

## DEPARTMENT OF THE ARMY TECHNICAL MANUAL

**ORGANIZATIONAL, DS, GS, AND DEPOT MAINTENANCE MANUAL**  
**POWER SUPPLY PP-2309A/U**  
**INCLUDING REPAIR PARTS AND SPECIAL TOOL LISTS**

Headquarters, Department of the Army, Washington, D.C. 20315

24 February 1966

**WARNING**

Be careful when working on the 115-volt ac line connections and the primary circuits of the input power transformers. Serious injury or death may result from contact with these terminals.

**DON'T TAKE CHANCES!**

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TM-6130-245-15

C 2

CHANGE

No. 2



HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON DC, 6 May 1982

**Organizational, Direct Support, General Support, and  
Depot Maintenance Manual  
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS  
POWER SUPPLY PP-2309A/U (NSN 6130-00-985-8305)**

TM 11-6130-245-15, 24 February 1966, is changed as follows:

*Page i.* Add the following WARNINGS:

**WARNINGS**

Power Supply PP-2309A/U weighs 105 pounds. Be careful when moving. Two people required for four foot or lower lift. Mechanical carry needed to move PP-2309A/U more than 5 steps.

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 the skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.



**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

Page 1-1. Paragraph 1-2 is superseded as follows:

## 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.

Paragraph 1-3 is superseded as follows:

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

Paragraph 1-3.1 is superseded as follows:

### 1-3.1. 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. Paragraph 1-3.2 is added after 1-3.1.

### 1-3.2. Reporting Equipment Improvement Recommendations (EIR)

If your PP-2309A/U 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.

Page 2-1. After paragraph 2-1 add:

#### WARNING

Power Supply PP-2309A/U weighs 105 pounds. Be careful when moving. Two people required for four foot or lower lift. Mechanical carry needed to move PP-2309A/U more than five steps.

Page 4-4. Paragraph 4-7a. The WARNING is superseded as follows:

#### WARNING

Adequate ventilation should be provided while 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 the skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

Paragraph 4-7b, line 3, "cleaning compound (FSN 7930-395-9542)" is changed to read "trichlorotrifluoroethane (NSN 6850-00-105-3084)."

## **APPENDIX I REFERENCES**

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DA Pam 310-4	Index of Technical Publications.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern painting of Electrical Equipment Shelters
TB SIG 222	Solder and Soldering.
TM 38-750	The Army Maintenance Management System (TAMMS).

By Order of the Secretary of the Army:

Official:

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

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

Distribution:

To be distributed in accordance with DA Form 12-34B requirements for TM DE/Calibration and Repair.

U.S. GOVERNMENT PRINTING OFFICE: 1982—564-016/261

CHANGE

No. 1

TM 11-6130-245-15

HEADQUARTERS

DEPARTMENT OF THE ARMY

WASHINGTON, D.C., 28 December 1973

**Organizational, Direct Support, General Support, and Depot Maintenance  
Manual Including Repair Parts and Special Tools Lists  
POWDER SUPPLY PP-2309A/U**

TM 11-6130-245-15, 24 February 1966, is changed as follows:

*Page 1-1.* paragraph 1.1. Delete the second sentence and substitute:

The maintenance allocation chart and the repair parts and special tools list are contained in appendixes III and IV.

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).

Paragraph 1-3. 1 added as follows:

**1-3.1. Reporting of Errors**

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 1-2.* After paragraph 1-5 add:

**1-6. Item Comprising an Operable Power Supply PP-2309A/G**

Power Supply PP-2309 A/G (FSN 6130-985-8305) comprises an operable equipment.

*Page A2-1,* appendix II. Delete appendix II.

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*



# CHAPTER 1

## INTRODUCTION

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### 1-1. Scope

This manual provides instruction for installation, operation, and maintenance of Power Supply PP-2309A/U. The maintenance allocation chart, basic issue items list, and the repair parts and special tool lists are contained in appendices II, III, and IV.

**Note.** This is a first-edition manual containing preliminary information compiled by the manufacturer of the equipment. Caution should be exercised in the use of the information in this manual until it is replaced by a revised edition.

### 1-2. Index of 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. 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 that are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc) and the latest changes to and revisions of each equipment publication.

### 1-3. Forms and Records

#### *a. Reports of Maintenance and Unsatisfac-*

*tory 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), NAVSANDA 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 using pencil, pen, or typewriter. DA Form 2028 will be completed by the individual using the manual and forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-MR-(NMP)-MA, Fort Monmouth, New Jersey 07703.

### 1-4. Purpose

Power Supply PP-2309A/U is designed to convert nominal 115 volts, single phase, 60 cycles per second, to regulated 0 to 36 volts direct current (dc).

### 1-5. Technical and Physical Characteristics

Ac input \_ \_ \_ \_ \_ 95 to 130 volts, single phase, 60 cycles per second.

Dc output voltage\_ \_0 to 36 volts dc.

Dc output current \_ \_ \_ 15 amperes maximum.

Regulation\_ \_ \_ \_ \_ $\pm 0.5$  percent in 5- to 36-volt range.  $\pm 40$  millivolts in 2- to 5-volt range.

Ripple \_ \_ \_ \_ \_ 1 percent rms maximum at 36 volts and 2 percent rms maximum at 2 Volts with full load.

Dimensions \_ \_ \_ \_ \_ 19 inches wide, 12 inches deep, 12 1/4 inches high.

Mounting \_ \_ \_ \_ \_ On standard 19 inch relay rack.

Metering \_ \_ \_ \_ \_ 3 1/2-inch ammeter, 0-20 amperes dc. 3 1/2 inch voltmeter, 0-40 volts dc.

Finish \_ \_ \_ \_ \_ Gray hammertone.

Weight \_ \_ \_ \_ \_ 105 pounds maximum.

Ac connection \_ \_ \_ **Heavy** duty three-wire cord with three-prong grounding plug.

Dc connection \_ \_ \_ \_ \_ Superior five-way terminals on front and terminal strip on rear of chassis.

## CHAPTER 2

### INSTALLATION

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#### 2-1. Installation Procedure

Power Supply PP-2309A/U is mounted on a standard 19-inch relay rack. Select a location that is convenient to the power input source and for connection of the load to the power supply.

#### 2-2. Power Connection

a. Connect the AC input plug to the 95- to 130-volt, single-phase, 60-cycle-per-second source.

b. Connect the dc load leads to the respective - and + DC OUTPUT jacks on the front panel or to terminals 1 and 4 on terminal board TB1 on the rear of the chassis.

## CHAPTER 3

### OPERATION

#### 3-1. Damage From Improper Control Setting

Before placing the DC OUTPUT switch in the ON position, always set the dc output voltage to the dc voltage level required by the load. If this procedure is not performed, the equipment to which the dc output voltage is being supplied may become damaged by the application of excessive dc voltage from the power supply.

#### 3-2. Controls and Indicators

Control or indicator	Function
VOLTAGE CONTROL knob (T3).	Provides coarse adjustment of output voltage.
VOLTAGE VERNIER control knob ( .	Provides fine adjustment of output voltage.
AC INPUT power switch (S1).	Turns power supply on and off.
Pilot indicator lamp (	Glowes when power supply is on.
Volts DC meter (M1) ----	Indicates output voltage.
Ammeter DC meter (M2) --	Indicates output current.
DC OUTPUT switch (S2) _	Applies power supply output to load.

#### 3-3. Operation

To operate the power supply, follow the procedure given in *a* through *e* below.

**Caution:** Before turning on the power supply, always make sure that the DC OUTPUT switch is in the OFF position. Failure to take this precaution may result in damage to the load to which the power supply is connected because of excessive application of voltage to the load.

*a.* Place the DC OUTPUT switch at OFF. Place the AC INPUT power switch to ON. Observe that the pilot indicator lamp lights.

*b.* Adjust the VOLTAGE CONTROL and VOLTAGE VERNIER knobs fully counter-clockwise then fully clockwise. Observe that the voltmeter indication varies from 0 to 36 volts.

**Caution:** Before placing the DC OUTPUT switch to ON, always set the output voltage to the dc voltage level required by the load. Excessive voltage may damage the load connected to the power supply.

*c.* Set the output voltage to the level required by the load. Place the DC OUTPUT switch at ON.

*d.* Adjust the VOLTAGE CONTROL and VOLTAGE VERNIER knobs until the voltmeter and ammeter indicate the desired voltage and current output.

*e.* During manufacture, the voltmeter in the power supply is direct-connected across the output terminals of the power supply and monitors the dc voltage output of the power supply. Under heavy load conditions, a significant difference may exist between the voltage present at the output of the power supply and the input voltage to the load. To monitor the voltage input to the load rather than the voltage output of the power supply, remove the factory-installed jumper between terminals 1 and 2 and the jumper between terminals 3 and 4 of TB1 at the rear of the power supply. Connect a lead from terminal 2 of TB1 to the positive end of the load and a lead from terminal 3 of TB1 to the negative end of the load.

**Note.** If one or both of the leads connected to terminals 2 and 3 become disconnected from the load, the voltmeter will automatically revert to monitoring the voltage at the output of the power supply.

## CHAPTER 4

### OPERATOR AND ORGANIZATIONAL MAINTENANCE

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#### 4-1. 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. Systemic Care.* The procedures given in paragraphs 4-2 through 4-8 cover routine systematic care and cleaning essential to proper upkeep of this equipment when it is used separately. When this equipment is used as part of a *set* or *system*, follow the procedures established in the *set* or *system* manual.

*b. Preventive Maintenance Checks and Services.* The preventive maintenance checks and services charts (para 4-3, 4-4, 4-5, and 4-6) outline functions to be performed at specific intervals; however, if the equipment is used as part of a *set* or *system*, follow the procedures established in the *set* or *system* manual. For equipment operated separately, 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 in maintaining combat serviceability, the chart indicates what to check, how to check, and what the normal conditions *are*; the *References*

column lists the illustrations, paragraphs, or manuals that maintain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective actions indicated, higher level maintenance is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

#### 4-2. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the PP-2309A/U are required daily, weekly, monthly, and quarterly.

*a.* Paragraph 4-3 specifies checks and services that must be accomplished daily and under the special conditions listed below.

- (1) When the equipment is initially installed.
- (2) When the equipment is reinstalled after removal for any reason.
- (3) At least once each week, if the equipment is maintained in standby condition.

*b.* Paragraphs 4-4, 4-5, and 4-6 specify additional checks and services that must be performed on a weekly, monthly, and quarterly basis, respectively.

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

Sequence No.	Item to be inspected	Procedure	References
1	Completeness -----	See that the equipment is complete -----	App II.
2	Exterior surfaces -----	Clean the exterior surfaces, including the panel and meter glass. Check the meter glass on the voltmeter and ammeter and the indicator lens for cracks.	Para 4-7.
3	Connectors -----	Check the security of the AC power input connector -----	None.
4	Controls and indicators -----	While making the operating checks (items 5 through 9), observe that the mechanical action of each knob and switch is smooth and free of external or internal binding and there is no excessive looseness. Also check the voltmeter and ammeter for sticking or bent pointers.	None.
5	Preliminary -----	Set the controls as follows: a. AC INPUT switch: OFF. b. DC OUTPUT switch: OFF. c. VOLTAGE CONTROL: fully ccw. d. VOLTAGE VERNIER: fully ccw.	None.
6	AC INPUT switch -----	Set AC INPUT switch to ON. Observe that power on indicator lamp lights. Replace panel lamp and fuse if indicator lamp does not light.	None.
7	VOLTAGE CONTROL and VOLTAGE VERNIER.	Turn VOLTAGE CONTROL and VOLTAGE VERNIER fully clockwise while observing voltmeter. Voltage should rise from 0 to 36 volts. <b>Caution:</b> If there is a load connected to the power supply, set the VOLTAGE CONTROL and VOLTAGE VERNIER for the correct load voltage before performing item 8 below. Excessive voltage may damage the load connected to the power supply.	None.
8	DC OUTPUT switch	Set the DC OUTPUT to ON. Voltmeter reading should not change from reading indicated in item 7 above. If no load is connected to power supply, ammeter should indicate 0. If load is connected to power supply, ammeter should read normal load current.	None.
9	Front panel controls -----	Turn off power supply as follows: a. Set DC OUTPUT switch to OFF. Observe that ammeter indication is zero and voltmeter continues to indicate normal voltage setting (item 7, above). b. Turn the VOLTAGE CONTROL and VOLTAGE VERNIER fully counterclockwise. Observe that the voltmeter falls to 0 volt. c. Set AC INPUT power switch to OFF. Observe the ac power-on indicator goes off.	None.

#### 4-4. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Cables -----	Inspect the AC input power cord for chafed, cracked, or frayed insulation. Replace if defective.	None.
2	Metal surfaces -----	Inspect exposed metal surfaces for rust and corrosion. Touch up paint as required.	Para 4-8.

#### 4-5. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Jacks -----	Inspect jacks for snug fit and good contact -----	None.
2	Transformer terminals -----	Inspect terminals of power transformers for secure connections and for dirt and corrosion.	None.
3	Terminals blocks -----	Inspect terminal block for loose connections and cracked or broken insulation -----	None.
4	Resistors and capacitors -----	Inspect resistors and capacitors for cracks, blistering, or other detrimental defects.	None.
5	Interior -----	Clean interior of chassis and cabinet -----	None.

#### 4-6. Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	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.
3	Spare parts -----	Check all spare parts for general condition and method of storage. There should be no evidence of overstock, and all shortages must be valid requisitions.	Appx II.

#### 4-7. 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:** 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 case; use a cloth dampened (not wet) with cleaning compound (FSN 7930-395-9542).

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

**Caution:** Do not press on the glass face of the front panel meters when cleaning; the meter may become damaged.

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

#### 4-8. 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 TB SIG 364.



## CHAPTER 5

### FUNCTIONING OF EQUIPMENT

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#### 5-1. Circuit Description

Single phase, 115 volts, 60 cycles per second (cps), is applied to the primary windings of variable transformer T3 and auxiliary power transformer T1. Transformer T3 controls the voltage to the power transformer T2 primary windings. The power transformer T2 secondary voltage is applied to the silicon-controlled rectifiers SCR1 and SCR2 anodes, and diodes CR4 and CR5. The auxiliary power transformer T1 secondary voltage is applied to diodes CR2 and CR3. Through the full-wave rectifying action of diodes CR2 and CR3 and the clipping action of diode CR1, a 20-volt amplitude square-wave reference voltage is formed. Transistor Q4 provides regulation of the reference voltage. Zener diode CR6 clamps the transistor Q4 base voltage. The reference voltage is then applied to the pulse generator unijunction transistor Q3 base to develop a gate current pulse as determined by the time constant of resistor R8 and phase-delay capacitor C3. The gate current pulse is applied to fire the silicon-controlled rectifier having a positive voltage applied to the anode. The time that the

silicon controlled rectifier is fired will determine the output voltage amplitude. Conduction of the silicon-controlled rectifier applies dc voltage to the power supply output terminals for the remainder of that half cycle. The gate current pulse will then be applied to the outer silicon-controlled rectifier when positive voltage is applied to the anode.

#### 5-2. Circuit Regulation

The negative output terminal is connected to the output sense terminal. The output voltage is then applied to variable resistor R3 and compared with the reference voltage. If a difference in the output and reference voltages exists, the difference will be amplified by amplifier transistor Q1. Transistor Q1 output will turn transistor Q2 *on*. Resistor R5 and capacitor C1 comprise a stabilizing feedback circuit. Transistor Q2 then assumes a collector current such that the output voltage error is corrected. Choke L1, resistor R16, and capacitor C5 form the output voltage filtering network. Variable transformer T3, variable resistor R3, and voltage vernier resistor R2 adjust the power supply output level.

## CHAPTER 6

### TROUBLESHOOTING

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#### 6-1. Test Equipment and Tools

Tools and test equipment required for maintenance of Power Supply PP-2309A/U are given in appendix II.

#### 6-2. Troubleshooting Transistor Circuits

Refer to TB SIG 357 for troubleshooting techniques and precautions to be observed when troubleshooting transistorized circuits. Some general precautions to be observed are given in a through f below.

a. Use a pencil-type soldering iron with a power rating of 50 watts or less and 40/60 solder with a low-melting point when making Soldering Connections to the transistors. Do not use a soldering gun to replace parts in the transistorized circuits:

b. use a heat sink when removing or installing soldered transistors or diodes. Excessive heat will damage a transistor or diode.

c. If any of the test equipment does not have an isolation transformer in its power supply, connect one in the primary ac power input circuit.

d. Do not connect test equipment (other than multimeters and vacuum-tube voltmeters) outputs directly to a transistor circuit; use a coupling capacitor.

e. Make test equipment connections carefully so that shorts will not be caused by exposed test equipment connectors. Tape or sleeve (spaghetti) test prods or clips as necessary to leave as little of the tip exposed as needed to make contact to the circuit under test.

f. Use only the multimeter authorized for use on this equipment. If a substitute must be made, do not use multimeters with a sensitivity of less than 20,000 ohms per volt, or ohmmeter circuit batteries in excess of 3 volts.

#### 6--3. Troubleshooting Chart

When an abnormal symptom has been observed in the equipment, look for a description of this symptom in the Symptom column of the chart below and perform the corrective measures shown in the Corrective measures column. If no operational symptoms are known, begin with item 5 of the preventive maintenance checks and services chart (para 4-3) and proceed until a trouble symptom appears.

Step	Symptom	Probable cause	Corrective action
1	Pilot lamp does not light when power switch is in the on position.	Defective pilot, lamp, incorrect power input, or blown fuse.	Check power input. If correct, check pilot lamp and fuse. Replace as necessary.
2	Power supply regulates but correct output voltage cannot be obtained.	Defective voltage control (T3, R3) or VOLTAGE VERNIER control R2. Defective unijunction Q3, Zenex diode CR3, or transistor Q4.	Check controls and replace as necessary. Replace defective part as required.
3	No regulation -----	Defective transistor Q1 or Q2 -----	Replace defective transistor as required.
4	Excess ripple -----	Defective choke L1, resistor R16, or capacitor C5.	Replace defective part as required.



## APPENDIX I

### REFERENCES

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Following is a list of applicable references available to the repairman of Power Supply PP-2309A/U.

DA Pamphlet Index of Technical Manuals, 310-4  
Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.

TB SIG 222

TB SIG 357

TB SIG 364

TM 38-750

Solder and Soldering.

Transistor Testing and Circuit Troubleshooting.

Field Instructions for Painting and Preserving Electronics Command Equipment.

Army Equipment Record Procedures.

## APPENDIX II

### BASIC ISSUE ITEMS LIST

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#### 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 issued as part of the major end item. 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. Description by model.* Not used.

*e. 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. Illustrations.* Not used.

## SECTION II. OPERATORS FUNCTIONAL PARTS LIST

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY AUTH	ILLUSTRATION	
						FIGURE NO.	ITEM NO.
6130-985-8305		POWER SUPPLY PP-230A/G: provides power conversion of 115 volt, single phase, 60 cps, to regulated 3 to 36 volts dc		Nx			
		ITEMS COMPRISING AN OPERABLE EQUIPMENT					
ORD THRU AGC		TECHNICAL MANUAL TM 11-6130-245-15			2		
		NOTE: For technical manuals the quantity authorized indicates the number of copies packed with the equipment at the time of procurement. It represents the maximum quantity authorized. Where a number of these equipments are concentrated in a small area, the quantity on hand may be reduced to practical levels. Excess publications must be returned to publication supply centers through AG channels.					
		RUNNING SPARE ITEMS					
6240-682-3411		FUSE, CARTRIDGE: 8 amp; 250 v; MIL type FO3G8R00A (M5Rd11-045)			3		
		LAMP, GLOW: MIL type NE51H			1		

Power Supply PP-2309A/G

1

END

## APPENDIX III

### MAINTENANCE ALLOCATION

---

#### Section I. INTRODUCTION

##### A3-1. General

*a.* This appendix assigns maintenance functions to be performed on component, 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 standards item name. Additional descriptive data are included only where clarification is necessary to identify the component. Component, 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) are 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, or 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 replacements of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

- (3) *Operator, organizational, 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 function 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 (†) symbol 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	MAINTENANCE CATEGORY					TOOLS REQUIRED	REMARKS
		O/C	O	DS	GS	D		
POWER SUPPLY PP-2309A/G	service		X				7	Limited to replacing fuse, knobs and lamp
	adjust				X		6	
	inspect	X					7	
	test		X		X		1,2,3,5,8	
						X	1,2,3,5,8	
	replace	X					7	
	repair		X				4,6	
	rebuild				X	X	4,6	
	overhaul				X		4,6	
							4,6	

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## SECTION III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

PART OR COMPONENT	MAINTENANCE FUNCTION	MAINTENANCE CATEGORY					TOOLS REQUIRED	REMARKS		
		O/C	O	DS	GS	D		SERVICE	STD ACTION	CODE NO
PP-2309A/G (continued)										
MULTIMETER ME-26B/U						+		Army	Std A	1
MULTIMETER TS-352/U					+	+		Army	Std A	2
OSCILLOSCOPE AN/USM-50( )					+	+		Army	Std A	3
REPAIR KIT, PRINTED WIRING BOARD ME-772/U					+	+		Army	Std A	4
TEST SET, TRANSISTOR TS-1836/U					+	+		Army	Std A	5
TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G					+	+		Army	Std A	6
TOOL AND TEST EQUIPMENT (Available to the repairman's use because of his assigned mission)			+							7
VOLTMETER, ELECTRONIC ME-30A/U					+	+		Navy	Std A	8

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## APPENDIX IV

### ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT, AND DEPOT MAINTENANCE REPAIR PARTS LIST

---

#### Section I. INTRODUCTION

##### A4-1. General

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

The organizational maintenance repair parts and special tools list lists the 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 on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

- (2) Direct and general support and depot maintenance repair parts and special tools list shows 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, the 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 sup-

ply. 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; produced by technical services, stocked in and supplied from the technical service depot system and authorized for use at indicated maintenance categories. "PI" 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 categories authorized to install the part.

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

"H" - General support maintenance.

(d) *Column D.* Not used.

(2) *Federal stock number.* This column lists the 1 1-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 equipment 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. Three same designations are also used on any illustrations of the equipment.

#### 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.

$$\text{Specific number of equipments supported} \times \frac{\text{allowance factor}}{100} =$$

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 lower whole number and fractional value 0.5 and above will advance 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.
6130-985-8305		POWER SUPPLY PP-2309A/G: provides power conversion of 115 volt, single phase, 60 cps, to regulated 0 to 36 volts dc		NX				
		FUSE, CARTRIDGE: 8 amp; 250 V; MIL type F03G8R00A (M5Rd11-045)			1	*		F1
5355-577-5882		KNOB: MS91528-2F2B			1	*		
6240-682-3411		LAMP, GLOW: MIL type NE51H			1	*		DS1

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END

## 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.
	B	C	D										
					6130-985-8305								
					POWER SUPPLY PP-2309A/G: provides power conversion of 115 volt, single phase, 60 cps, to regulated 0 to 36 volts dc		NX						
PLH					6625-720-3512			1		1.0	6.0		M2
PH					AMMETER: MIL type MR36W020DCAAR			1		1.0	10.0		F1
					CABLE ASSEMBLY: service cord; moulded plug on one end, other end tinned; Birnbach Radio part no. 309/3 (M5Rd11-A031)			1		1.0	10.0		
PH					CAPACITOR, FIXED, ELECTROLYTIC: 15 uuf - 10% + 150%; 25 vdcw; MIL type CE10C150F (M5Rd11-A007)			2		1.5	12.0		C1,C4
PH					CAPACITOR, FIXED, ELECTROLYTIC: 10,000 uuf; 50 vdcw; MIL type CG14U50F1			1		1.0	6.0		C5
PH					5910-644-3575			1		1.0	6.0		C3
					CAPACITOR, FIXED, PAPER DIELECTRIC: 220,000 uuf ±10%; 100 vdcw; MIL type CP09A1KB224K			1		1.0	6.0		C2
PH					CAPACITOR, FIXED, ELECTROLYTIC: 2 uuf -10% +150%; 12 vdcw; MIL type CE10C020J (M5Rd11-A006)			1		1.0	6.0		
PO					FUSE, CARTRIDGE: 8 amp; 250 v; MIL type FO3G8R00A (M5Rd11-045)			1		1.4	25.0		F1
PLH					5920-892-9311			1		0.7	3.0		XF1
PO					5355-577-5882			1		0.2	4.0		
PO					6240-682-3411			1		0.8	15.0		DS1
PLH					LAMP, GLOW: MIL type NE51H			1		0.7			XDS1
					LIGHT, INDICATOR: MIL type LH76LC14RD (M5Rd11-051)			1		1.0	4.0		L1
PH					REACTOR: Electrosolids part #868 (M5Rd11-A055)			1		1.0	6.0		R10
PH					RESISTOR, FIXED, COMPOSITION: 22 ohm ±5%; 1/2 w; MIL type RC20GF220J (M5Rd11-A014)			1		1.0	6.0		

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														
									Power Supply PP-2309A/G(continued)								
P	H								RESISTOR, FIXED, COMPOSITION: 24 ohm ±5%; 1/2 w; MIL type RC20GF240J (M5RD-A016)			2		1.5	12.0	R13, R15	
P	H			5905-252-4018					RESISTOR, FIXED, COMPOSITION: 47 ohm ±5%; 1/2 w; MIL type RC20GF470J			1		1.0	6.0	R11	
P	H			5905-843-7199					RESISTOR, FIXED, WIREWOUND: 51 ohm; 55 w; MIL type RW35V510			1		1.0	6.0	R16	
P	H			5905-581-7598					RESISTOR, FIXED, WIREWOUND: 100 ohm; 55 w; MIL type RW35V101			1		1.0	6.0	R14	
P	H			5905-195-6806					RESISTOR, FIXED, COMPOSITION: 1000 ohm ±5%; 2 w; MIL type RC42GF102J			2		1.5	12.0	R17, R18	
P	H			5905-190-8880					RESISTOR, FIXED, COMPOSITION: 1,200 ohm ±5%; 1/2 w; MIL type RC20GF122J			1		1.0	6.0	R9	
P	H								RESISTOR, FIXED, COMPOSITION: 3,300 ohm ±5% 1/2 w; MIL type RC20GF332J (M5Rd11-A017)			1		1.0	6.0	R19	
P	H			5905-843-3033					RESISTOR, FIXED, WIREWOUND: 4,700 ohm ±5%; 7 w; MIL type RW55V472			1		1.0	6.0	R12	
P	H			5905-279-2019					RESISTOR, FIXED, COMPOSITION: 5,100 ohm ±5%; 1/2 w; MIL type RC20GF512J			1		1.0	6.0	R5	
P	H			5905-299-1971					RESISTOR, FIXED, COMPOSITION: 8,200 ohm ±5%; 1/2 w; MIL type RC20GF822J			1		1.0	6.0	R1	
P	H			5905-185-8510					RESISTOR, FIXED, COMPOSITION: 100,000 ohm ±5%; 1/2 w; MIL type RC20GF103J			2		1.5	12.0	R7,R8	
P	H			5905-195-6761					RESISTOR, FIXED, COMPOSITION: 10,000 ±5%; 1/2 w; MIL type RC20GF104J			2		1.5	12.0	R4,R6	
P	H			5905-583-4233					RESISTOR, VARIABLE, WIREWOUND: 1000 ohm; 3 w; MIL type RA3CNASD102A			1		1.0	6.0	R2	



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.
						Power Supply PP-2309A/G(continued)								
P	H			5905-681-8991		RESISTOR, VARIABLE, WIREWOUND: 20,000 ohm; 3 w; MIL type RA30NASD203A			1		1.0	6.0	R3	
P	H			5960-975-2175		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N458			5		2.6	28.0	CR1, CR2 CR3, CR7 CR8	
P	H			5960-848-7007		SEMICONDUCTOR DEVICE, DIODE: MIL type 1N968B			1		1.0	6.0	CR6	
P	H					SEMICONDUCTOR HEAT SINK ASSEMBLY: c/o of heat sink, 2 diodes; 1 MIL type 1N3492, 1 GE no. C32A; Electrosolids part no. 20058 (M5Rd11-A077)			2		1.5			
P	H			6625-892-4342		SHUNT, INSTRUMENT: MIL type MA751T200			1		1.0	6.0	R20	
PL	H			5930-655-1582		SWITCH, TOGGLE: DP; MS35059-23			1		1.0	7.0	S2	
PL	H			5930-655-1514		SWITCH, TOGGLE: SP; MS35058-22			1		1.0	7.0	S1	
P	H					TRANSFORMER, POWER: Electrosolids part no. 867 (M5Rd11-A096)			1		1.0	7.0	T2	
P	H					TRANSFORMER, VARIABLE, POWER: Electrosolids part no. 20113 (M5Rd11-A097)			1		1.0	7.0	T3	
P	H					TRANSFORMER, VOLTAGE REFERENCE: Electrosolids part no. 866 (M5Rd11-A023)			1		1.0	7.0	T1	
P	H			5960-836-7262		TRANSISTOR: MIL type 2N697			3		1.9	15.0	Q1, Q2, Q4	
P	H					TRANSISTOR: MIL type 2N2646 (M5Rd11-A022)			1		1.0	5.0	Q3	
PL	H			6625-643-1792		VOLTMETER: MIL type MR36W050DCVVR			1		1.0	8.0	M1	

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USASESCS (30)  
USATC AD (2)  
USATC Armor (2)  
USATC Engr (2)  
USATC Inf (2)  
USASTC (2)  
WRAMC (1)  
Army Pic Cen (2)  
USACDCEC (10)

NG: None

USAR: None

For explanation of abbreviations used see AR 320-50.

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MDW (1)  
Instl (2) except  
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Ft Hancock (4)  
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WSMR (5)  
Ft Carson (2)  
Ft Knox (12)  
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Sig Sec, GENDEP (OS) (5)  
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