TECHNICAL MANUAL

OPERATOR' S, ORGANI ZATI ONAL, DI RECT AND GENERAL SUPPORT MAINTENANCE MANUAL

# POWER SUPPLY PP-4606C/G (NSN 6130-00-504-0327)

This copy is a reprint which includes current pages from Changes 1 and 2.

HEADQUARTERS, DEPARTMENT OF THE ARMY 6 JULY 1978

#### DON'T TAKE CHANCES!!

## WARNING

The fumes of Trichloroethane are toxic. Provide thorough ventilation whenever it is used; avoid prolonged or repeated breathing of vapor. Do not use near an open flame or hot surface; Trichloroethane is non-flammable but heat converts the fumes to a highly toxic phosgene gas. The inhalation of this gas could result in serious injury or death. Prolonged or repeated skin contact with Trichloroethane & cause skin inflammation. When necessary, use gloves, sleeves and aprons which the solvent cannot penetrate.

#### WARNING

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

HEADQUARTERS DEPARTMENT OF THE ARMY WASHINGTON DC, 9 December 1981

# Operator's Organizational, Direct Support, and General Support Maintenance Manual POWER SUPPLY PP-4606CIG (NSN 6130-00-504-0327)

TM 11-6130-243-14-3, 6 July 1978, is changed as follows:

1. New or changed material is indicated by a vertical bar in the margin of the page.

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Change No. 2

HEADQUARTERS DEPARTMENT OF THE ARMY WASHINGTON, DC, 24 October, 1978

Change No.1

# Operator's Organizational, Direct Support and General Support Maintenance Manual POWER SUPPLY PP-4606 C/G (NSN 6130-00-504-0327)

 TM 11-6130-243-143, 6 July 1978, is changed as follows:

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 i and ii
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 FO-1
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To be distributed in accordance with DA Form 12-31, Operator maintenance requirements for All Rotor Wing Aircraft.

# WARNING

# PRIOR TO INSTALLATION

A shock hazard, due to incorrect wiring, may exist within some PP-4606-C/U (NSN 6130-00-504-0327) units manufactured by MCL, Inc., under contract number DAAB07-76-C-1411. The wiring code does not follow the National Electrical Color Code for power circuits. Before connecting the unit to an external ac power source refer to Chapter 2, paragraph 2-3.





SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL



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. Reenergize the equipment before connecting or disconnecting the battery to be charged, and before performing any maintenance. Follow precautions listed in TB 385-4.

Avoid personal injury. Power Supply PP-4606C/G weighs 400 Pound; 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 products 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. 11-6130-243-14-3 HEADQUARTERS DEPARTMENT OF THE ARMY WASHINGTON, DC, 6 July 1978

# OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

# POWER SUPPLY PP-4606C/G (NSN 6130-00-504-0327)

### **REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes or if you know of away to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual 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.

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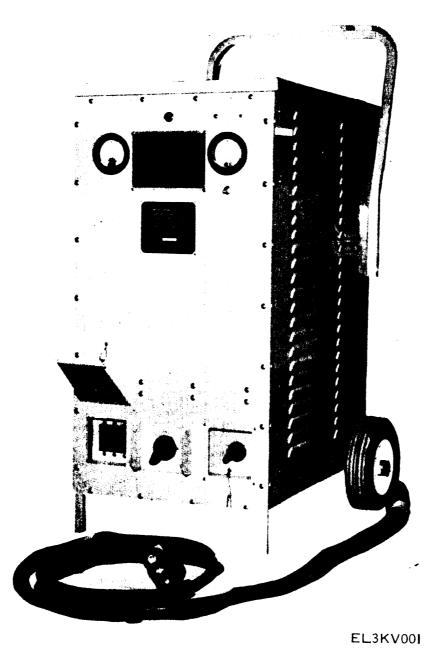


Figure 1-1. Power supply PP-4606C/U.

# CHAPTER 1 INTRODUCTION

# Section I. GENERAL

# 1-1. Scope

This manual describes Power Supply PP-4606C/G (fig. 1-1) and provides instructions for installation, operation, and maintenance. It includes instructions for cleaning and inspection of the equipment and replacement of parts available to organizational repair personnel. It also includes instructions for troubleshooting, testing, and repairing the equipment, as well as tools, materials, and test equipment required for maintenance by general support maintenance personnel.

# 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.

# 1-3. 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

1-7. Purpose and Use

a. *Purpose*. Power Supply PP-4606C/G converts 220 or 440 volt 3-phase alternating current (at) to 28 volts direct current (dc).

*b. Use.* The power supply is used to power aircraft with 28 volts electrical systems.

# **1-8. Description of Equipment**

# (fig. l-l)

a. Physical Description. Power Supply PP-4606C/G is a self-contained unit in a two wheeled metal cabinet. The PP-4606C/G is 48 in. high, 25 1/8 in. wide, and 32 in. deep. Operating controls and indicators are mounted on the front panel. Louvers are provided for venting the equipment.

Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33 B/AFR 75-18/MCO P4610.19C/DLAR 4500.15.

# 1-4. Reporting Equipment Improvement Recommendations (EIR)

If your Power Supply PP-4606C/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.

# 1-5. Administrative Storage

Administrative Storage of Equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage are covered in paragraphs 3-4 and 3-5.

# 1-6. Destruction of Army Electronics Materiel

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

# Section II. DESCRIPTION AND DATA

b. Items Comprising an Operable Equipment. Power Supply PP-4606C/G comprises an operable equipment.

#### 1-9. Tabulated Data

Power Input:
Voltage
Phase 3-phase
Maximum Current
(full load, 440 volts ac)
Power Consumption 1900 watts
Power Output:
Voltage
Maximum Current
Weight
Ambient operating
temperature ratingd
(131 'F)

# WARNING PRIOR TO INSTALLATION

A shock hazard, due to incorrect wiring, may exist within some PP-4606C/G (NSN 6130-00-504-0327) units manufactured by MCL, Inc., under contract number DAAB07-76-C- 1411. The wiring code does not follow the National Electrical Color Code for power circuits. Before connecting the unit to an external ac power source refer to Chapter 2, paragraph 2-3.

# CHAPTER 2 INSTALLATION AND OPERATING INSTRUCTIONS

# Section I. SERVICE UPON RECEIPT OF EQUIPMENT AND INSTALLATION

# 2-1. Unpacking

*a. Packaging Data.* When packed for shipment, the PP-4606C/G is placed in a plastic protective bag and securely packed in a wooden packing frame. The frame is shown in figure 2-1. The volume is 32 cubic feet and the weight is 400 lbs.

b. Removing Contents.

#### WARNING

Avoid personal injury. Power Supply PP-4606C/G weighs 400 pounds; be careful when moving. A mechanical lift is required.

(1) Remove the nails from the sides of the top 2x4 frame with a nailpuller. Remove the top frame.

(2) Remove nails from hold down 2x4 cross braces using a nailpuller. Remove cross braces (2).

(3) Remove nails from sides of corner side braces using a nailpuller. Remove sides (4).

(4) Lift unit from base.

(5) Remove plastic protective cover.

(6) The manual is packed in an envelope taped to the top of the unit.

(7) The cables are wrapped at the back of the unit.

#### 2-2. Checking Unpacked Equipment

*a.* Inspect the equipment for damage incurred during shipment. If the equipment has been changed, report the damage on SF 364 (para 1-3).

*b.* Check the equipment against the component listing (para 3-4) and the packing slip to see if the shipment is complete. Report all discrepancies in accordance with paragraph 1-3. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

c. Check to see whether the equipment has been modified. (Equipment which has been modified will have the MWO number on the front panel, near the nomenclature plate.) Check also to see whether all currently applicable MWO's have been applied. (Current MWO'S applicable to the equipment are listed in DA Pam 310-4.)

# 2-3. Input Power Connections WARNING PRIOR TO INSTALLATION

A shock hazard, due to incorrect wiring, may exist within some PP-4604C/G (NSN 6130-00-504-0327) units manufacturing by MCL Inc, under Contract Number DAAB07-76-C- 1411. The wiring does not follow the National Electrical Color Code for power circuits. Before connecting the unit to an external ac power source, check that the 100 foot ac power input cable of the unit is internally wired as shown in figure FO-1. That is, RED to Ll, BLACK to L2, WHITE to L3, and GREEN to chassis ground. If unit is not wired correctly, red tag the unit until the wiring has been changed.

#### WARNING

HIGH VOLTAGE (220 or 440 volts ac) is present during power line connections. These connections must be made by authorized installation personnel and should be protected with three 20-ampere fuses for 220 volt ac input or three 10-ampere fuses for 440 volt ac input. These connections must be controlled by an external switch for removal of power from the power supply during maintenance.

a. Set CIRCUIT BREAKER to OFF position.

*b*. Remove plexiglass plate that covers INPUT VOLTAGE switch by removing the four locking screws.

c. Set INPUT VOLTAGE switch to 220 (left) position for 220 volts ac input power or to 440 (right) position for 440 volts ac input power.

*d*. Secure plexiglass cover using the four locking screws.

*e*. Source of ac input power should be protected with three 20-ampere fuses for 220 volt ac input power or three 10-ampere fuses for 440 volt ac input power. These connections should be controlled by an external switch. Set this external switch to off.

*f*. Connect 100 foot ac input cable to the ac power source. Make sure the green conductor, which is the chassis ground, is connected to the ground of the ac line terminal.

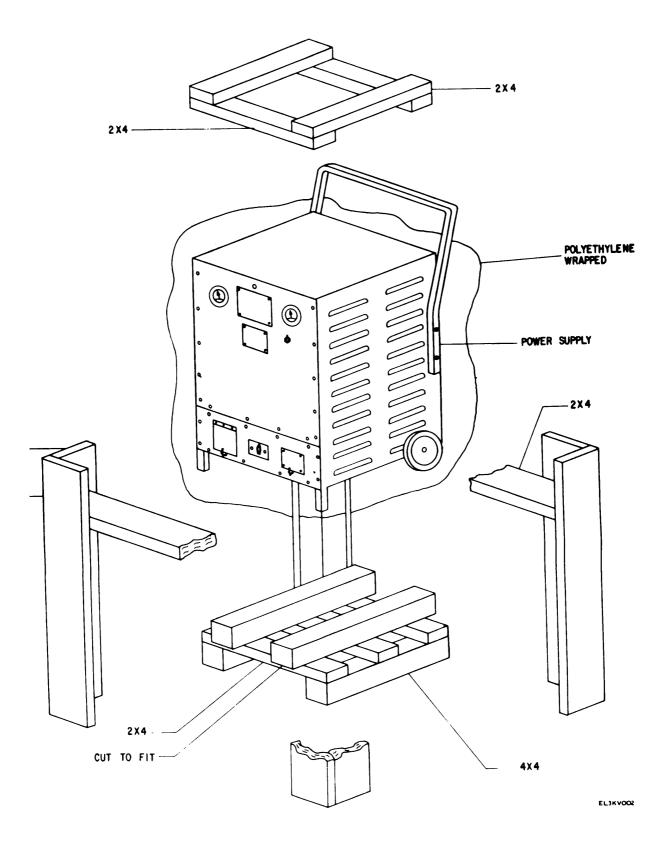


Figure 2-1. Power supply PP-4606C/G packaging diagram.

# Section II. OPERATING INSTRUCTIONS

# 2-4. Damage From Improper Settings

This section should be read carefully before using the Power Supply PP-4606C/U. Improper setting of INPUT VOLTAGE switch will damage the power supply and the equipment to which it is connected.

# 2-5 Controls and Indicators

(fig. 2-2)

The following chart lists the controls and indicators of the PP-4606C/G and indicates their functions.

Tunetions.	
Control or Indicator	Function
INPUT VOLTAGE switch CIRCUIT BREAKER	Used to select proper input circuitry for either 220V or 440V ac input. Used to turn PP-4606C/G ON or OFF. Automatically turns PP-4606C/G OFF when input current is excessive.
OUTPUT VOLTAGE ADJUST PILOT LIGHT VOLTS meter AMPS meter	Adjusts the dc output voltage to 28 volts in eight increments. Illuminates when PP-4606C/G is on. Indicates dc output voltage. Indicates dc output current when AMMETER SWITCH is held in ON position.
AMMETER SWITCH	Momentary switch used to tem- porarily connect AMPS meter across output current.

## 2-6. Operating Procedures WARNING

HIGH VOLTAGES AND CURRENTS exist in this equipment. Serious injury or DEATH may result from contact with the output terminals. Reenergize the equipment before connecting the load to be powered and before performing any maintenance.

# CAUTION

Before operating the equipment, be sure the INPUT VOLTAGE switch is set to the correct ac input voltage position. Failure to set the INPUT VOLTAGE switch to the appropriate voltage setting will result in equipment damage when power is applied.

a. Set CIRCUIT BREAKER to OFF.

*b.* Verify that source voltage is 220 or 440, 3-phase.

c. Verify INPUT VOLTAGE switch is set for appropriate source voltage.

*d*. Connect power supply to source voltage (para 2-3).

e. Connect power supply output cables to equip ment to be charged.

*f.* Set OUTPUT VOLTAGE ADJUST switch completely counterclockwise.

g. Set CIRCUIT BREAKER to ON.

*h.* Adjust OUTPUT VOLTAGE ADJUST switch until VOLTS meter reads 28 volts.

*i*. To read current, set AMMETER SWITCH (momentary) to ON position.

*j.* To turn power supply off, set CIRCUIT BREAKER to OFF.

# 2-7 Stopping Procedure

a. Standby.

(1) Check that CIRCUIT BREAKER is in OFF position.

(2) Disconnect power supply output cables from equipment being charged.

(3) Stow cables on cable brackets at rear of unit.

b. Shutdown.

(1) Perform steps a(1) through (3) above.

(2) Using external switch (para 2-3), turn off ac input voltage source.

(3) Disconnect ac input cable and stow on brackets at rear of unit.

(4) If power supply is to be placed in administrative storage (less than 60 days), perform perventive maintenance specified in paragraphs 3-4 and 3-5. Store in cool, dry place.

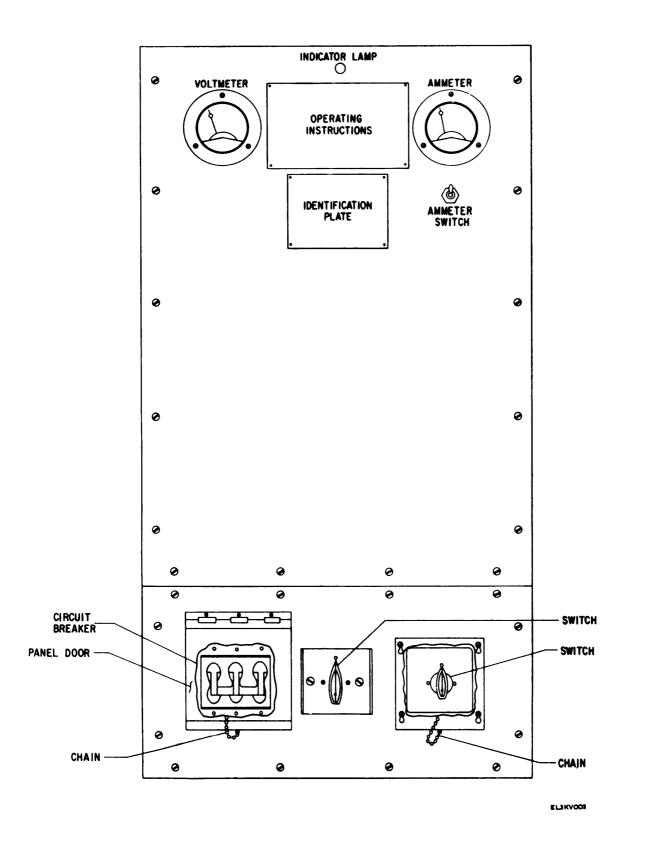


Figure 2-2. PP-4606C/G Controls and Indicators

# CHAPTER 3 OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

# **3-1. Scope of Maintenance**

The maintenance duties assigned to operator and organizational repair 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)

g. Troubleshooting (para 3-10)

- *h*. Replacement of indicator lamp (para 3-11)
- *i.* Replacement of input cables (para 3-12)
- J. Replacement of output cables (para 3-13)

# 3-2. Daily Preventive Maintenance Checks and Services Chart

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 paragraph 3-4 through 3-8 cover routine systematic care and cleaning essential to proper unkeep 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 combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the chart indicates what to check, how to check, and the normal indications. The reference column lists the paragraphs or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective actions listed, higher category of maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

c. *Routine Checks.* Routine checks like cleaning, dusting, washing, checking for frayed cables, stowing items not in use, covering unused receptacles, and checking for loose nuts and bolts are not listed as preventive maintenance checks or services. They are things that you should do anytime you see that they must be done.

# 3-3. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the PP-4606C/G are required daily, (only if the equipment is to be used that day), monthly, and quarterly.

*a.* Paragraph 3-4 specifies checks and services that must be accomplished every day that the equipment is used, and under the special conditions listed below:

(1) Before the equipment is taken on a mission.

(2) When the equipment is initially installed.

(3) When the equipment is reinstalled after removal for any reason.

(4) At least once a week if the equipment is maintained in standby condition.

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

# 3-4. Operator's Preventive Maintenance Checks and Services Daily Schedule

Item No.	Item to be Inspected	Procedures
I	Completeness	See that the equipment is complete.
2	Connectors	Check the tightness of all connectors.
3	Controls and Indicators	While making the operating checks (Items 5 through 8) observe that the mechanical action of each knob and switch is smooth and free of external or internal binding, and that there is no excessive looseness. Also, check the meters for sticking or bent pointers.
4	INPUT VOLTAGE switch	See that the INPUT VOLTAGE switch is set for the proper input voltage. (para 2-3)
5	CIRCUIT BREAKER switch	Connect the output plug to the socket. Turn circuit breaker "ON". Note that the PILOT LIGHT glows (para 2-5).
6	OUTPUT VOLTAGE ADJUST	Adjust OUTPUT VOLTAGE ADJUST switch in a clockwise direction. Reading on VOLTS meter will increase at each step.
7	AMMETER SWITCH	Hold AMMETER SWITCH in the ON position and adjust the OUTPUT VOLTAGE ADJUST switch in a clockwise direction. Current reading on AMPS meter will increase at each step.

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# 3-5. Organizational Preventive Maintenance Checks and Services Monthly Schedule

Item No.	Item to be Inspected	Procedures
1	Transformer Terminals	Inspect terminals on power transformer. All nuts must be tight. There should be no evidence of
2 3 4	Terminal Blocks Gaskets and Insulators Metal Surfaces	dirt or corrosion. Inspect terminal blocks for loose connections and cracked or broken insulation. Inspect gaskets, insulators, bushings, and sleeves for cracks, chipping, and excessive wear. Inspect exposed metal surfaces for rust and corrosion. Clean and touchup paint as required (para 3-9).

# 3-6. Organizational Preventive Maintenance Checks and Services Quarterly Schedule

Item No.	Item to be Inspected	Procedures
1 2	Publications Modification Work Orders	Requisition all publications which are not on hand or in usable condition (para 1-2). Check to see if any MWO'S are required for the power supply. Check equipment to see if current MWO'S have been applied and MWO number is stamped as required. Perform or request modifications as applicable (para 1-2).
3	Components	Inventory components. Requisition missing parts (para 1-8).

# 3-7. Cleaning

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

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

## WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUORO-ETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUORO- ETHANE 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.

*b*. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with Tri-chlorotrifluoroethane (NSN 6850-00-105-3084).

c. Remove dust or dirt from OUTPUT terminals with a brush.

# CAUTION

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

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

# 3-8. Touchup Painting Instructions

# NOTE

Touchup painting recommended instead of refinishing whenever practical; screwheads, binding posts, receptacles, and other plated parts will not be painted or polished with abrasives.

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 applicable cleaning and refinishing practices specified in TB 43–0118. Refer to SB 11–573 for supplies available for field painting and preservation.

# 3–9. General Troubleshooting Information

Troubleshooting the power supply is based upon the operational check contained in the preventive maintenance checks and services daily schedule (para 3-4). To troubleshoot the battery charger, perform all functions starting with Item #5 in the preventive maintenance checks and services daily schedule (para 3-4) and proceed through the items until an abnormal indication or result is observed; note the item number in the troubleshooting chart (para 3-11). If the corrective measures indicated do not result in correction of the trouble, higher category maintenance is required.

Item N o .	Trouble Symptom	Probable Cause	Checks and Corrective Measures
1	PILOT LIGHT does not light	Defective PILOT LIGHT	Replace indicator lamp (para 3–11)
2	<ul> <li>a. VOLTS meter indication does not vary in accordance with changed settings of OUTPUT VOLTAGE ADJUST switch.</li> </ul>	<i>a.</i> VOLTS meter is defective or OUTPUT VOLTAGE ADJUST switch is shorted.	a. Higher category maintenance is re- quired.
	<i>b.</i> AMPS meter indicates zero at all times.	b. AMPS meter is defective or AM- METER SWITCH is open.	<b>b.</b> Higher category maintenance is re- quired.
3	With CIRCUIT BREAKER switch set to OFF, VOLTS meter or AMPS meter does not indicate zero, and PILOT LIGHT does not extinguish.	Short circuit across CIRCUIT BREAKER switch.	Higher category maintenance is required.
4	Cable insulation cuts, burns, abrasions, or pinch marks that could cause short circuits or open circuits.	Defective cable or cables.	Inspect cable insulation. With power dis- connected and CIRCUIT BREAKER switch ON, check continuity between any two input power leads with Multimeter AN/URM – 105. Resistance should be less than 5 ohms. Check continuity between ground lead on input cable and cart chassis with multimeter. Resistance should be less than 5 ohms. Check con- tinuity between two output leads with multimeter. Resistance should be less than 5 ohms. If necessary, replace cables (paras 3-12 and 3-13.)

## 3-10. Troubleshooting Chart

# 3-11. Replacement of Indicator Lamp

*a*. Turn the glass indicator lamp jewel counterclockwise and pull it out to expose the defective lamp.

*b*. Press in on the indicator lamp and turn it counterclockwise to unlock it.

*c*. Pull the defective indicator lamp out and replace it with a new one. Push the indicator lamp in and twist clockwise to lock it,

# 3-12. Replacement of Input Cable

*a*. Remove top cover from power supply by removing the four cover *screws*.

*b*. Loosen the input cable strain relief by rotating the outer cover counterclockwise.

c. Remove the four screws attaching the input cable to the input filter.

d. Remove the input cable.

e. Replace the cable.

f. Reassemble the power supply by reversing steps c through a above.

# 3-13. Replacement of Output Cables

*a*. Remove top cover from power supply by removing the four cover screws.

*b.* Loosen the two output cable strain reliefs by rotating the outer covers counterclockwise.

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c. Remove the two bolts attaching the input cable to the input terminal block.d. Remove the input cable.

e. Replace the cable.f. Reassemble the power supply by reversing steps c through a above.

# CHAPTER 4 FUNCTIONING OF EQUIPMENT

# **4-1. Input Circuit** (fig. FO-1)

The power supply is designed to operate from either 220- or 440-volt, 60Hz, 3-phase power. The input circuit consists of three electrical parts and the primary winding of power transformer T1. The three electrical parts are circuit breaker CB1, switch S1, and switch S2. Circuit breaker CB1 protects the unit in the event of overcurrent, and turns the unit on or off. Switch S1 changes the taps on the transformer to allow the output voltage to be adjusted to  $28 \pm 25$  volts. Switch S2 changes each of the three sets of windings on the power transformer from series to parallel to permit operating at 440 or 220 volts. Transformer T1 has six windings on the primary, three of which have multiple taps. The windings are connected in delta-series or delt-parallel depending on the position of Switch S2.

#### 4-2. Output Circuit (fig. FO-1)

*a.* The output circuit consists of the secondaries of power transformer Tl, full wave rectifiers CR1 and CR2, an interphase transformer T2, a bleeder resistor Rl, and a filter capacitor Cl along with an indicator

lamp LI and metering circuitry.

b. Transformer T1 has two 3-phase secondaries, one in delta configuration and one in wye configuration. The output of each secondary is converted to direct current by CR1 and CR2, which are 3-phase full-wave bridge rectifiers. The interphase transformer T2 permits continuous flow from each of the rectifiers by preventing each rectifier from biasing the other off. Each rectifier has a ripple frequency of 360 Hz. The output currents of the two rectifiers are combined in transformer T2, yielding a ripple frequency of 720Hz. Bleeder resistor R1 improves regulation characteristics by decreasing the voltage drop from no load to full load. Filter capacitor Cl decreases ripple by removing high frequency components from the output, L1 is a 28 volt indicator light across the output.

c. The metering circuitry consists of a voltmeter M2 and a current measuring circuit, When current flows through meter shunt R2, a voltage appears across it which is proportional to the current flow. Potentiometer R3 and resistor R4 provide meter adjustment and current limiting for ammeter M1, which is across the meter shunt R2.

# **CHAPTER 5**

# **GENERAL SUPPORT MAINTENANCE INSTRUCTIONS**

#### Section I. TROUBLESHOOTING

#### WARNING

HIGH VOLTAGES AND CURRENTS exist in this equipment. Serious injury or DEATH may result from contact with the output terminals or internal circuitry. Reenergize the equipment before connecting the load and before performing any maintenance.

# 5-1. General

Troubleshooting at the general support maintenance category includes all the techniques outlined for operator's and organizational maintenance and any special or additional techniques required to isolate a defective part. Paragraph 5–4d provides the troubleshooting chart to be used by repair personnel.

## 5-2. Organization of Troubleshooting Procedure

a. General. The first step in servicing a defective power supply is to localize the fault, which means tracing the fault to a 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 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 the 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 test frequently indicates the general location of trouble. In many instances, the test will help in determining the exact

nature of the fault. The operator's preventive maintenance checks and services chart (para 3–4) contains a good operational test.

(3) *Troubleshooting chart*. The troubleshooting chart (para 5-4d) lists symptoms of common troubles and gives (or references) the corrective measures. Such a chart obviously cannot include all trouble symptoms that may occur. The repair technician should use this chart as a guide in analyzing symptoms that may be listed.

#### 5-3. Test Equipment Required

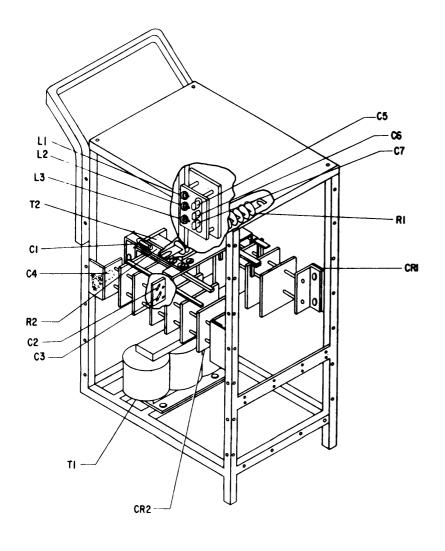
The test equipment required for troubleshooting the battery charger is Multimeter AN/USM-223/U. Multimeter AN/USM-223/U is used by continuity test and dc voltage measurements.

#### 5-4. Localizing Troubles

a. General. In the troubleshooting chart (d below), procedures are outlined for localizing troubles and for isolating troubles within the various circuits of the power supply. Refer to figure 5–1 for parts locations. Refer to the schematic diagram (fig. FO–1) to identify the circuit components. 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 has been observed in the equipment, look for a description of this symptom in the Symptom column and perform the corrective measure shown in the Corrective Measures column. If no operational symptoms are known, begin with item 5 of the operator's preventive maintenance checks and services chart (para 3–4) and proceed until a trouble symptom appears.

*c. Test Conditions.* All checks outlined in the troubleshooting chart are so be conducted with the Power Supply connected to a power source and the power supply output connected to Dummy Load, Electrical DA–638/U.



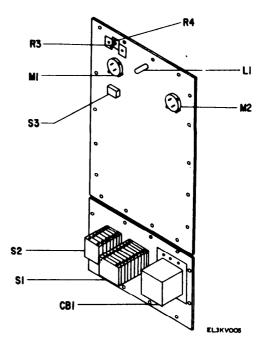


Figure 5-1. Power Supply PP-4606C/U Parts Location Diagram

d. Troubleshooting Chart.

Item No.	Symptom	Probable trouble	Corrective Measures
1	PILOT LIGHT does not light when CIRCUIT BREAKER is set to ON.	<ul> <li>a. No ac power applied to power supply.</li> <li>b. PILOT LIGHT lamp burned out.</li> <li>c. CIRCUIT BREAKER CB1 defective.</li> </ul>	<ul> <li>a. Check for correct input voltage.</li> <li>b. Replace lamp.</li> <li>c. Check C B1, replace if necessary.</li> </ul>
2	No output voltage present.	a. Open in output circuit.	<ul> <li>Check for loose connection, broken lead, or faulty component.</li> </ul>
3	Output voltage does not change when OUTPUT VOLTAGE ADJUST switch	<ul> <li>b. Defective power transformer T1.</li> <li>a. Defective switch S1.</li> <li>b. Defective power transformer T1.</li> </ul>	<ul><li><i>b.</i> Replace power transformer T1.</li><li><i>a.</i> Replace switch S1.</li><li><i>b.</i> Replace power transformer T1.</li></ul>
4	is turned in a clockwise direction.	<i>a</i> . Defective rectifier CR1 or CR2.	<i>a</i> . Replace defective rectifier.
4	Low output voltage as indicated on VOLTS meter.	<i>b.</i> Defective transformer T2.	b. Replace transformer T2.
5	Indication on VOLTS meter differs from the voltage measured at the output terminals using AN/USM-223/U.	<ul><li>a. Defective VOLTS meter M2.</li><li>b. Defective capacitor C1.</li></ul>	<ul><li><i>a.</i> Replace VOLTS meter M2.</li><li><i>b.</i> Check Cl, replace if necessary.</li></ul>
6	indication on AMPS meter Ml does not vary as OUTPUT VOLTAGE AD- JUST switch is turned in a clockwise direction with AMMETER SWITCH held in ON position.	<ul><li>a. Defective AMMETER SWITCH S3.</li><li>b. Defective AMPS meter M1.</li><li>c. Defective meter shunt R2.</li><li>d. Maladjusted meter M1.</li></ul>	<ul> <li>a. Replace AMMETER SWITCH S3.</li> <li>b. Replace AMPS meter M1.</li> <li>c. Replace meter shunt R2.</li> <li>d. Adjust or replace potentiometer R3.</li> </ul>

#### 5-5. General Parts Replacement Techniques

a. Removal of Top Cover. Remove four screws and washers from top cover and lift top cover away from power supply.

b. Removal of Side Panels.

(1) Remove top cover (a above).

(2) Remove two screws and washers from center of side panel.

(3) Remove two bolts, washers, and nuts which

hold handle to frame.

(4) Remove 14 screws and washers holding side panel to frame.

(5) Slide side panel away from handles until clear and then lift away.

c. *Parts Replacement.* Power supply parts can be reached and replaced without special procedures after the top cover and appropriate side panel have been removed.

# Section II. TEST PROCEDURES

## 5-6. General

*a.* Test procedures are prepared for use by maintenance shops and service organizations responsible for general support maintenance of electronic 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, A summary of the performance standards is given in paragraph 5-10.

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.

# 5-7. Test Equipment and Tools

All test equipment and tools required to perform the

testing procedures given in this chapter are listed in a and b below:

a. Test Equipment

Nomenclature	NSN
Multimeter AN/USM-33(*) Multimeter, AN/USM –223/U (RSTS-352B/u)	6625–00-648-9172 6625-00-999-7465
Multimeter, ME–30 ( )/U Dummy Load, Electrical DA –638/U	6625-00-669-0742 6625-00-422-2111

*b. Tools.* All the tools required are included in Tool Kit, Electronic Equipment TK–105/G and Tool Kit, Electronic Equipment TK–101/G.

#### 5-8. Physical Test and Inspection

a. Test Equipment and Materials. None Required

b. Test Connections and Conditions. Make sure input power line is disconnected.

# c. *Procedures*.

1	Control Settings			
Item No.	T e s t Equip.	PP-4606C/U	Test Procedure	Performance Standard
1	None	Circuit Breaker to OFF	a. Inspect case and chassis for damage, missing parts, and condition of paint.	a. No damage evident or parts missing. Ex- ternal surfaces intended to be painted will not show bare metal. Panel lettering will be legible,
			b. Inspect all controls and mechanical assemblies for loose or missing screws, bolts, and nuts.	<b>b.</b> Screws, bolts, and nuts will be tight; none missing
2	None		Rotate OUTPUT VOLTAGE ADJUST and IN- PUT VOLTAGE switch.	Switches will rotate freely, without binding or excessive looseness.

# 5-9. Functional Test

a. Test Equipment. The test equipment required is listed in paragraph 5–7.

Dummy Load DA-638/U to power supply as shown in figure 5-2.

c. Procedure. Perform test procedures specified in table 5–1.

b. Test Connections and Conditions. Connect AN/USM-33(\*) (A2), AN/USM-223/U (V1) and

Table 5 – 1. Functional Test Procedures
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	Table 5 – 1. Functional Test Procedures							
Step No.	Control Settings PP-4606C/U	Test Procedures	Performance Standard					
1	INPUT VOLTAGE switch to 220. CIRCUIT BREAKER to OFF.	Check ac input source (220 V, 3 phase, 60 Hz) using ME-30(*)/U.	Input voltage will be 220 vac + 10%.					
2	Same as step 1.	Connect power supply to ac input source.	None.					
3	CIRCUIT BREAKER to ON.	Rotate OUTPUT VOLTAGE ADJUST in a clockwise direction until VOLTS meter indicates 28V.	AN/USM–223/U will indicate $28 \pm .125$ volts,					
4	AMMETER SWITCH to ON.	Read indications on AMPS meter and AN/USM-33(*).	Indications on both AMPS meter and AN/USM – 33(*) will be 200 amps.					
5	AMMETER SWITCH to OFF.	Set CIRCUIT BREAKER to OFF.	VOLTS meter and AN/USM-223/U will indicate OV.					
6	INPUT VOLTAGE switch to 440. CIRCUIT BREAKER to OFF.	Disconnect 220 vac input source. Check 440 vat, 3 phase, 60 Hz input source with ME–30( )/U.	Input voltage will be 440 vac + 10%.					
7		Repeat steps 2 through 6 above.	Same as steps 2 through 6 above.					

# 5-10. Test Data Summary

b. Output

a. Input	
(l) Voltage	
(2) Frequency	
(3) Phase	

# 

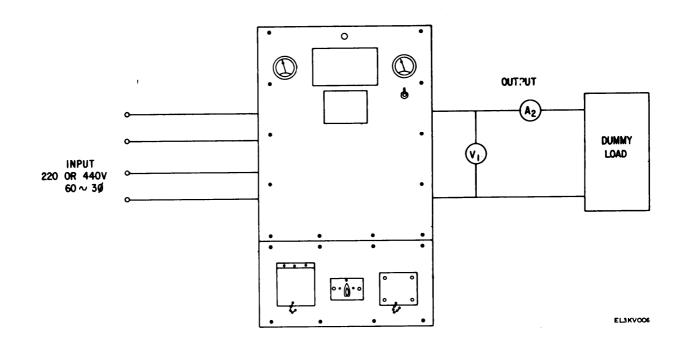


Figure 5-2. Functional Test Connection Diagram

# APPENDIX A REFERENCES

DA Pam 310-4	Index of Technical Publications.
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
TB 385-4	Safety Precautions for Maintenance of Electrical/Electronic Equipment.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TM 11-6625-203-12	Operator's and Organizational Maintenance Manual: Multimeter AN/URM-105, and AN/URM-105C (including Multimeter ME-77/U and ME-77 C/U).
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 11-6625-314-15	Operator's, Organizational, Field and Depot Maintenance Manual: Multimeter AN/USM-33.
TM 11-6625-654-14	Operator's, Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools Lists) for Multimeter AN/USM-223.
TM 11-6625-2745-14	Operator, Organizational, Direct Support and General Support Maintenance Manual: Voltmeter, Electronic ME-30F/U and Voltmeter AN/USM-265A.
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 750-244-2	Procedures for Destruction of Electronics Material to Prevent Enemy Use (Electronics Command).

# APPENDIX C

# MAINTENANCE ALLOCATION

#### Section I. INTRODUCTION

# C-1. General

This appendix provides a summary of the maintenance operations for PP– 4606C/G. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

## C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

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

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

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

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

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

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

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

h. Replace. The act of substituting a serviceable

like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

*i. Repair.* The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

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

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

#### C–3. Column Entries

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

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

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

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

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

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

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

# C-4. Tool and Test Equipment Requirements (See III)

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

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

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

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

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

# C-5. Remarks (sec IV)

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

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

(Next printed page is C-3)

# SECTION II MAINTENANCE ALLOCATION CHART FOR

Power Supply PP-4606C/G

(I)	(2)	(3) MAINTENANCE	м	AINTEN	(4) ANCE C	ATEGOR	Y	(5) TOOLS	(6) REMARKS
GROUP NUMBER	COMPONENT/ASSEMBLY	FUNCTION	с	0	F	н	D	AND EQPT.	
ω	Power Supply PP-Ц606С/G	Inspect Service Inspect Test Service Replace Test Repair Overhaul	0.1 0.1	0.5 0.2 1.0 0.5		1.5 2.0	38	1 2 1 1,5,7,9 3 3-10	1 2 3 14 5

#### SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS FOR Power Supply **PP-4606C/G**

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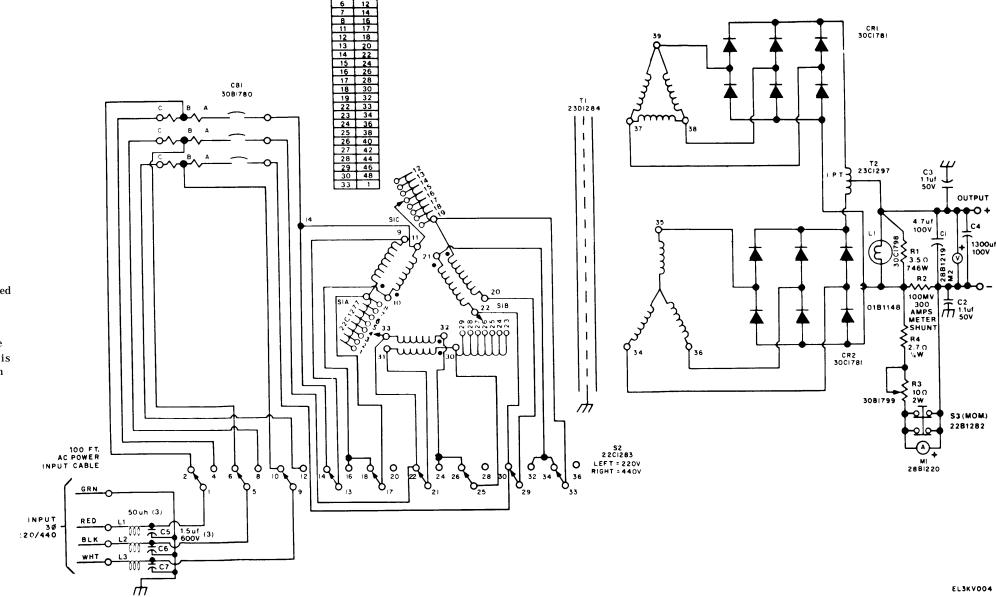
OLI OR TEST	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
OU OR TEST QUIPMENTI EFI CODE		NOMENCLATURE Tool Kit, Electronic Equipment TK-101/G Multimeter, AN/USM-223U (Re TS-352B/U) Multimeter, AN/USM-233U (Re TS-352B/U) Multimeter, AM/USM-31 Multimeter, AM/USM-51 Multimeter, AN/USM-59 or equal	STOCK NUMBER         5180-00-064-5178         6625-00-669-0742         6625-00-668-9172         6625-00-648-9172         6625-00-48-9172         6625-01-48-9172         6625-01-48-9172         6625-01-48-9172         6625-01-48-9172         6625-01-48-917	TOOL NUMBER

SECTION	IV.	REMARKS
Power Sup	ply I	PP-4606C/G

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-

	Power Supply PP-4606C/G
REFERENCE CODE	REMARKS
(1) (2) (3) (4) (5)	Exterior Organizational Lamp, power cables, and frame panels & screws. All tests except efficiency and transformer winding dielectric All except power transformer



SI WIRING DIAGRAM

2

SWITCH

TRANSFORMER

WARNING

#### PRIOR TO INSTALLATION

A shock hazard, due to incorrect wiring, may exist within some PP-4606C/U (NSN 6130-00-504-0327) units manufactured by MCL, Inc, under contract number DAAB07-76-C-1411. The wiring does not follow the National Electrical Color Code for power circuits. Before connecting the unit to an external ac power source, check that the 100 foot ac power input cable is internally wired as shown on this illustration. If unit is not wired correctly, red tag the unit until the wiring has been changed.

By Order of the Secretary of the Army:

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Official:

J. C. PENNINGTON Brigadier General, United States Army The Adjutant General

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		$\frown$			RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS
	7%	-1).T	$\mathbf{b}$	S	OMETHING WRONG WITH THIS MANUAL?
	5			DOPE A	JOT DOWN THE BOUT IT ON THIS TEAR IT OUT, FOLD DROP IT IN THE Stateside, N.J. 07703 DATE 10 July 1975
1	PUBLICAT	ION NUMBE	R		
i	רו איד	-5840 -3	840-12		23 Jan 74 Radar Set AN/200-76
1		PIN-PC	-	REITIS	IN THIS SPACE TELL WHAT IS WRONG
1	PAGE NO.	PARA- GRAPH	FIGURE NO.	TABLE NO.	AND WHAT SHOULD BE DONE ABOUT IT:
1	2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a $2^{\circ}$ IFF antenna lag rather than $1^{\circ}$ .
ALONG DOTTED LINE					REASON: Experience has shown that with only a $1^{\circ}$ lag, the antenna servo system is too sensitive to wind gusting in excess of $25$ knots, and has a tendency to rapidly accelerate and vecelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to $2^{\circ}$ without degradation of operation
ONG DO	3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db."
TEAR AL					REASON: The rejustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjust- ment to light the TRANS POWER FAULT indicator.
1	5-6	5-8			Add new step f.l to read, "Replace cover plate removed in the e.l, above."
ì					REASON: To replace the cover plate.
			FO3	2	Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."
1				S	REASON: This is the output line of the 5 VDC power supply. + 24 VDC is the input voltage.
					6
1		ME. GRADE			999-1776 SSL. M. De Serilof,
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