and 12, TM 11-6625-438-10. Set the input range switch to 50 volts (VOLTS RANGE switch).

b. Set up the ac voltmeter as described in paragraph 14, TM 11-6625-320-12. Set the VOLTS-DB range switch to the 0.001-volt range for this test.

Note: Be careful to shield the meter test leads to prevent stray pickup from circuits adjacent to the hot lead.

c. Connect the dc voltmeter and the ac voltmeter test leads across capacitor C16 as shown in figures 5-4 and 6-2. (Refer to figures 4-3 and 7-3 for the schematic location of the test point.)

d. Rotate the COARSE ADJ. control on the front panel of the power supply extremely counterclockwise.

Note: The shafts of T1 and control resistor R30 are ganged by the adjustable coupling (fig, 5-1) During this procedure, the shaft coupling must be secured against slipage.

e. Rotate the FINE ADJ. control (fig. 2-1) extremely counterclockwise.

f. Turn the POWER switch to ON. The pilot lamp should light.

g. Adjust potentiometer R44 (located on outer component board in figure 5-3) until the dc voltmeter reads between 6.0 to 6.1 volts dc.

h. Observe the indication on the ac voltmeter. The maximum allowable ripple should be 50 microvolts (measured at the low end of the meter scale).

i. Rotate the variac to provide a variation in the ac input voltage from 105 to 125 volts ac.

Note: Connect Multimeter TS-352/U as an ac voltmeter across the output terminals of the test variac to perform the procedures above.

j. Note the voltage reading on the dc voltmeter as the variac is turned. The voltage should vary not more than 1 millivolt dc from its original value which was meassured in *g* above.

k. The ripple voltage measured on the ac voltmeter should remain at the 50-microvolt level.

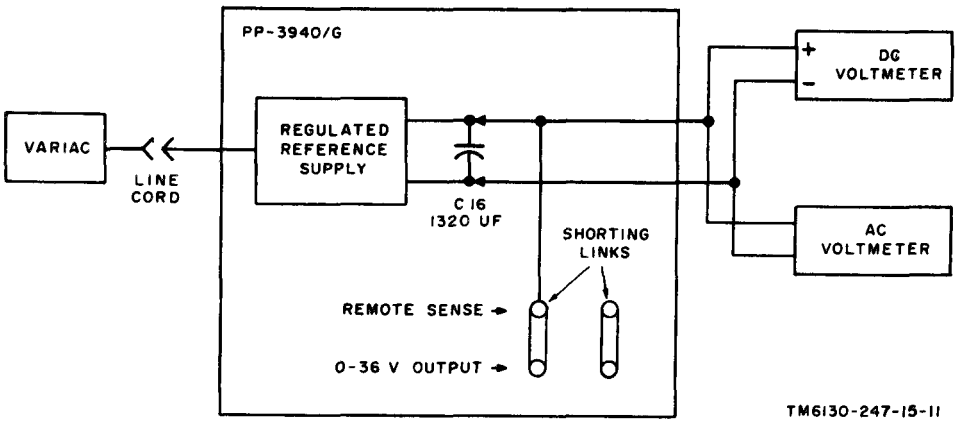

Figure 6-2. Connections for reference supply tests.

6-6. Output Voltage Range Test (fig. 6-1)

This test will check the minimum and maximum output voltage at the output terminals of the power supply. Before performing these tests, connect the equipment as described in paragraph 6-5.

a. Prepare the dc voltmeter for voltage tests as described in TM 11-6625-438-10, and set the VOLTAGE RANGE switch to the 50-volt dc range.

b. Connect the dc voltmeter test leads to the power supply front panel output terminals.

Note: Connect the positive voltmeter lead to the strapped + (red) binding posts, and connect the negative voltmeter lead to the - (black) strapped binding posts (fig. 2-1).

c. Adjust the variac for an output to the power supply of 115 volts ac. Use the multimeter to accomplish this adjustment.

d. Rotate the COARSE ADJ. control extremely clockwise.

e. Turn the power supply POWER switch to ON.

f. The dc voltmeter should indicate between + 35.7 and 36.3 volts dc.

g. Disconnect the test leads and change the VOLTS RANGE switch of the dc voltmeter from the 50-volt setting to the 0.5-volt setting.

h. Rotate the COARSE ADJ. control extremely counterclockwise.

i. After connecting the dc meter leads back to the output terminals, the dc voltmeter should indicate between -0.01 to -0.02 volts dc.

j. If the readings specified in *f* and *i* above fail to meet the requirements, proceed as described below. If the readings meet the requirements, proceed to *k* below.

(1) Turn the POWER switch to OFF.
(2) Rotate the COARSE ADJ. control extremely counterclockwise.
(3) Loosen the setscrews in the coupling assembly of the variac-to-R30 shaft (fig. 5-1).
(4) Connect the dc voltmeter test leads across capacitor C1 (fig. 5-1 and 7-3).
(5) Set the dc voltmeter VOLTS RANGE switch to the 50-volt range.
(6) Turn the power supply POWER switch to ON.
(7) Hold the shaft of resistor R30 in place and rotate the COARSE ADJ. control until the dc voltmeter reads between 20 and 21 volts dc.

Note: This adjustment will set up the minimum dc voltage which the main power supply will always apply to the passing stages. It is one of the requirements for obtaining the proper bridge operation of the reference supply and the main power supply.

(8) Turn the POWER switch to OFF.
(9) Tighten the setscrew on the shaft coupling.
(10) Turn the POWER switch to ON.
(11) The reading on the dc voltmeter should remain at 20 to 21 volts dc.
(12) If the voltage reading changes outside the range of 20 to 21 volts, repeat the procedure given in (7) through (11) above.

k. Make minimum voltage to maximum voltage range final adjustments as follows:

(1) Connect the dc voltmeter to the output binding posts of the power supply. (VOLTS RANGE of the dc voltmeter switch in the 50-volt position) (fig. 2-1).

(2) Rotate the COARSE ADJ. control to provide a maximum reading on the dc voltmeter (maximum clockwise position).

(3) Adjust potentiometer R24 (fig. 5-3) until the dc voltmeter reading indicates between 35.7 to 36.3 volts dc (fig. 4-3 and 7-3).

Note : It may not be possible to obtain this dc reading on the first trial. In this case, adjust R24 to obtain a voltage close to the requirement.

(4) Change the COARSE ADJ. control to its extreme counterclockwise position (minimum).

(5) Change the dc voltmeter VOLTS RANGE switch to the 0.5-volt range.

(6) Adjust potentiometer R23 (fig. 5-3) until the dc voltmeter reads between -0.01 and -0.02 volts dc.

Note: It may not be possible to obtain the required voltage given in (6) above. In this case, repeat the procedure given in (3) through (6) above until the proper range is obtained. It should take approximately four trials before the specification can be met.

(7) The final voltage range after the procedures given in (1) through (6) above are completed should be -0.02 volt minimum (COARSE ADJ. set extremely counterclockwise) and 36 volts ± 0.3 maximum.

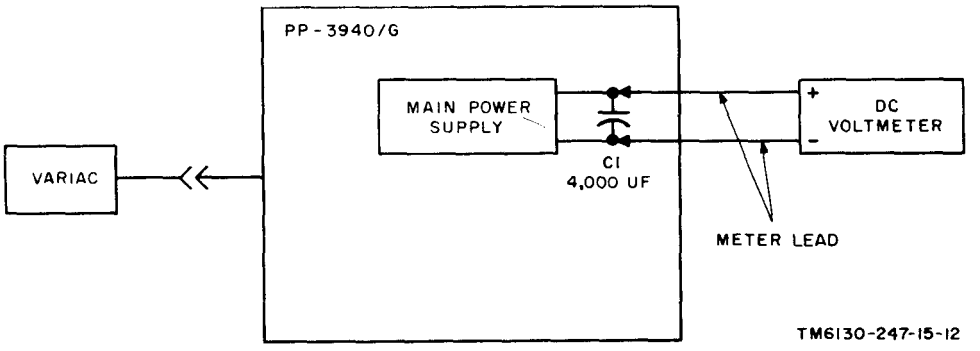

Figure 6-3. *Connections for calibration of COARSE ADJ. control.*

6-7. Fine Adjust Control Range Test

This test checks the dc output voltage range which is established by the FINE ADJ. control. Connect the equipment and set the panel controls according to paragraph 6-5.

a. Set up the dc voltmeter for a dc voltage range of 0.5 volt dc.

b. Adjust the variac to provide an input of 115 volts ac to the power supply.

C. Connect the dc voltmeter test leads across the output binding posts of the power supply.

d. Rotate the FINE ADJ. control over its full range.

e. The dc voltmeter should indicate a deviation of approximately 0.8 volt.

Note: This deviation will cause the voltmeter to change from a negative to a positive dc value.

6-8. Continuity Test

This test determines whether there is a complete connection between the front output binding posts and the rear output terminal strip. Use the multimeter to check for continuity between the points listed in the chart below.

Front panel binding post	To rear terminal
0-36 V.D.C.-0-4A	+
+	+
—	—
REMOTE SENSE	Remote output
+	+
-	-

6-9. Link Test

Connect the equipment and set the panel controls as indicated in paragraph 6-4a. For this test, it will not be necessary to perform

the procedures given in paragraph 6-4b through *h*.

a. Set the COARSE ADJ. and the FINE ADJ. controls on the front panel until the panel voltmeter (M2) reads 36 volts dc. (Refer to figures 2-1 and 7-3 to identify the meter.)

b. Set the POWER switch to OFF.

c. Remove all links from the unit (front or rear) and turn the POWER switch to ON.

d. The panel voltmeter (M2) should show a reading of 36 volts dc ± 2.

6-10. Voltage Checks Under Load

Connect the equipment and set the front panel controls as indicated in paragraph 6.5. Prepare a load for testing the power supply.

Note : A suitable load for the power supply can be built by using a set of standard 150-watt lamp bulbs connected in parallel. Use a bank of approximately nine lamps. Change the load by unscrewing them.

a. Add a resistive load to the power supply output terminals of 2 amperes.

Note: One 150-watt lamp gives a load current (on dc meter M1) of approximately 750 milliamperes. The four lamps connected in parallel should load the supply close to the required 2 amperes. Use a total of nine lamps in the test load setup. Change the load by unscrewing the lamps as needed or screwing them back as needed.

b. Set up the dc voltmeter to a volts range of 500 volts dc.

c. Connect the dc voltmeter test leads across filter capacitor C1; observe the proper polarity.

d. Adjust the variac to provide an input of 115 volts ac to the power supply.

e. The dc voltmeter should indicate a reading of 58 volts dc ± 5.8.

f. Remove the dc voltmeter test leads from C1 and connect the leads across resistor R2 of passing stage Q1 (fig. 5-4 and 7-3). Place the negative voltmeter lead to the emitter end of Q1 (right side of the resistor as seen on figure 5-4).

g. Increase the load by screwing in lamp bulb loads until panel meter M1 indicates a load current of 4 amperes.

h. The dc voltage drop as indicated across R2 on the dc voltmeter should be 1.3 volts ± 0.26 volt dc.

i. Repeat the procedure given in *d* through *h* above for passing stage resistors R3 through R7. Refer to figures 5-4 and 7-3 to locate the negative meter lead test point.

j. Reduce the load current to 2 amperes by unscrewing the lamp bulbs until panel meter M1 indicates 2 amperes.

k. Check the ac input at the variac for a level of 115 volts ac. Adjust the variac if necessary.

l. Adjust the COARSE ADJ. and the FINE ADJ. controls for a panel dc meter (M2) indication of 36 volts dc. Check panel ammeter M1 for a 2-ampere indication. Adjust by changing the lamp bulb loads if it is necessary.

m. Prepare the dc voltmeter for a volts range of 50 volts dc.

n. Check the voltage across the capacitors listed in the chart below:

Capacitor	Expected indication
C10	21 volts dc ± 2.1
C11	22 volts dc ± 2.2
C12	10 volts dc ± 1
C13	10 volts dc ± 1

Note: Be careful when handling the component boards during these tests to avoid damage to the transistors.

6-11. Rear Terminal Measurements and Tests

Connect the equipment and set the controls as indicated in paragraph 6-4a through *g*. Remove the front panel shorting links (fig. 2-1) and connect the suitable shorting links to the rear terminal board screw terminals (fig. 5-5).

a. Perform the test procedure as outlined in paragraph 6-7; use the rear terminal strips instead of the front binding posts. (Refer to paragraph 6-4h and change the strapping requirements to the rear terminal strip.)

b. Be sure that all connections to the terminal strip are mechanically tight when making the tests.

c. Disconnect all test equipment and restore the power supply unit to its normal operating condition.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

7-1. Disassembly of Equipment

Disassembly of the power supply consists of removing the power cord from the power source and the load conductors from the terminals.

7-2. Repackaging for Shipment or 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.

a. Materials Reauired. The following materials are required for packaging the power supply. For stock numbers of the materials, consult SB 38-100.

Material	Quantity
Filler material	4 lb
Corrugated cardboard	27 sq ft
Gummed tape	17 ft
Gummed waterproof tape	20 ft
Waterproof paper	25 sq ft

b. Packaging. Package the power supply as follows:

(1) Cushion the power supply on all surfaces with pads of filler material.

(2) Place the cushioned unit within a wrap of corrugated cardboard.

(3) Secure the wrap with gummed tape.

(4) Protect the corrugated cardboard wrap with a waterproof paper barrier.

(5) Seal the seams of the paper barrier with waterproof tape.

c. Packing.

(1) Place the package containing the power supply into a wooden box.

(2) Nail a wooden lid on the box.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

7-3. Authority of Demolition

The demolition procedures given in paragraph 7-4 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

7-4. Methods of Destruction

Any or all of the methods of destruction given below may be used. The time available will be the major determining factor in the choice of the methods to be used in most instances when the destruction of equipment is undertaken. The tactical situation will determine how the destruction order will be carried out. In most cases, it is preferable to completely demolish some portions of the equipment rather than partially destroy all the equipment parts.

a. Smash. Smash the rack.

b. Cut. Cut cables, cords, and wires.

c. Burn. Burn the technical manuals.

Warning: **Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.**

d. Explode. If explosives are necessary, use firearms, grenades, powder charges, or explosives to demolish the equipment.

e. Dispose. Scatter or bury destroyed parts or throw them into waterways.

APPENDIX I

REFERENCES

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army.
TB SIG 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 353-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TB SIG 364	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 9-213	Painting Instructions for Field Use.
TM 11-663	Electronic Power Supplies.
TM 11-5527	Multimeters TS-352/U, TS-352A/U, and TS-352B/U.
TM 11-5950-203-15P	Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Variable Power Transformer TF-171A/USM.
TM 11-6625-320-12	Organizational Maintenance Manual: Voltmeter, Meter ME-30A/U and Voltmeters, Electronic ME-30B/U, ME-30C/U, and ME-30E/U.
TM 11-6625-438-10	Operator's Manual: Voltmeter, Electronic AN/USM-98.
TM 38-750	Army Equipment Record Procedures.

APPENDIX II

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

A2-1. General

This appendix lists items supplied for initial operation and for running spares. The list includes tools, parts, and material issues as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

A2-2. Columns

Columns are as follows:

a. Federal Stock Number. This column lists the 11-digit Federal stock number.

b. Desigignation by Model. Not used.

c. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

d. Unit of Issue. The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

e. Expendability. Nonexpendable items are indicated by NX. Expendable items are not annotated.

f. Quantity Authorized. Under "Items Comprising an Operable Equipment," the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spare Items," the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

g. Illustration. Not used.

SECTION II. FUNCTIONAL PARTS LIST

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION FIGURE NO.	ILLUSTRATION ITEM NO.
		POWER SUPPLY PP-3940/G					
6130-985-8130		POWER SUPPLY PP-3940/G: Rectification data: electronic type, full-wave; output 0-36 vdc, 0-4 amps; oper power req: 105-125 vac, 50-400 cps; single phase; o/a dim 17 in. lg x 15 in. w x 5 in. h; filter included; Mfr data: Sorensen, A unit of Raytheon Co., South Norwalk, Conn., Model QR-36-4A; for general purpose use.		NX			
		ITEMS COMPRISING AN OPERABLE EQUIPMENT					
ORD THRU AGC		TECHNICAL MANUAL TM 11-6130-247-15			2		
		RUNNING SPARE ITEMS					
5920-284-7466		FUSE, CARTRIDGE: 4 amp; 125 volt max; Littelfuse Inc. p/n 313004			5		
5920-296-0679		FUSE, CARTRIDGE: 5 amp, 250v 3 AG; Littelfuse p/n 312005			3		
6240-682-3411		LAMP, GLOW: GE Co. No. NE-51			6		
5960-284-6016		SEMICONDUCTOR DEVICE, DIODE: Semiconductor Products Dept, GE Co. #1N91			2		
5960-617-3179		SEMICONDUCTOR DEVICE, DIODE: National Semiconductor Corp # 1N467			1		
5960-834-3654		TRANSISTOR: Sylvania Electric Prod #2N214			2		
5960-752-6045		TRANSISTOR: Tung-Sol Electric, Inc. #2N378			1		
5960-538-0493		TRANSISTOR: Tung-Sol Electric, Inc. #2N460			1		
		TRANSISTOR: Sorenson #18-024			1		

APPENDIX III

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

A3-1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance category.

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the component, components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component, and subassemblies which are part of an assembly are listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) is listed in disassembly order or alphabetical order.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the categories.

(a) *Service.* To clean, to preserve, and to replenish lubricants,

(b) *Adjust.* To regulate periodically to prevent malfunction.

(c) *Inspect.* To verify serviceability and detect incipient electrical or mechanical failure by scrutiny.

(d) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(e) *Replace.* To substitute serviceable components, assemblies, subassemblies, for unserviceable components, assemblies, or subassemblies.

(f) Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

(g) Align. To adjust two or more components of an electrical system so that their functions are properly synchronized.

(h) Calibrate. To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(i) Overhaul. To restore an item to *completely serviceable* condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(j) Rebuild. To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or

specifications and subsequent reassembly of the item.

(3) *Operator, organization, direct support, general support and depot.* The symbol X indicates the categories responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Categories higher than those marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *Operator, organization, direct support, general support, and depot.* The dagger (†) indicates the categories normally allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

A3-2. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including general support are authorized to the organization operating this equipment.

SECTION II. MAINTENANCE ALLOCATION CHART

PART OR COMPONENT	MAINTENANCE FUNCTION	ECHELON O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
POWER SUPPLY, PP-3940/G	service		X					Operational
	adjust		X				4,6,7	Visual
	inspect		X					
	test		X				4,6,7,9	
					X		2 thru 6,8,9,10	
						X	1 thru 6,8,9,10	Depot facilities
	replace		X				6	Pluckout items
	repair				X		2 thru 6,8,9,10	
	calibrate				X		2 thru 6,8,9,10	
	rebuild					X		Depot facilities
	overhaul				X			Shop facilities

SELMS Form 1151 (Replaces SELMS 004 TF, which is obsolete) 1 Apr 64 PP-3940/G

Army-Ft Monmouth, NJ-MON 1964-64

SECTION III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	MAINTENANCE CATEGORY O/C	O	DS	GS	D	TOOL CODE	PROC SVC	TYPE CLASS	REMARKS
PP-3940/G (continued)									
VOLTMETER, AN/USM-98					†	1	Army	Std. A	
MULTIMETER, TS-352/U				†	†	2	Army	Std. A	
TRANSFORMER, VARIABLE TF-171/USM		†		†	†	4	Army	Std. A	
RESISTOR VARIABLE, 5K 200 WATT FSN-5905-259-9230				†	†	5	N/A	N/A	
TOOL KIT, ELECTRONIC EQUIPMENT REPAIR TK-105/G		†		†	†	6	Army	Std. A	
VOLTMETER, ME-30/U				†	†	8	Army	Std. A	
TRANSISTOR, TEST SET TS-1836/U		†		†	†	9	Army	Std. A	
TOOL KIT, ELECTRONIC EQUIPMENT REPAIR TK-100/G				†	†	10	Army	Std. A	

NOTE: Above tool and test equipment is also available for the AN/FPA-15 in which this equipment is used, with the exception of items 1 and 5.

APPENDIX IV

ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT, AND DEPOT PARTS LIST

Section I. INTRODUCTION

A4-1. General

a. This appendix includes an organizational, direct and general support, and depot maintenance special tools list.

(1) The organizational maintenance repair parts and special tools list lists repair parts authorized for organizational maintenance and is a basis for requisitioning by organizations which are authorized the major item of equipment. End items of equipments are issued cm the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

(2) The direct and general support and depot maintenance repair parts and special tools list lists the quantities of repair parts authorized for general support maintenance and is a basis for requisitioning authorized parts. It is also a guide for depot maintenance in establishing initial levels of spare parts.

b. Columns are as follows:

(1) *Source, maintenance, and recoverability code.* Source, maintenance, and recoverability codes indicate the technical service responsible for supply, maintenance category at which an item is stocked, categories at which an item is installed or repaired, and whether an item is repairable or salvageable. The source code column is divided into four parts.

(a) *Column A.* This column indicates the materiel code and designates the area of responsibility for supply. AR 310-1 defines the basic numbers used to identify the materiel code. If the part is Signal materiel responsibility, the column is left blank.

(b) *Column B.* This column indicates the point within the maintenance system where the part is available. "P" indicates that the repair part is a high mortality part; procured by technical services, stocked in and supplied from the technical service depot system, and authorized for use at indicated maintenance categories. "P1" indicates that the repair part is a low mortality part; procured by technical services, stocked only in and supplied from technical service *key* depots, and authorized for installation at indicated maintenance categories.

(c) *Column C.* This column indicates the lowest maintenance category authorized to install the part.

"O"-Oganizational maintenance (operator and organizational).

"H"-General support maintenance.

(d) *Column D.* Not used.

(2) *Federal stock number. This* column lists the 11-digit Federal stock number.

(3) *Designation by model.* Not used.

(4) *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(5) *Unit of issue.* The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Nonexpendable items

are indicated by NX. Expendable items are not annotated.

(7) *Quantity incorporated in unit.* This column lists the quantity of each part found in a given assembly, component, or equipment.

(8) *Organizational.* An asterisk (*) indicates that an item is not authorized for stockage but if required, may be requisitioned for immediate use only.

(9) *Direct support.* No parts authorized for stockage.

(10) *General support.* The numbers in this column indicate quantities of repair parts authorized for initial stockage for use in general support maintenance. The quantities are based on 100 equipments to be maintained for a 15-day period.

(11) *Depot.* The numbers in this column indicate quantities of repair parts authorized for depot maintenance and for initial stockage for maintenance, and for supply support to lower categories. The entries are based on the quantity required for rebuild of 100 equipments.

(12) *Illustration.* The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

A4-2. Parts for Maintenance

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide theater communications, those repair parts authorized up to and including general support are authorized for stockage by the organization operating this equipment.

A4-3. Requisitioning Information

a. The allowance factors are based on 100 equipments. In order to determine the number of parts authorized for initial stockage for the specific number of equipments supported, the following formula will be used and carried out to two decimal places.

$$\text{Specific number of equipments supported} \times \frac{\text{allowance factor}}{100} = \text{Number of parts authorized for initial stockage.}$$

b. Fractional values obtained from above computation will be rounded to whole numbers as follows:

(1) When the total number of parts authorized is less than 0.5, the quantity authorized will be zero.

(2) When the total number of parts authorized is between 0.5 and 1.0, the quantity authorized will be one.

(3) For all values above one, fractional values below 0.5 will revert to the next higher whole number.

c. The quantities determined in accordance with the above computation represent the initial stockage for a 15-day period.

SECTION II: ORGANIZATIONAL FUNCTIONAL PARTS LIST

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	ORGAN-IZATIONAL	ILLUSTRATION	
							FIGURE NO.	ITEM NO.
		POWER SUPPLY PP-3940/G						
6130-985-8136		POWER SUPPLY PP-3940/G: full wave rectification; output data: 0-36 vdc, 0-4 amps; oper power req: 105-125 vac, 50-400 cps, single phase; o/a dim 17 in lg X 15 in W X 5 in h; filter incl; mfr data: Sorenson, A Unit of Raytheon Co, South Norwalk, Conn, code no. 55938, model no. QR36-4A; for general purpose use		NX				
5920-284-7466		FUSE, CARTRIDGE: 4 amp, 125 v; Littelfuse no. 313004			1	*	2-1	F1
5920-296-0679		FUSE, CARTRIDGE: 5 amp, 250 v, 3 AG; Littelfuse no.312005			1	*	2-1	F2
5960-284-6016		SEMICONDUCTOR DEVICE, DIODE: Sig dwg no SM-C-397808			10	*	5-3 5-4	CR3,CR5 thru CR14
5960-617-3179		SEMICONDUCTOR DEVICE, DIODE: Hoffman Semiconductor no 1N467			1	*	5-3	CR4
		TRANSISTOR: Sorenson no 18-024 (M5RC44-A159)			6	*		Q1 thru Q6
5960-752-6045		TRANSISTOR: Industrial Assn Std data no 2N378			3	*		Q7,Q10, Q16
5960-538-0493		TRANSISTOR: Tung Sol Elec Co no 2N460			3	*	5-3	Q8,Q11, Q17
5960-834-3654		TRANSISTOR: Sylvania no 2N214			9	*	5-3	Q9,Q12 thru Q15, Q18 thru Q21

AMSEL-MR Form 6009 1 Dec 64 (Supersedes SELMS-2 (TF))

END

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SECTION III. DIRECT AND GENERAL SUPPORT AND DEPOT FUNCTIONAL PARTS LIST

SOURCE CODE				FEDERAL STOCK NUMBER	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION	
																		FIGURE NO.	ITEM NO.
A	B	C	D	6130-985-8136							POWER SUPPLY PP-3940/G POWER SUPPLY PP-3940/G: full wave Rectification; output data: 0-36 vdc, 0-4 amps; oper power req: 105-125 vac, 50-400 cps, singal phase; o/a dim 17 in lg X15 in W X 5 in h; filter incl; Mfr data; Sorenson, A Unit of Raytheon Co, Soutth Norwalk, Conn, Code no. 55938, model no. QR 36-4A; For general purpose use.		NX							
	P1	H									AMMETER: Sorenson no. 94433 (M5RC44-A055)			1		1.3	2.0	2-1	M1
	P	H									CAPACITOR, FIXED, CERAMIC DIELECTRIC: Raido Materials Co. no. type U/O.02uf/ (M5RC44-A077)			1		2.2	2.0		C18
	P	H									CAPACITOR, FIXED, ELECTROLYTIC: Spraque Electric NO. 17D4000UF/ (M5RC44-A091)			1		2.2	2.0		C1
	P	H									CAPACITOR, FIXED, ELECTROLYTIC: Spraque Electric NO. 17D/22000uf (M5RC44-A092)			1		2.2	2.0	5-1	C1
	P	H									CAPACITOR, FIXED, PAPER, DIELECTRIC Astron Co. no. ML-2-05 (M5RC44-A107)			1		2.2	2.0	5-3	C2
	P	H		5910-669-1518							CAPACITOR, FIXED, PAPER, DIELECTRIC 250.000 uuf ± 30%, -20%; 200vdc; Astron Company no. ML-2-25			5		5.2	2.6	5-3	C3, C7 C8, C14 C15
	P	H		5910-341-2437							CAPACITOR, FIXED, PAPER, DIELECTRIC 100,000 uuf, ±20%; 200vdc Ordnance no. 8193684			1		2.2	2.0	5-3	C4
	P	H									CAPACITOR, FIXED, PAPER, DIELECTRIC Astron Co. no. ML-2-01 (M5RC44-A109)			1		2.2	2.0		C6
	P	H		5910-881-6092							CAPACITOR, FIXED, PAPER, DIELECTRIC 0.05uf, 6000 vdc; Cornell-Dubillier no. PJ6S5			1		2.2	2.0		C19

SOURCE CODE				FEDERAL STOCK NUMBER	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION	
																		FIGURE NO.	ITEM NO.
A	B	C	D								PP-3940/G (continued)								
	P	H									CAPACITOR, FIXED: Sprague Electric No. 029658 (M5RC44-A081)			1		2.2	2.0		C9
	P	H									CAPACITOR, FIXED: Cornell Dubilier No. BRH5050 (M5RC44-A141)			2		3.2	2.0	5-4	C10, C11
	P	H		5910-889-4930							CAPACITOR, FIXED: 250 uf, 25 vdc; Sprague Elec no. TVA-1208			1		2.2	2.0		C12
	P	H									CAPACITOR, FIXED Spraque Electric No. 1320 uf, 15 vdc (M5RC44-A143)			1		2.2	2.0		C16
	P	H		5910-860-7328							CAPACITOR, FIXED 150 uf, 50 vdc Sprague Elec no TVA-1311			1		2.2	2.0	5-4	C17
	P	H									CORD, LINE: Sorenson no. 21915 M5RC44-A008			1		1.5	2.0	1-1	
	P	O		5920-284-7466							FUSE, CARTRIDGE: 4 amp, 125 v; Littelfuse no. 313004			1		0.8	20.0	2-1	F1
	P	O		5920-296-0679							FUSE, CARTRIDGE: 5 amp, 250 v, 3 AG; Littelfuse no 312005			1		0.8	20.0	2-1	F2
	P	H		5920-615-3909							FUSEHOLDER: Cartridge type, plastic Body; Solder lug type; Littelfuse No. 342012			2		1.5	3.0	5-2	XF1, XF2
	P1	H		5955-538-3524							HOLDER CRYSTAL UNIT: Sig dwg SM-B-190475			1		1.5	1.3		
	P1	H									KNOB: Sorenson no. 42-227 (M5RC44-A029)			1		1.5	2.0	1-1	
	P1	H									KNOB: Sorenson no. 42-229 (M5RC44-A056)			1		1.5	2.0	1-1	
	P	H									RESISTOR, FIXED, COMPOSITION: Ward Leonard no. 75r.5 (M5RC44-A036)			1		2.2	2.0		R1
	P	H									RESISTOR, FIXED, COMPOSITION: Int'l Resistance Co. no. PW-5 (M5RC44-A147)			6		5.2	2.6	5-4	R2 Thru R7

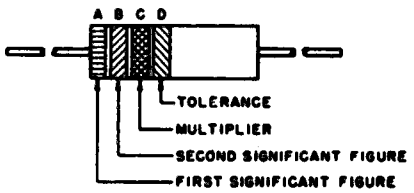
SOURCE CODE				FEDERAL STOCK NUMBER	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION	
A	B	C	D															FIGURE NO.	ITEM NO.
											PP-3940/G (continued)								
	P	H		5905-185-8510							RESISTOR, FIXED, COMPOSITION: MIL Type RC 200GF103J			4		4.6	2.3	5-3	R9,R10 R15, R37
	P	H									RESISTOR, FIXED, COMPOSITION: Int'l Resistance Co. no. DCC (M5RC44-A126)			2		3.2	2.0		R11, R12
	P	H									RESISTOR, FIXED, COMPOSITION: Ward Leonared no. 3X300WL(M5RC44-A115)			2		3.2	2.0	5-3	R13, R36
	P	H		5905-245-0023							RESISTOR, FIXED, COMPOSITION: MIL Type RC20GF682K			1		2.2	2.0	5-3	R14
	P	H		5905-192-3972							RESISTOR, FIXED, COMPOSITION: MIL Type RC200GF471J			2		3.2	2.0	5-3	R16 R47
	P	H									RESISTOR, FIXED, COMPOSITION: Allen Bradley no. EB8315 (M5RC44-A124)			1		2.2	2.0	5-3	R17
	P	H		5905-256-0387							RESISTOR, FIXED, COMPOSITION: MIL Type RC20GF681K			2		3.2	2.0	5-3	R18, R20
	P	H		5905-195-6806							RESISTOR, FIXED, COMPOSITION: MIL Type RC20GF102J			2		3.2	2.0	5-3	R19, R40
	P	H		5905-256-0409							RESISTOR, FIXED, COMPOSITION: MIL Type RC20GF221K			2		3.2	2.0	5-3	R21, R42
	P	H									RESISTOR, FIXED, COMPOSITION: Int'l Resistance Co. No. BW-1/2/6.8 ohms/ (M5RC44-A122)			1		2.2	2.0	5-3	R22
	P	H									RESISTOR, FIXED, COMPOSITION: Ward Leonard no. 3X25WL (M5RC44-A123)			1		2.2	2.0	5-3	R25
	P	H		5905-190-8883							RESISTOR, FIXED, COMPOSITION: MIL type RC20GF100J			2		3.2	2.0	5-4	R26, R28
	P	H									RESISTOR, FIXED, COMPOSITION: 2200 Ohm ±10%, 1/2 watt; Allen Bradley No. 2221 (M5RC44-A115)			3		3.9	2.1	5-4	R27, R29 R33
	P	H		5905-190-8889							RESISTOR, FIXED, COMPOSITION: MIL Type RC20GF101J			1		2.2	2.0	5-4	R32

SOURCE CODE				FEDERAL STOCK NUMBER	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION	
																		FIGURE NO.	ITEM NO.
A	B	C	D								PP-3940/G (continued)								
	P	H		5905-252-4018							RESISTOR, FIXED, COMPOSITION: MIL Type RC20GF470J			1		2.2	2.0		R34
	P	H		5905-195-6502							RESISTOR, FIXED, COPOSITION: MIL Type RC20GF332K			1		2.2	2.0	5-3	R35
	P	H		5905-171-1997							RESISTOR, FIXED, COMPOSITION: MIL Type RC20GF331K			3		3.9	2.1	5-3	R38, R39, R41
	P	H		5905-739-6900							RESISTOR, FIXED, COMPOSITION: Int'l Resistance no. BW-1/2/18 ohms			1		2.2	2.0	5-3	R43
	P	H									RESISTOR, FIXED, COMPOSITION: MIL Int'l Resistance Co. no. BW-1/2/51 ohms/ (m5rc44-A110)			1		2.2	2.0	5-3	R45
	P	H		5905-251-7751							RESISTOR, FIXED, COMPOSITION: MIL Type RC20GF180K			1		2.2	2.0		R48
	P	H		5905-279-2115							RESISTOR, FIXED, WIRE WOUND: 200 Ohm, ±5%, 25 w; Ward Leonard no. 25F200			1		2.2	2.0		R46
	P	H		5905-665-6082							RESISTOR, VARIABLE: 30 OHMS, 2 w; Clarostat no. 43			3		3.9	2.1	5-3	R23, R24, R44
	P	H									RESISTOR, VARIABLE: General Radio No. 975J (M5RC44-A048)			1		2.2	2.0		R30
	P	H		5905-899-5035							RESISTOR, VARIABLE: 10 OHMS ±10%; 2 watt; Clarostat Kig. Co. no. series 43			1		2.2	2.0		R31
	P	H		5960-682-9330							SEMICONDUCTOR DEVICE, DIODE: Western Electric no. 341D			2		3.2	4.0		CR1, CR2
	P	O		5960-284-6016							SEMICONDUCTOR DEVICE, DIODE: Sig Dwg no. SM-C-397808			10		7.7	4.0	5-3 5-4	CR3, CR5 Thur CR14
	P	O		5960-617-3179							SEMICONDUCTOR DEVICE, DIODE: Hoffman Semiconductor no. 1N467			1		2.2	2.0	5-3	CR4

SOURCE CODE				FEDERAL STOCK NUMBER	DESIGNATION BY MODEL						DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	DIRECT SUPPORT	GENERAL SUPPORT	DEPOT	ILLUSTRATION	
																		FIGURE NO.	ITEM NO.
A	B	C	D								PP-3940/G (continued)								
	P	H									SEMICONDUCTOR DEVICE, DIODE: Western Electric no. 320A (M5RC44-A051)			1		2.2	2.0		CR15
	P	H									SOCKET, DIODE: Cinch Mfg. Co. no. 46A-20928 (M5RC44-A130)			1		2.2	2.0		XCR4
	P	H									SOCKET, TRANSISTOR: Elco Corp no. 47202 (M5RC44-A135) (Item nos. XQ8, XQ9, XQ11 thur XQ15, XQ17 thur XQ21)			12		5.2	2.6		See Desc Column
	P	H		5930-501-4859							SWITCH, TOGGLE: DPST; 10 amp, 250 VAC; 15 amp, 125 VAC; Cutler-Hammer no. 7561k5			1		2.2	2.0		S1
	P	H									TRANSFORMER, POWER: Sorenson no. 126-1902 (m5rc44-a070)			1		2.2	2.0		T2
	P	H									TRANSFORMER, POWER: Sorenson no. 126-1901 (M5RC44-A078)			1		2.2	2.0		T3
	P	H									TRANSFORMER,, VARIABLE: Superior Electric no. 20-1017 (M5RD44-A050)			1		2.2	2.0		T1
											TRANSFORMER: Sorenson no. 18-024 (M5RD44-A159)			6		5.2	2.6		Q1 Thur Q6
	P	O		5960-752-6045							TRANSISTOR: Industrial Assn Std Data no. 3N378			3		3.9	1.9		Q6, Q10, Q16
	P	O		5960-538-0493							Transistor: Tung Sol Elec Co. no. 2N460			3		3.9	1.9	5-3	Q8, Q11, Q17
	P	O		5960-834-3654							TRANSISTOR: Sylvania no. 2N214 (Item nos. Q9, Q12 thry Q15, Q18 thur Q21)			9		7.7	4.0	5-3	See Desc Column
	P1	H									VOLTMETER: Sorenson no. 94-549 (M5RC44-A021)			1		1.5	2.0	2-1	M2

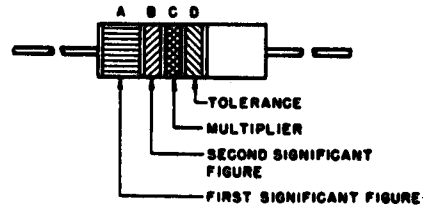
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

COMPOSITION-TYPE RESISTORS



BAND A— Equal Width Band Signifies Composition-Type

WIRE-WOUND-TYPE RESISTORS

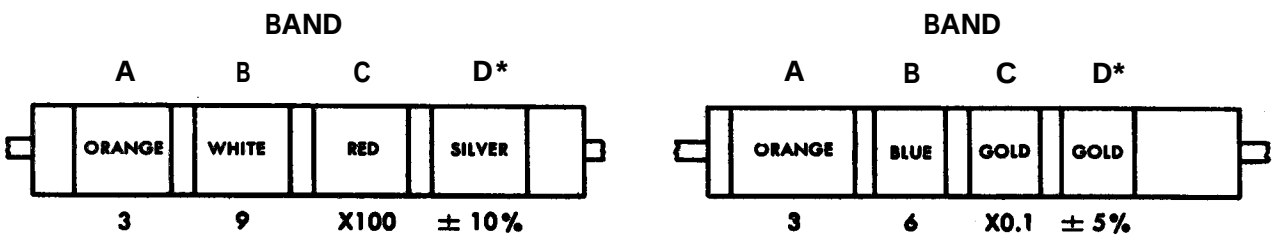


BAND A— Double Width Signifies Wire-wound Resistor

COLOR CODE TABLE

BAND A		BAND B		BAND C		BAND D*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE 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 3,900 Ohms 3.6 Ohms

RESISTANCE TOLERANCE ± 10 percent ± 5 percent

STD-R2

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

Figure 7-1. Color-code marking for MIL-STD resistors.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
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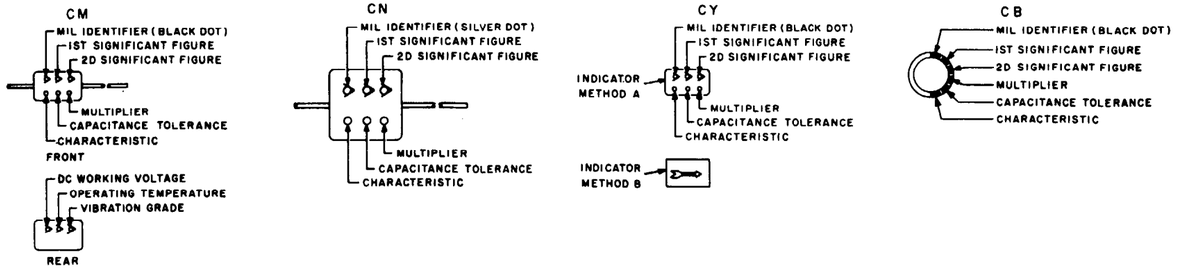
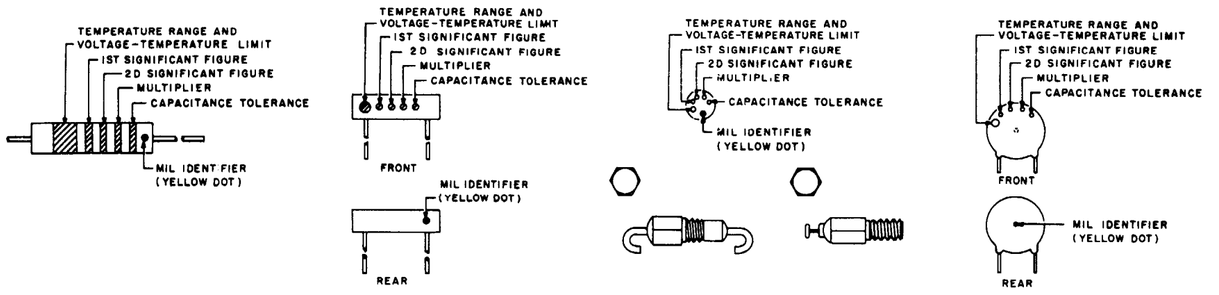
COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

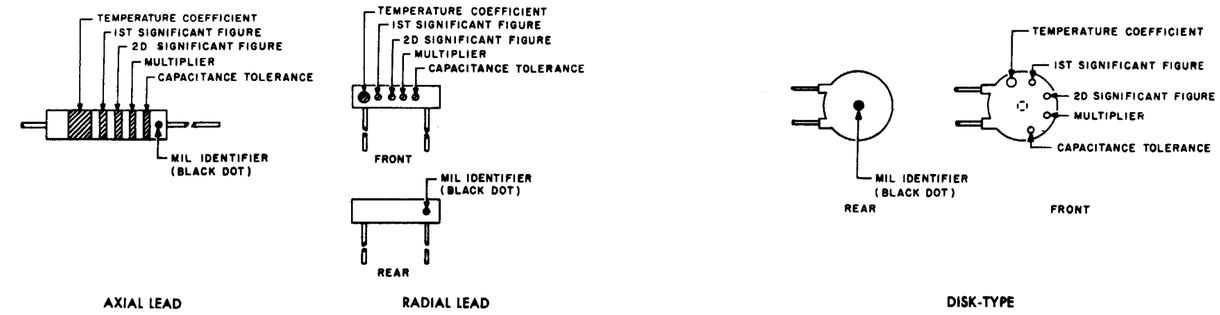
GROUP I Capacitors, Fixed, Various-Dielectrics, Styles CM, CN, CY, and CB



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



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



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[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
BLACK	CM, CY CB	0	0	1			± 20%	± 20%		A				−55° to +70°C	10–55 cps
BROWN		1	1	10					B	E		B			
RED		2	2	100	± 2%		± 2%	± 2%	C		C			−55° to +85°C	
ORANGE		3	3	1,000		± 30%			D			D	300		
YELLOW		4	4	10,000					E					−55° to +125°C	10–2,000 cps
GREEN		5	5		± 5%				F				500		
BLUE		6	6											−55° to +150°C	
PURPLE (VIOLET)		7	7												
GREY		8	8												
WHITE		9	9												
GOLD				0.1			± 5%	± 5%							
SILVER	CN				± 10%	± 10%	± 10%	± 10%							

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

COLOR	TEMP. RANGE AND VOLTAGE – TEMP. LIMITS[3]	1st SIG FIG	2nd SIG FIG	MULTIPLIER	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	± 20%	
BROWN	AW	1	1	10	± 10%	
RED	AX	2	2	100		
ORANGE	BX	3	3	1,000		
YELLOW	AV	4	4	10,000		CK
GREEN	CZ	5	5			
BLUE	BV	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD						
SILVER						

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

COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					Capacitances over 10uuf	Capacitances 10uuf or less	
BLACK	0	0	0	1		± 2.0uuf	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	± 2%	± 0.25uuf	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5%	± 0.5uuf	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
GOLD	+100					± 1.0uuf	
SILVER							

1. The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uut.
2. Letters indicate the Characteristics designated in applicable specifications: MIL–C–5, MIL–C–91, MIL–C–11272, and MIL–C–10950 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.

Figure 7-2. Color-code marking for MIL-STD capacitors.

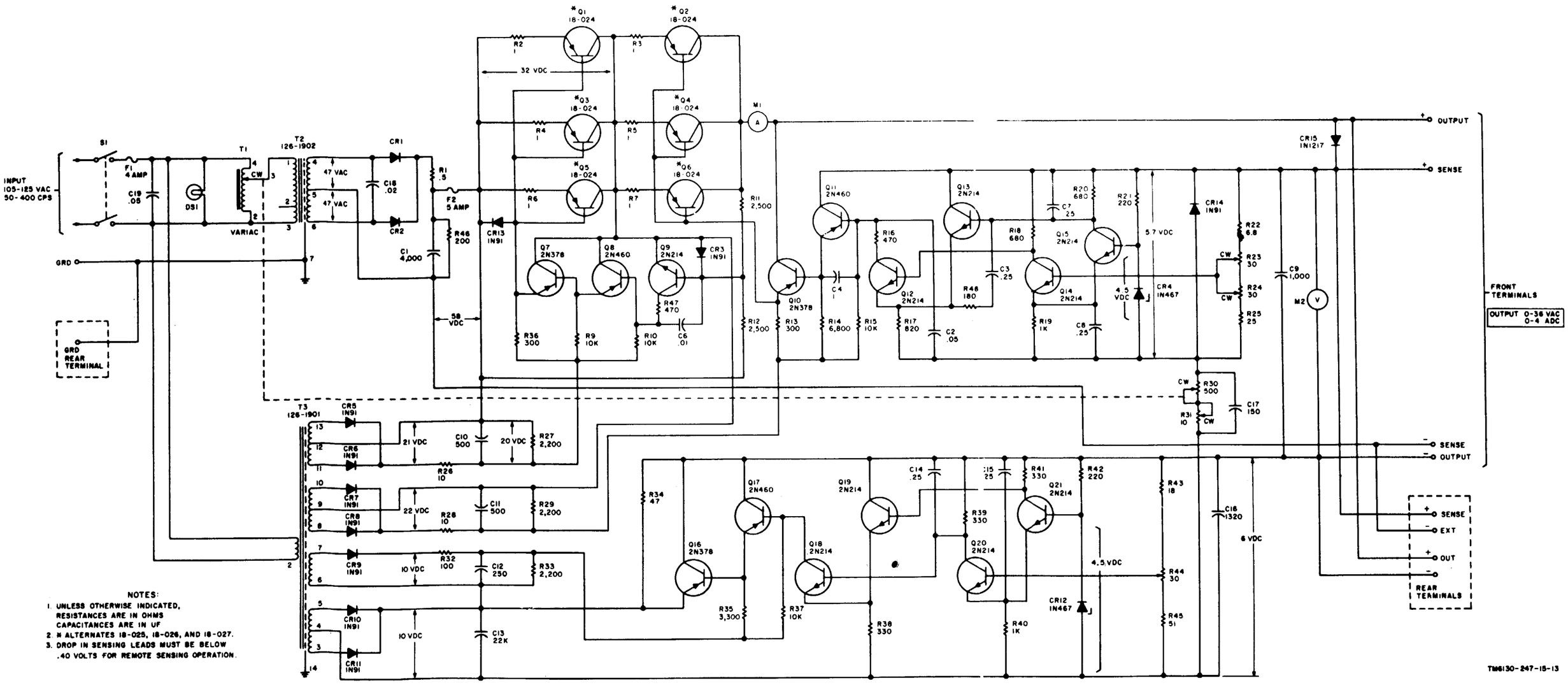


Figure 7-3. Power Supply PP-3940/G, complete schematic diagram.