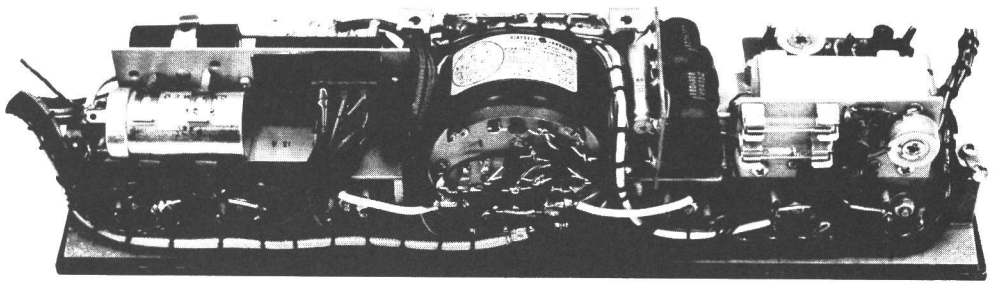
MOBILE RADIO

MASTR Progress Line

6/12-VOLT, 30-WATT POWER SUPPLY MODEL 4EP37C10

DF-0051



EP-37-C

SPECIFICATIONS *

Type Number — **EP-37-C**

Input	Voltage	Current
Vehicle Electrical System	6 Volts	35 amps max
Vehicle Electrical System	12 Volts	13 amps max

Output	Voltage 6 Volts	Voltage 12 Volts	Current 6 Volts	Current 12 Volts
Regulated-Receiver	10 Volts	10 Volts	70 mA	70 mA
Regulated-Transmitter				
25-88 MHz	-20 Volts	-20 Volts	45 mA	45 mA
132-174 MHz	-20 Volts	-20 Volts	70 mA	70 mA
406-420 MHz; 450-470 MHz	-20 Volts	-20 Volts	70 mA	70 mA
Bias				
25-88 MHz; 132-174 MHz	-45 Volts	-45 Volts	0 mA	0 mA
406-420 MHz; 450-470 MHz	-45 Volts	-45 Volts	5 mA	5 mA
Low B-Plus				
25-88 MHz	297 Volts	310 Volts	30 mA	30 mA
132-174 MHz	295 Volts	300 Volts	40 mA	40 mA
406-420 MHz; 450-470 MHz	255 Volts	290 Volts	80 mA	100 mA
High B-Plus				
25-88 MHz	445 Volts	455 Volts	150 mA	150 mA
132-174 MHz	440 Volts	450 Volts	160 mA	160 mA
406-420 MHz; 450-470 MHz	380 Volts	430 Volts	180 mA	200 mA
12-Volt Supply				
25-88 MHz; 132-174 MHz	14.4 Volts	----	1.65 amps	---
406-420 MHz; 450-470 MHz	13.2 Volts	----	2.5 amps	---
Receiver				
Standby-Squelched	----	----	2 amps	.05 amp
Standby-Unsquelched	----	----	3.5 amps	.7 amp
ON-Squelched				
25-88 MHz; 132-174 MHz	----	----	4.5 amps	.9 amp
406-420 MHz; 450-470 MHz	----	----	6.7 amps	2.1 amps
ON-Unsquelched				
25-88 MHz; 132-174 MHz	----	----	6 amps	1.55 amps
406-420 MHz; 450-470 MHz	----	----	8.2 amps	2.75 amps
Transmit				
25-88 MHz	----	----	22 amps	9 amps
132-174 MHz	----	----	23 amps	10.5 amps
406-420 MHz; 450-470 MHz	----	----	31 amps	14 amps

Transistors	
Multivibrator Circuit	6
10-Volt Regulator Circuit	2
-20 Volt Regulator Circuit	2
Rectifiers	11
Zener Diodes	2
Duty Cycle	Transmit: 20% (one minute transmit, four minutes off)
Ambient Temperature Range	-30°C (-22°F) to +60°C (+140°F)

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

GENERAL ELECTRIC

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ILLUSTRATIONS

WARNING

No one should 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 4EP37C10 is used with 30-watt, 6 or 12 volt MASTR mobile combinations.

When operated from a 12-volt vehicle electrical system, the power supply provides:

- Multiplier and power amplifier B-plus
- Bias voltages

When operated from 6 volt vehicle electrical system, voltages are provided for the following:

- Multiplier and power amplifier B-plus
- Bias voltages
- 12 volt DC for:
  Keying relay, Transmitter filaments, Receiver, Dial lamps

The fully transistorized power supply uses highly efficient silicon rectifiers for reliable operation. The use of Mylar® capacitors provide additional reliability with good performance at low temperatures. Regulation of critical transmitter and receiver supply voltages provides improved operation over the wide range of input voltages encountered in mobile communications.

CIRCUIT ANALYSIS

The power supply may be used in vehicles having either positive or negative ground systems. The proper power cables are connected for the proper polarity and vehicle battery voltage when the Two-Way Radio is installed.

NOTE

Plug P503 must be plugged into the left side of jack J503 (labeled "6 V") for 6 volt systems and into the right side of J503 (labeled "12 V") for 12 volt systems.

All connections to the transmitter, receiver and power cables are made through two plug connectors. Four clip-on connectors are used for connecting the power supply to the push-to-talk relay on the system frame. Figures 1 and 2 are simplified power distribution and switching diagrams for 6-volt systems and 12-volt systems respectively.

12-VOLT MULTIVIBRATOR

Q501, Q502 and the primary of T501 operate as an inductively coupled multivibrator to produce the proper T501 secondary AC voltage for the bias and B-plus power supplies.

Keying the transmitter closes the relay contacts and applies power to transistors Q501 and Q502. The bases of the transistors are negatively biased (with respect to their emitters) through resistor R504 to start conduction. Due to inherently different characteristics, one transistor will conduct slightly more than the other.

Assuming that Q501 will initially conduct more than Q502, Q501 will draw more current through winding 1-2/3 of T501 than Q502 will draw through winding 2/3-4, making terminal 1 more positive than terminal 4.

The increasing magnetic field in the core of T502 induces a voltage in windings 5-6-7, causing terminal 7 to become negative with respect to the emitter of Q501. This increased bias causes Q501 to conduct even harder. At the same time, terminal 5 becomes positive with respect to the emitter Q502, stopping current flow through Q502 and winding 2/3-4. Current through winding 1-2/3 rapidly saturates the core of the transformer, and the magnetic field ceases to increase.

The voltage induced at terminal 5 falls to zero, reducing the bias to Q501 to that obtained through R504. The reduced bias tends to cut off Q501 and reduces the current through winding 1-2/3.

The collapsing magnetic field in T502 reverses the voltage across winding 5-6-7. This biases Q501 off and turns Q502 on. Q502 now conducts in a similar manner until T501 is again saturated.

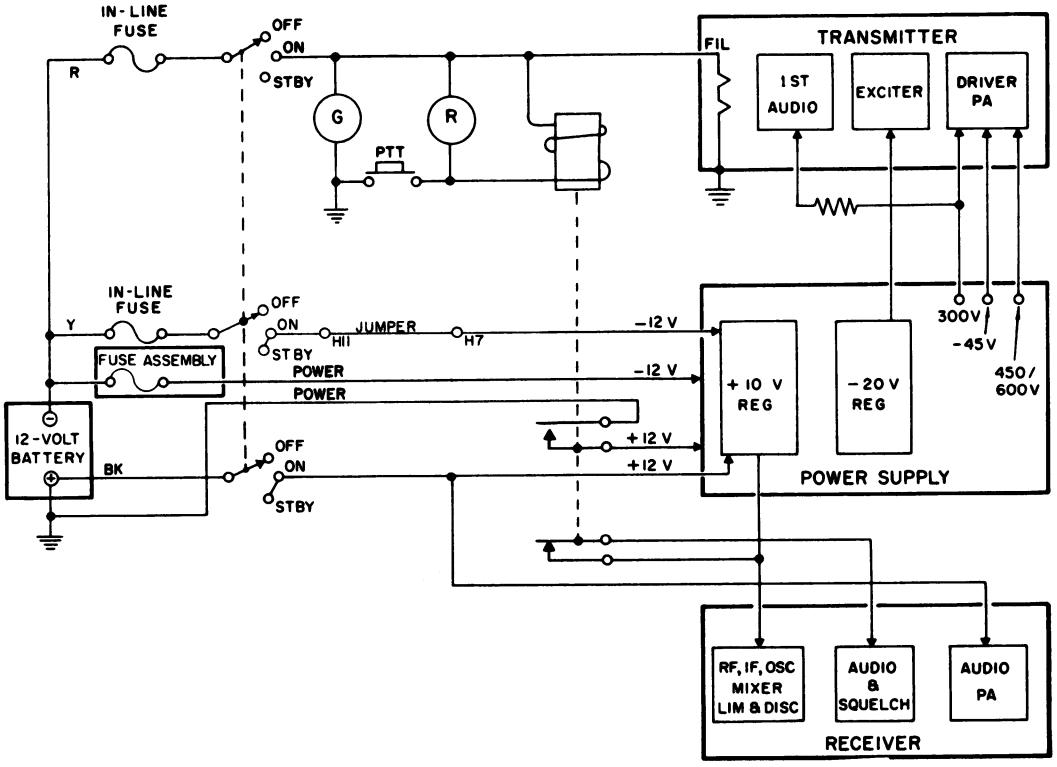
Resistor R502 limits the base current which can flow through Q501 and Q502.

The two transistors continue to conduct alternately at a frequency of approximately 1330 hertz with the resulting waveform approaching that of a perfect square wave.

R502 and R504 form a voltage divider to provide bias for the conduction of Q501 and Q502.

During the 12-volt operation, T502, Q503, Q504, Q505, Q506 are inoperative.

12 VOLT POSITIVE GROUND



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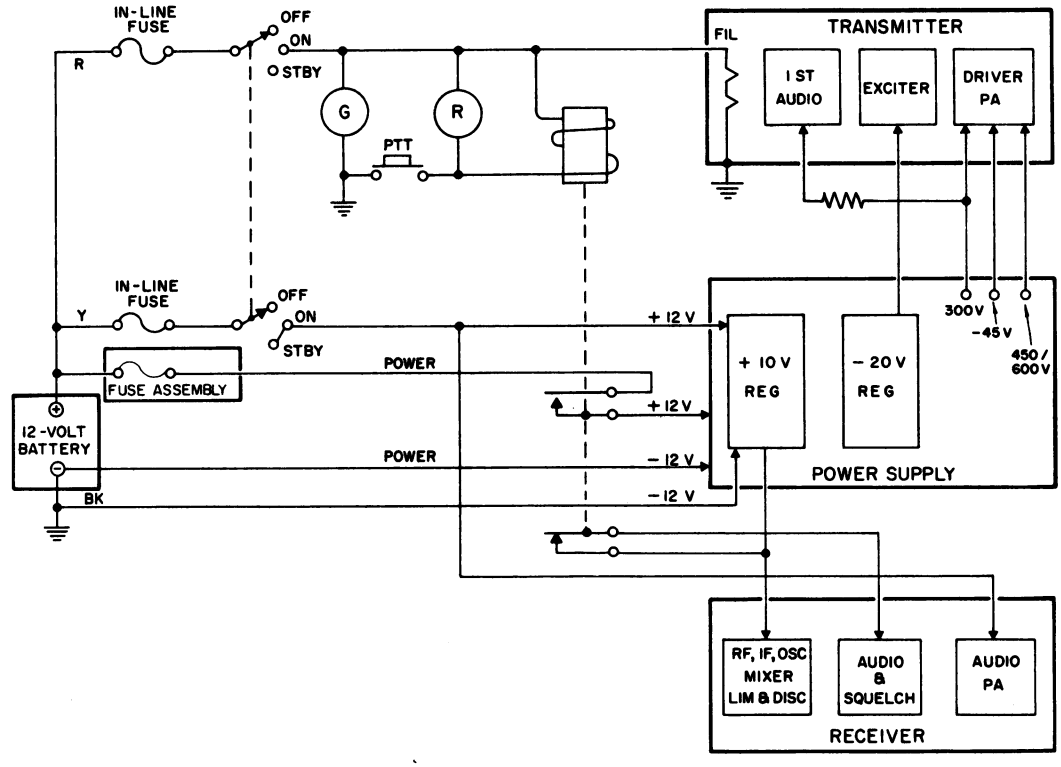
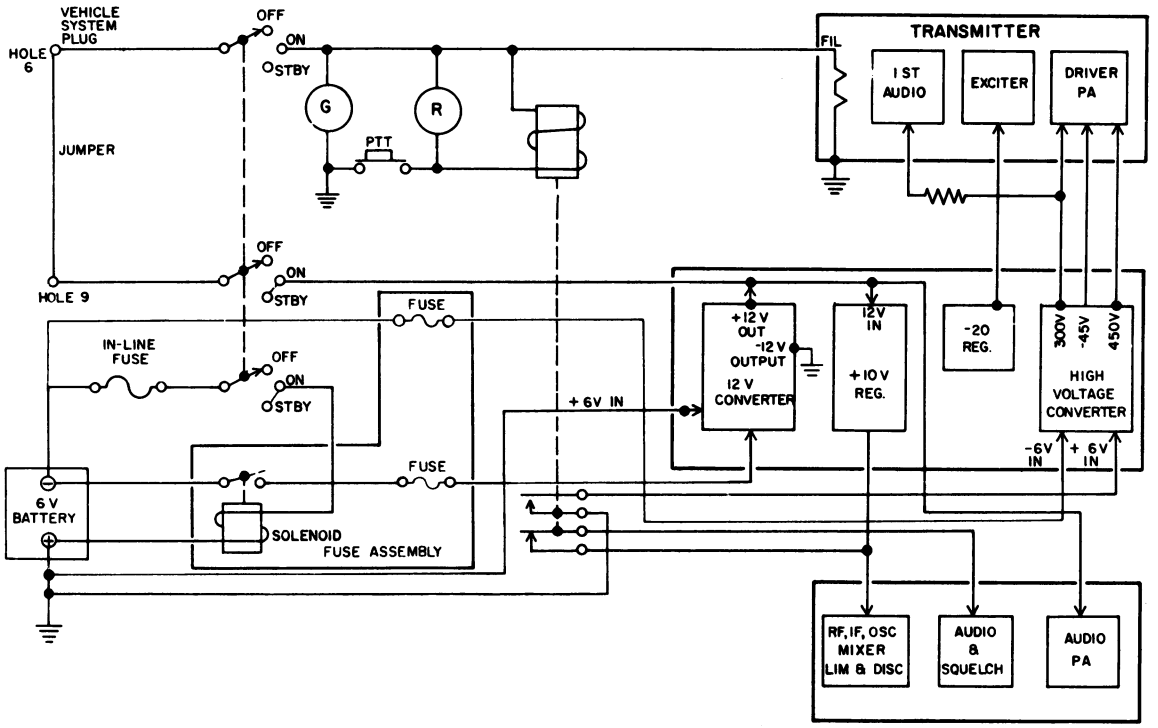
12 VOLT NEGATIVE GROUND



RC-1168A

Figure 1 - 12 Volt Power Distribution Diagrams

6-VOLT POSITIVE GROUND



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6-VOLT NEGATIVE GROUND

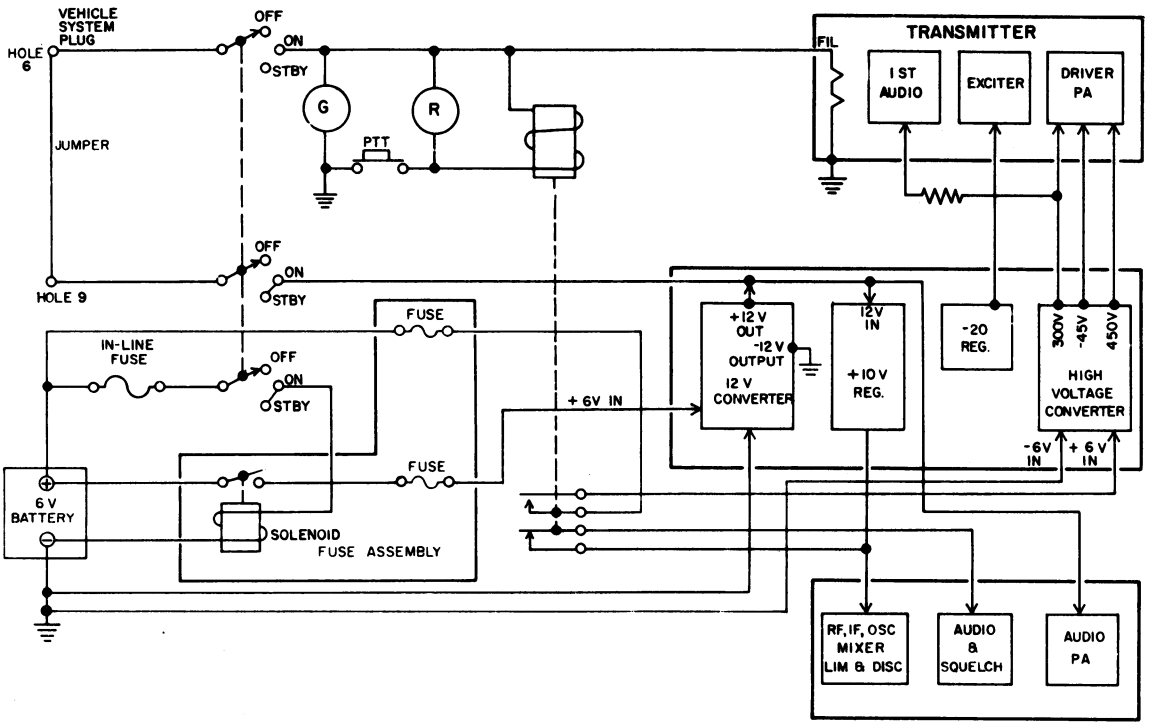

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Figure 2 - 6 Volt Power Distribution Diagrams

The 12-volt input for the 10-volt Regulator Supply is furnished by the 12-volt vehicle electrical system.

6-VOLT MULTIVIBRATOR

Q505 and Q506 and the primary of T502 operate as an inductively coupled multivibrator to produce a 12 VAC from the secondary output of T502 for the 12-volt power supply circuit.

When plug P503 is connected to the 6-volt portion of J503, the OFF-ON-STBY switch on the Control Unit to the ON or STBY position activates the system relay. This applies power to the primary circuit of T502, Q505 and Q506.

Transistors Q505 and Q506 with T502 operate in an inductively coupled multivibrator circuit conducting alternately at an approximate frequency of 1700 hertz. R503, R504 and R505 form a voltage divider to supply starting bias to Q505 and Q506.

The output of winding 14-15-16 is rectified by CR509 and CR510 and is filtered by C507, L503 and C508 to provide 12 volts DC for all functions requiring 12 VDC. Q501, Q502, Q503, Q504 and T501 now function as a power amplifier with driving power being supplied from windings 4-5-6 and 10-11-12 of T502. When the keying relay is closed, +6 volts is applied to the emitters of Q501 through Q504 and also completes the base drive circuit to T502. Winding 5-6-7 of T501 is not used. T501 does not saturate. The collectors of Q501 through Q504 are connected to taps 22 and 23 of T501 so that the output voltage of T501 is the same as is produced when operating from 12 volts DC.

RECTIFIER AND FILTER CIRCUITS

Negative Bias Supply (Figure 3) - The AC voltage developed across secondary windings 12-8-14 of transformer T501 is rectified by fullwave rectifiers CR501 and CR502 and is filtered by C501, L502 and C502. The negative 45 volts is the bias voltage for the control grids of the transmitter driver and power amplifier and also supplies 45 volts input to the -20 volt Regulator Supply. The bias voltage is present as a protective measure to limit cathode current in the PA tube while the PA is untuned, or in case of loss of drive to the PA. Fuse F501 is used to protect T501 and the multivibrator transistors if a short or overload should occur in the bias output.

Transmitter Low Voltage B-Plus (300 V) (Figure 4) - The AC voltage for the 300-volt supply is developed across the high voltage secondary winding of T501 by using a full-wave tapped bridge rectifier circuit.

During one-half of each AC cycle, the voltage across terminals 17 and 18 of the high voltage output winding is rectified by CR503 and CR507. During the second half of the cycle, the voltage across terminals 15 and 21 is rectified by CR504 and CR506. Filtering is provided by filter capacitors C503 and C504 and filter choke L501.

Power Amplifier B-Plus (450 V) (Figure 5) - The full-wave rectifier bridge composed of CR505, CR506, CR507 and CR508 rectifies the voltage present across the high voltage winding of T501.

The voltage developed across winding terminals 15 and 17 during one-half of each AC cycle is rectified by CR505 and CR507. During the second half cycle, the voltage is rectified by CR506 and CR508. The output is filtered by C505. R511 and R512 are bleeder resistors to discharge C505 when the keying relay is opened.

Fuse F502 provides protection for T501 and the multivibrator transistors if a short or overload should occur in the B-plus output.

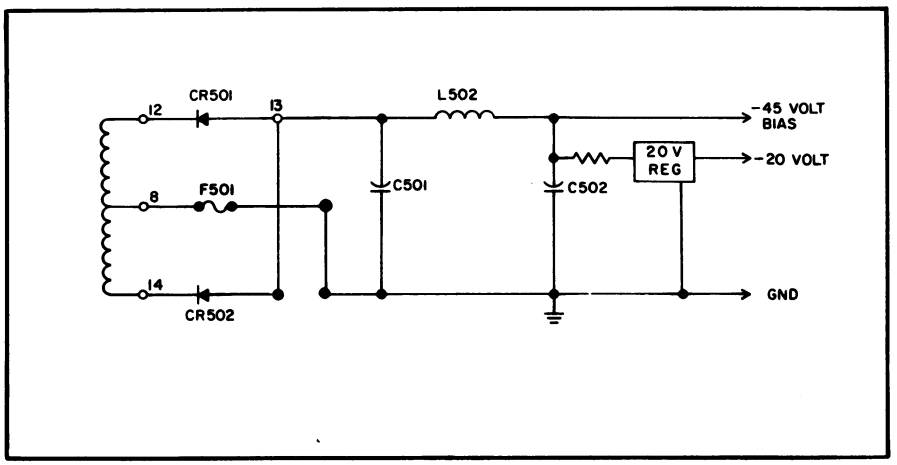


Figure 3 - Negative Bias Supply

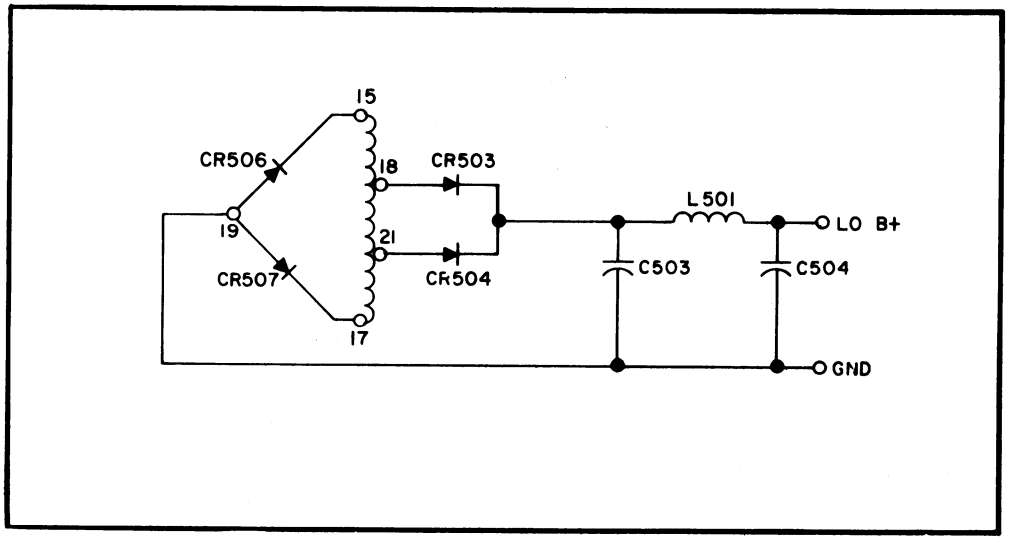


Figure 4 - Low Voltage B-Plus Circuit

12-Volt Supply (Figure 6) (Used with 6-volt electrical system) - The AC voltage developed across T502 secondary windings 14 and 16 is rectified by CR509 and CR510. Output filtering is provided by C507, L503 and C508. The 12-volt output is supplied to the 10-Volt Regulator and to P505-6 for distribution to the transmitter and receiver.

The leads can be moved from T502-14 and -16 to TB502-13 and -17 respectively to provide an increase of one volt in the output. This change should be made only when the supply is used with a 450 MHz transmitter in a vehicle where the battery voltage is consistently below nominal.

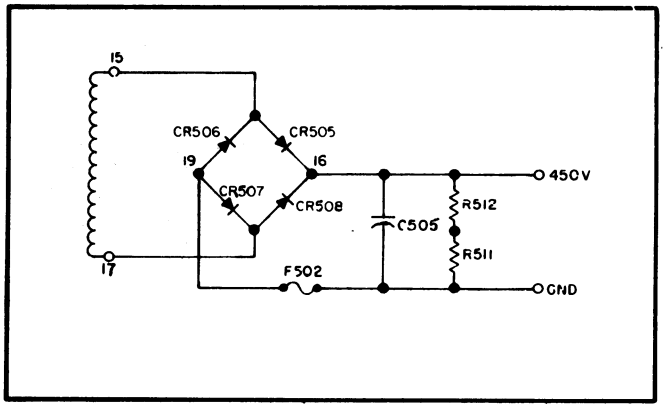


Figure 5 - Amplifier B-Plus Circuit

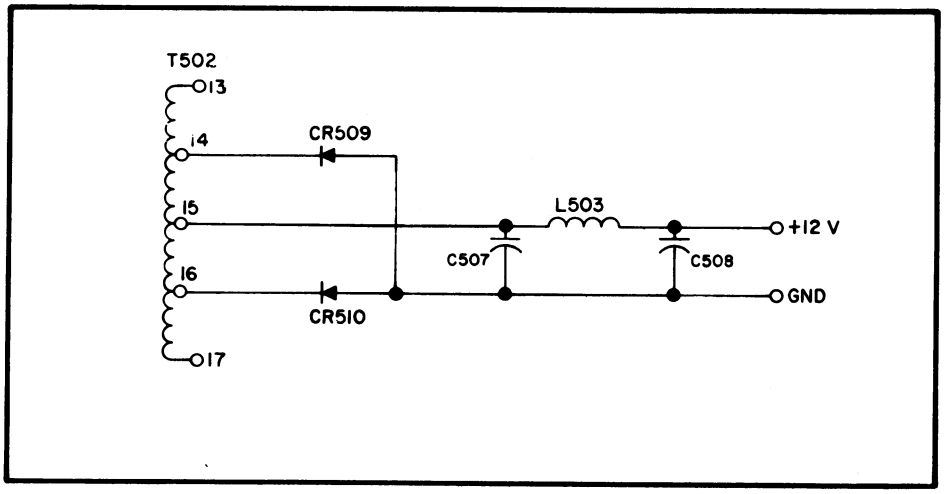


Figure 6 - 12-Volt Supply Circuit

-20 VOLT REGULATOR (FIGURE 7)

The -20 Volt Regulator provides a closely controlled supply voltage for the transistorized exciter section of the transmitter. Input power is taken from the -45 volt bias output at TB3-31. Dropping resistor R514 provides the negative bias to turn on Q507. Zener® diode VR501 provides a voltage reference for the regulator, Q509. R524 limits maximum current through Q507 and reduces the power dissipated in Q507.

When the input voltage at TB-31 rises, the output voltage at the emitter of Q507 also tends to rise. This increases the base-emitter bias on Q509, making it conduct more heavily. When Q509 conducts, there is less base bias on Q507, and less base current. With less current, the voltage drop across Q507 is larger; and the output voltage remains constant.

When the input voltage starts to drop, the output voltage also tends to drop; and Q509 will conduct less. This increases the forward bias on Q507 and reduces the voltage drop across the transistor so that the output voltage remains constant.

Capacitor C510 prevents high frequency oscillation.

R513, R516 and R517 form an adjustable voltage divider so that potentiometer R516 can be adjusted for a -20 volt output reading. R515 provides bias current for VR501. The output is metered at the transmitter centralized metering jack J102-12.

10-VOLT REGULATOR (A501)

The 10 Volt Regulator Circuit provides a closely controlled supply voltage for the receiver (except for the audio amplifier), and a supply voltage for the transmitter Channel Guard option, when present.

The 12-volt power supply provides the regulator input for 28-volt vehicle electrical systems. For 12-volt vehicle electrical systems, the regulator input is supplied from the vehicle electrical system battery.

When the supply voltage (or output) starts to increase, the voltage at the base of Q5 also increases. As the emitter voltage of Q5 is kept constant by VR4, the emitter-base voltage increases. This causes Q5 to conduct more which means less base current for Q508. The voltage drop across Q508 becomes larger and the output remains constant.

When the input voltage starts to drop, the output voltage also tends to drop and Q5 will conduct less. This increases the forward bias on Q508 and reduces the voltage drop across Q508 to keep the output constant.

Diode CR2 gives reverse polarity protection to the supply. Potentiometer R11 is used to set the emitter-base voltage of Q5 for the desired 10-volt ±5% output. R8 and R10 limit maximum current through Q5. R9 provides bias current for zener diode VR4, and lamp DS1 provides bias for Q508.

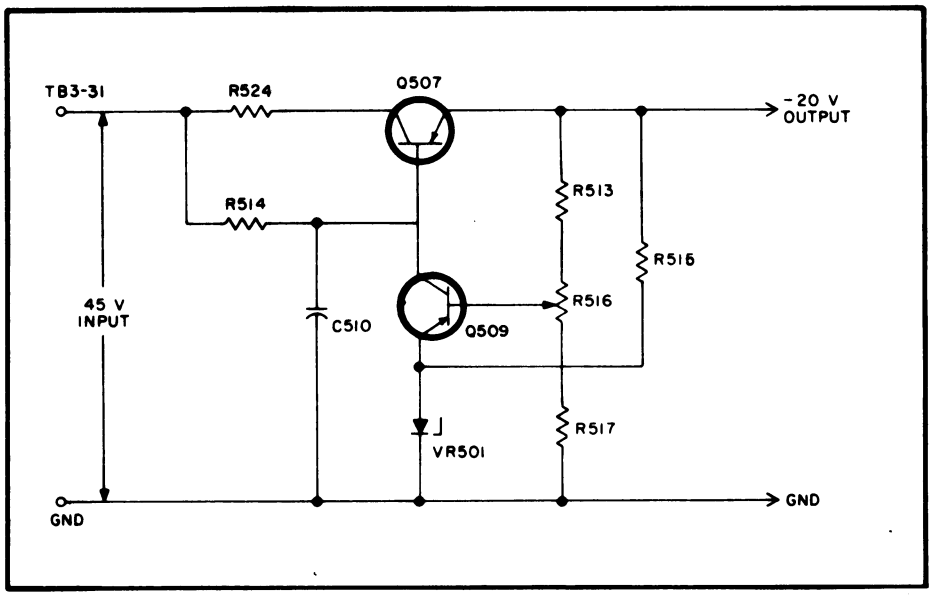


Figure 7 - -20 Volt Regulator Circuit

C4 and C5 prevent high frequency oscillation. The output voltage is metered at P505-7 and -13.

MAINTENANCE

HEAT SINK SERVICING

Since the metal envelopes of the transistors are at collector potential, they must be electrically isolated from ground. However, there must be a good path for heat from the transistors to reach the cast aluminum radiator (heat sink) in which they are mounted, so that the heat will be dissipated by the heat sink. The anodized aluminum spacers used between the transistors and their mounting plate not only isolate the transistors electrically, but also provide a good conductor to conduct heat away from them.

Silicone grease is used between the metal parts in the heat sink to improve contact between them and allow the heat to be transferred more readily.

NOTE

Whenever the transistor mounting plate is removed from the heat sink, be sure that there is sufficient silicone grease on the plate to make good contact with the heat sink before it is replaced. There should also be a coating of grease beneath the transistors and beneath the anodized aluminum spacers.

REINSTALLATION

If the mobile combination is ever moved to a different vehicle, be sure to check the battery polarity of the new system and, if necessary, change the power cable connections to the fuse assembly as well as the ignition switch cable connections to maintain correct polarity.

DISASSEMBLY

To service the power supply —

1. Pull the locking handle down and pull radio out of mounting frame.
2. Remove the two screws in bottom cover and take off cover.

To remove the power supply from the system frame —

1. Complete Steps 1 and 2 above.
2. Remove the two Phillips-head retaining screws in the front casting, and pull casting away from system frame.
3. Pry power connector out of connector supporting bracket. Next, unplug the four clip-on connectors to the system relay, and unplug systems connector at the back of the power supply.
4. Lift the Two-Way Radio away from power supply.

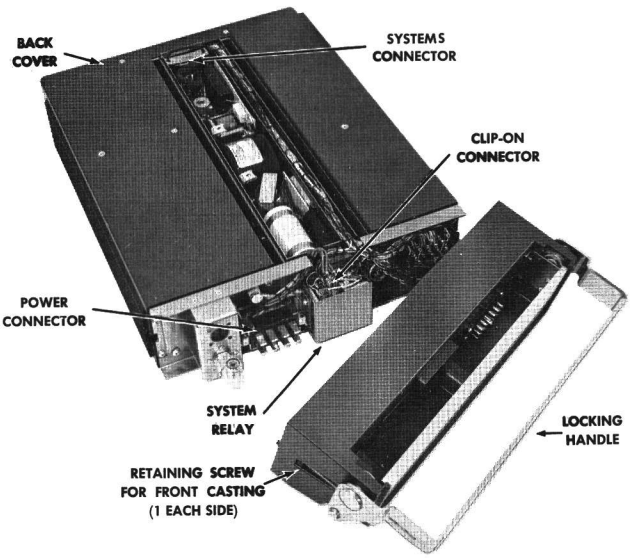


Figure 8 - Disassembly of Power Supply

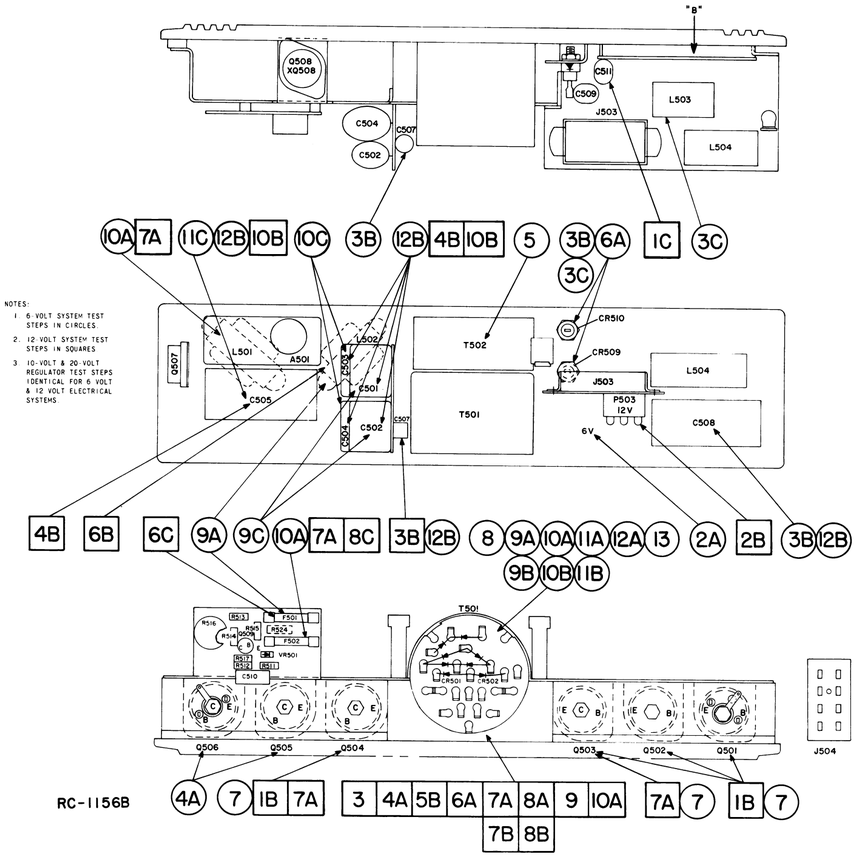
STEP 1 - QUICK CHECKS

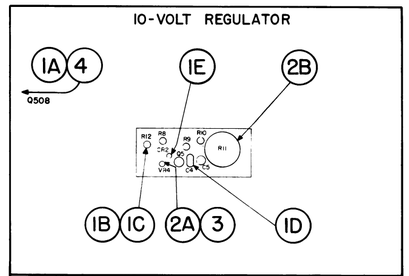
6-VOLT ELECTRICAL SYSTEM

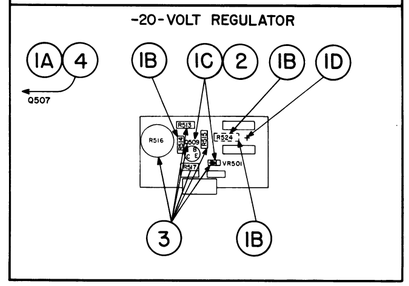
SYMPTOM	PROCEDURE
Receiver/Transmitter inoperative, no 12 volts at P505-6 to ground	Check for 6 volts at J504-1-7. If O.K., go to Step 2; otherwise check:
	1. A. Open fuse in system cable. B. Fuse assembly for open circuit. C. Relay on fuse assembly should close when ON-OFF switch is turned to ON/STANDBY. With 6 volts at J504-1-7, check the following steps:
	2. P503 must be in 6-volt position on J503.
	3. A. P505-6 (12V) shorted to ground. B. Shorted C507, C508, CR510, CR509. C. Open L503, CR509, CR510.
	4. A. Check Q505, Q506. B. Open R503, R504, R505.
	5. T502 shorted or open. Check T502 for shorted winding turns by applying a 1/2-volt P-P from an audio generator to the primary winding. Then check output of each secondary winding with a scope. No output indicates shorted turns.
12-volt output low	6. A. Open CR509, CR510. B. Overload in output.
No bias and B-plus voltages at P505-1-2-3-9	7. Check Q501 through Q504, R501, R502 open.
	8. T501 shorted or open. Check T501 for shorted winding turns by applying a 1/2-volt P-P from an audio generator to the primary winding. Then check output of each secondary winding with a scope. No output indicates shorted turns.
No -45 volts at P505-2	9. A. Open CR501, CR502, F501, L502. B. Open bias winding. C. Shorted C501, C502.
No 300 volts at P505-1	10. A. Open L501, CR503, CR504, F502, CR506, CR507. B. Open T501 high voltage secondary. C. Shorted C503, C504.
No 450 volts at P505-9	11. A. Open CR505 through CR508 (two or more). C. Shorted C505.
Excessive output ripple voltages	12. A. Open diodes. B. Open C501, C502, C503, C504, C505, C508, C507.
Reverse or high output voltage on bias output	13. Check for short between bias output winding and B+ output winding of T501.
	10 VOLT REGULATOR
No 10 volts regulated at P505-7	1. Check for the following: A. Open Q508. B. 12 volts input to emitters of Q1 and Q4. C. Open R12. D. Shorted C4. E. Open CR2. F. Open fuse in vehicle system.
Output voltage too high, cannot be adjusted by R11	2. A. Check for open VR4. B. Defective R11.
Very low output voltage	3. Check for a shorted VR4.
Output voltage equals input voltage	4. Shorted Q508.
	-20 VOLT REGULATOR
No -20 volts regulated at P505-3	1. Check for the following: A. Open Q507. B. Open R514 or R524. C. Shorted Q509 and/or VR501. D. -45 volts at TB3-36.
Very low output voltage	2. Shorted Q509 or VR501.
Output voltage too high, cannot be adjusted by R516	3. Open VR501, Q509, R513, R515, R516, R517.
Output voltage equals input voltage	4. Shorted Q507.

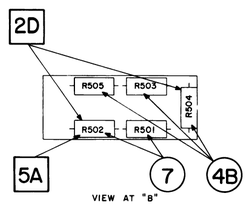
12-VOLT ELECTRICAL SYSTEM

SYMPTOM	PROCEDURE
No power supply output voltages at P505 when unit is keyed	Check for 12 volts at J504-3-7. If O.K., go to Step 2; otherwise check:
	1. A. Check fuse assembly for open circuit. If fuse is open, check: B. Transistor collector-to-emitter shorts in Q503, Q504, Q501, Q502. C. If Q501 or Q502 is shorted, check C511 for a short. D. Primary wiring shorts to chassis. With 12 volts at J504-3-7, check the following steps:
	2. A. Open fuse in system cable. B. P503 is in 12-volt position on J503. C. Keying relay in system should close when PTT switch is depressed. D. Check for open R504, R502.
	3. T501 shorted or open, check for T501 shorted winding turns by applying a 1/2-volt P-P from an audio signal generator to the primary winding of the transformer. Then check output of each secondary winding with a scope. No output indicates shorted turns.
	4. Check P505-1-2-3-9 for shorts to chassis ground. If shorts are found, check for: A. Shorted rectifier diodes. B. Shorted filter capacitors C501, C502, C503, C504, C505.
Output voltages low	5. A. Open R502. B. Open diodes.
No -45 volts at P505-2	6. A. Open diodes CR501, CR502. B. L502 open. C. Open fuse F501.
No 300 volts at P505-1	7. A. Open L501. Open CR503 and CR504. Open F502. Open CR506, CR507. B. Open T501 high voltage secondary.
No 450 volts at P505-9	8. A. Open diodes CR505 through CR508 (two or more). B. Open T501 high voltage secondary. C. Open fuse F502.
Reverse or high output voltage on bias output	9. Check for short between bias output winding and B+ output winding of transformer.
Excessive output ripple voltages	10. A. Open diodes. B. Open capacitors C501, C502, C503, C504, C505.
	10 VOLT REGULATOR
No 10 volts regulated at P505-7	1. Check for the following: A. Open Q508. B. 12 volts input to emitters of Q1 and Q4. C. Open DS1. D. Shorted C4. E. Open CR2. F. Open fuse in vehicle system.
Output voltage too high, cannot be adjusted by R11	2. A. Check for open VR4. B. Defective R11.
Very low output voltage	3. A. Check for open VR4.
Output voltage equals input voltage	4. Shorted Q508.
	-20 VOLT REGULATOR
No -20 volts regulated at P505-3	1. Check for the following: A. Open Q507. B. Open R514, R524. C. Shorted Q509 and/or VR501. D. -45 volts at TB3-36.
Very low output voltage	2. Shorted Q509 or VR501.
Output voltage too high, cannot be adjusted by R516	3. Open VR501, Q509, R513, R515, R516, R517.
Output voltage equals input voltage	4. Shorted Q507.



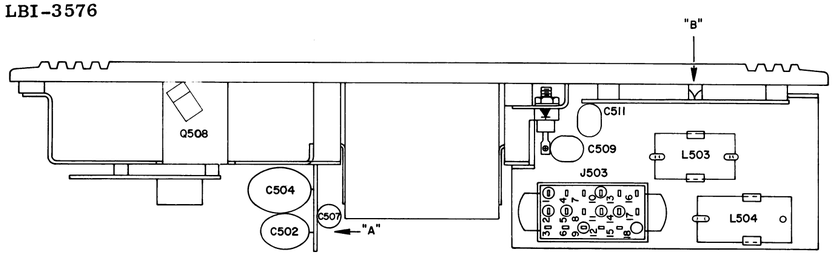


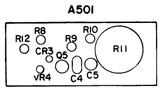


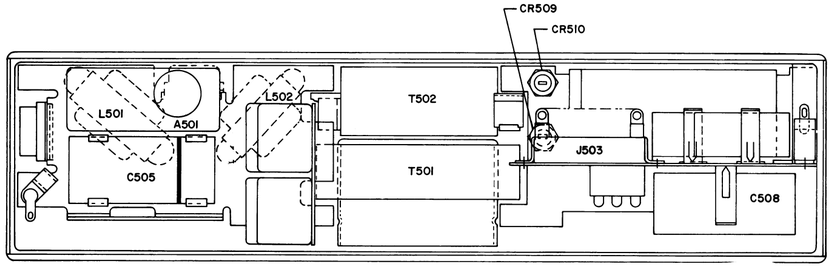


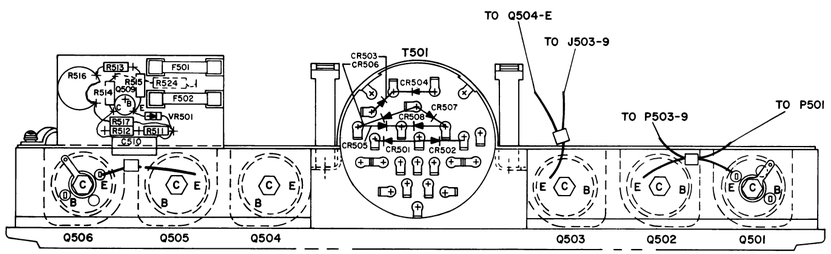
TROUBLESHOOTING PROCEDURE

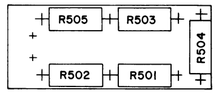
6/12-VOLT, 30-WATT MASTR POWER SUPPLY
MODEL 4EP37C10



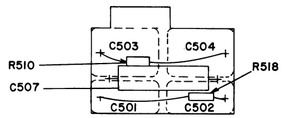




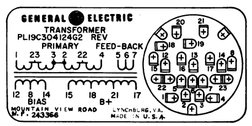


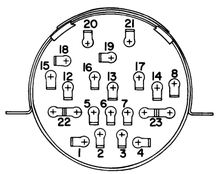


VIEW AT "B"



VIEW AT "A"

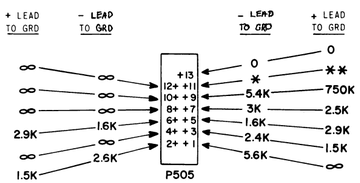




T501

RESISTANCE READINGS

ALL RESISTANCE READINGS ARE TYPICAL READINGS
TAKEN WITH A 20,000 OHMS-PER-VOLT METER TO CHASSIS GROUND



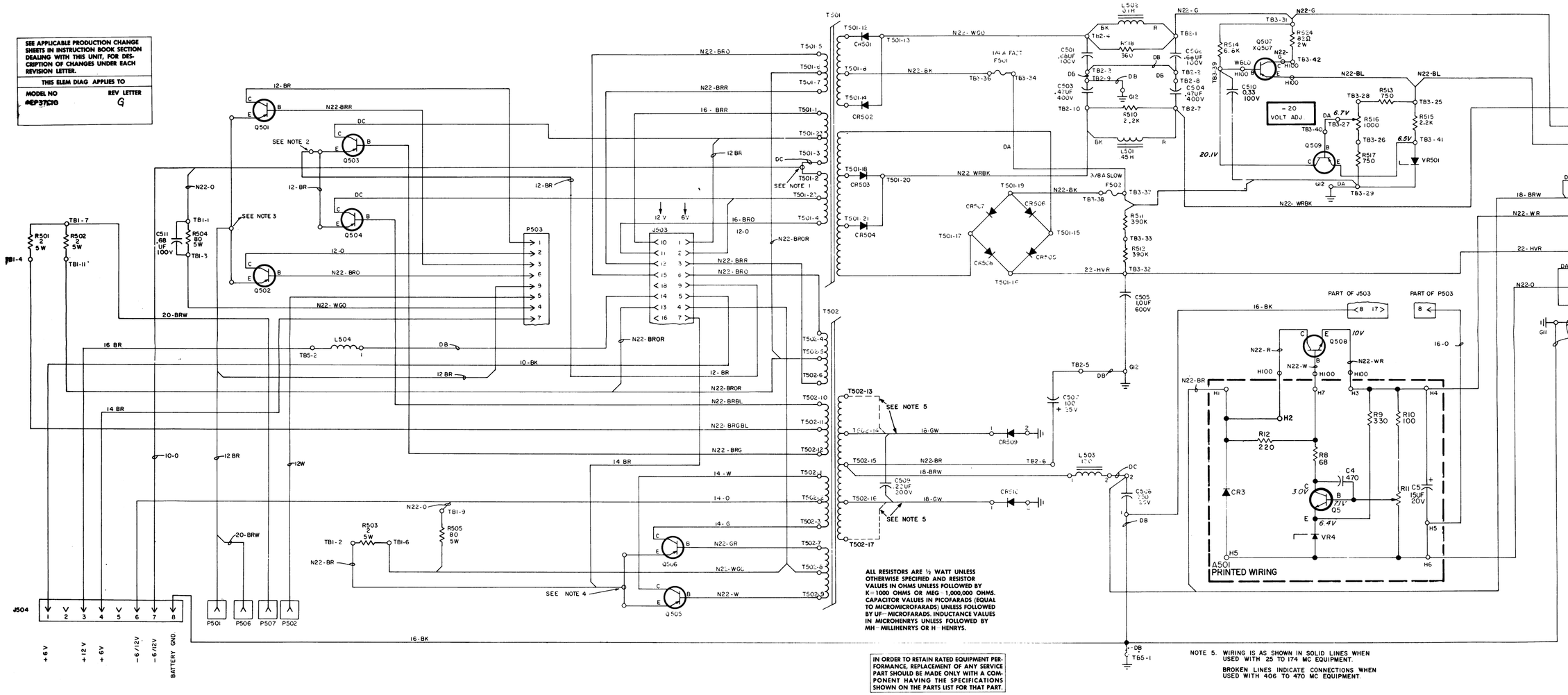
* 0 WITH P503 IN 6V POSITION
6K WITH P503 IN 12V POSITION

** 200K WITH P503 IN 12V POSITION
0 WITH P503 IN 6V POSITION

(19D402587, Rev. 5)

OUTLINE DIAGRAM

6/12-VOLT, 30-WATT MASTR POWER SUPPLY
MODEL 4EP37C10



(19R620704, Rev. 12)

SCHEMATIC DIAGRAM

6/12-VOLT, 30-WATT MASTR POWER SUPPLY
MODEL 4EP37C10

PARTS LIST

LBI-3577E

6/12 VOLT, 30 WATT POWER SUPPLY
MODEL 4EP37C10
(19D402321G1)

SYMBOL	GE PART NO.	DESCRIPTION
A501 *		10-VOLT REGULATOR COMPONENT BOARD ASSEMBLY 19C303420G6 (Added by REV C)
		- - - - - - - - - - CAPACITORS - - - - - - - -
C4	7774750P1	Ceramic disc: .00047 µf +100% -0%, 500 VDCW.
C5	5496267P14	Tantalum, 15 µf, ±20%, 20 VDCW; sim to Sprague Type 150D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR2*	19A115250P1	Silicon. Deleted by REV E.
CR3*	4037822P1	Silicon. Added by REV E.
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1*	4034664P1	Lamp, incandescent: 28 v; sim to GE2148. Deleted by REV G.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q5	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R8*	3R77P680K	Composition: 68 ohms ±10%, 1/2 w.
		In REV C and earlier:
	3R77P161J	Composition: 160 ohms ±5%, 1/2 w.
R9	3R77P331J	Composition: 330 ohms ±5%, 1/2 w.
R10	3R77P101J	Composition: 100 ohms ±5%, 1/2 w.
R11	19A115681P1	Variable, wirewound: 1000 ohms ±20%, 2.25 w; sim to CTS Series 115.
R12*	3R77P221J	Composition: 220 ohms ±5%, 1/2 w. Added by REV G.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR4	4036887P6	Diode, Zener.
A501*		REGULATOR COMPONENT BOARD ASSEMBLY 19C303420G4 (Deleted by REV C)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1*	4037822P1	Silicon. Added by REV A.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1*	4037993P1	Germanium, PNP; sim to Type 2N1303. Deleted by REV B.
Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q4	4037993P1	Germanium, PNP; sim to Type 2N1303.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P680J	Composition: 68 ohms ±5%, 1/2 w.
R3	3R77P242J	Composition: 2400 ohms ±5%, 1/2 w.
R4	3R77P331J	Composition: 330 ohms ±5%, 1/2 w.
R5	3R77P681J	Composition: 680 ohms ±5%, 1/2 w.
R6	19B209113P1	Variable, wirewound: 250 ohms ±20%, 2.5 w; sim to CTS Series 110.
R8*	3R77P680K	Composition: 68 ohms ±10%, 1/2 w. Added by REV B.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1	4036887P9	Silicon, Zener.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C501 and C502	19A115028P220	Polyester: 0.68 µf ±10%, 100 VDCW.
C503 and C504	19A115028P259	Polyester: 0.47 µf ±10%, 400 VDCW.
C505	5491656P39	Polyester: 1 µf +30% -10%, 600 VDCW; sim to GE Type 61F.
C507	7489483P18	Polyester: 100 µf +75% -10%, 25 VDCW; sim to Sprague Type 30D.
C508	7476442P19	Electrolytic, twist-prong: 750 µf +250-10%, 25 VDCW; sim to PR Mallory 20-2220.
C509	19A115028P16	Polyester: 0.22 µf ±20%, 200 VDCW.
C510	19A115028P17	Polyester: 0.33 µf ±20%, 100 VDCW.
C511	19A115028P220	Polyester: 0.68 µf ±10%, 100 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR501 thru CR504	19A115845P5	Silicon.
CR505 thru CR508	19A115845P2	Silicon.
CR509 and CR510	4037898P2	Silicon.
		- - - - - - - - - - FUSES - - - - - - - - - -
F501	1R16P13	Cartridge, quick blowing: 1/4 amp at 250 v; sim to Littelfuse 312.250 or Bussmann AGC-1/4.
F502	7487942P2	Cartridge, slow blowing: 3/8 amp at 250 v; sim to Bussmann MDL-3/8.
		- - - - - - - JACKS AND RECEPTACLES - - - - -
J503	19B209109P1	Connector, phen: 18 contacts; sim to Beauchaine and Sons 3305-39.
J504	19A121524G1	Connector, phen: 8 contacts rated at 15 amps at 1100 VRMS.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L501	19B200775P1	Reactor: 0.45 h +0.5 -.05 h ind min at 0.15 amp DC, 20 ohms ±10% DC res, 1000 v peak, 420 VDC operating.
L502	19B200777P1	Reactor: 0.1 h min, 12 ohms ±10% DC res, 720 v peak, 300 VDC operating.
L503	7143944P2	Choke, RF: 120 µh ±10% at 1 KHz, .064 ohm DC res max.
L504	19A115392P1	Coil, RF: 50 µh ±10% at 1 KHz, .02 ohm DC res.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P501 and P502	19B209151P1	Terminal: solderless; sim to Amp 42284-5.
P503	19B209109P2	Connector, phen: 18 contacts; sim to Beauchaine and Sons 3305-38.
P505	19B204781P1	Female, phen: No. 1-12 contacts rated at 2 amps at 650 VDC max, No. 13 contact rated at 4 amps at 450 VDC max.
P506 and P507	19B209241P2	Contact, electrical: rated at 5 amps; sim to Amp 66010-2.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q501 thru Q506	19A115487P1	Germanium, PNP.
Q507	19A115341P1	Germanium, PNP.
Q508*	19A116118P3	Silicon, NPN.
		In REV E and earlier:
	19A115267P1	Germanium, PNP.

SYMBOL	GE PART NO.	DESCRIPTION
Q509	4037993P1	Germanium, PNP; sim to Type 2N1303.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R501 thru R503	5493035P3	Wirewound: 2 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R504 and R505	5493035P4	Wirewound: 80 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R510	3R77P222K	Composition: 2200 ohms ±10%, 1/2 w.
R511 and R512	3R77P394K	Composition: 0.39 megohm ±10%, 1/2 w.
R513	3R77P751J	Composition: 750 ohms ±5%, 1/2 w.
R514	3R77P682K	Composition: 6800 ohms ±10%, 1/2 w.
R515	3R77P222K	Composition: 2200 ohms ±10%, 1/2 w.
R516	19B209113P3	Variable, wirewound: 1000 ohms ±20%, 2.5 w; sim to CTS Series 110.
R517	3R77P751J	Composition: 750 ohms ±5%, 1/2 w.
R518	3R77P361J	Composition: 360 ohms ±5%, 1/2 w.
R524	19B209022P61	Wirewound, phen: 82 ohms ±5%, 2 w; sim to IRC Type BWH.
		- - - - - - - - - TRANSFORMERS - - - - - - -
T501	19C304124G2	Transformer.
T502	19C304113G2	Transformer.
		- - - - - - - - TERMINAL BOARDS - - - - - - -
TB1	19A121572G1	Eyelet board.
TB2	19A121568G1	Eyelet board.
TB3	19B204520G1	Eyelet board.
TB5	7775500P44	Phen: 1 terminal.
		- - - - - - - - VOLTAGE REGULATORS - - - - - -
VR501	4036887P6	Silicon, Zener.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XQ507	5491888P1	Transistor, power, phen: sim to Cinch 133-92-10-034.
XQ508*	5491888P1	Transistor, power, phen: sim to Cinch 133-92-10-034. Deleted by REV C.
		HARNESS ASSEMBLY 19D402321G3 (Includes J503, J504, P501-P503, P506, P507)
		MECHANICAL PARTS (SEE RC-1161)
1	4032596P1	Nut. No. 10-32. (Used with Q501-506).
2	N405P9C13	Lockwasher: No. 10. (Used with Q501-506).
3	4034225P1	Flat washer: (Used with Q501-506).
4	4034215P1	Bushing.
5	4031291P1	Transistor insulator. (Used with Q501-506).
6	19C303751P2	Heat sink, chassis.
7	19A115221P3	Mica washer: (Used with Q501-506).
8	4036835P1	Solder terminal: sim to Shakeproof 214-14-000. (Used with Q501-506).
9	7118719P4	Mounting clip: sim to Prestole E-50005-038. (Used with L503 and L504).
10	7118719P6	Mounting clip: sim to Prestole E-50008-038. (Used with C508).
11	7147223P1	Clamp.

SYMBOL	GE PART NO.	DESCRIPTION
12	7108469P1	Fuse clip: sim to Littelfuse 122063. (Used with F501 and F502).
13	4036555P1	Washer, insulator: nylon. (Used with Q1 and Q509).
14	7878455P1	Terminal lug.
15	7763541P4	Cable clamp. (Used with P505 cable).
16	4029974P1	Transistor insulator. (Used with Q507 and Q508).
17	19B204533G1	Support. (Used with power supply cover).
18	7160861P4	Speed nut: spring; sim to Tinnerman C6452-8E-157. (Used with power supply cover).
19	19A121220P2	Support.
20	19B204538G1	Support.

PRODUCTION CHANGES

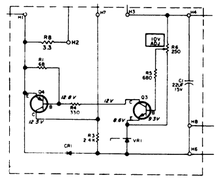
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV.A - To protect the 10-volt regulator against reverse polarity. Added CR1 to the 10-volt regulator board A501.

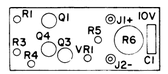
REV.B - To improve operation of the 10-volt regulator. Deleted Q1 and added R8.

REV.C - To improve reliability of the 10-volt regulator. Changed Q508 and changed the regulator board.

A501 Schematic Diagram Was:



A501 Outline Diagram Was:

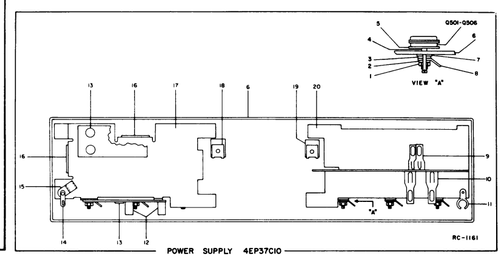


REV.D - To improve operation of 10-volt regulator A501. Changed R8.

REV.E - To provide protection against reverse polarity. Deleted CR2 and added CR3 to 10-volt regulator A501.

REV. F - To incorporate a new transistor. Changed Q508.

REV. G - To improve procurement. Deleted DS1. Added R12.



*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-3576

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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