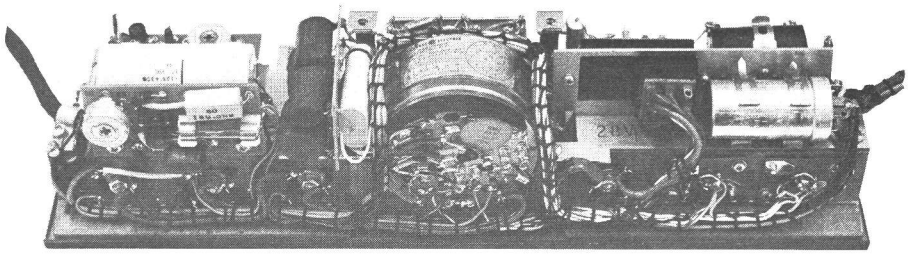
MASTR Progress Line

12/28-VOLT 30-WATT POWER SUPPLY MODEL 4EP37D10



SPECIFICATIONS *

Type Number	EP-37-D			
Input	Voltage		Current	
Vehicle Electrical System	12 Volts		12 amps max	
Vehicle Electrical System	28 Volts		7.5 amps max	
	Voltage		Current	
Output	12 Volts	28 Volts	12 Volts	28 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	90 ma
Bias				
25 - 88 MHz; 132-174 MHz	-45 Volts	-45 Volts	0	0
406-420 MHz; 450-470 MHz	-45 Volts	-45 Volts	5 ma	5 ma
Low B-Plus				
25 - 88 MHz	311 Volts	303 Volts	30 ma	30 ma
132-174 MHz	309 Volts	303 Volts	40 ma	40 ma
406-420 MHz; 450-470 MHz	290 Volts	300 Volts	100 ma	100 ma
High B-Plus				
25 - 88 MHz	450 Volts	450 Volts	150 ma	150 ma
132-174 MHz	458 Volts	450 Volts	160 ma	160 ma
406-420 MHz; 450-470 MHz	420 Volts	430 Volts	200 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	---	2.3 amps
Receiver				
Standby - Squelched	----	----	.05 amp	.35 amp
Standby - Unsquelched	----	----	.7 amp	.73 amp
ON-Squelched				
25 - 88 MHz; 132-174 MHz	----	----	.9 amp	.95 amp
406-420 MHz; 450-470 MHz	----	----	2.1 amps	1.5 amps
Transmit				
25 - 88 MHz	----	----	9 amps	5 amps
132-174 MHz	----	----	10.5 amps	5.5 amps
406-420 MHz; 450-470 MHz	----	----	14 amps	7 amps
Transistors				
Multivibrator Circuit	6			
10-Volt Regulator Circuit	4			
20-Volt Regulator Circuit	2			
Rectifiers	12			
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.

ILLUSTRATIONS

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 4EP37D10 is used with 30-Watt, 12 or 28 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 a 28 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 right side of jack J503 (labeled "12V") for 12 Volt systems and into the left side of J503 (labeled "28V") for 28 Volt systems.

All connections to the transmitter, receiver and power cables are made through two plug connectors. Two 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 28 Volt systems and 12 Volt systems respectively.

12-VOLT MULTIVIBRATOR

Q512, Q513 and the primary of T503 operate as an inductively coupled multivibrator to produce the proper T503 secondary AC voltage for the bias and B-plus power supplies.

Keying the transmitter closes the relay contacts and applies power to transistors Q512 and Q513. The bases of the transistors are negatively biased (with respect to their emitters) through resistor R505 to start conduction. Due to inherently different characteristics, one transistor will conduct slightly more than the others.

Assuming that Q512 will initially conduct more than Q513, Q512 will draw more current through T503 winding 1-3 than Q513 will draw through winding 4-2, thereby making terminal 1 more positive than terminal 3.

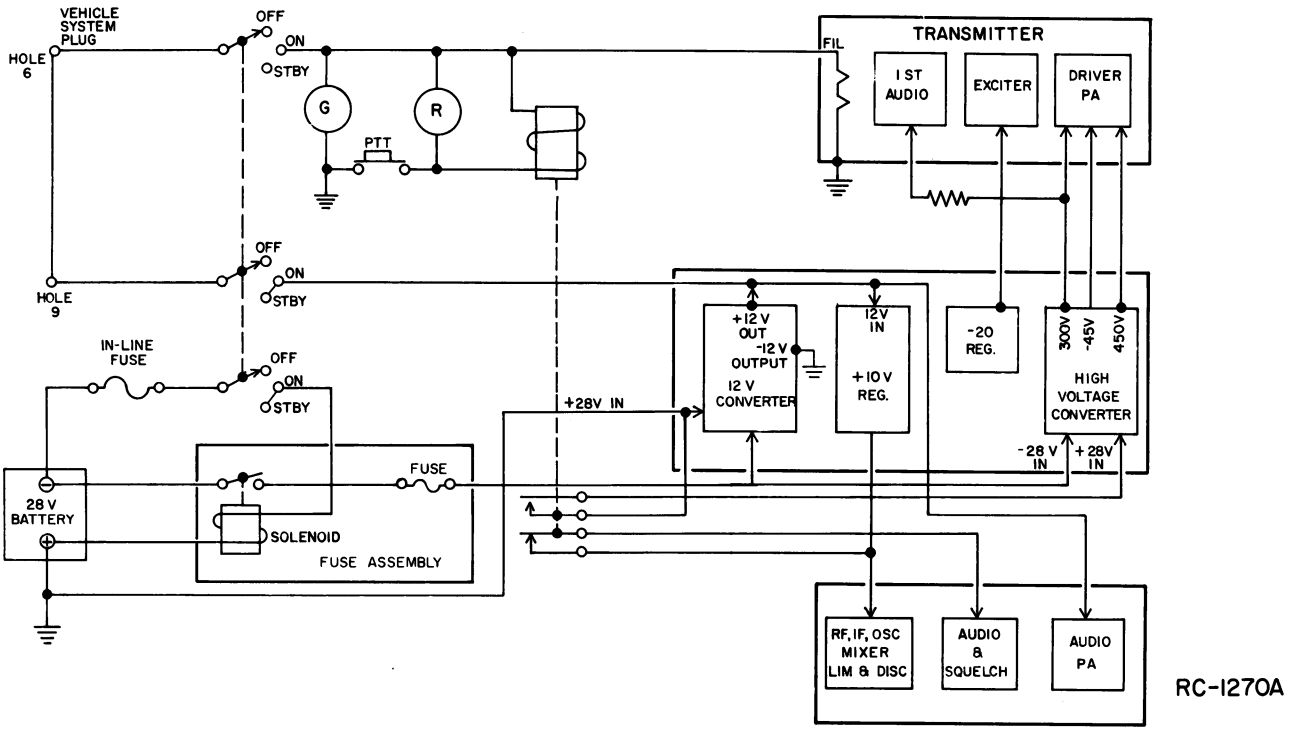
The increasing magnetic field in the core of T503 induces a voltage in windings 11-23-22, causing terminal 22 to become negative with respect to the emitter of Q512. The increased bias causes Q512 to conduct even harder. At the same time, terminal 11 becomes positive with respect to the emitter of Q513, stopping current flow through Q513. The current through winding 1-3 rapidly saturates the core of T503 and the magnetic field ceases to increase. The voltage induced in winding 11-23-22 falls to zero, reducing the bias on Q512 to the starting bias through R505. The reduced bias tends to shut off Q512 and reduces the current through winding 1-3. The collapsing magnetic field in T503 reverses the voltage across winding 11-23-22 which turns off Q512 and turns Q513 on. Q513 now conducts in a similar manner until the core of T503 saturates again. The two transistors continue to conduct alternately at an approximate frequency of 1330 hertz. The resulting waveform approaches that of a perfect square wave to produce the proper AC output of T503 for the bias and B-plus power supplies. Resistor R503 limits the current through Q512 and Q513.

During the 12-Volt operation, T504, Q510 and Q511 are inoperative. The 12-Volt input for the 10 Volt Regulator Supply is furnished by the 12-Volt vehicle electrical system.

28-VOLT MULTIVIBRATOR

Q510, Q511 and the primary of T504 operate as an inductively coupled multivibrator to produce 12 VAC from the secondary output of T504 for the 12-Volt power supply circuit.

28-VOLT POSITIVE GROUND



28-VOLT NEGATIVE GROUND

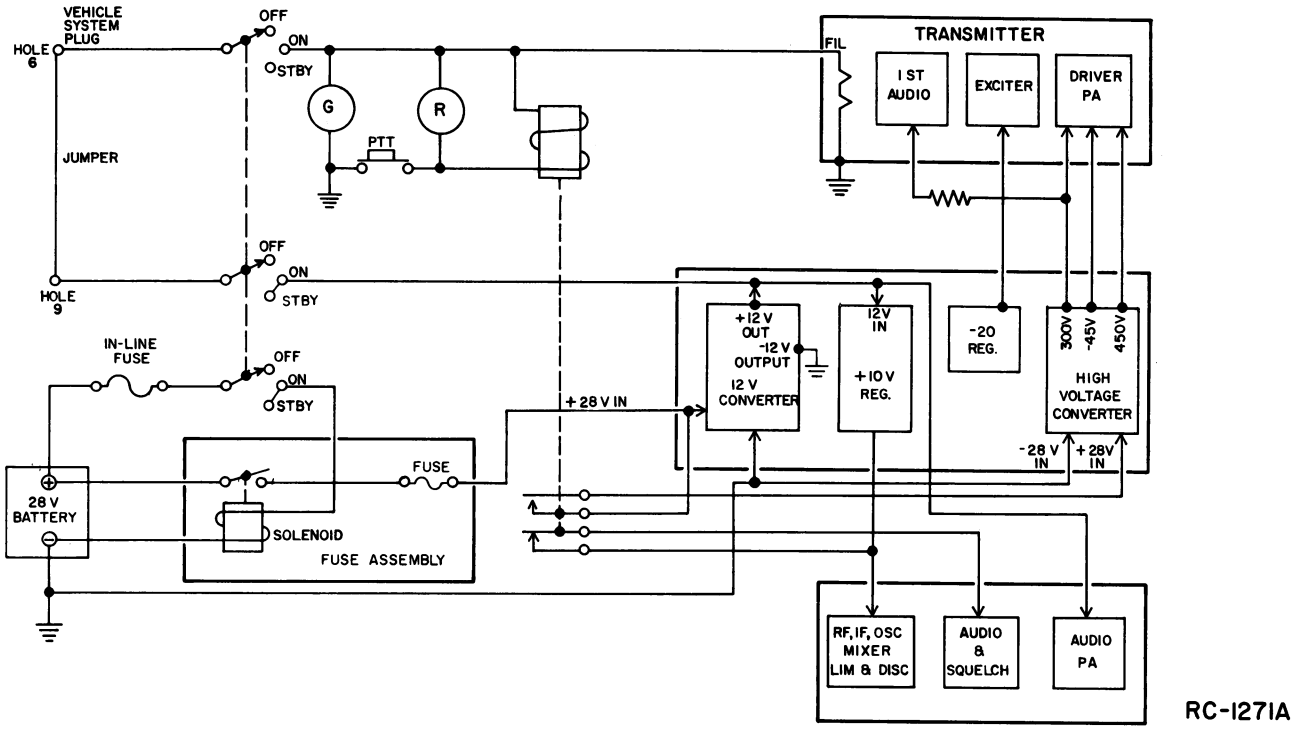
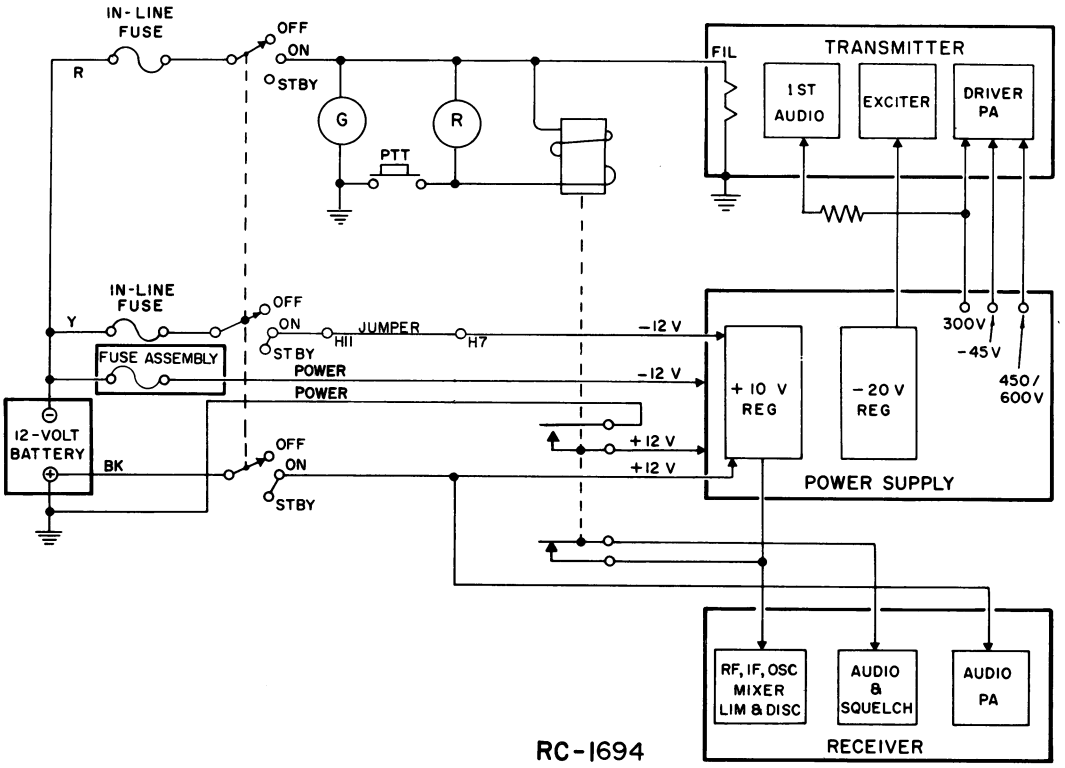


Figure 1 - 28-Volt Power Distribution Diagrams

12 VOLT POSITIVE GROUND



12 VOLT NEGATIVE GROUND

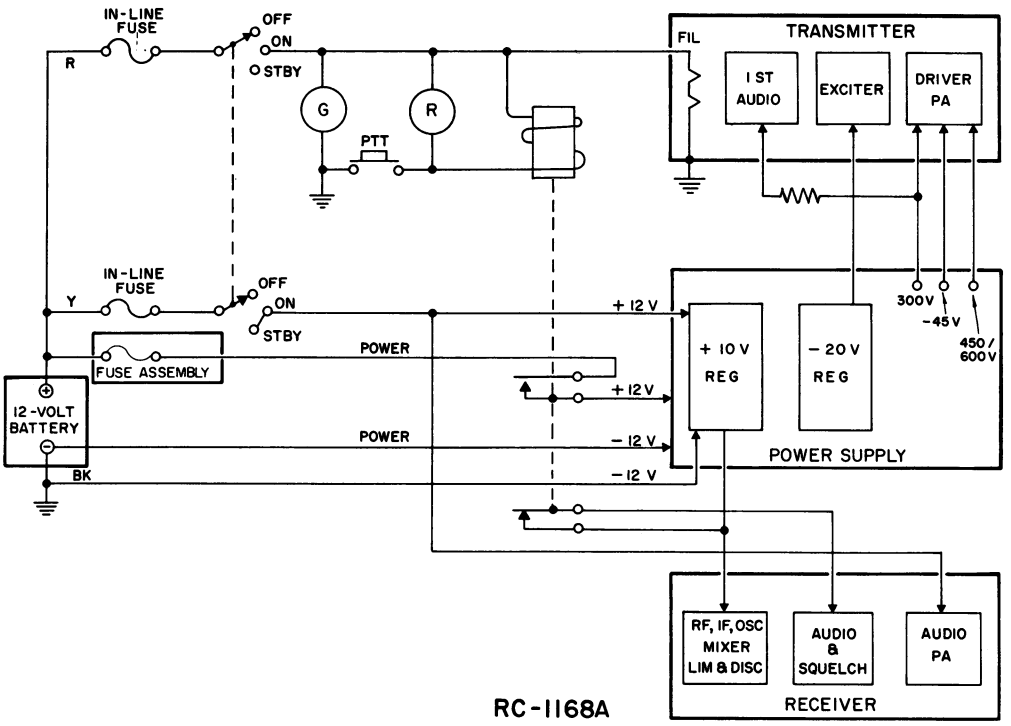


Figure 2 - 12 Volt Power Distribution Diagrams

Q512, Q513, Q514 and Q515 form a transistorized square wave oscillator to provide the proper T503 secondary AC voltages for the bias and B-plus power supplies.

With plug P503 in the 28-Volt position, turning the ON-OFF-STANDBY switch on the control unit to the ON (or STANDBY) position activates the system relay and closes the primary circuit to T504.

C515 supplies momentary starting bias current to Q510 and Q511 through R522 to enable the multivibrator to supply greater than normal current during transmitter tube warm-up time. R521 discharges C515 when power is removed from the circuit. R520 limits the base current through Q510 and Q511. CR511 and CR512 prevent excessive reverse voltage from being applied to the base of Q510 and Q511.

Keying the transmitter applies starting bias to Q512 and Q513 through R505 and R507. Bias is fed to Q514 through R519. The bias triggers a current flow through Q513, Q514 and winding 4-5 of T503.

The voltage induced in winding 22-23 and 6-7 bias Q513 and Q514 on, simultaneously with the bias cutoff of Q512 and Q515 from winding 11-23 and 9-10. The core rapidly saturates and Q513 and Q514 conduct alternately with Q512 and Q515 to produce a square wave voltage across winding 4-5 to produce the AC voltages for the bias and B-plus supplies.

RECTIFIER AND FILTER CIRCUITS

Negative Bias Supply (Figure 4) - The AC voltage developed across secondary windings 12-8-14 of transformer T503 is rectified by full-wave 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.

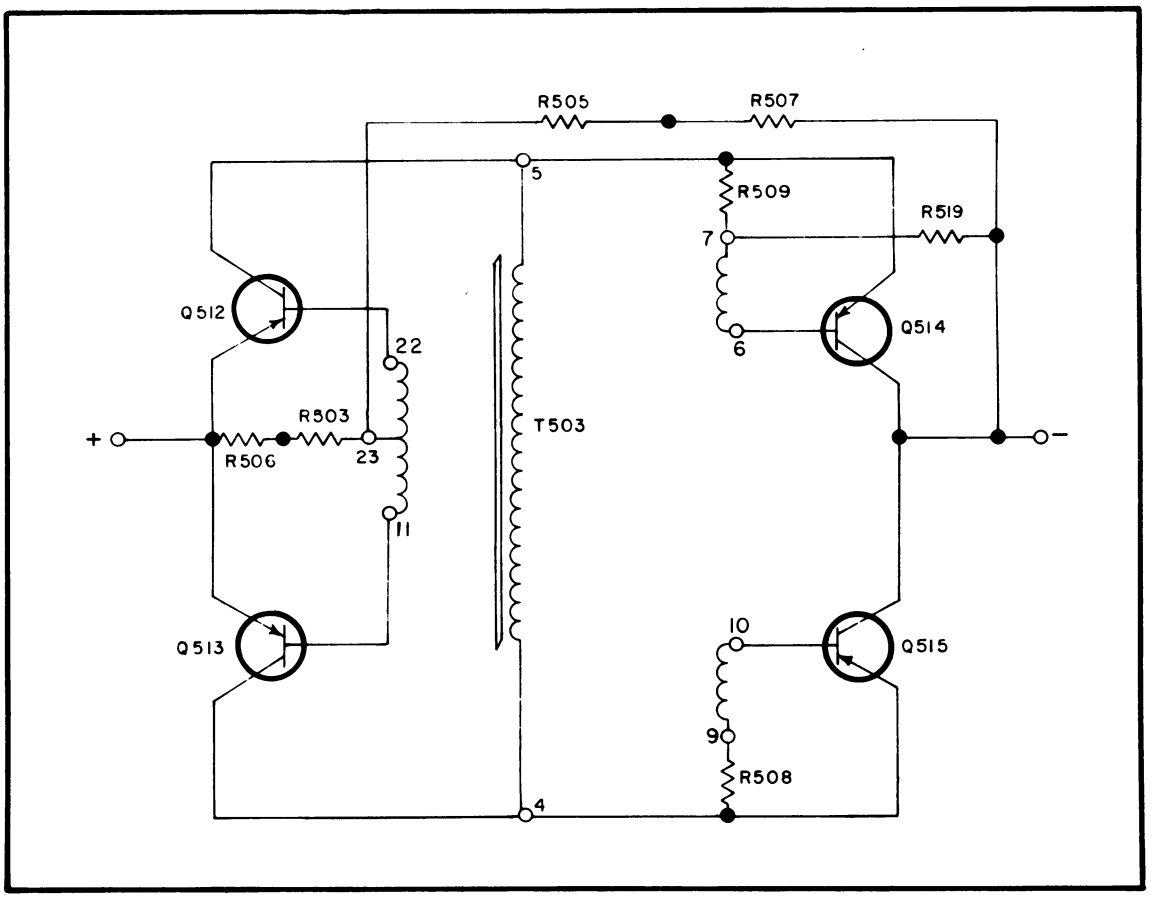


Figure 3 - Simplified Bridge Multivibrator Circuit

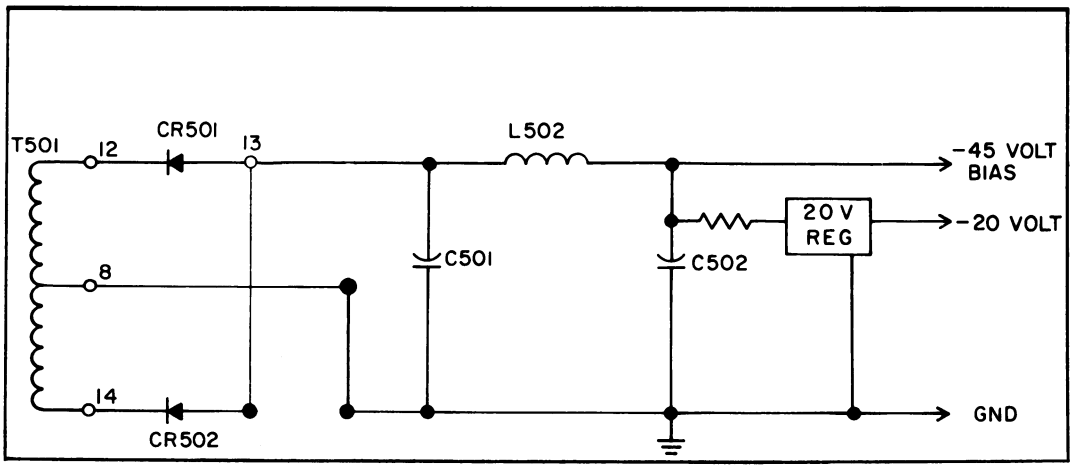


Figure 4 - Negative Bias Supply

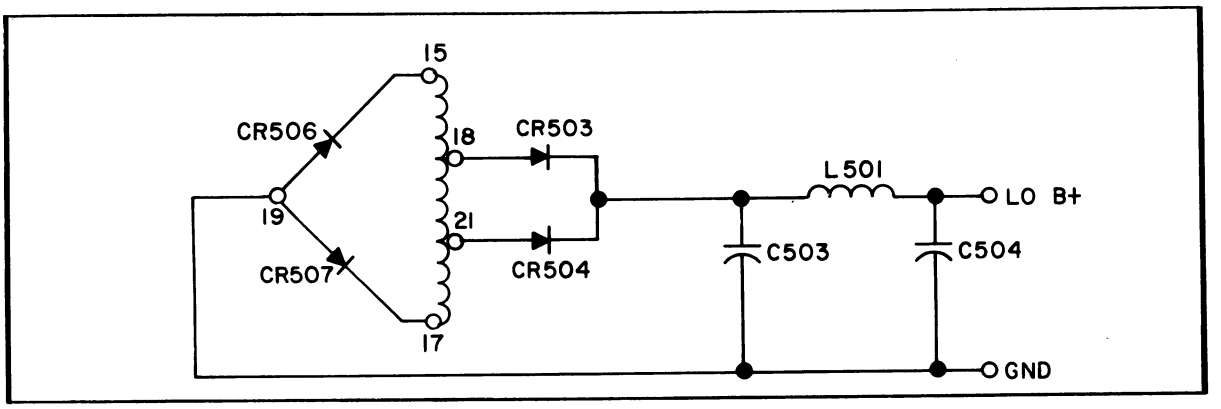


Figure 5 - Low Voltage B-Plus Circuit

Transmitter Low Voltage B-Plus (300 V) (Figure 5) - The AC voltage for the 300-Volt supply is developed across the high voltage secondary winding of T503 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 6) - The full-wave rectifier bridge composed of CR505, CR506, CR507 and CR508 rectifies the voltage present across the high voltage winding of T503.

The voltage developed across winding terminals 15 and 17 during one-half of each AC cycle is rectified by CR505 and CR507.

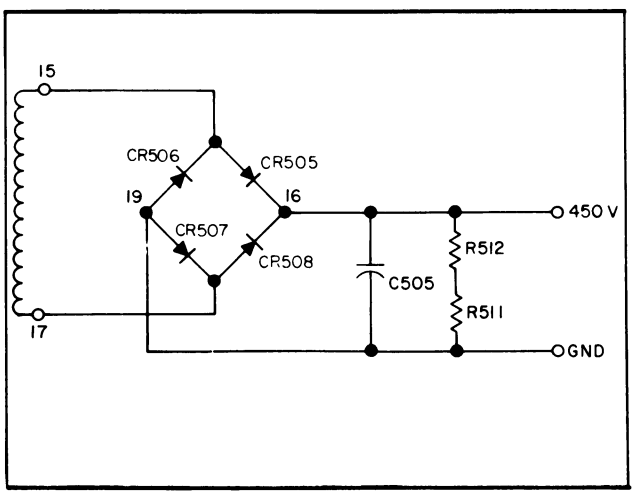


Figure 6 - Power Amplifier B-Plus Circuit

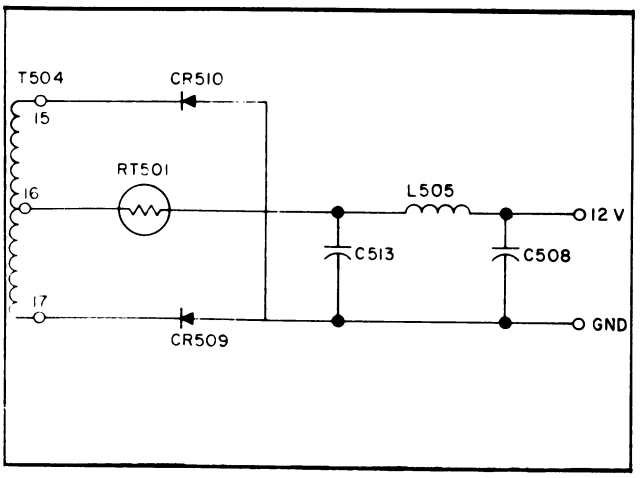


Figure 7 - 12 Volt Supply Circuit

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.

12-Volt Supply (Figure 7) (Used with 28-Volt Electrical System) - The AC voltage developed across T504 secondary windings 15 and 17 is rectified by CR509 and CR510. The rectified voltage is taken off at T504 center tap terminal 16 through thermistor RT501 and filtered by C508, L505 and C513. Thermistor RT501 limits the maximum current drawn during the transmitter warm-up period. The 12-Volt output is supplied to the 10-Volt Regulator and to P505-6 and P505-5 for distribution to the transmitter and receiver.

-20 VOLT REGULATOR (Figure 8)

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. R523 limits maximum current through Q507 and reduces the power dissipated in Q507.

When the input voltage at TB3-31 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. 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 C511 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

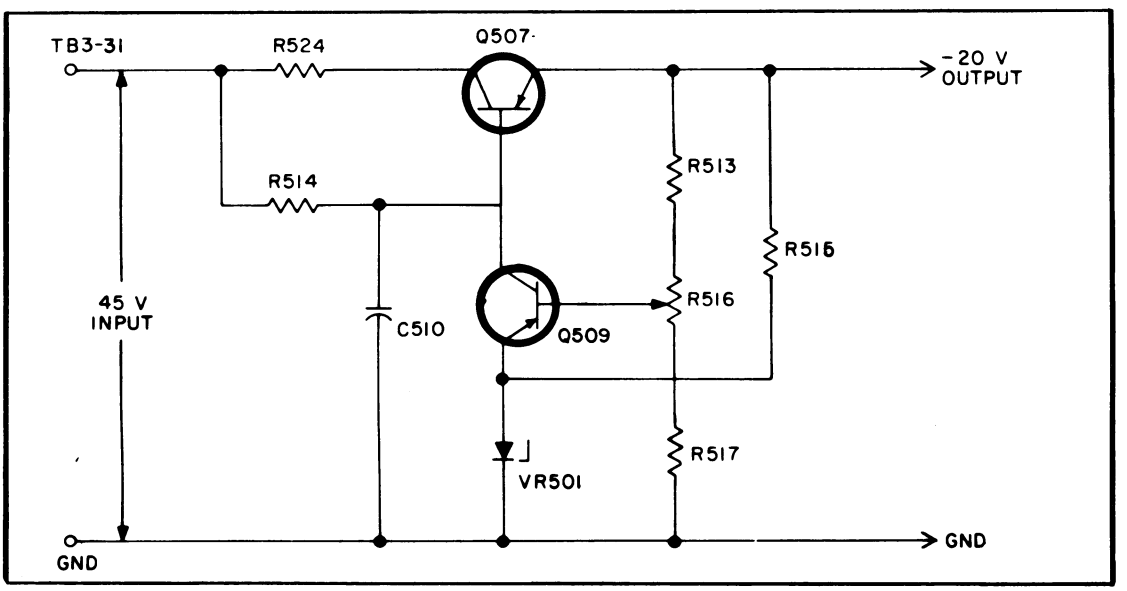


Figure 8 - -20 Volt Regulator Circuit

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. 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.

RE-INSTALLATION

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 two 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.

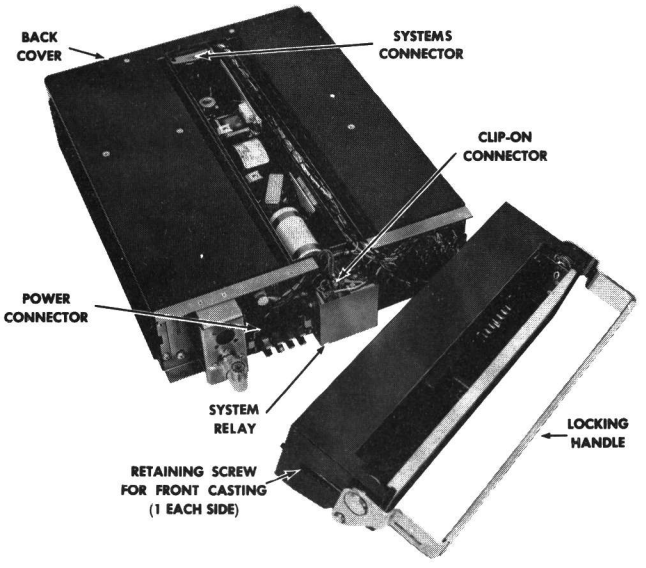


Figure 9 - Disassembly of Power Supply

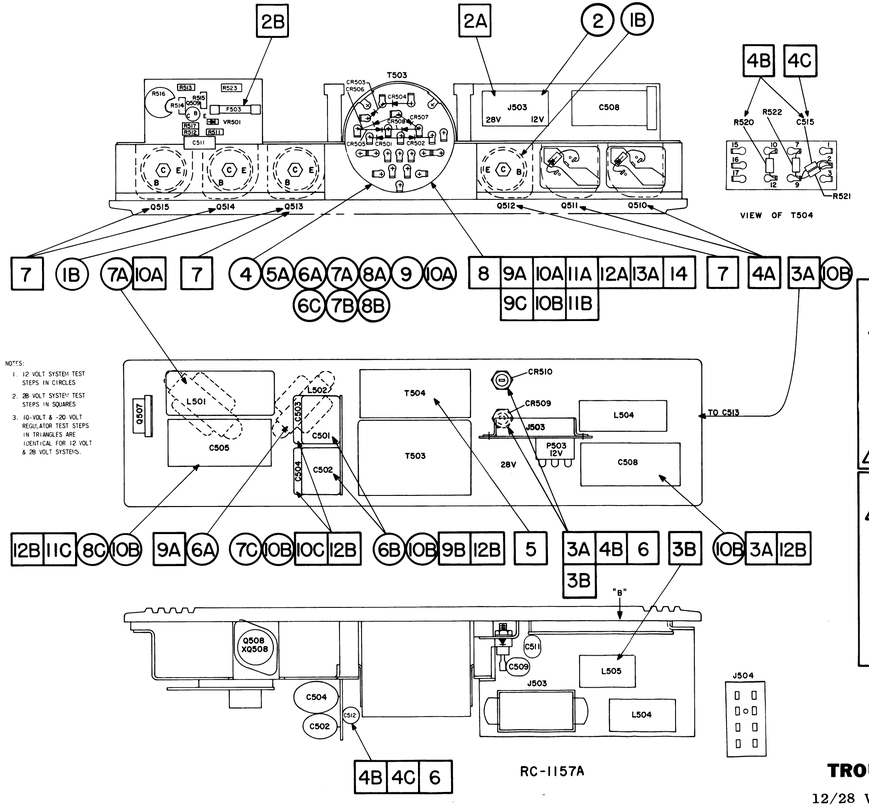
STEP 1 - QUICK CHECKS

30-WATT POWER SUPPLY
12-VOLT ELECTRICAL SYSTEM
MODEL 4EP37D10

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. B. Collector-emitter shorts in Q512, or Q513. C. Check for primary wiring shorts. D. Open fuse in system cable. E. Keying relay in system should close when PTT switch is depressed.
	With 12 volts at J504-3-7, check the following steps:
	2. P503 is in 12-volt position on J503.
	3. Open R503, R505.
	4. T503 shorted or open. Check T503 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.
Output voltages low	5. A. Open diodes. B. Excessive load.
No -45 volts at P505-2	6. A. Open L502, CR501, CR502. B. Shorted C501, C502. C. Open bias winding.
No 300 volts at P505-1	7. A. Open L501, CR503, CR504, CR506, CR507. B. Open T503 high voltage secondary. C. Shorted C503, C504.
No 450 volts at P505-9	9. A. Open diodes CR505 through CR508 (two or more). B. Open T503 high voltage secondary. C. Shorted C505.
Reverse or high output voltage on bias output	9. Check for short between bias output winding and B+ output winding of T503.
Excessive output ripple voltages	10. A. Open diodes. B. Open C501, C502, C503, C504, C505, C508, C513.
	10 VOLT REGULATOR
No 10 volts regulated at P505-7	1. Check for the following: A. Open Q508. B. 12 volts input. C. Open DS1. D. Shorted C4. E. Open CR2. F. Open fuse in vehicle sytem.
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 R523. 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.

30-WATT POWER SUPPLY
28-VOLT ELECTRICAL SYSTEM
MODEL 4EP37D10

SYMPTOM	PROCEDURE
Receiver/Transmitter inoperative, no 12 volts at P505-8 to ground	Check for 28 volts at J504-2-7. If O.K., go to Step 2; otherwise check: 1. A. Open fuse in system cable. B. Fuse Assembly for open circuit. Check C514 for short. C. Relay on fuse assembly should close when ON-OFF switch is turned to ON/STANDBY.
	With 28 volts at J504-2-7, check the following steps:
	2. A. P503 must be in 28-volt position on J503. B. Open fuse F503. C. Overload in output.
	3. A. Shorted C508, C513, CR509, CR510. B. Open L505, CR509, CR510, RT501.
	4. A. Check Q510, Q511. B. Open R520, C512, C515, CR509, CR510. C. Shorted C512, C515.
	5. T504 shorted or open. Check T504 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. Open C512, CR509, CR510.
No bias & B-plus voltages at P505-1-2-3-9	7. Check R519, Q512 through Q515, R502, R505, R506, R507, R508, R509. 8. T503 shorted or open. Check T503 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 L502, CR501, CR502. B. Shorted C501, C502. C. Open bias winding.
No 300 volts at P505-1	10. A. Open L501, CR503, CR504, CR506, CR507. B. Open T503 high voltage secondary. C. Shorted C503, C504.
No 450 volts at P505-9	11. A. Open diodes CR505 through CR508 (two or more). B. Open T503 high voltage secondary. C. Shorted C505.
Excessive output ripple voltages	12. A. Open diodes B. Open C501, C502, C503, C504, C505, C508.
Output voltages low	13. A. Open diodes. B. Excessive load.
Reverse or high output voltage on bias output	14. Check for short between bias output winding and B+ output winding of T503.
	10 VOLT REGULATOR
No 10 volts regulated at P505-7	**1. Check for the following:** **A. Open Q508.** **B. 12 volts input.** **C. Open R12.** **D. Shorted C4.** **E. Open CR2.** **F. Open fuse in vehicle sytem.**
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, R523. 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.



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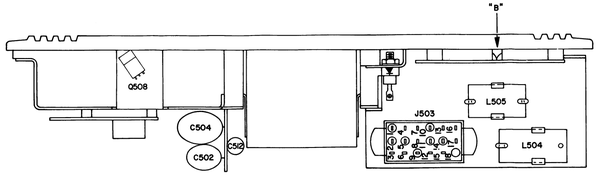
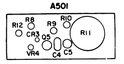
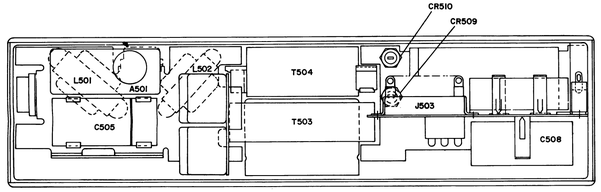
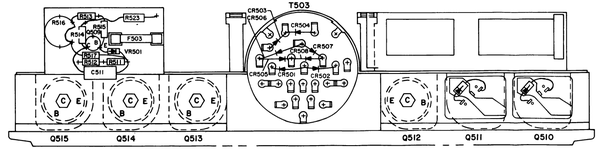
TROUBLESHOOTING PROCEDURE

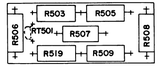
12/28 VOLT, 30-WATT MASTR POWER SUPPLY
MODEL 4EP37D10



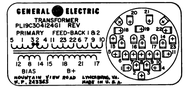


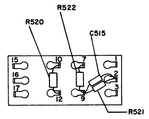




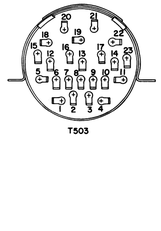


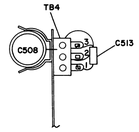
VIEW AT "B"





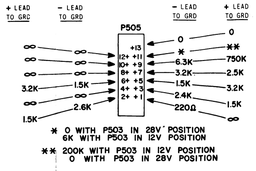
VIEW OF T504





RESISTANCE READINGS

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



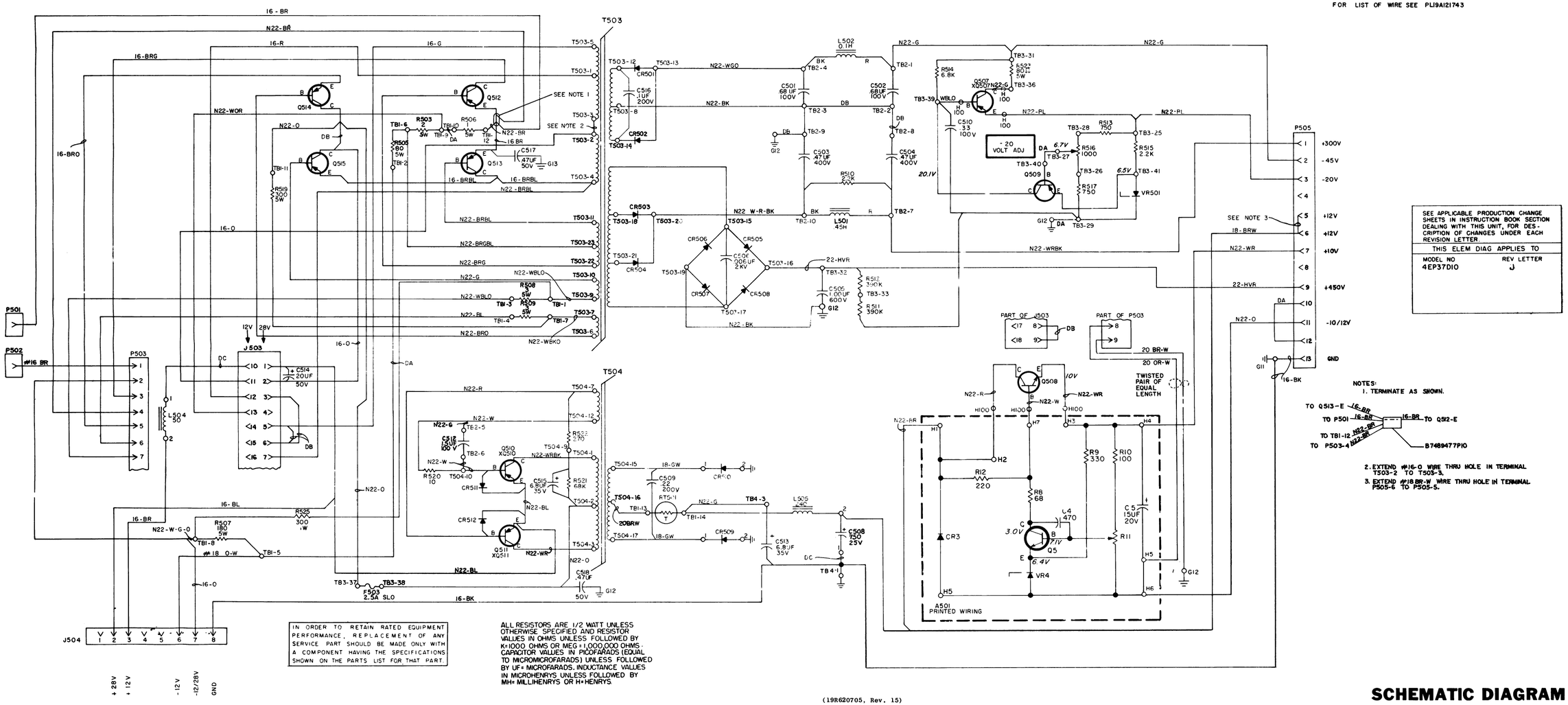
* 0 WITH P503 IN 28V POSITION
6K WITH P503 IN 12V POSITION

** 200K WITH P503 IN 12V POSITION
0 WITH P503 IN 28V POSITION

OUTLINE DIAGRAM

(19D402588, Rev. 5)

12/28 VOLT, 30-WATT MASTR POWER SUPPLY
MODEL 4EP37D10



(DF-0059)

SCHEMATIC DIAGRAM

12/28 VOLT, 30-WATT MASTR POWER SUPPLY
MODEL 4EP37D10

PARTS LIST

LBI-3579D

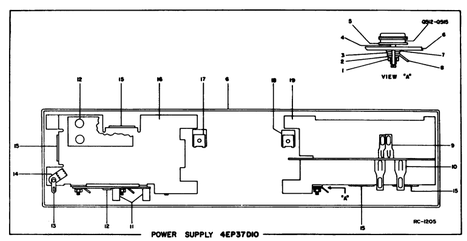
12/28 VOLT, 30 WATT POWER SUPPLY
MODEL 4EP37D10
(19D402321G2)

SYMBOL	GE PART NO.	DESCRIPTION
A501*		10-VOLT REGULATOR BOARD 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 F.
CR3*	4037822P1	Silicon. Added by REV F.
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1*	4034664P1	Lamp, incandescent: 28 v; sim to GE2148. Deleted by REV J.
		- - - - - - - - - - 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: 100 ohms, ±20%, 3 w.
R12*	3R77P221J	Composition: 220 ohms ±5%, 1/2 w. Added by REV J.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR4	4036887P6	Silicon, Zener.
A502*		10-VOLT REGULATOR BOARD 19C303420G1 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.
Q2	19C300073P2	Germanium, PNP; sim to Type 2N1414.
Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - 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.
R8*	19B209022P127	Wirewound: 313 ohms ±10%, 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.
C506	5490825P4	Ceramic disc: 6000 pf 10%, 2000 VDCW; sim to RMC JF Discap.
C508	7476442P19	Electrolytic, twist-prong: 750 µf -10 +250%, 25 VDCW; sim to PR Mallory 20-22201.
C509	19A115028P16	Polyester: 0.22 µf ±20%, 200 VDCW.
C510	19A115028P17	Polyester: 0.33 µf ±20%, 100 VDCW.
C512	19B200184P8	Polyester: 1.5 µf ±20%, 100 VDCW; sim to Good-All 663F.
C513	5496267P18	Tantalum: 6.8 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C514	7489483P11	Electrolytic: 20 µf +75% -10%, 50 VDCW; sim to Sprague Type 30D.
C515	5496267P18	Tantalum: 6.8 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C516*	19A115028P14	Polyester: 0.1 µf ±20%, 200 VDCW. Added by REV E.
C517* and C518*	19A116080P11	Polyester: 0.47 µf ±20%, 50 VDCW. Added by REV E.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR501* thru CR504*	19A115845P5	Silicon.
		In REV D and earlier:
	4037822P1	Silicon.
CR505* thru CR508*	19A115845P2	Silicon.
		In REV D and earlier:
	4037822P1	Silicon.
CR509 and CR510	4037898P2	Silicon.
CR511 and CR512	4037822P1	Silicon.
		- - - - - - - - - - FUSES - - - - - - - - - -
F503	7487942P28	Slow blowing: 2.5 amps at 125 v; sim to Bussmann MDL-2.5.
		- - - - - - - 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 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.
L504	19A115392P1	Choke, RF: 50 µh ±10%, .02 ohm DC res max.
L505	19A115543P1	Choke, RF: 240 µh ±10%, 0.128 ohms DC res.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P501 and P502	19B209151P1	Terminal: solderless; sim to Amp 42284-5.

SYMBOL	GE PART NO.	DESCRIPTION
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 850 VDC max, No. 13 contact rated at 4 amps at 450 VDC max.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q507	19A115341P1	Germanium, PNP.
Q508*	19A116118P3	Silicon, NPN.
		In REV C-G:
	19A115527P1	Silicon, NPN.
		In REV B and earlier:
	19A115267P1	Germanium, PNP.
Q509	4037993P1	Germanium, PNP; sim to Type 2N1303.
Q510 and Q511	19A115531P1	Germanium, PNP; sim to Type 2N1073B.
Q512 thru Q515	5490810P1	Germanium, PNP.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R503	5493035P3	Wirewound, ceramic: 2 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R505	5493035P4	Wirewound, ceramic: 80 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R506	5493035P2	Wirewound, ceramic: 1 ohm ±5%, 5 w; sim to Hamilton Hall Type HR.
R507	5493035P7	Wirewound, ceramic: 180 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R508 and R509	5493035P6	Wirewound, ceramic: 3 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.
R517	3R77P751J	Composition: 750 ohms ±5%, 1/2 w.
R519	5493035P9	Wirewound, ceramic: 300 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R520	3R77P100K	Composition: 10 ohms ±10%, 1/2 w.
R521	3R77P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R522	3R77P271K	Composition: 270 ohms ±10%, 1/2 w.
R523	5493035P4	Wirewound, ceramic: 80 ohms ±5%, 5 w; sim to Hamilton Hall Type HR.
R525*	3R78P301J	Composition: 300 ohms ±5%, 1 w. Added by REV G.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT501	19B209278P1	Disc: no load res 1.41 ohms at 25°C.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T503	19C304124G1	Transformer.
T504	19C304113G1	Transformer.
		- - - - - - - - TERMINAL BOARDS - - - - - - - -
TB1	19A121572G1	Eyelet board.
TB2	19A121568G1	Eyelet board.
TB3	19B204520G2	Eyelet board.
TB4	7775500P2	Phen: 3 terminals.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR501	4036887P6	Silicon, Zener.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XQ507	5491888P1	Transistor, power, phen: sim to Cinch 133-92-10-034.
XQ510 and XQ511	5491888P1	Transistor, power, phen: sim to Cinch 133-92-10-034.
		HARNESS ASSEMBLY 19D402321G4 (Includes C514, J503, J504, P501-P503)
		MECHANICAL PARTS (SEE RC-1205)
1	4032596P1	Nut: No. 10-32. (Used with Q512-515).
2	N405P9C13	Lockwasher: No. 10. (Used with Q512-515).
3	4034225P1	Flat washer. (Used with Q512-515).
4	4034215P1	Bushing: approx 9/32 inch dia.
5	4031291P1	Transistor insulator. (Used with Q512-515).
6	19C303751P1	Heat sink, chassis.
7	19A115221P3	Mica washer: approx 1/2 inch dia. (Used with Q512-515).
8	4036835P1	Solder terminal: sim to Shakeproof 214-14-000. (Used with Q512-515).
9	7118719P4	Mounting clip: sim to Prestole E-50005-038. (Used with L504 and L505).
10	7118719P6	Mounting clip: sim to Prestole E-50008-038. (Used with C508).
11	7108469P1	Fuse clip: sim to Littelfuse 122063. (Used with F503).
12	4036555P1	Washer, insulator: nylon. (Used with Q1, Q2 and Q509).
13	7878455P1	Terminal lug.
14	7763541P4	Cable clamp. (Used with P505 cable).
15	4029974P1	Transistor insulator. (Used with Q507 and Q508).
16	19B204533G1	Support. (Used with power supply cover).
17	7160861P4	Speed nut: spring; sim to Tinnerman C6452-8E-157. (Used with power supply cover).
18	19A121220P2	Support.
19	19B204538G2	Support.



PRODUCTION CHANGES

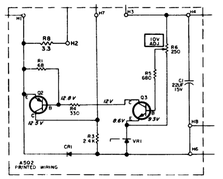
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - To protect the 10-volt regulator against reverse polarity. Added CR1 to the 10-volt regulator board A502.

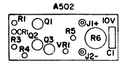
REV. B - To improve operation of the 10-volt regulator. Deleted Q1 and added R8.

REV. C - To improve reliability of the 10-volt regulator. Changed Q508 and changed the 10-volt regulator board from A502 to A501.

A502 Schematic Diagram was:



A502 Outline Diagram was:



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

REV. E - To reduce voltage spikes and ripple. Changed CR501-CR508, and added C516, C517 & C518.

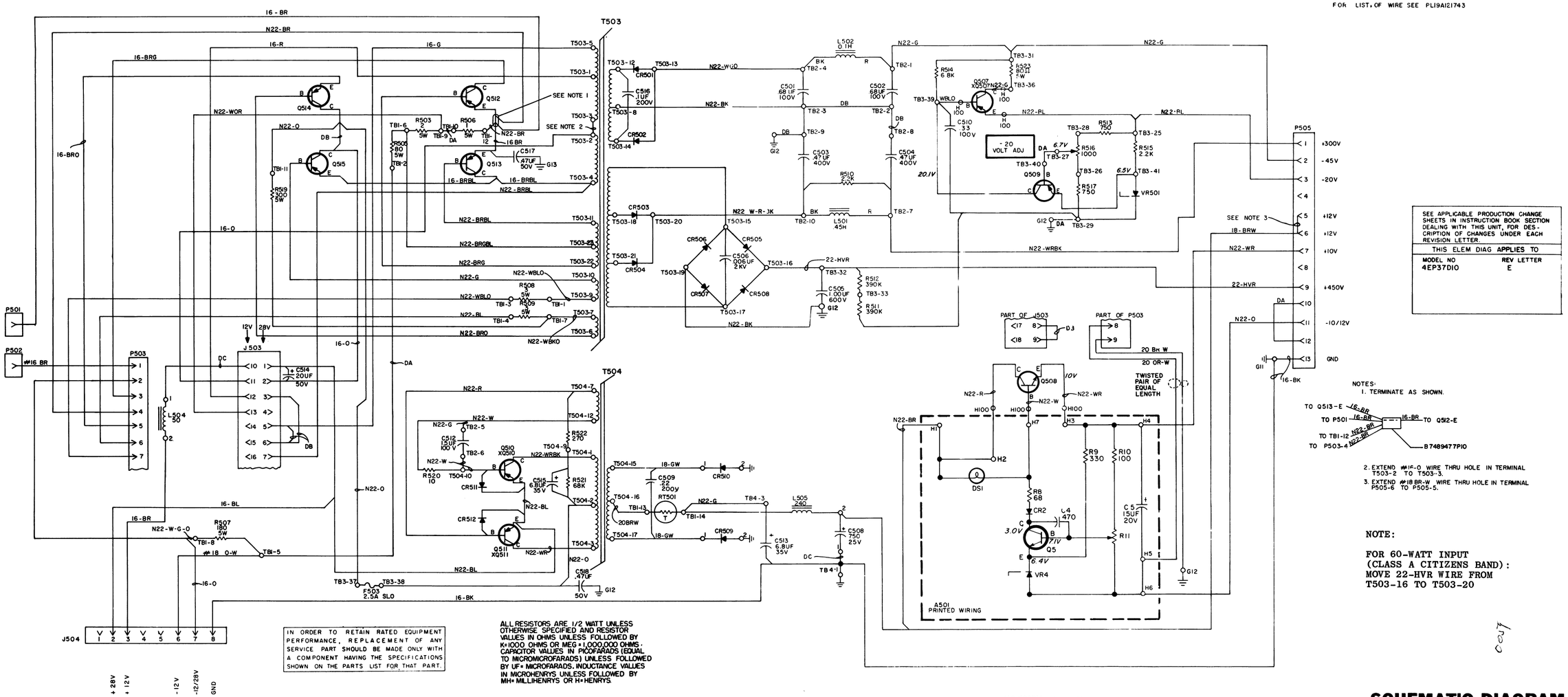
REV. F - To provide protection against reverse polarity. Deleted CR2 and added CR3 to 10-Volt regulator A501.

REV. G - To improve the starting time of the high voltage multivibrator circuit in the 28 Volt mode of operation. Added R525.

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

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

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



SCHEMATIC DIAGRAM

12/28 VOLT, 30-WATT MASTR POWER SUPPLY
MODEL 4EP37D10

PARTS LIST

LBI-3579B

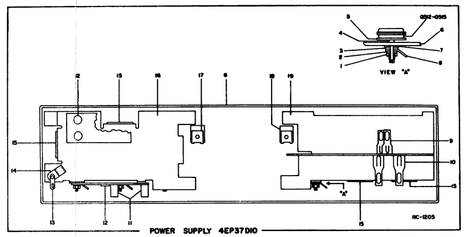
12/28 VOLT, 30 WATT POWER SUPPLY
MODEL 4EP37D10
(PL-19D402321-G2)

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - SUBASSEMBLIES - - - - - - - -
A501*		10-VOLT REGULATOR COMPONENT BOARD ASSEMBLY PL-19C303420-G6. Added by REV C.
		- - - - - - - - - - CAPACITORS - - - - - - -
C4	7774750-P1	Ceramic disc, .00047 µf, +100-0%, 500 VDCW.
C5	5496267-P14	Tantalum, 15 µf, ±20%, 20 VDCW
		- - - - - - - - - - DIODES - - - - - - - - -
CR2	19A115250-P1	Silicon
		- - - - - - - - - TRANSISTORS - - - - - - - -
Q5	19A115123-P1	NPN
		- - - - - - - - - RESISTORS - - - - - - - - -
R8*	3R77-P680K	Fixed Composition, 68 ohms, ±10%, 1/2 w. In REV. C and earlier:
		Fixed Composition, 160 ohms, ±5%, 1/2 w.
R9	3R77-P331J	Fixed Composition, 330 ohms, ±5%, 1/2 w.
R10	3R77-P101J	Fixed Composition, 100 ohms, ±5%, 1/2 w.
R11	19A115681-P1	Potentiometer, variable, linear, 100 ohms, ±20%, 3 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - -
VR4	4036887-P6	Diode, Zener
		- - - - - - - - - MISCELLANEOUS - - - - - - - -
DS1	4034664-P1	Lamp
A502*		REGULATOR COMPONENT BOARD ASSEMBLY PL-19C303420-G1.Deleted by REV C
		- - - - - - - - - - CAPACITORS - - - - - - -
C1	5496267-P10	Tubular, hermetically sealed, tantalum, dry solid: axial leads, 22 µf ±20%, 15 VDCW; sim to Sprague 150D226X0015B2.
		- - - - - - DIODES AND RECTIFIERS - - - - - -
CR1*	4037822-P1	Silicon, Added by REV A
		- - - - - - - - - TRANSISTORS - - - - - - - -
Q1*	4037993-P1	Germanium, PNP; sim to Type 2N1303. Deleted by REV B.
Q2	19C300073-P2	Germanium, PNP; sim to Type 2N1414.
Q3	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77-P680J	Fixed composition: 68 ohms ±5%, 1/2 w.
R3	3R77-P242J	Fixed composition: 2400 ohms ±5%, 1/2 w.
R4	3R77-P331J	Fixed composition: 330 ohms ±5%, 1/2 w.
R5	3R77-P681J	Fixed composition: 680 ohms ±5%, 1/2 w.
R6	19B209113-P1	Variable, wirewound: 250 ohms ±20%, 2.5 w, linear taper.
R8	19B209022-P127	Wirewound; 3.3 ohms ±10%, 2 w. Added by REV B.
		- - - - - - - - VOLTAGE REGULATORS - - - - -
VR1	4036887-P9	Silicon, Zener

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - -
C501 and C502	19A115028-P220	Mylar® dielectric, dipped phen: radial leads, 0.68 µf ±10%, 100 VDCW.
C503 and C504	19A115028-P259	Mylar® dielectric, dipped phen: radial leads, 0.47 µf ±10%, 400 VDCW.
C505	5491656-P39	Tubular, Mylar® dielectric: axial leads, 1 µf +30% -10%, 600 VDCW; sim to G-E Type 61F.
C506	5490825-P4	Ceramic disc: radial leads, .006 µf ±10%, 2000 VDCW; sim to RMC Type JF Discap.
C508	7476442-P19	Tubular, twist-prong, electrolytic: polarized, 750 µf +250% -10%, 25 VDCW.
C511	19A115028-P16	Mylar® dielectric, dipped phen: radial leads, 0.22 µf ±20%, 200 VDCW.
C512	19B200184-P8	Tubular, Mylar® dielectric: axial leads, 1.5 µf ±20%, 100 VDCW; sim to Good-All Types 663F and 663FR.
C513	5496267-P18	Tubular, hermetically sealed, tantalum, dry solid: axial leads, 6.8 µf ±20%, 35 VDCW; sim to Sprague 150D685X0035B2.
C514	7489483-P11	Tubular, hermetically sealed, electrolytic: axial leads, 20 µf +75% -10%, 50 VDCW; sim to Sprague 30D198A1.
C515	5496267-P18	Tubular, hermetically sealed, tantalum, dry solid: axial leads, 6.8 µf ±20%, 35 VDCW; sim to Sprague 150D685X0035B2.
C510	19A115028-P15	Mylar®, dielectric, dipped phen: radial loads, 0.15 uf. ±20%. 200 VDC.
C516*	19A115028-P14	Polyester: 0.1 µf ±20%, 200 VDCW. Added by Rev. E.
C517* and C518	5491189-P10	Polyester: 0.47 µf ±20%, 50 VDCW. Added by Rev. E.
		- - - - - - DIODES AND RECTIFIERS - - - - - -
CR501* thru CR504	19A115845-P1 4037822-P1	Silicon. In REV. D and earlier: Silicon.
CR505* thru CR508	19A115845-P2 4037822-P2	Silicon. In REV. D and earlier: Silicon
CR509 and CR510	4037898-P2	Silicon
CR511 and CR512	4037822-P1	Silicon
		- - - - - - - - - - FUSES - - - - - - - - - -
F503	7487942-P28	Cartridge, slow blowing: 2.5 amp at 125 v; sim to Bussmann MDL-2.5.
		- - - - - - - JACKS AND RECEPTACLES - - - - -
J503	19B209109-P1	Connector, phen: 18 contacts; sim to Beauchaine and Sons 3305-39.
J504	PL-19A121524-G1	Connector, phen: 8 contacts rated at 15 amps at 1100 VRMS.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L501	19B200775-P2	Reactor: 0.45 h +0.1 -.05 h min, 20 ohms ±10% DC res, 1000 v peak, 420 VDC operating.
L502	19B200777-P1	Reactor: 0.1 h min, 12 ohms ±10% DC res, 720 v peak, 300 VDC operating.
L504	19A115392-P1	Coil, RF: 50 µh ±10% at 1 KC, .02 ohm DC res.
L505	19A115543-P1	Choke, RF: 240 µh ±10% at 1 KC, 0.128 ohm DC res.
		- - - - - - - - - - PLUGS - - - - - - - - -
P501 and P502	19B209151-P1	Terminal: solderless; sim to Amp 42284-5.
P503	19B209109-P2	Connector, phen: 18 contacts; sim to Beauchaine and Sons 3305-38.
P505	19B204781-P1	Female, phen: No. 1-12 contacts rated at 2 amps at 850 VDC max, No. 13 contact rated at 4 amps at 450 VDC max.
		- - - - - - - - - TRANSISTORS - - - - - - - -
Q507	19A115341-P1	Germanium, PNP.
Q508*	19A115527-P1 19A115267-P1	Germanium, PNP. In REV B and earlier: Germanium, PNP.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - TRANSISTORS (Cont'd)- - - - - - - -
Q509	4037993-P1	Germanium, PNP; sim to Type 2N1303.
Q510 and Q511	19A115531-P1	Germanium, PNP; sim to Type 2N1073B.
Q512 thru Q515	5490810-P1	Germanium, PNP.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R503	5493035-P3	Wirewound, ceramic: 2 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R505	5493035-P4	Wirewound, ceramic: 80 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R506	5493035-P2	Wirewound, ceramic: 1 ohm ±5%, 5 w; sim to Tru-Ohm Type X-60.
R507	5493035-P7	Wirewound, ceramic: 180 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R508 and R509	5493035-P6	Wirewound, ceramic: 3 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R510	3k77-P222K	Fixed composition: 2200 ohms ±10%, 1/2 w.
R511 and R512	3R77-P394K	Fixed composition: 0.39 megohm ±10%, 1/2 w.
R513	3R77-P751K	Fixed composition: 750 ohms ±10%, 1/2 w.
R514	3R77-P682K	Fixed composition: 6800 ohms ±10%, 1/2 w.
R515	3R77-P222K	Fixed composition: 2200 ohms ±10%, 1/2 w.
R516	19B209113-P3	Variable, wirewound: 1000 ohms ±20%, 2.5 w, linear taper.
R517	3R77-P751K	Fixed composition: 750 ohms ±10%, 1/2 w.
R519	5493035-P9	Wirewound, ceramic: 300 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R520	3R77-P100K	Fixed composition: 10 ohms ±10%, 1/2 w.
R521	3R77-P683K	Fixed composition: 68,000 ohms ±10%, 1/2 w.
R522	3R77-P271K	Fixed composition: 270 ohms ±10%, 1/2 w.
R523	5493035-P4	Wirewound, ceramic: 80 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
		- - - - - - - - - - THERMISTORS - - - - - - - -
RT501	19B209278-P1	Disc: no load res 1.41 ohms at 25°C.
		- - - - - - - - - TRANSFORMERS - - - - - - - -
T503	PL-19C304124-G1	Transformer.
T504	PL-19C304113-G1	Transformer.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - -
TB1	PL-19A121572-G1	Eyelet board.
TB2	PL-19A121568-G1	Eyelet board.
TB3	PL-19B204520-G2	Eyelet board.
TB4	7775500-P2	Phen: 3 terminals.
		- - - - - - - - - VOLTAGE REGULATORS - - - - -
VR501	4036887-P6	Silicon, Zener®.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XQ507 thru XQ511	5491888-P1	Transistor, power, phen: sim to Cinch 133-92-10-034.

SYMBOL	G-E PART NO	DESCRIPTION
		MECHANICAL PARTS (SEE RC-1205)
1	4032596-P1	Nut. No. 10-32. (Used with Q512-515).
2	N405P9C13	Lockwasher: approx 5/16 inch dia. No. 10. (Used with Q512-515).
3	4034225-P1	Flat washer: approx 1/2 inch dia. (Used with Q512-515).
4	4034215-P1	Bushing: approx 9/32 inch dia.
5	4031291-P1	Transistor insulator. (Used with Q512-515).
6	19C303751-P1	Heat sink, chassis: approx 14-1/2 x 3-1/2 x 1-3/4 inches.
7	19A115221-P3	Mica washer: approx 1/2 inch dia. (Used with Q512-515).
8	4036835-P1	Solder terminal: sim to Shakeproof 214-14-000. (Used with Q512-515).
9	7118719-P4	Mounting clip: sim to Prestole E-50005-038. (Used with L504 and L505).
10	7118719-P6	Mounting clip: sim to Prestole E-50008-038. (Used with C508).
11	7108469-P1	Fuse clip: sim to Littelfuse 122063. (Used with F503).
12	4036555-P1	Washer, insulator: nylon. (Used with Q1, Q2 and Q509).
13	7878455-P1	Terminal lug.
14	7763541-P4	Cable clamp. (Used with P505 cable).
15	4029974-P1	Transistor insulator. (Used with Q507 and Q508).
16	PL-19B204533-G1	Support. (Used with power supply cover).
17	7160861-P4	Speed nut: spring; sim to Tinnerman C6432-8E-157. (Used with power supply cover).
18	19A121220-P2	Support: approx 1-3/4 x 1/2 x 5/8 inches.
19	PL-19B204538-G2	Support.



PRODUCTION CHANGES

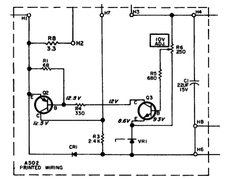
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - To protect the 10-volt regulator against reverse polarity. Added CR1 to the 10-volt regulator board A502.

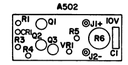
REV. B - To improve operation of the 10-volt regulator. Deleted Q1 and added R8.

REV. C - To improve reliability of the 10-volt regulator. Changed Q508 and changed the 10-volt regulator board from A502 to A501.

A502 Schematic Diagram was:



A502 Outline Diagram was:



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

REV. E - To reduce voltage spikes and ripple. Changed CR501-CR508, and added C516, C517 & C518.

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-3578

DF-0059

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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