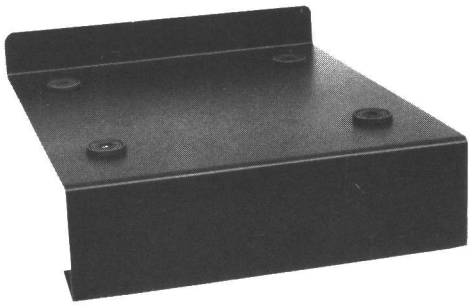
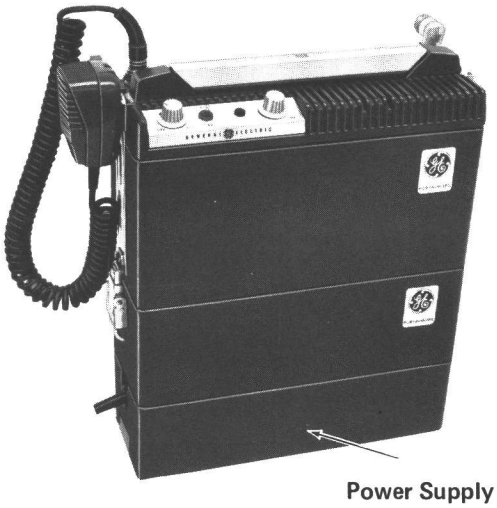
MOBILE RADIO

MAINTENANCE MANUAL

PORTA-MOBIL POWER SUPPLY MODEL 4EP66A10



Stand For Desk Top Mounting



Power Supply

SPECIFICATIONS *

Power Input:	117 VAC, 50/60 Hz	234 VAC, 50/60 Hz
Standby	0.15 ampere	.08 ampere
Receive	0.25 ampere	0.13 ampere
Transmit 25—175 MHz	0.7 ampere	0.35 ampere
406—470 MHz	1.0 ampere	0.5 ampere
LPI Combinations	0.4 ampere	0.2 ampere

Power Output:	14 VDC	24 VDC	32 VDC
Standby	.04 ampere		
Receive	0.5 ampere		
Transmit	0.5 ampere	0.5 ampere	1.0 ampere (25—174 MHz) 1.4 amperes (406—470 MHz)

LPI Combinations:	0.5 0.4
Duty Cycle:	20% transmit, 100% receive
Temperature Range:	-30°C to +65°C (-22°F to +140°F)
Dimensions (H x W x D):	
Power Supply Only	7-1/4" x 11-1/8" x 3-5/8"
Combination	12-3/4" x 11-1/8" x 3-5/8"
Weight	14 pounds

*These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

EP-66-A

GENERAL ELECTRIC

TABLE OF CONTENTS

WARNING

Under no circumstances should any person be permitted to handle any portion of the equipment that is supplied with high voltage, or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS.

DESCRIPTION

Transistorized Power Supply Model 4EP66A10 permits the operation of Porta-Mobil transmitters and receivers from a 117/234 Volt AC, 50/60 Hertz source. The Power Supply provides the following regulated DC voltage:

- +14 volts for the receiver, PTT and pilot relays, and the Transmit light.
- +24 volts for the transmitter exciter.
- +32 volts for the transmitter PA.

The power supply fits into an aluminum can attached to a casting that serves as a heat sink for the regulator transistors. Power connections to the transmitter and receiver are made through a jack on the case that connects to a plug on the transmitter-receiver section.

Reference to symbol numbers mentioned in the following test are found on the Schematic Diagram, Outline Diagram and Parts List (see Table of Contents).

CIRCUIT ANALYSIS

Power Supply Model 4EP66A10 operates from either a 117-volt or 234-volt AC, 50/60-Hz source. For 117-volt operation, the two identical primary windings of T501 are connected in parallel. For 234-volt operation, the transformer primaries are connected in series. Instructions for connecting the transformer for either mode of operation are contained on the Schematic Diagram.

Connecting power cable W501 to an appropriate AC source applies power to T501. A 3-ampere fuse in one side of the AC lead protects the power supply against overloads.

SUPPLY VOLTAGE CIRCUITS

The power supply has a separate rectifier, filter and regulator circuit for each supply voltage. A simplified power and switching diagram is shown in Figure 1.

24 & 32-Volt Supply

The 24-volt and 32-volt regulators are supplied by a tapped-bridge rectifier circuit. The AC voltages developed across the Red-Red and Blue-Blue windings of T501 and rectified by CR501 through CR506. Filtering for the 32-volt regulator input is provided by L501, C501 and C502. Filtering for the 24-volt regulator input is provided by L502, L503 and C503. Fuses F502 and F503 protect the secondary of T501. The rectified and filtered output is applied to the regulator circuits.

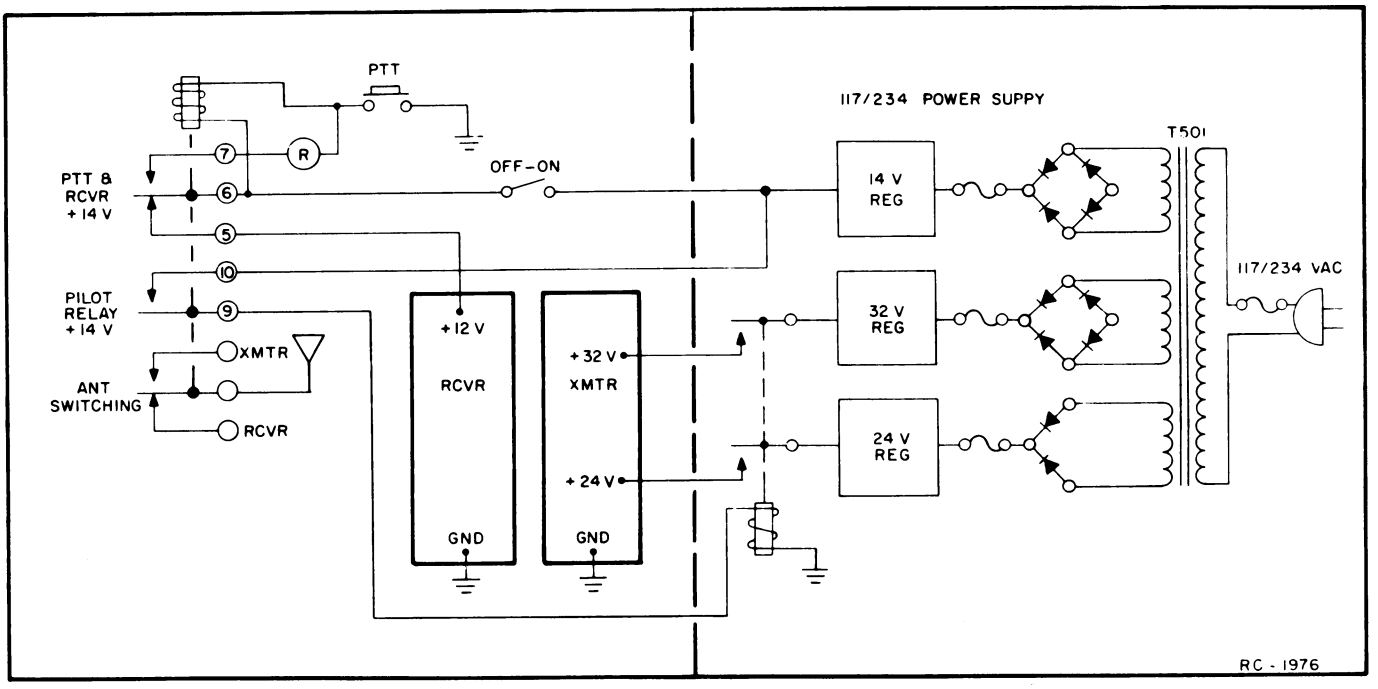


Figure 1 - Power Distribution and Switching Diagram

As the 24-volt and 32-volt regulators operate the same way, only the operation of the 32-volt regulator will be described.

Applying a voltage to the collector of Q501 and Q502 causes them to conduct. When the output voltage at the emitter of Q501 tries to increase, the voltage at the base of Q1 increases, and Q1 starts to conduct. When conducting, the collector voltage of Q1 becomes more negative, causing Q502 and Q501 to conduct less. This increases the voltage drop across Q501, keeping the output voltage constant.

If the output voltage starts to decrease, Q1 conducts less, causing Q502 and Q501 to conduct harder. This reduces the voltage drop across Q501, keeping the output voltage constant.

Keying the transmitter energizes pilot relay K501, applying the 24-volt and 32-volt supply to the transmitter. R3 and R7 are used to set the regulators for the proper output voltage with the transmitter keyed.

14-Volt Supply

The AC voltage developed across the Green-Green windings of T501 is rectified by full-wave bridge rectifier circuit CR507 through CR510. The rectifier output is filtered by L504 and C504. Fuse F503 protects the secondary of T501.

Applying a voltage to the collector of Q504 causes it to conduct. When the output voltage at the emitter of Q504 tries to increase, the voltage at the arm of R11 exceeds the breakdown voltage of zener diode VR3, causing Q4 to conduct. When conducting, the collector voltage of Q4 becomes more negative, causing Q504 to conduct less. This increases the voltage drop across Q504, keeping the output voltage constant.

When the output voltage starts to decrease, the voltage at the base of Q4 decreases. This keeps Q4 tuned off, causing Q504 to conduct harder. This reduces the voltage drop across Q504, keeping the output voltage constant.

The output is set for 14 volts by R11 with no load on the power supply.

MAINTENANCE

DISASSEMBLY

To gain access to the power supply for servicing:

1. Disconnect the power cable.
2. Remove the three Phillips-head screws in the top of the power supply and lift off the top can.
3. Remove the three Allen-head screws in the bottom of the power supply.
4. Carefully slide the power supply assembly out of the bottom casting.

SERVICING

Fuse Checks

When troubleshooting the power supply, the first things to check are the fuses. Disassemble the power supply as directed in the Disassembly Procedure. Check the fuses by placing the meter probes through the holes provided in the fuse insulator board.

234-Volt Connections

To make the 234-volt connections, disassemble the power supply as directed in the Disassembly Procedure. Next, remove the three Phillips-head screws in the fuse insulator board and remove the board. Then connect the transformer leads to tie-point E1 as directed on the Schematic Diagram.

ADJUSTMENT

A 20,000 ohm-per-volt meter is required for setting the regulator outputs.

32-Volt Supply

Connect the meter from J2 on the Regulator Board to ground. Then key the transmitter and adjust R3 for a meter reading of 32 volts.

24-Volt Supply

Connect the meter from J4 on the Regulator Board to ground. Then key the transmitter and adjust R7 for a meter reading of 24 volts.

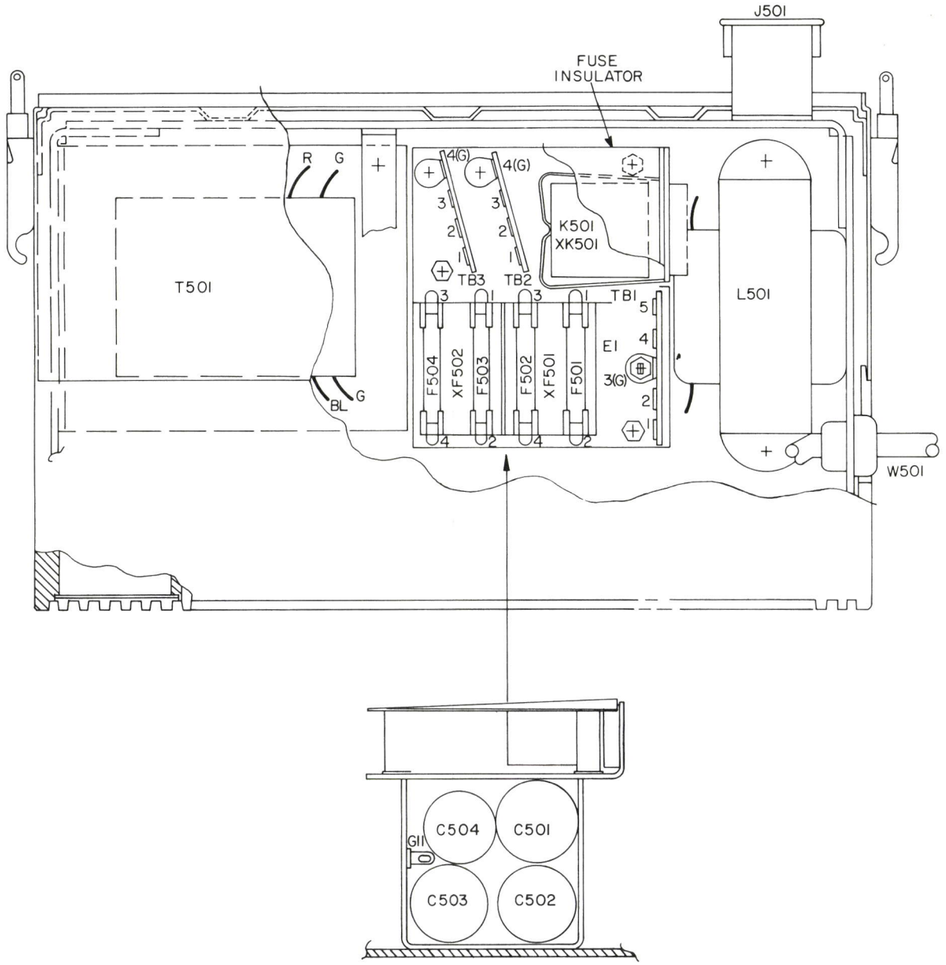
14-Volt Supply

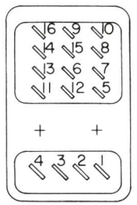
Disconnect the power supply from the transmitter-receiver section. Next, connect the meter from J6 on the Regulator Board to ground. Then adjust R11 for a meter reading of 14 volts.

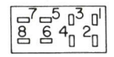
TROUBLESHOOTING PROCEDURE

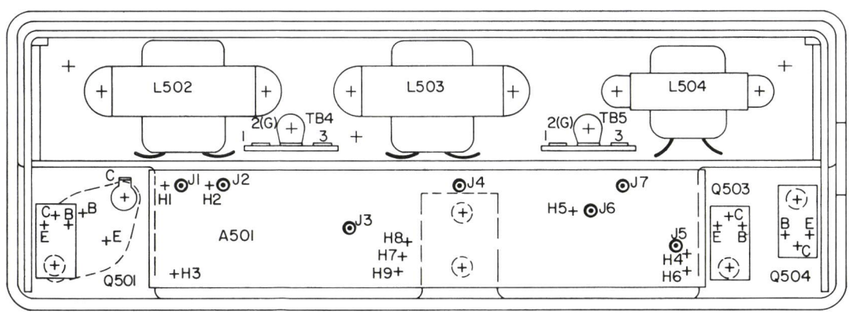
When troubleshooting the power supply, first check the fuses according to directions in the Servicing section (see Table of Contents).

SYMPTOM	CHECK FOR:
No 24-volt or 32-volt output	1. Input voltage to Regulator Board A501. 2. Collector-to-emitter open in Q501 and Q502. (32-V) or Q503 and Q2 (24-V). 3. Emitter-to-ground short in Q501 (32-V) or Q503 (24-V). 4. Shorted Q1 or VR1 (32-V) or Q3 and VR2 (24-V).
No 14-volt output	1. Input voltage to regulator circuit. 2. Collector-to-emitter open in Q504. 3. Emitter-to-ground short in Q504. 4. Shorted Q4 or VR3.
Output voltage too high	1. Proper setting of R3, R7 or R11. 2. Collector-to-emitter short in regulator transistors. 3. Open Q1, Q3, Q4, VR1, VR2 or VR3. 4. Defective R3, R7 or R11.
Regulation poor but output is adjustable	Defective transistor, Zener diode or potentiometer.

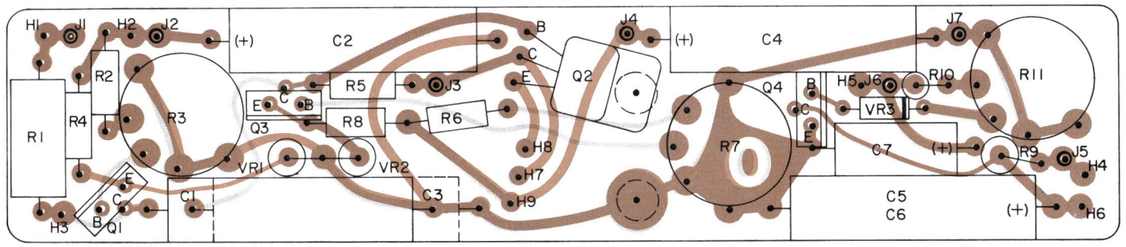








REGULATOR BOARD
A501



(19C317256, Sh. 1, Rev. 0)
(19C317256, Sh. 2, Rev. 0)

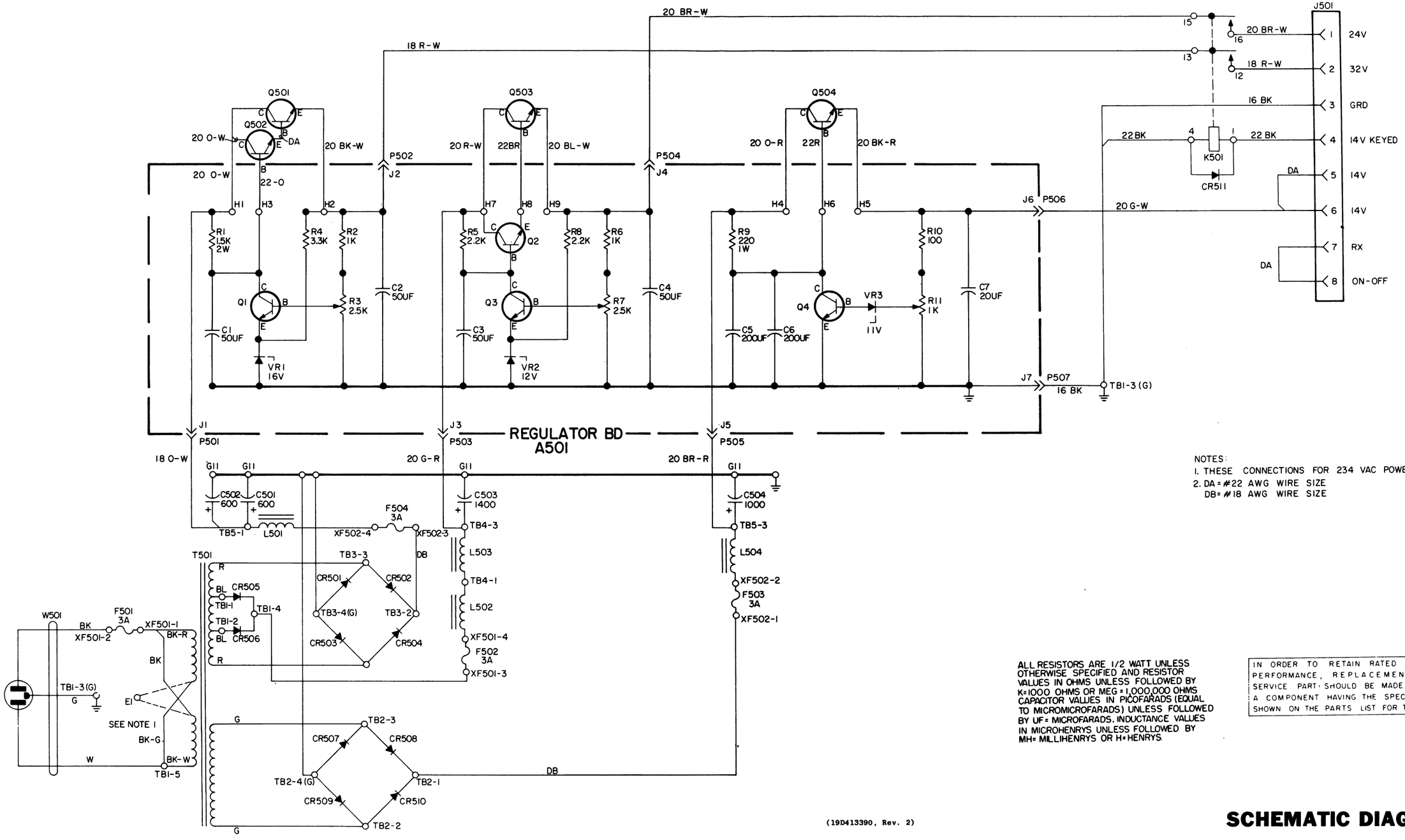
RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

OUTLINE DIAGRAM

(19D413687, Rev. 0)

PORTA.MOBIL POWER SUPPLY
MODEL 4EP66A10

4 Issue 1



NOTES:
1. THESE CONNECTIONS FOR 234 VAC POWER SUPPLY.
2. DA = #22 AWG WIRE SIZE
   DB = #18 AWG WIRE SIZE

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG = 1,000,000 OHMS CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF = MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH = MILLIHENRYS OR H = HENRYS.

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

(19D413390, Rev. 2)

SCHEMATIC DIAGRAM

PORTA.MOBIL POWER SUPPLY
MODEL 4EP66A10

PARTS LIST

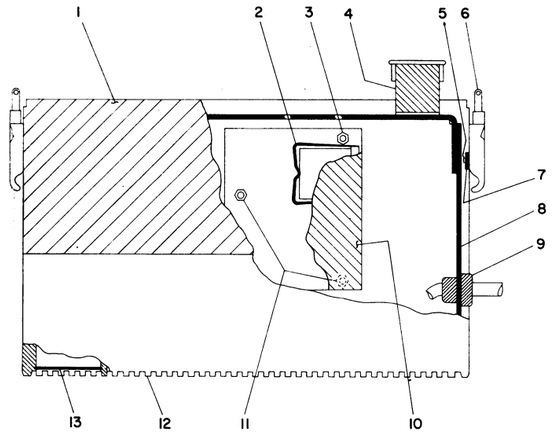
LBI-4111

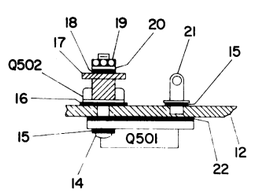
POWER SUPPLY 4EP66A10
117/234 VAC PORTA MOBIL

SYMBOL	GE PART NO.	DESCRIPTION
A501		REGULATOR BOARD 19C317258-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C4	19A115680-P6	Electrolytic: 50 µf +150% -10%, 50 VDCW; sim to Mallory Type TT.
C5 and C6	19A115680-P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT.
C7	19A115680-P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 thru J7	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q4	19A116118-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R79-P152K	Composition: 1500 ohms ±10%, 2 w.
R2	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R3	19A115681-P4	Variable, wirewound: 2500 ohms ±20%, 3 w; sim to CTS Series 115.
R4	3R77-P332K	Composition: 3300 ohms ±10%, 1/2 w.
R5	3R77-P222K	Composition: 2200 ohms ±10%, 1/2 w.
R6	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R7	19A115681-P4	Variable, wirewound: 2500 ohms ±20%, 3 w; sim to CTS Series 115.
R8	3R77-P222K	Composition: 2200 ohms ±10%, 1/2 w.
R9	3R78-P221K	Composition: 220 ohms ±10%, 1 w.
R10	3R77-P101K	Composition: 100 ohms ±10%, 1/2 w.
R11	19A115681-P1	Variable, wirewound: 1000 ohms ±20%, 3 w; sim to CTS Series 115.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
VR1	19A115528-P6	Silicon, Zener.
VR2	19A115528-P4	Silicon, Zener.
VR3	4036887-P8	Silicon, Zener.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C501 and C502	19A126770-P109	Electrolytic: 600 µf, 75 VDCW; sim to Sprague 34D.
C503	19A126770-P108	Electrolytic: 1400 µf, 50 VDCW; sim to Sprague 34D.
C504	19A126770-P107	Electrolytic: 1000 µf, 30 VDCW; sim to Sprague 34D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR501 thru CR504	19A115823-P1	Silicon.
CR505 thru CR511	4037822-P1	Silicon.

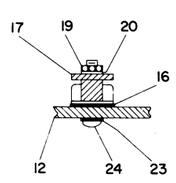
SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - FUSES - - - - - - - - - -
F501 thru F504	1R16-P6	Quick blowing: 3 amps at 250 v; sim to Littlefuse 312003 or Bussmann AGC-3.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J501	19A121226-P1	Connector, phen: 8 female contacts rated at 10 amps at 730 VRMS; sim to HB Jones261-32-08--000(Modified).
		- - - - - - - - - - RELAYS - - - - - - - - - -
K501	5491595-P26	Armature: 12 VDC nominal, 1.5 w operating, 185 ohms ±15% coil res, 4 form C contacts; sim to Allied ControlT154-X-260.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L501	19B209179-P1	Reactor: 10 ohms DC res max, 18 VDC operating.
L502 and L503	19B209345-P1	Reactor: 0.5 ohms DC res max, 15 VDC operating.
L504	5490936-P1	Reactor: .02 h min, 1.3 ohms ±10% DC res, 1.5 VDC operating.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P501 thru P507	4029840-P1	Contact, electrical: sim to AMP 41854.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q501	19A115774-P1	Silicon, NPN.
Q502 thru Q504	19A116118-P1	Silicon, NPN.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T501	19A116340-P1	Power, step down: Pri: 117 VRMS, 50/60 Hz (Parallel connected). 234 VRMS, 50/60 Hz (Series connected). Sec(Red): 33.5 VDC ±1 v at 1.5 amps. Sec(Blue): 26.5 VDC ±1 v at 0.5 amps. Sec(Green): 17.5 VDC ±0.6 v at 0.5 amps.
		- - - - - - - - TERMINAL BOARDS - - - - - - - -
TB1	7775500-P11	Phen: 5 terminals.
TB2 and TB3	7775500-P3	Phen: 4 terminals.
TB4 and TB5	7775500-P7	Phen: 3 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W501	19A122527-G2	Power: Approx 10 feet long.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XF501 and XF502	19A115164-P2	Fuseholder, phen: 30 amps max; sim to Littlefuse 350284.
XK501	5491595-P5	Relay: 10 contacts; sim to Allied Control 30054-1.
		MECHANICAL PARTS (SEE RC-1984)
1	19C317254-G1	Cover.
2	5491595-P9	Retainer: spring; sim to Allied Control 30040-1.
3	5491541-P205	Spacer, hex: 6-32 tap.
4	19A121181-G2	Support. (Used with J501).
5	19B200525-P181	Rivet, brass.
6	4029994-P2	Catch, pull down: chrome plated steel; sim to Nielsen SC-B-83314.

SYMBOL	GE PART NO.	DESCRIPTION
7	19A127618-P1	Plate. (Used with catch assembly).
8	19B216710-G1	Chassis.
9	7491987-P2	Strain relief: sim to Heyco SR-6P-1. (Used with W501).
10	19B216702-P1	Insulator board.
11	5491541-P204	Spacer, hex. 6-32 tap.
12	19D402428-P3	Casting.
13	19A121822-P1	Access plate. (Used with Q501-Q504).
14	N80P9016C13	Screw, panhead: 4-40 X 1.
15	4034968-P1	Insulator: sim to Delco 7269634. (Used with Q501 and solderless terminal).
16	19A116023-P1	Insulator, mica. (Used with Q2 and Q502-Q504).
17	19A127515-G1	Terminal board. (Used with Q502-Q504).
18	19A116022-P1	Insulator, nylon. (Used with Q2 and Q502).
19	7141225-P2	Nut, hex. 4-40.
20	N404P11C13	Lockwasher, NO 4.
21	4036835-P4	Terminal, solderless: NO 4; sim to Shakeproof 2177-04-000.
22	4029974-P1	Insulator, aluminum.
23	19A115222-P1	Insulator: sim to Nylomatic N5228. (Used with Q503 and Q504).
24	N80P9012C13	Screw, pan head. 4-40 X 3/4.
	19C317269-G1	Desk-Top Mounting Stand.





Q501 & Q502
(Q2 USES ITEMS 16 & 18)



Q503 & Q504

RC-1984

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and GE Part Number.

Service parts may be obtained from Authorized GE Communication Equipment Service Stations or through any GE Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. GE Part Number for component
2. Description of part
3. Model Number of equipment
4. Revision letter stamped on unit

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-4110

DF-0058

GENERAL ELECTRIC

MOBILE RADIO DEPARTMENT LYNCHBURG, VIRGINIA 24502 CABLE GECOMPROD

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