

TM 11-6130-243-35-1

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DS, GS, AND DEPOT MAINTENANCE MANUAL

INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST
POWER SUPPLY PP-4606A/G



HEADQUARTERS, DEPARTMENT OF THE ARMY

9 NOVEMBER 1967

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 and output connections. Deenergize the equipment before connecting or disconnecting the load to be powered, before changing jumper connections, and before performing any maintenance.

DON'T TAKE CHANCES!

Posted
22 Apr 82

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CHANGE }
No 1. }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON DC, 3 December 1981

**DS, GS, and Depot Maintenance Manual
POWER SUPPLY PP-4606A/G
(NSN 6130-00-504-0327)**

TM 11-6130-243-35-1, 9 November 1967, is changed as follows:

1. Title of the manual is changed as shown above.
2. Changed material is indicated by a vertical bar in the margin of the page.
3. Remove and insert pages as indicated below:

<i>Remove</i>	<i>Insert</i>
Warning inside Front Cover	A through C (front of manual)
i/(ii blank)i/(ii blank)
1-1and 1-21-1and 1-2
A-1	A-1/(A-2 blank)
B-1 through B-11	None

4. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

E. C. MEYER
*General, United States Army
Chief of Staff*

Official:

ROBERT M. JOYCE
*Brigadier General, United States Army
The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12-31, Direct and General Support Maintenance requirements for All Fixed and Rotor Wing Aircraft.

**5****SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK****1****DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL****2****IF POSSIBLE , TURN OFF THE ELECTRICAL POWER****3****IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL****4****SEND FOR HELP AS SOON AS POSSIBLE****5****AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION**

WARNINGS

DANGEROUS VOLTAGES (220 vac, and 440 vac) exist in this equipment. When equipment is operated with covers open or removed, DO NOT touch exposed connections or components. SERIOUS INJURY OR DEATH MAY RESULT. Deenergize the equipment before connecting or disconnecting the battery to be charged, and before performing any maintenance. Follow all precautions listed in TB 385-4.

Avoid personal injury. Power Supply PP-4604A/G weighs 360 pounds; be careful when moving. A mechanical lift is required.

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the product of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

TECHNICAL MANUAL

No.
11-6130-243-35-1



HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 9 November 1967

DS, GS, and Depot Maintenance Manual

**POWER SUPPLY PP-4606A/G
(NSN 6130-00-504-0327)**

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CHAPTER 1 FUNCTIONING OF EQUIPMENT

1-1. Scope

a. This manual contains direct support, general support, and depot maintenance instructions for Power supply PP-4606A/G (power supply). It includes instructions appropriate for troubleshooting, testing, and repairing the equipment. It also lists tools, materials, and test equipment required for maintenance. Functional analysis of the equipment is covered in this chapter.

b. The complete technical manual for this equipment includes TM 11-6130-243-12-1.

c. Reporting Errors and Recommending Improvements. You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to Commander, US Army Communications-Electronics Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. In either case, a reply will be furnished direct to you.

1-2. Index of Technical Publications

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.

1-2.1 Maintenance Forms, Records, and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy [ROD]) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73/AFR 400-54/MCO 4430.3E.

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 B/AFR 75-18/MCO 4610.19C/DLAR 4500.15.

1-2.2. Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM 740-90-1.

1-2.3. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-2.4. Reporting Equipment Improvement Recommendations (EIR)

a. Army. If your Power Supply PP-4606A/G needs

improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. We'll send you a reply.

1-3. Input Power

(fig. 1-1)

a. The power supply is designed to operate from either 220- or 440-volt, 60-cycle, 3-phase power mains. Jumpers are used to provide for correct connection of the power mains to the primary windings of input power transformers T1, T2, and T3. Figures 1-2 and 1-3 are simplified schematic diagrams that show how the primary windings are delta-connected to the power mains. Refer to the complete schematic diagram (fig. 1-1) while studying the two simplified schematic diagrams.

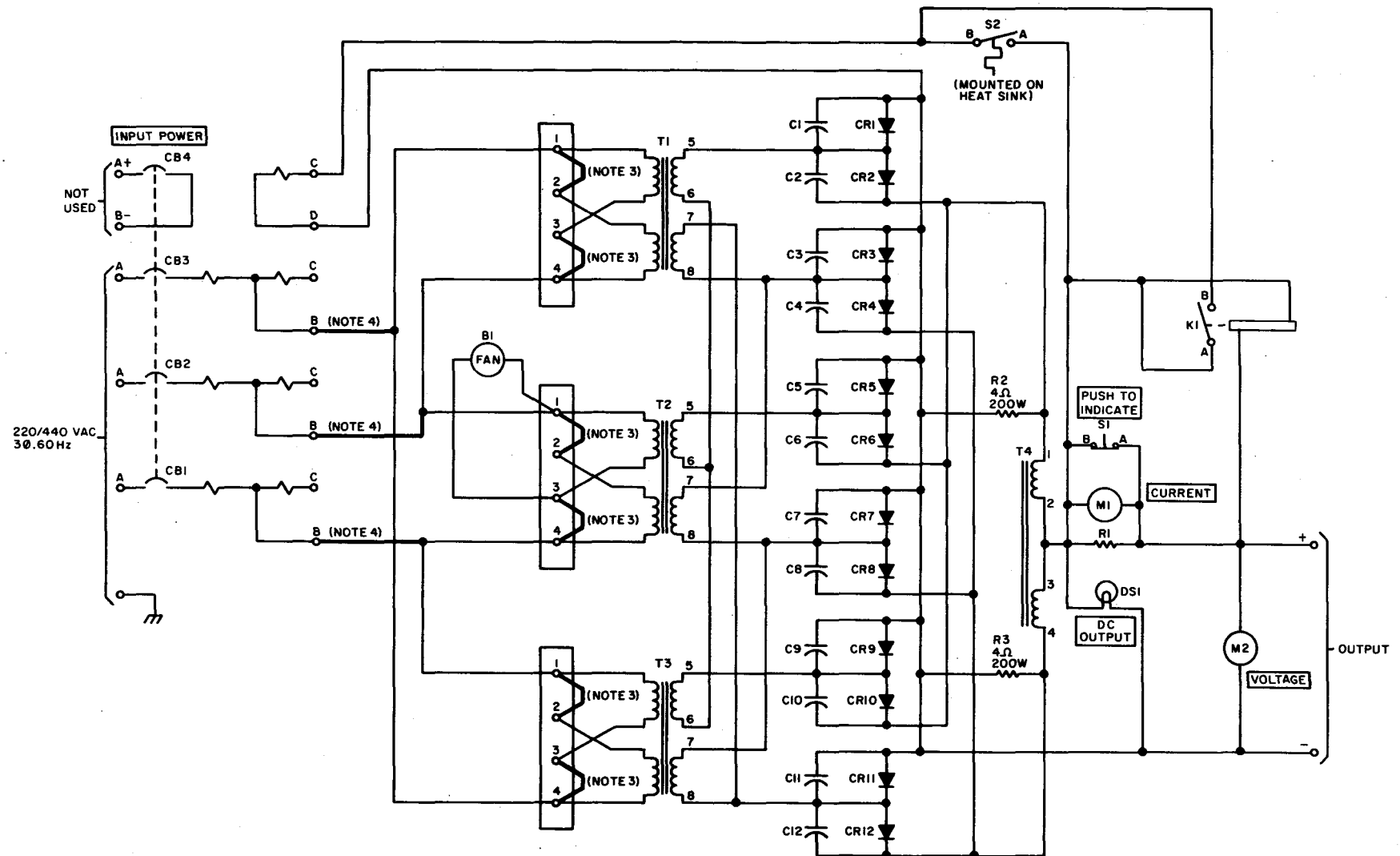
b. When the power supply is arranged to operate with 220-volt input power, jumpers are connected between specific terminals as shown by the short heavy lines in figure 1-2. The primary windings of transformers T1, T2, and T3 are thus parallel-connected into a delta configuration. When the INPUT POWER circuit breaker switch (CB1, CB2, and CB3) is at ON, input power is routed from the B terminals of the circuit breakers through the jumpers to each parallel-connected pair of primary windings in each leg of the delta.

c. When the power supply is arranged to operate with 440-volt input power, jumpers are connected between a different group of specific terminals as shown by the short heavy lines in figure 1-3. The primary windings of transformers T1, T2, and T3 are now series-connected into a delta configuration. When the INPUT POWER circuit breaker switch (CB1, CB2, and CB3) is at ON, input power is routed from the C terminals of the circuit breakers through the jumpers to each series-connected pair of primary windings in each leg of the delta.

1-4. Output Circuit

(fig. 1-1)

The output circuit includes the two secondary windings (5 and 6; 7 and 8) of power transformers T1, T2, and T3, diode rectifiers CR1 through CR12, capacitors C1 through C12, load resistors R2 and R3, and interphase transformer T4. Secondary windings 5 and 6 of T1, T2, and T3 are connected in a wye configuration, and secondary windings 7 and 8 of T1,



NOTES:

1. DIODES CR1 THROUGH CR12 ARE TYPE 1N1183A.
2. CAPACITORS C1 THROUGH C12 ARE 2UF, 200 VDC.
3. HEAVY LINES INDICATE JUMPER CONNECTIONS FOR 220V-INPUT. FOR 440V-INPUT, CONNECT JUMPER FROM TERMINAL 2 TO TERMINAL 3 ON T1, T2, AND T3.
4. HEAVY LINES INDICATE JUMPER CONNECTIONS FOR 220V INPUT. FOR 440V INPUT, DISCONNECT JUMPER FROM TERMINAL B AND RECONNECT JUMPER TO TERMINAL C.

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Figure 1-1. Power Supply PB A/G, Schematic Diagram.

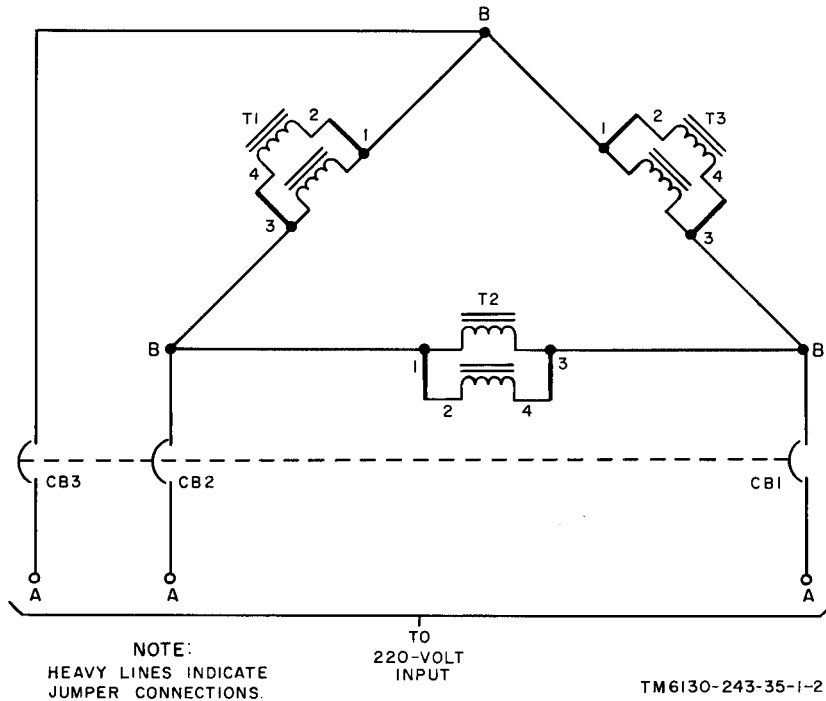


Figure 1-2. Connections to power transformers T1, T2, and T3 primary windings for 220-volt input, simplified schematic diagram.

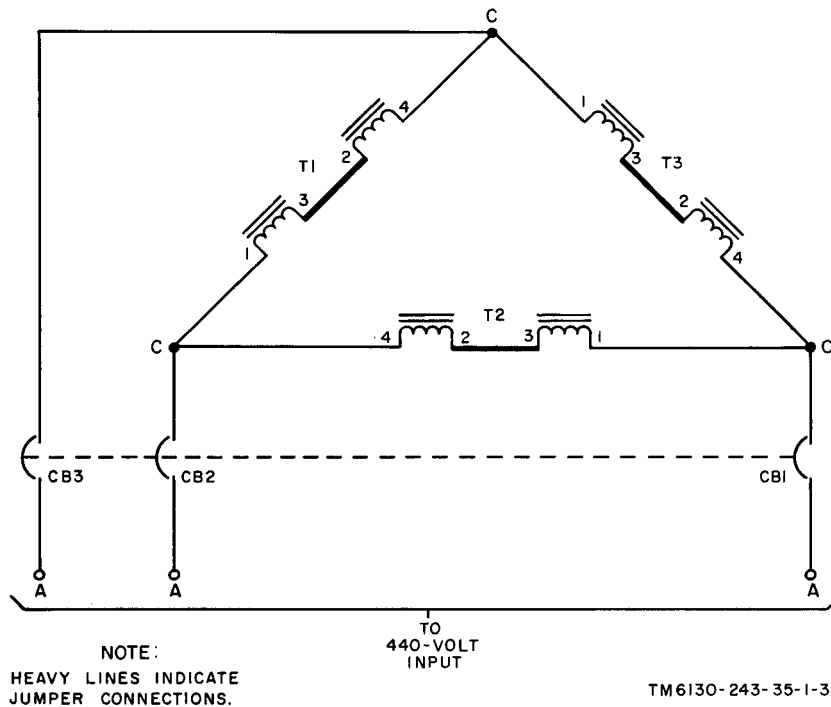


Figure 1-3. Connections to power transformers T1, T2, and T3 primary windings for 440-volt input, simplified schematic diagram.

T2, and T3 are connected in a delta configuration, as shown in the simplified schematic diagram (fig. 1-4). The alternating-current (ac) output voltage from the secondary windings of T1, T2, and T3 is converted to a pulsating direct-current (dc) voltage by full-wave rectifiers CR1 through CR12. The dc pulses appearing across resistors R2 and R3 are applied to interphase transformer T4. Blower fan motor B1 is connected across one of the primary windings of T2.

1-5. Monitor Circuit

(fig. 1-1)

VOLTAGE meter M2 is connected across the output of the power supply and monitors the output voltage. CURRENT meter M1 monitors

output current whenever spring-loaded PUSH TO INDICATE switch S1 is in depressed position. With switch S1 depressed, load current flowing through low-resistance shunt resistor R1 produces a small voltage drop which is proportional to the current. Although the scale of CURRENT meter M1 is marked to indicate amperes, the meter is actually a millivoltmeter which measures the voltage across shunt R1. When PUSH TO INDICATE switch S1 is released to the off position, the switch creates a short circuit across R1 and M1. DC OUTPUT lamp DS1 indicates the presence of dc power. Overcurrent relay K1 provides protection if excessive current flows. Thermal switch S2 provides protection from excessive heat that may damage the power diodes.

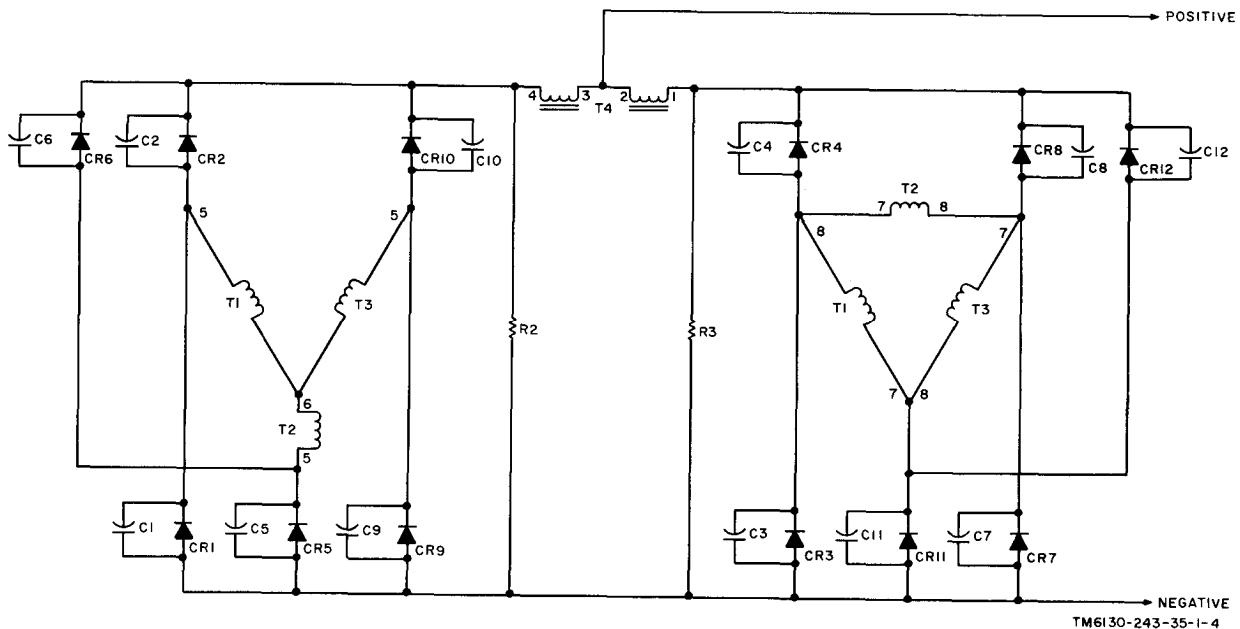


Figure 1-4. Power supply output circuit, simplified schematic diagram.

CHAPTER 2

TROUBLESHOOTING

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

2-1. General Instructions

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 2-4d provides the troubleshooting chart to be used by the repairman.

2-2. Organization of Troubleshooting Procedures

a. General. The first step in servicing a defective power supply is to localize the fault, which means tracing the fault to defective circuit responsible for the abnormal indication. The second step is to isolate the fault, which means locating the defective part or parts. Some defective parts, such as burned resistors and shorted transformers, can often be located by sight, smell, and hearing. Most defective parts, however, must be isolated by checking voltages and resistance.

b. Localization and Isolation. The first step in tracing trouble is to locate the circuit or part at fault by the following methods:

- (1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring circuits. All meter indications or other visual signs should be observed and an attempt made to localize the fault to a particular part.
- (2) *Operational test.* Operational tests frequently indicate the general location of trouble. In many instances, the test will help in determining the exact na-

ture of the fault. The operator's daily preventive maintenance services inspection chart (TM 11-6130-243-12-1) contains a good operational test.

- (3) *Troubleshooting chart.* The troubleshooting chart (para 2-4d) lists symptoms of common troubles and gives corrective measures (or references). Such a chart cannot include *all* trouble symptoms that may occur; therefore, the repairman should use this chart as a guide in analyzing symptoms that may not be listed.
- (4) *Resistor and capacitor color code diagrams.* Color code diagrams for resistors and capacitors (fig. 4-2 and 4-3) provide pertinent resistance, voltage rating, and tolerance information.

2-3. Test Equipment Required

The following chart lists test equipment required for troubleshooting Power Supply PP-4606A/G. Also listed are the associated technical manuals.

<i>Test equipment</i>	<i>Technical manual</i>
Multimeter TS-352B/U -----	TM 11-6625-366-15
Analyzer ZM-3A/U -----	TM 11-5043-12

2-4. Localizing Troubles

a. General. The troubleshooting chart (*d* below) outlines procedures for localizing troubles and for isolating troubles within the various circuits of the power supply. Refer to figures 2-1 and 2-2 for parts location. Refer to the schematic diagram (fig. 1-1) to identify circuit components. Depending on the nature of

the operational symptoms, one or more of the localizing procedures will be necessary. When trouble has been localized to a particular circuit, use voltage and resistance measurements to isolate the trouble to a particular part.

b. Use of Chart. When an abnormal symptom is observed in the equipment, look for a description of the symptom in the *Symptom*

column and perform the corrective measure given in the *Corrective measures* column.

c. Conditions to Test. All checks outlined in the troubleshooting chart are to be conducted with the power supply connected to a 220- or 440-volt power source. The output cables should be connected to a load.

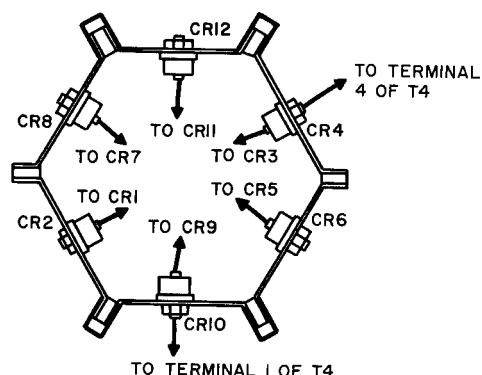
d. Troubleshooting Chart.

<i>Symptom</i>	<i>Probable trouble</i>	<i>Corrective measures</i>
1. Indicator lamp DS1 does not light when INPUT POWER circuit breaker switch is set to ON.	<ul style="list-style-type: none"> a. No ac power is applied to power supply. b. Defective circuit breaker switch. c. Open in output circuit ----- d. Open interphase transformer T4. e. Defective power transformer T1, T2, or T3. 	<ul style="list-style-type: none"> a. Check for input voltage. b. Check circuit breaker switch; replace if defective. c. Check for loose connections, broken leads, or faulty components. d. Replace T4. e. Replace defective power transformer.
2. Low output voltage -----	<ul style="list-style-type: none"> a. Defective resistor R2 or R3 --- b. Defective rectifier CR1, CR2, CR3, CR4, CR5, CR6, CR7, CR8, CR9, CR10, CR11, or CR12. c. Defective power transformer T1, T2, or T3. 	<ul style="list-style-type: none"> a. Check resistors R2 and R3; replace if defective. b. Replace defective rectifier. c. Replace defective power transformer.
3. Indication on VOLTAGE meter M2 differs from voltage present at output.	Defective meter M2 -----	Replace meter M2.
4. With S1 depressed, no indication on CURRENT meter M1.	<ul style="list-style-type: none"> a. Power supply not connected to load. b. Defective switch S1 ----- c. Defective M1 ----- 	<ul style="list-style-type: none"> a. Check connections to load. b. Replace switch S1 c. Replace M1.
5. Indication on CURRENT meter M1 differs from current present at output.	<ul style="list-style-type: none"> a. Defective shunt resistor R1 --- b. Defective meter M1 ----- 	<ul style="list-style-type: none"> a. Replace shunt resistor R1. b. Replace meter M1.

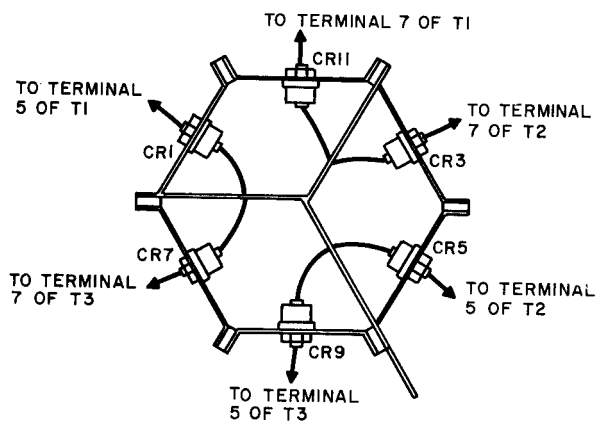
2-5. General Parts Replacement Techniques

AH power supply parts can be reached and replaced easily without special procedures. Re-

fer to figures 2-1 and 2-2 for the location of all parts. Connect replaced items according to the schematic diagram (fig. 1-1).



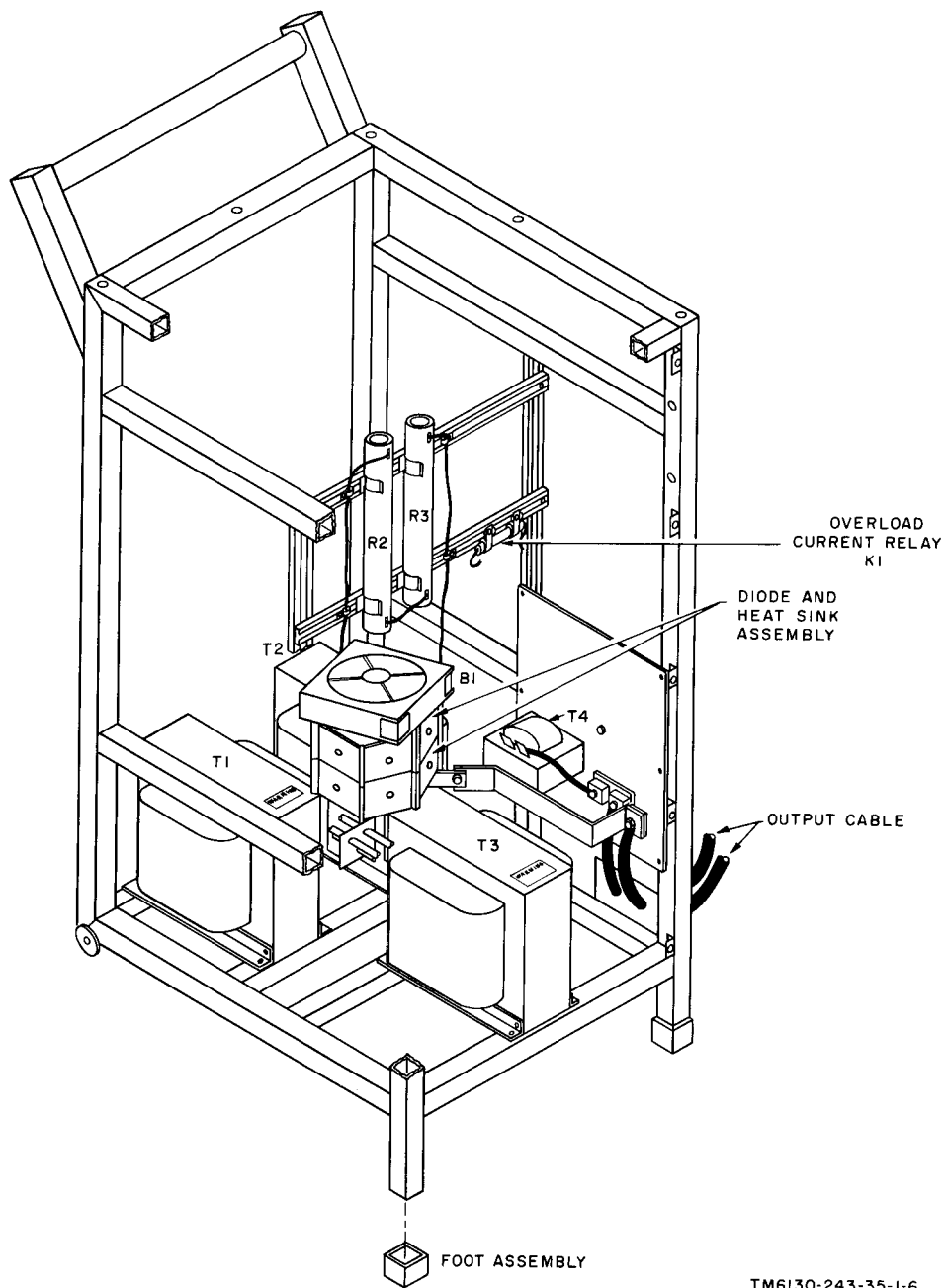
A. TOP VIEW OF TOP ASSEMBLY.



B. TOP VIEW OF BOTTOM ASSEMBLY.

NOTE:
HEAVY LINES INDICATE JUMPER CONNECTION.
TM6130-243-35-1-5

Figure 2-1. Diode and heat sink assembly.



TM6130-243-35-1-6

Figure 2-2. Power Supply PP-4606A/G, parts location.

CHAPTER 3

GENERAL SUPPORT TESTING PROCEDURES

3-1. General

a. Testing procedures are prepared for use by Signal Field Maintenance Shops and Signal Service Organizations responsible for general support maintenance of electronics equipment to determine the acceptability of repaired equipment. These procedures set forth specific requirements that repaired equipment *must* meet before it is returned to the using organization. These procedures may also be used as a guide for testing equipment that has been repaired at direct support, if the proper tools and test equipments are available. A summary of the performance standards is given in paragraph 3-7.

b. Comply with the instructions preceding each chart before proceeding to the chart. Perform each step in sequence. Do not vary the sequence. For each step, perform all the actions required in the *Control settings* column; then perform each specific test procedure and verify it against its performance standard.

3-2. Test Equipment, Tools, and Materials

All test equipment, tools, and materials required to perform the testing procedures given in this chapter are listed in *a*, *b*, and *c* below and are authorized under TA 11-17, Signal Field Maintenance Shops; and TA 11-100 (11-17), Allowances of Signal Corps Expendable Supplies for Signal Field Maintenance Shops.

a. Test Equipment.

<i>Nomenclature</i>	<i>Federal stock No.</i>	<i>Technical manual</i>
Ammeter ME-65/U.	6625-237-9312	
Multimeter TS-352B/U.	6625-242-5023	TM 11-6625-366-15
Low Voltage Circuit Tester TV-100.	4910-092-9136	None
Voltmeter, Meter ME-30(*)/U. ^a	6625-669-0742	TM 11-6625-320-12
Ohmmeter ZM-21A/U.	6625-246-5880	TM 11-2050

^a Indicates Voltmeter, Meter ME-30A/U or Voltmeter, Electronic ME-30B/U, ME-30C/U, or ME-30E/U.

b. Tools. All the tools required are included in Tool Kits, Electronic Equipment TK-100/G and TK-105/G.

c. Materials

<i>Nomenclature</i>	<i>Federal stock No.</i>
Resistance element, 0.41-ohm, 3,400-watt (3 required).	5905-259-5909
Wire, electrical stranded; #0 AWG	6145-822-8431
Mating connector (dc output) -----	5935-236-4640

3-3. Physical Tests and Inspections

a. Test Equipment and Materials. None required.

b. Test Connections and Conditions. No connections are necessary. Remove power supply left and right side panels.

c. Procedure.

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
1	None.	Control may be in any position.	<p>a. Inspect case and chassis for damage, missing parts, and condition of paint.</p> <p><i>Note.</i> Touchup painting is recommended instead of refinishing whenever practical; screwheads, binding posts, receptacles, and other plated parts will not be painted or polished with abrasives.</p> <p>b. Inspect control and mechanical assemblies for loose or missing screws, bolts, and nuts.</p> <p>c. Inspect meters for loose, damaged, or missing parts.</p>	<p>a. No damage evident or parts missing. External surfaces intended to be painted will not show bare metal. Panel lettering will be legible.</p> <p>b. Screws, bolts, and nuts will be tight. None missing.</p> <p>c. No loose, damaged, or missing parts.</p>
2	None.	Control may be in any position.	Operate INPUT POWER circuit breaker switch.	Circuit breaker switch will operate properly.

3-4. Power Output, Regulation, and Ripple Tests at 220-Volt Input

a. Test Equipment and Materials.

- (1) Voltmeter, Meter ME-30 (k)/U.
- (2) Ammeter ME-65/I.
- (3) Multimeter TS-3152B/U.
- (4) Low Voltage Circuit Tester TV-100.
- (5) Resistance element, 0.41-ohm, 3,400 - watt; 3 required.

(6) Power cable (as fabricated).

(7) Mating connector (FSN 5935-236-4640).

b. Test Connections and Conditions. Connect the equipment as shown in figure 3-1. (This test is written for operation of the power supply at 220 volts at.) Do not connect the load and the TV-100 to the power supply until instructed to do so in the procedure given in c below.

c. Procedure.

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
1	<p>ME-65/U Ammeter range: 20</p> <p>TS-352B/U</p> <p>Function: DC VOLTS ME-30(*)/U ON-OFF switch: ON Range selector switch: 3</p>	INPUT POWER circuit breaker switch: OFF	<p>a. Connect PP-4606A/G for 220-volt operation.</p> <p>b. Connect the PP-4606A/G to a 220-volt, 60-cps, 3-phase ac source.</p> <p><i>Note.</i> For this step, do not connect the load to the positive and negative output leads.</p> <p>c. Set the PP-4606A/G INPUT POWER circuit breaker switch to ON. Observe the indication on the 0 to 50 scale of the TS-352B/U.</p>	<p>a. None.</p> <p>b. None.</p> <p>c. Reading is between 26.5 and 31 volts.</p>

Step No.	Control settings		Test procedure	Performance standard
	Test equipment	Equipment under test		
			<p>i. Observe PP-4606A/G VOLTAGE meter.</p> <p>2. Set PP-4606A/G INPUT POWER circuit breaker switch to off.</p> <p>f. Connect load (three 0.41-ohm, 3,400-watt resistors connected in parallel for a total resistance of 0.1366 ohm). Connect TV-100 to measure output current. Set PP-4606A/G INPUT POWER circuit breaker switch to ON. Observe indication on the TS-352B/U.</p> <p>7. Observe indication on the TV-100 ammeter.</p> <p>2. Depress PP-4606A/G PUSH TO INDICATE switch and observe indication on CURRENT meter. Observe the indication on the 0- to 3-volt scale of the ME-30(*)/U.</p> <p>i. Observe the indication on the ME-65/U.</p> <p>c. Set PP-4606A/G INPUT POWER circuit breaker switch to off position and disconnect equipment.</p>	<p>d. Reading is not less than 25 volts.</p> <p>e. None.</p> <p>f. Reading is within 10 percent of reading obtained in e above.</p> <p>g. Reading is 200 amperes \pm 20.</p> <p>h. Reading is within \pm 5 percent of reading obtained in g above.</p> <p>i. Reading is less than 1.3 volts.</p> <p>j. Reading is less than 18 amperes.</p> <p>k. None.</p>

3-5. Insulation Resistance Test

a. *Test Equipment.* The only test equipment required is Ohmmeter ZM-21A/U.

b. *Test Connections and Conditions.* This test is performed with the PP-4606A/G disconnected from the ac power source, and is used to check the insulation resistance of the primary windings of power transformers T1, T2, and T3. The test is written for the PP-4606A/G connected for 220-volt ac operation.

c. *Procedure.*

- (1) Connect the ZM-21A/U ground lead to the PP-4606A/G frame.
- (2) Connect the ZM-21A/U line lead to any terminal of the primary windings of T1, T2, and T3.
- (3) Operate the ZM-21A/U and observe the indication on the ZM-21A/U meter. The PP-4606A/U meets the performance standard if the ZM-21

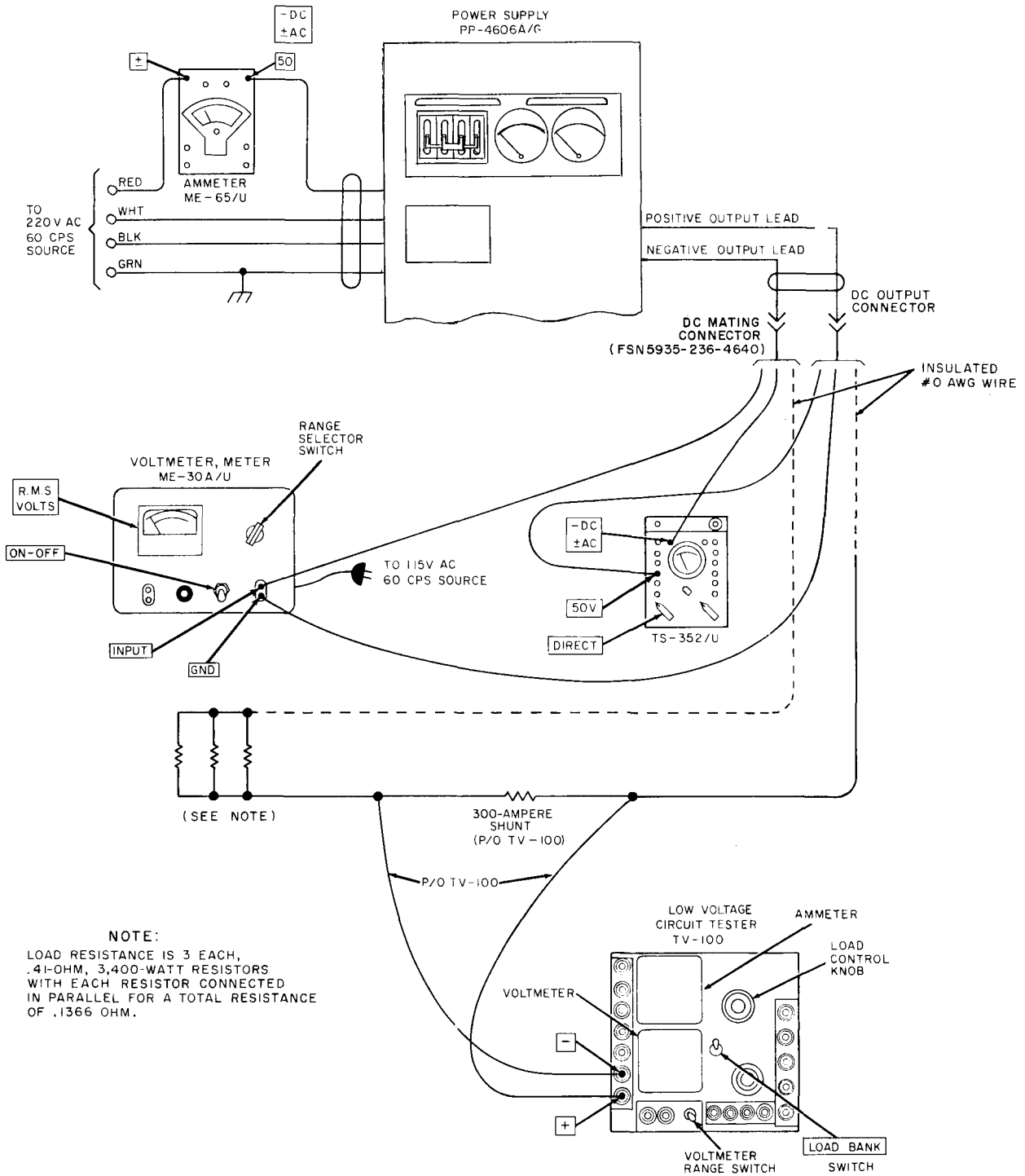


Figure 3-1. Connection diagram for power output, regulation, and ripple tests at 220-volt input.

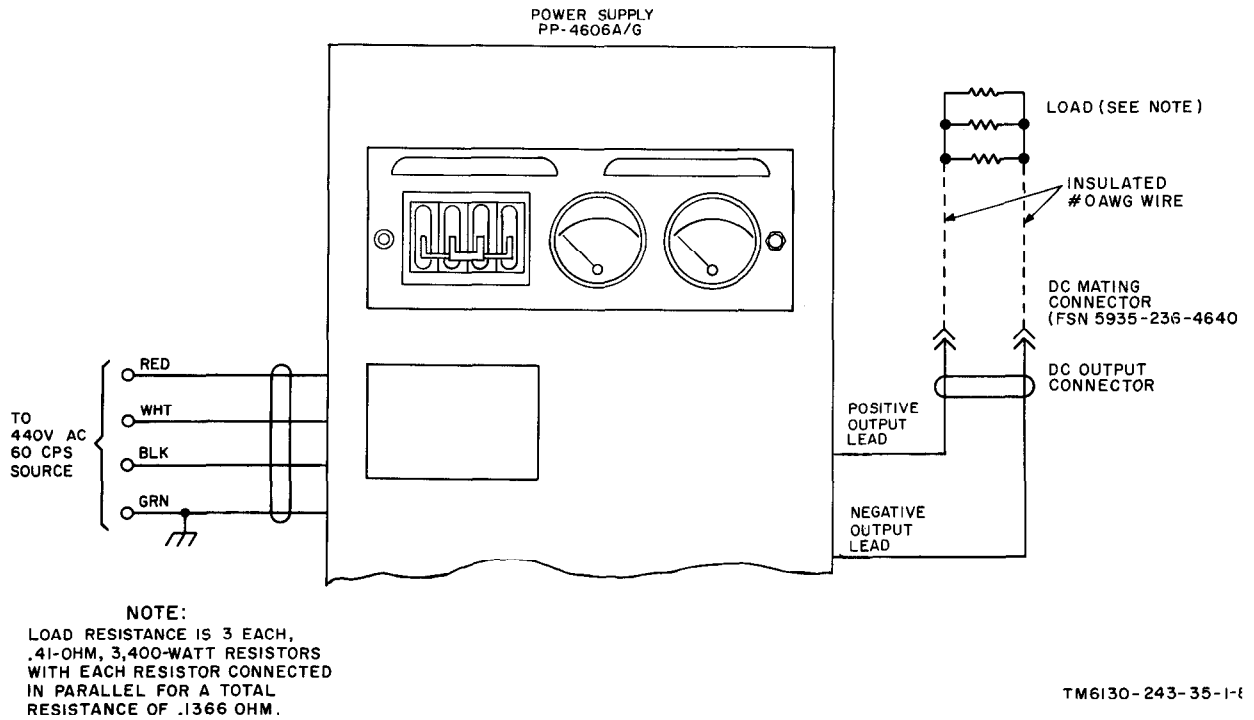


Figure 3-2. Connection diagram for output power test at 440-volt input.

- A/U meter reading at T1, T2, and T3 is greater than 10 megohms.
- (4) Disconnect the ZM-21A/U from the PP-4606A/G.

- (2) Power cable (as fabricated).
- (3) Mating connector (FSN 5935-236-4640).

3-6. Output Power Test at 440-Volt Input

a. Material.

- (1) Resistance element, 0.41-ohm, 3,400 - watt; 3 each.

b. Test Connections and Conditions. Connect the equipment as shown in figure 3-2. (This test is written for operation of the power supply at 440 volts ac.) Do not connect the load to the power supply until instructed to do so in the procedure given in c below.

c. Procedure.

Step No.	Control settings		Test procedures	Performance standard
	Test equipment	Equipment under test		
1	None.	INPUT POWER circuit breaker switch: off.	<p>a. Connect PP-4606A/G for 440-volt operation.</p> <p>b. Connect the PP-4606A/G to a 440-volt, 3-phase, ac source.</p> <p>Note. For this step, do not connect the load to the positive and negative output leads.</p>	<p>a. None.</p> <p>b. None.</p>

Step No.	Control settings		Test procedures	Performance standard
	Test equipment	Equipment under test		
			<p>c. Set the PP-4606A/G INPUT POWER circuit breaker switch to ON. Observe the indication on the VOLTAGE meter.</p> <p>d. Connect the load (three 0.41-ohm, 3,400-watt resistors connect in parallel for a total resistance of 0.1366 ohm). Observe the indication on the VOLTAGE meter.</p> <p>e. Depress PP-4606A/G PUSH to INDICATE switch and observe indication on CURRENT meter.</p> <p>f. Set PP-4606A/G INPUT POWER circuit breaker switch to off position and disconnect equipment.</p>	<p>c. Reading is between 26.5 and 31 volts.</p> <p>d. Reading is not less than 25 volts.</p> <p>e. Reading is 200 amperes ± 20.</p> <p>f. None.</p>

3-7. Test Data Summary

a. Input.

- (1) Voltage _____ 220 or 440 volts.
- (2) Frequency _____ 60 cps.
- (3) Phase _____ Three.
- (4) Current (each leg at full load)
18 amperes maximum for 220-volt input or 9 amperes for 440-volt input.

b. Output.

- (1) Voltage _____ Between 26.5 and 31 volts at no load. Not less than 25 volts at full load.
- (2) Current (maximum)
200 amperes ± 20 .

(3) Ripple voltage

1.3 volts maximum (5 percent).

(4) Regulation _ 10 percent (maximum).

c. Formulas Used.

$$\% \text{ Regulation} = \frac{E_{NL} - E_L}{E_L} \times 100$$

$$\% \text{ Ripple} = \frac{E_{RMS}}{E_{DC}}$$

Where:

E_{NL} is dc output voltage measured under no-load conditions.

E_L is dc output voltage measured under full-load conditions.

E_{RMS} is the measured ripple voltage.

E_{DC} is the measured dc output voltage.

CHAPTER 4

DEPOT OVERHAUL STANDARDS

4-1. Applicability of Depot Overhaul 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.

a. Repair Standards. Applicable procedures of the depots performing these tests and the general standards for repaired electronics equipment given in TB SIG 355-1, TB SIG 355-2, and TB SIG 355-3 form a part of the test requirements.

b. Technical Publication. The technical publication applicable to the equipment to be tested is TM 11-6130-243-12-1.

c. Modification Work Orders. Perform all modification work orders applicable to this equipment before making the tests specified. DA Pam 310-7 lists all available MWO'S.

4-2. Test Facilities Required

The following items are required for depot testing.

a. Test Equipment.

Item	Federal stock No.	Technical manual
Multimeter TS-352B/U.	6625-242-5023	TM 11-6625-366-15
Low Voltage Test Set TV-100.	4910-092-9136	None
Voltmeter, Meter ME-30(*)/U. ^a	6625-669-0742	TM 11-6625-320-12
Ohmmeter ZM-21A/U	6625-246-5880	TM 11-2050
Wattmeter TS-430/U (2 required).	6625-649-5393	None

^a Indicates ME-30A/U, ME-30B/U, ME-30C/U, or ME-30E/U.

b. Materials.

Nomenclature	Federal stock No.
Resistance element, 0.41-ohm, 3,400 (3 required).	5905-259-5909
Wire, electrical stranded; # 0 AWG.	6145-822-8431
Mating connector (dc output) -----	5935-236-4640

4-3. Power Output, Regulation, Ripple, and Efficiency Test at 220-Volt Input

a. With 220-volt, 3-phase, 60-cps input power, connect the equipment as shown in figure 4-1.

b. With no load connected to the power supply, set the INPUT POWER circuit breaker switch to ON. The TS-352B/U should indicate between 26.5 and 31 volts. The PP-4606A/G VOLTAGE meter should indicate within ± 5 percent of the reading on the TS-352B/U.

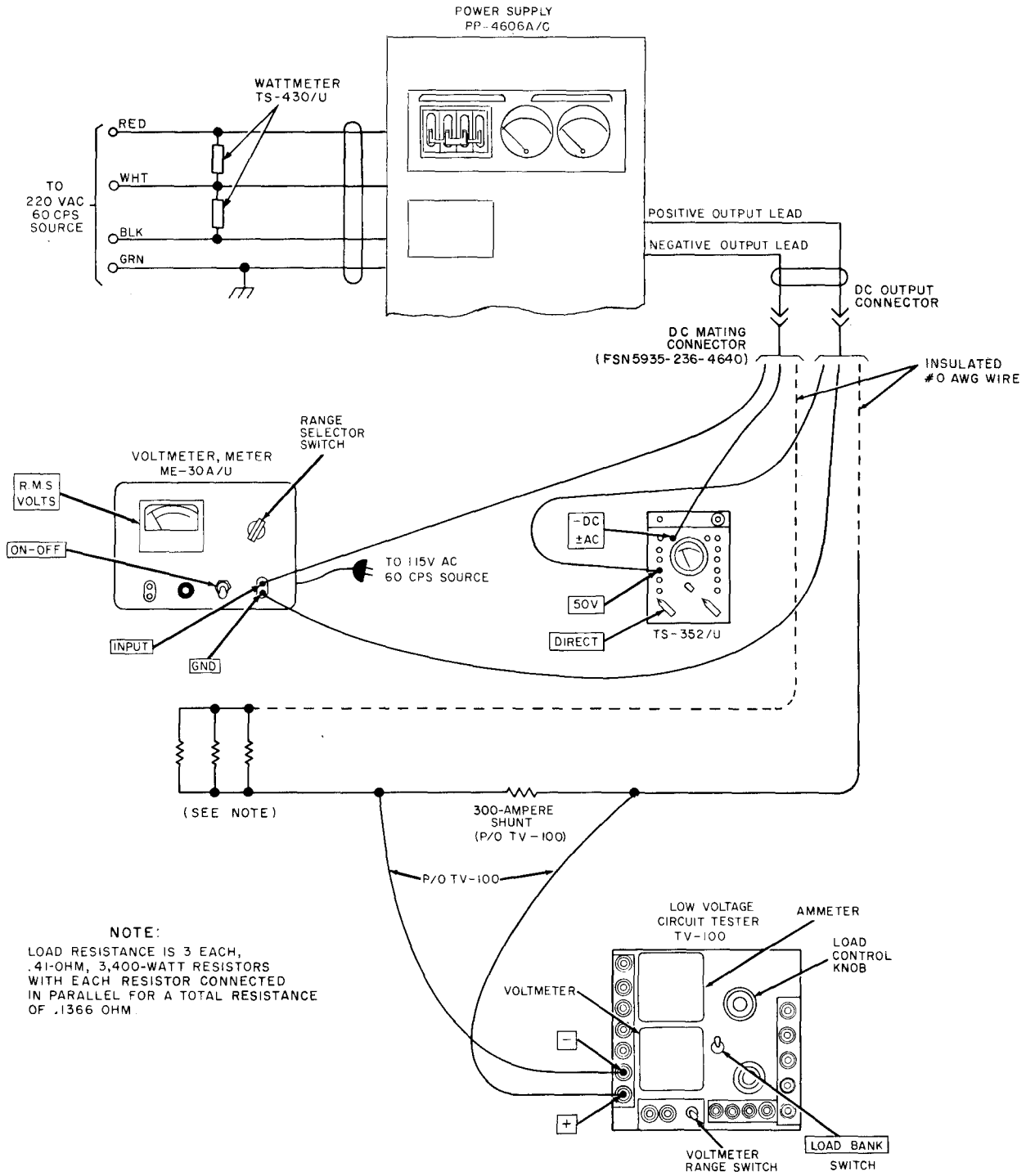
c. Set the PP-4606A/G INPUT POWER circuit breaker switch to off.

d. Connect the load, consisting of three each 0.41-ohm, 3,400-watt resistors connected in parallel, for a total resistance of 0.1366 ohm. Connect the TV-100 to measure the output current. Set the PP-4606A/G INPUT POWER circuit breaker switch to ON. The TS-352B/U should indicate no less than 25 volts. The TV-100 should indicate 200 amperes ± 20 . Depress the PP-4606A/G PUSH TO INDICATE switch. Indication on the CURRENT meter should be within ± 5 percent of the current reading obtained on the TV-100.

e. The ME-30(*)/U should indicate less than 1.3 volts.

f. Both wattmeters (TS-430/U) should indicate less than 6,700 watts total.

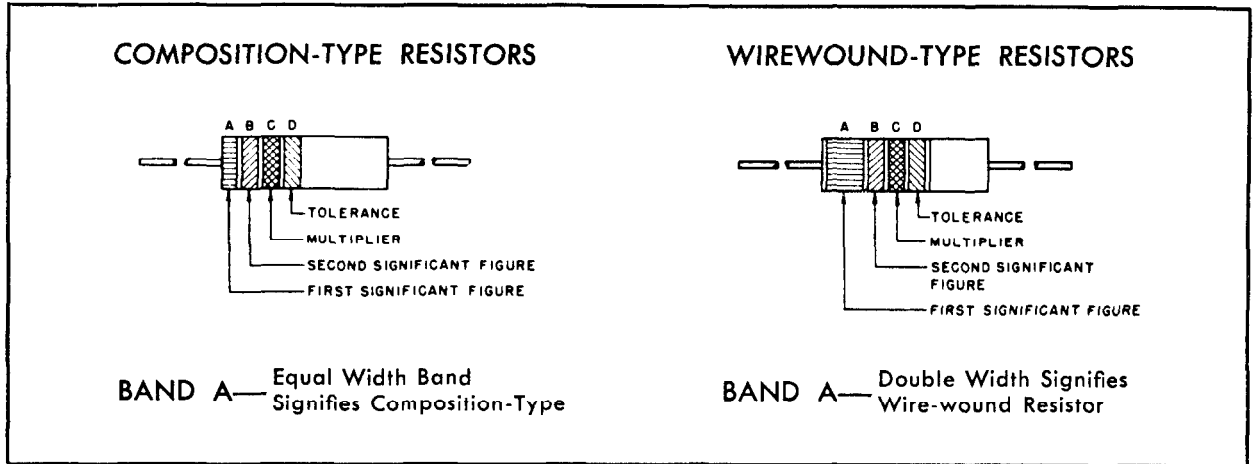
g. Set the PP-4606A/G INPUT POWER circuit breaker switch to off and disconnect the equipment.



TM6130-243-35-1-9

Figure 4-1. Connection diagram for power output, regulation, ripple, and efficiency at 220-volt input.

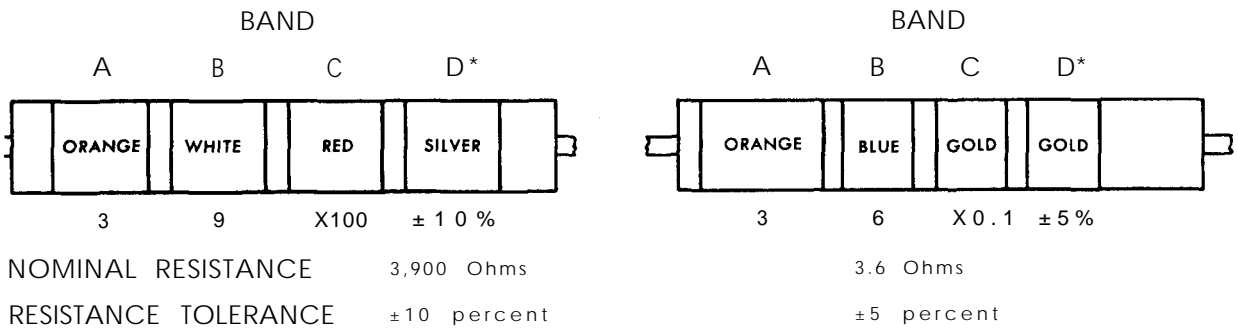
COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS



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



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

STD-R 2

Figure 4-2. Color code marking for MIL STD resistors.

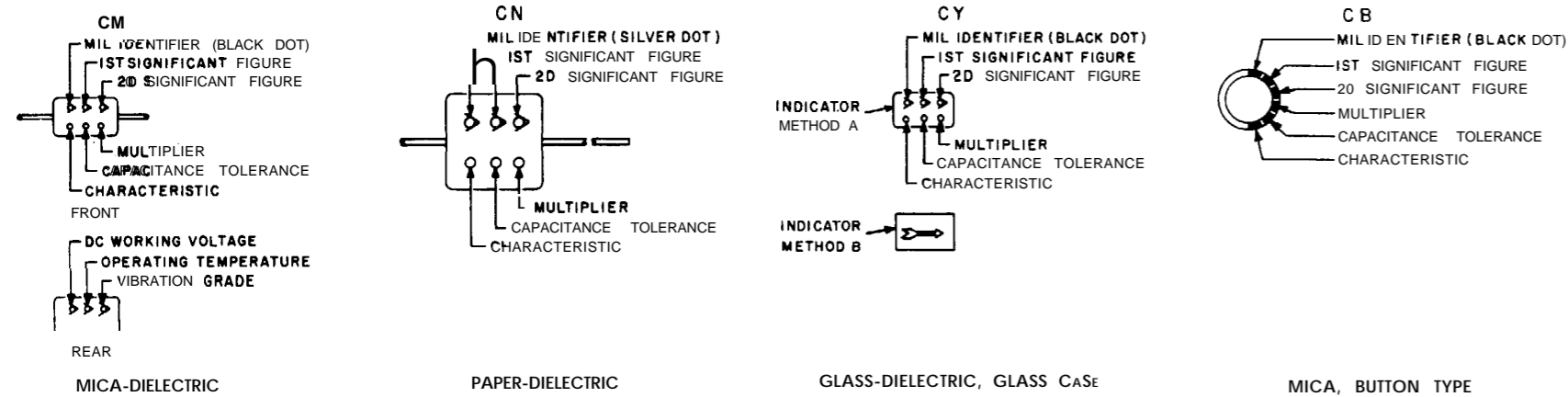
4-4. Insulation Resistance Test

The depot overhaul standards insulation resistance test procedures are the same as those for general support (para 3-5). Equipment that meets the performance standards stated in paragraph 3-5 will furnish satisfactory insulation resistance equivalent to that of new equipment.

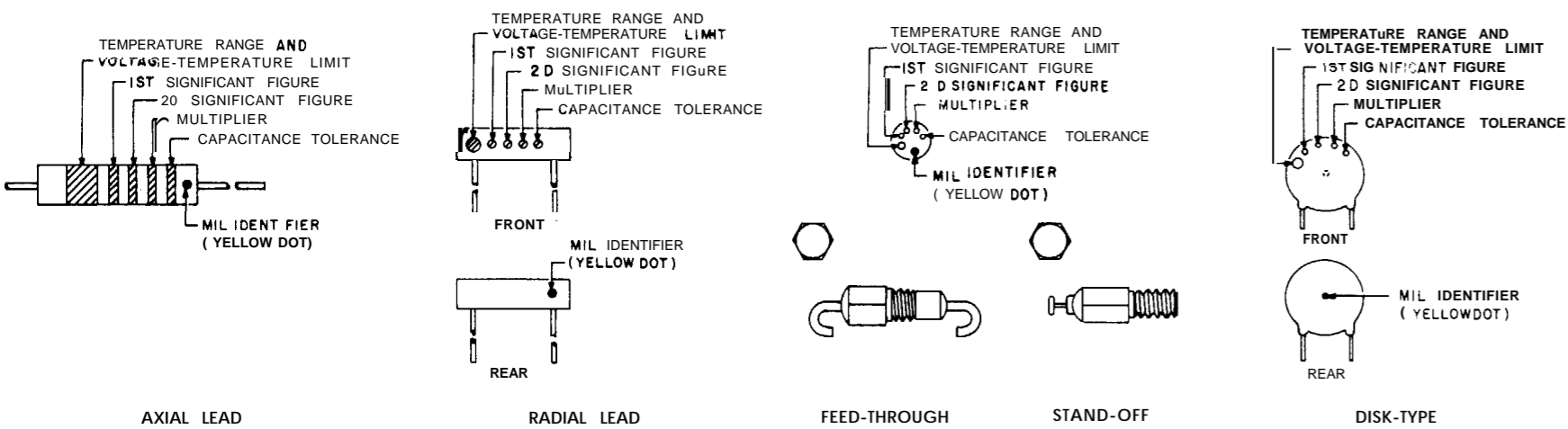
4-5. Output Power Test at 440-Volt Input

The depot overhaul standards output power test procedures at 440-volt input are the same as those for general support (para 3-6). Equipment that meets the performance standards stated in paragraph 3-6 will furnish satisfactory output power at 440-volt input equivalent to that of new equipment.

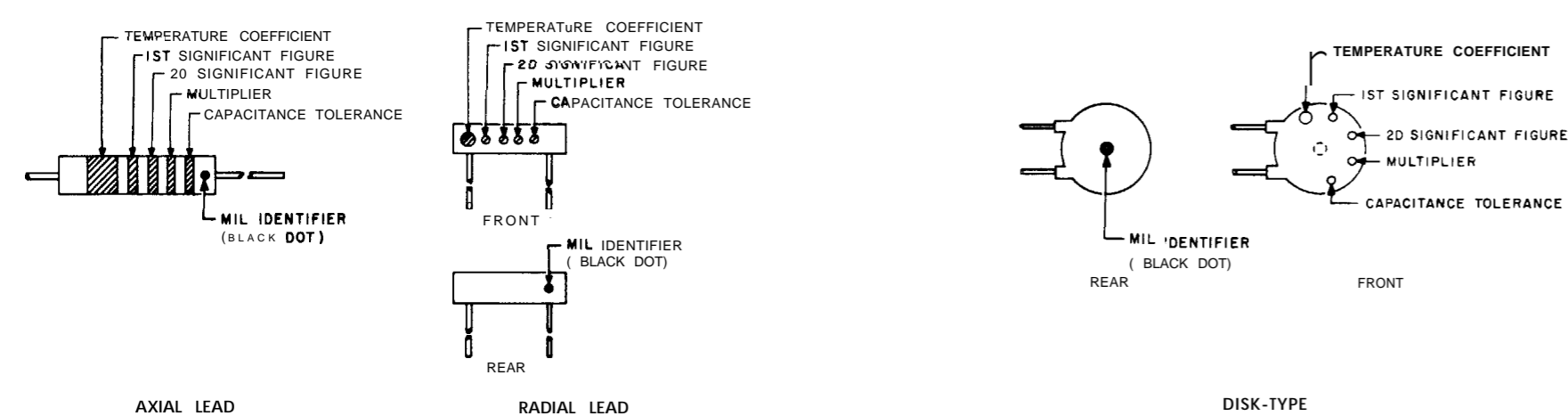
GROUP I Capacitors, Fixed, Various-Dielectrics, Styles CM, CN, CY, and CB



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



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



COLOR CODE TABLES

TABLE I - For use with Group 1, 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												
WHITE		?	?												
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 ¹	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							

- The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uuf.
- Letters indicate the Characteristics designated in applicable specifications: MI L-C-5, MIL-C-91, MI L-C-1 1272, and MI L-C-1 0950 respectively.
- Letters indicate the temperature range and voltage-temperature limits designated in MI L-C-1 1015.
- Temperature coefficient in parts per million per degree centigrade.

Figure 4-3. Color code marking for MIL STD capacitors.

APPENDIX A

REFERENCES

DA Pam 310-4	Index of Technical Publications.
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 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TB 385-4	Safety Precautions for Maintenance of Electrical/Electronic Equipment.
TM 11-487H-1/1	Military Standardization Handbook: Electronic Test Equipment.
TM 11-2050	Test Set 1-48-B and Ohmmeter ZM-21A/U.
TM 11-5043-12	Operator's and Organizational Maintenance Manual: Analyzers, ZM-3/U and Z-3A/U.
TM 11-6130-243-12-1	Organizational Maintenance Manual (Including Repair Parts and Special Tool Lists) Power Supply PP-4606A/G.
TM 11-6625-320-12	Operator's and Organizational Maintenance Manual: Voltmeter, Meter ME-30A/U and Voltmeters, Electronic ME-30B/U, ME-30C/U, and ME-30E/u .
TM 11-6625-366-15	Operator's Organizational, DS, GS, and Depot Maintenance Manual: Multi-meter TS-352B/U.
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

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