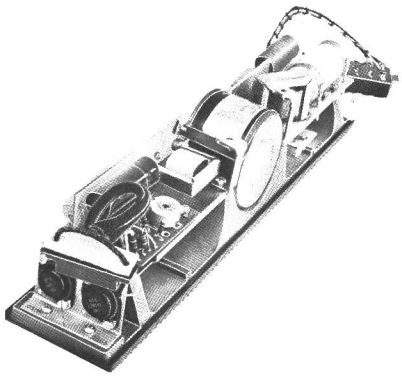
MOBILE RADIO

# MASTR Progress Line

## 12-VOLT, 30 WATT POWER SUPPLY MODEL 4EP37B10



Maintenance Manual LBI-3503J

EP-37-B

## SPECIFICATIONS *

| Type Number | EP-37-B | |
|---|---|---|
| Output | Voltage | Current |
| Regulated Receiver | 10 volts | 150 mA |
| Regulated Transmitter | | |
| 25-88 MHz | -20 volts | 45 mA |
| 132-470 MHz | -20 volts | 90 mA |
| Bias | -45 volts | |
| Low B-Plus | | |
| 25-88 MHz | 300 volts | 70 mA |
| 132-174 MHz | 300 volts | 110 mA |
| 406-470 MHz | 300 volts | 95 mA |
| High B-Plus | | |
| 25-88 MHz | 455 volts | 150 mA |
| 132-174 MHz | 450 volts | 160 mA |
| 406-470 MHz | 430 volts | 200 mA |
| Battery Drain | | |
| Transmit | | |
| 25-88 MHz | 13.6 volts | 12 amps |
| 132-174 MHz | 13.6 volts | 12 amps |
| 406-470 MHz | 13.6 volts | 14 amps |
| Receive | | |
| Standby-Squelched | 13.8 volts | 150 mA |
| Standby-Unsquelched | 13.8 volts | 1.1 amps |
| Squelched-Transmitter Filaments on | 13.8 volts | 1.2 amps (25-174 MHz)<br>2.1 amps (406-470 MHz) |
| Transistors | | |
| Multivibrator Circuit | 2 | |
| 10-Volt Regulator Circuit | 3 | |
| -20 Volt Regulator Circuit | 2 | |
| Rectifiers | 10 | |
| Zener Diodes | 2 | |
| Battery Voltage | 13.6 volts ±20% (postive or negative ground, 12-volt system | |
| 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.

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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 4EP37B10 is used with 12-volt, 30/35-watt MASTR mobile combinations. The power supply provides:

- Plate, screen and bias voltages for the transmitter multiplier and power-amplifier stages,
- Regulated -20 volts for the transistorized transmitter exciter board,
- Regulated +10 volts for the receiver and for the transmitter Channel Guard.

Low voltage for the transmitter filaments and the receiver audio amplifiers is taken directly from the vehicle battery.

## CIRCUIT ANALYSIS

The fully transistorized power supply uses highly efficient silicon rectifiers for reliable operation. The use of Mylar® capacitors provides 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.

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

**NOTE**

No damage will occur if the radio is installed with the polarity accidentally reversed, as long as the transmitter is not keyed. Always check to see if the receiver is operating properly before keying the transmitter.

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. Figure 1 is a simplified power distribution and switching diagram.

MULTIVIBRATOR CIRCUIT (Figure 2)

Power Supply Model 4EP37B10 uses transistors as switches in an inductively coupled multivibrator circuit. These switches connect the battery voltage across alternate halves of the transmitter primary, resulting in alternating square waves. The output of the multivibrator circuit (square wave generator) is stepped up by power transformer T502, then rectified and filtered to supply B-plus and bias voltage for the transmitter.

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

Assuming that Q501 will initially conduct more than Q502, Q501 will draw more current through winding 1-2/3 of T502 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 the windings 5-6-7, causing winding 7 to become negative with respect to the emitter of Q501. This increased bias causes Q501 to conduct even harder. At the same time, winding 5 becomes positive with respect to the emitter of 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.

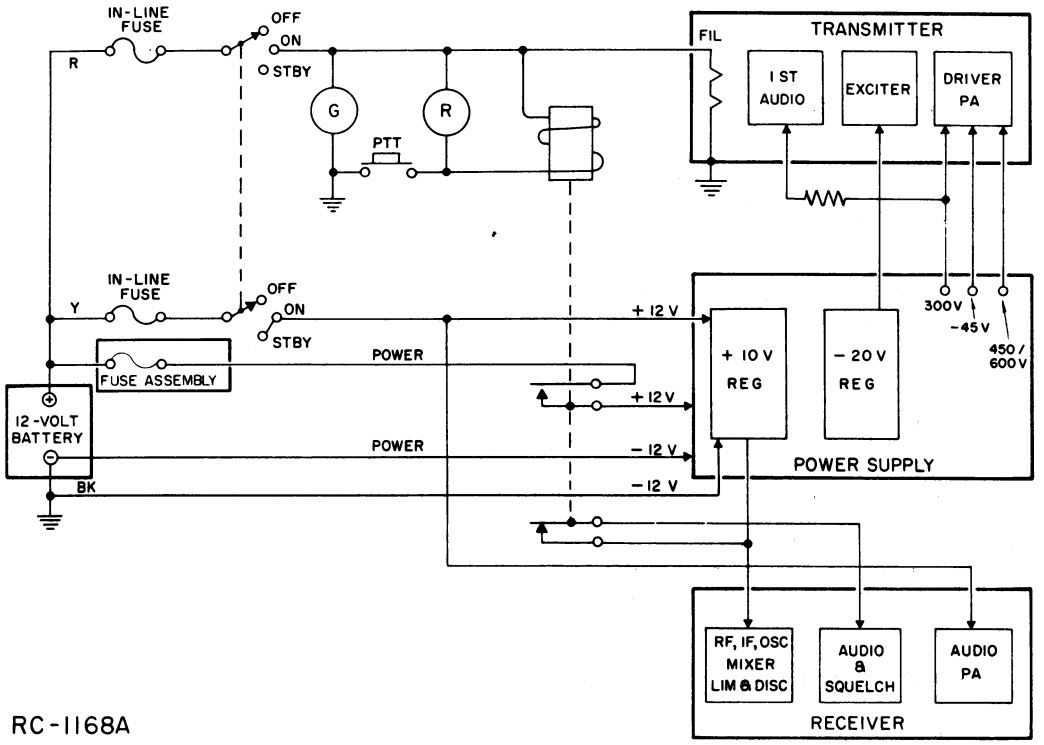
The voltage being induced in winding 5-7 therefore falls to zero, reducing the bias to Q501 to that obtained through R504. This reduced bias tends to cut off Q501 and reduce the current through winding 1-2/3.

The collapsing magnetic field in T502 induces a reverse voltage across winding 5-6-7, biasing Q501 off and biasing 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.

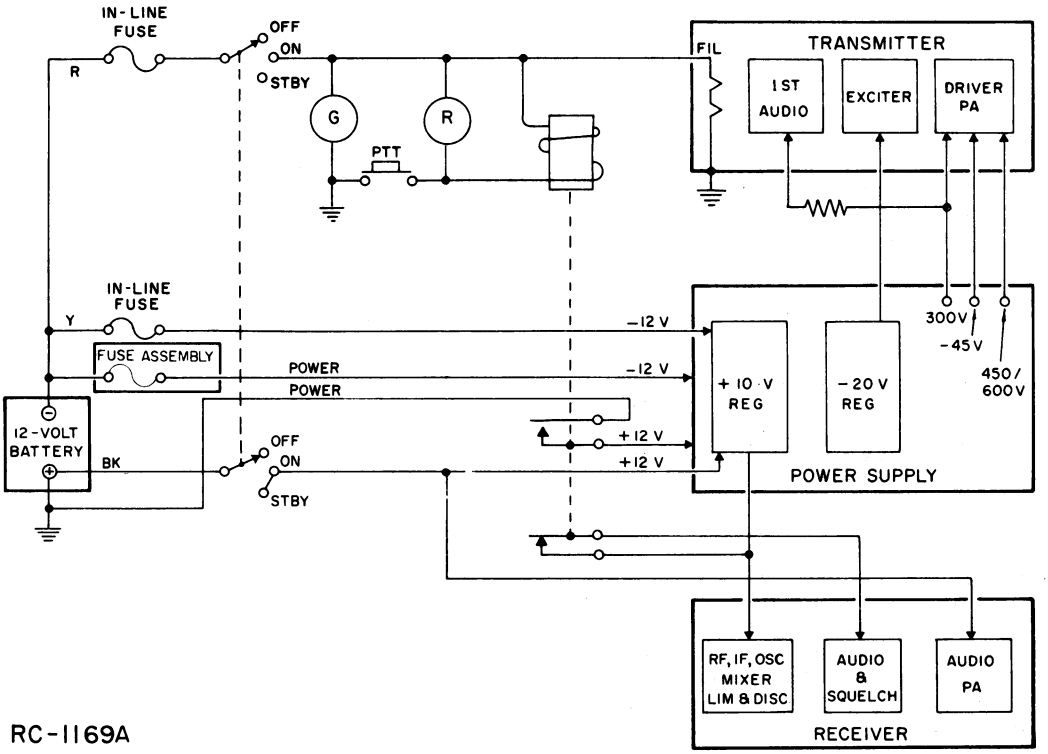
The two transistors continue to conduct alternately at a frequency of approximately 1330 hertz. The resulting waveform approaches that of a perfect square wave.

12 VOLT NEGATIVE GROUND




RC-1168A

12 VOLT POSITIVE GROUND




RC-1169A

Figure 1 - 12-Volt Power Distribution Diagrams

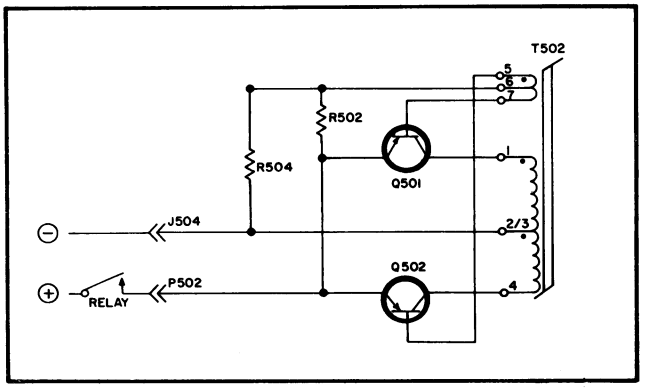



Figure 2 - Simplified Multivibrator Circuit

RECTIFIER AND FILTER CIRCUITS

Negative Bias and 20-Volt Regulator Supply (Figure 3) - The AC voltage developed across secondary windings 12-8-14 of transformer T502 is rectified by full-wave rectifiers CR501 and CR502. It is then filtered by C501, L502 and C502 to supply a negative 45 volts for the control grids of the transmitter driver and power amplifier, and also to supply 45 volts for the input of the 20-volt regulator. The bias voltage is present as a protective measure to limit cathode current in the PA tube while the PA is untuned, or in the case of loss of drive to the PA.

Transmitter Multiplier B-Plus (Figure 4) - The AC voltage developed across high voltage secondary windings of T502 is rectified by 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 CR509.

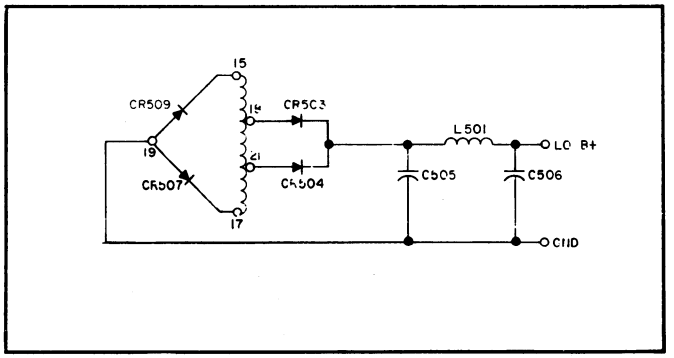



Figure 4 - Transmitter Multiplier B-Plus Circuit

Filtering is provided by L-C filter C505, L501 and C506. Relatively small values of L and C are required because of the high frequency and the square wave characteristics of the AC voltage. R505 prevents ringing in the oscillator circuit formed by C505, L501 and C506.

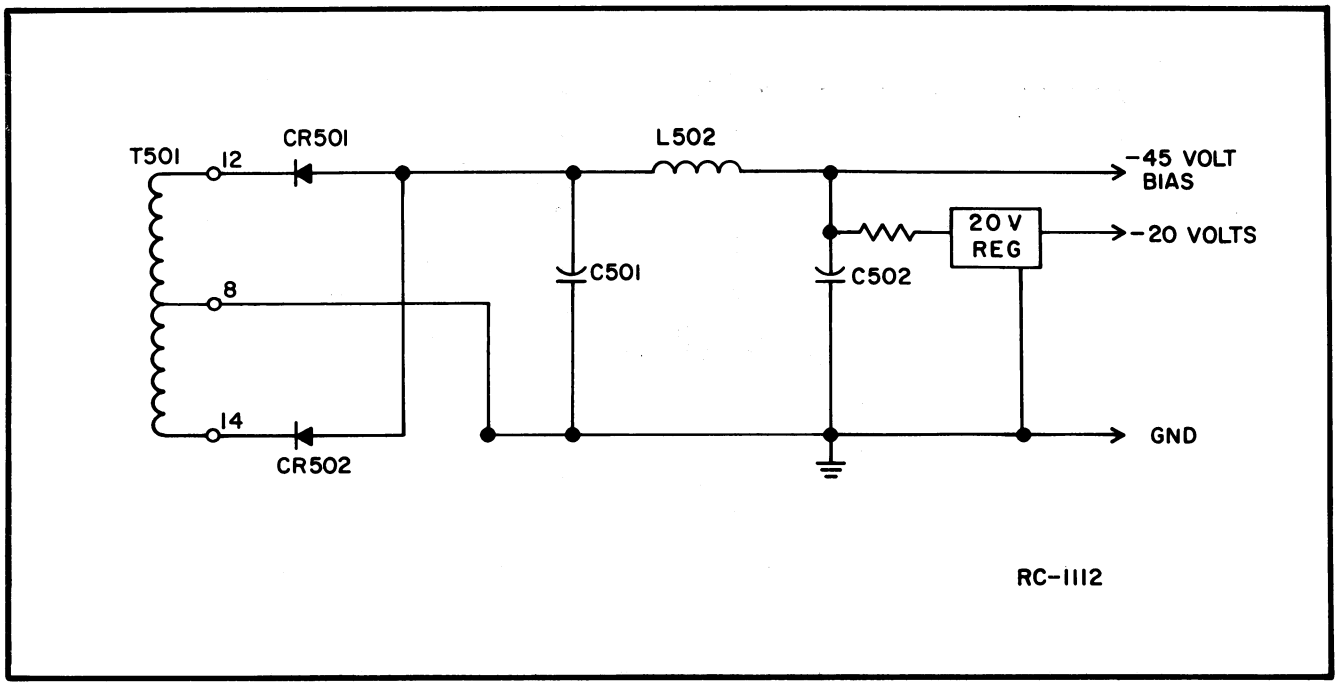



Figure 3 - Bias and 20-Volt Regulator Supply Circuit

Power Amplifier B-Plus (Figure 5) - The AC voltage developed across the high voltage secondary windings 15-17 of T502 is rectified by bridge rectifier circuit CR507, CR508, CR509 and CR510. The output of the bridge rectifier circuit provides the High B-Plus output. Filtering is provided by C508. Resistors R510 and R511 form a bleeder circuit which discharges C508 when the keying relay is opened.

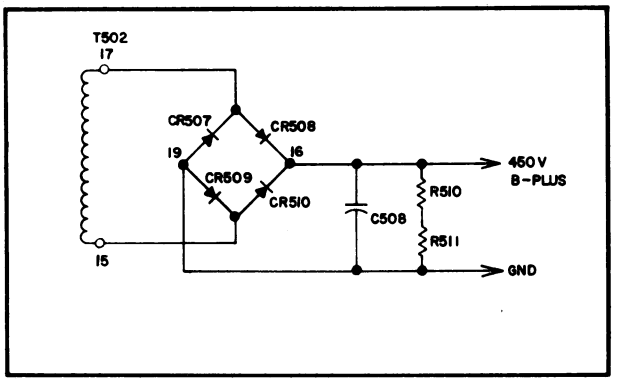



Figure 5 - Power Amplifier B-Plus Circuit

-20 VOLT REGULATOR (Figure 6)

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 TB1-3. Dropping resistor R507 provides the negative bias to turn on Q506. Zener diode VR501 provides a voltage reference for the regulator.

When the input voltage at TB1-3 rises, the output voltage at the emitter of Q506 also tends to rise. This causes a change in the base-emitter bias on Q507, making it conduct more heavily. When Q507 conducts, there is less base bias on Q506, and less base current. With less base current, the voltage drop across Q506 is larger, and the output voltage remains constant.

When the input voltage starts to drop, the output voltage also tends to drop, causing Q507 to conduct less. This increases the forward bias on Q506 and reduces the voltage drop across the transistor so that the output voltage remains constant. Capacitor C511 prevents high frequency oscillation.

R506, R508 and R512 form an adjustable voltage divider so that potentiometer R508 can be adjusted for a -20 volt output. R509 provides bias current for VR501. The output is metered at the transmitter centralized metering jack J102-12.

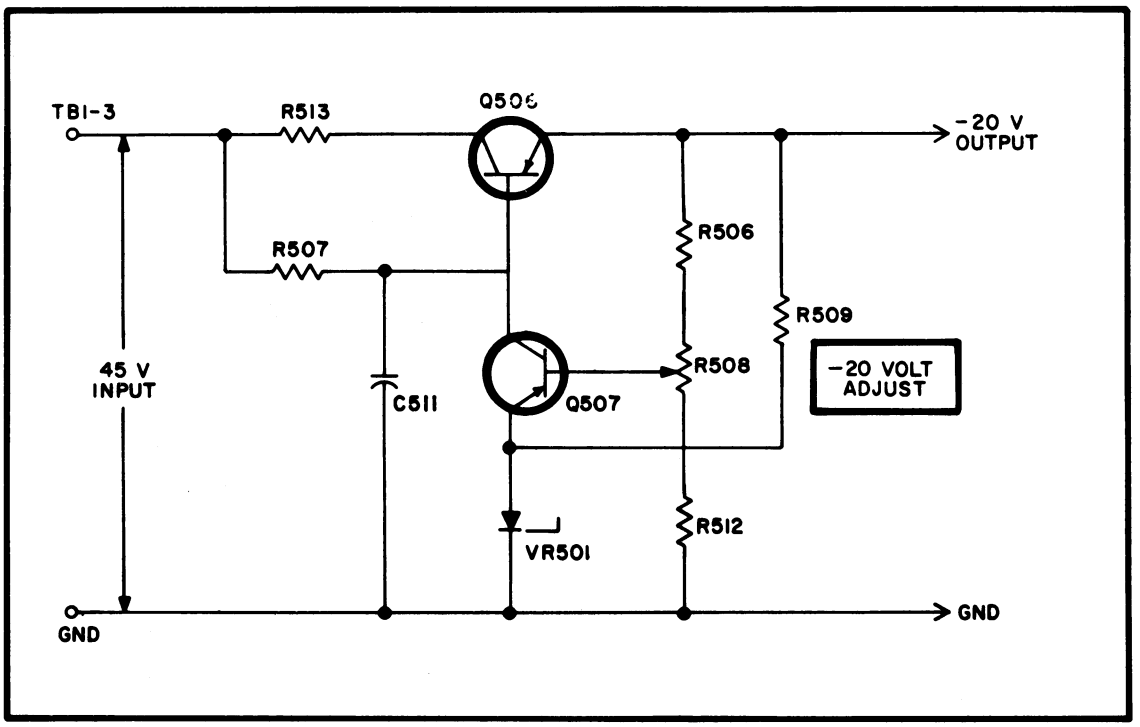



Figure 6 - -20 Volt Regulator Circuit

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. Input voltage is supplied from the Control Unit on P505-5.

When the supply voltage (or output) starts to increase, the voltage at the base of Q1 also increases. As the emitter voltage of Q1 is kept constant by VR1, the emitter-base voltage increases. This causes Q1 to conduct more which means less base current for Q505. The voltage drop across Q505 becomes larger and the output remains constant.

When the input voltage starts to drop, the output voltage also tends to drop and Q1 will conduct less. This increases the forward bias on Q505 and reduces the voltage drop across Q505 to keep the output constant.

Diode CR1 gives reverse polarity protection to the supply. Potentiometer R4 is used to set the emitter-base voltage of Q1 for the desired 10-Volt ±5% output. R1 and R3 limit maximum current through Q1. R2 provides bias current for Zener diode VR1, and resistor R7 provides bias for Q505. C1 and C3 prevent high frequency oscillation. The output voltage is metered at P505-7.

RECEIVER MUTING

Transistor Q2 on the 10-volt regulator board operates as a switch for the receiver muting +10 volts. When the transmitter is not keyed, the base of Q2 is connected to ground, causing Q2 to conduct. When conducting, the +10 volts at the collector of Q2 is coupled from P505 to the base of receiver DC amplifier Q9, turning it on. With Q9 conducting Q10 is turned off, allowing the receiver to operate normally.

Keying the transmitter applies +12 volts to the base of the PNP muting switch (Q2), turning it off. This removes the +10 volts to receiver DC amplifier Q9, turning it off. Turning off Q9 causes DC amplifier Q10 to turn on, which turns off the receiver audio stages and mutes the receiver.

# 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 the thermal 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 in which the power supply is mounted 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 along with ignition switch cables to maintain current 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 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.

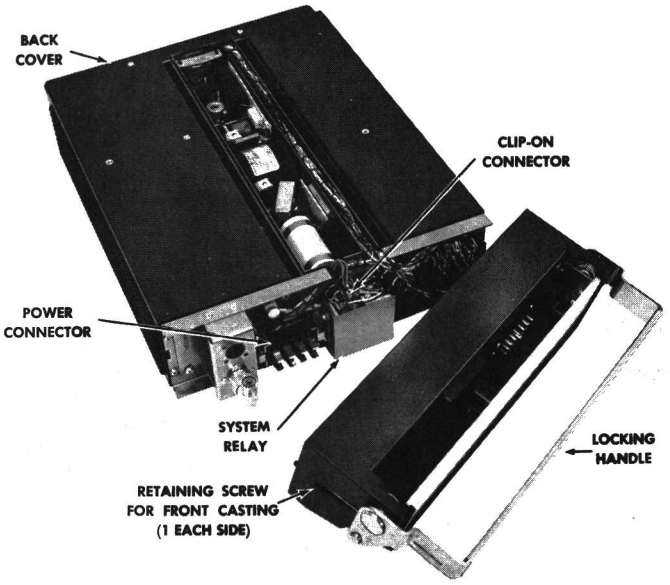
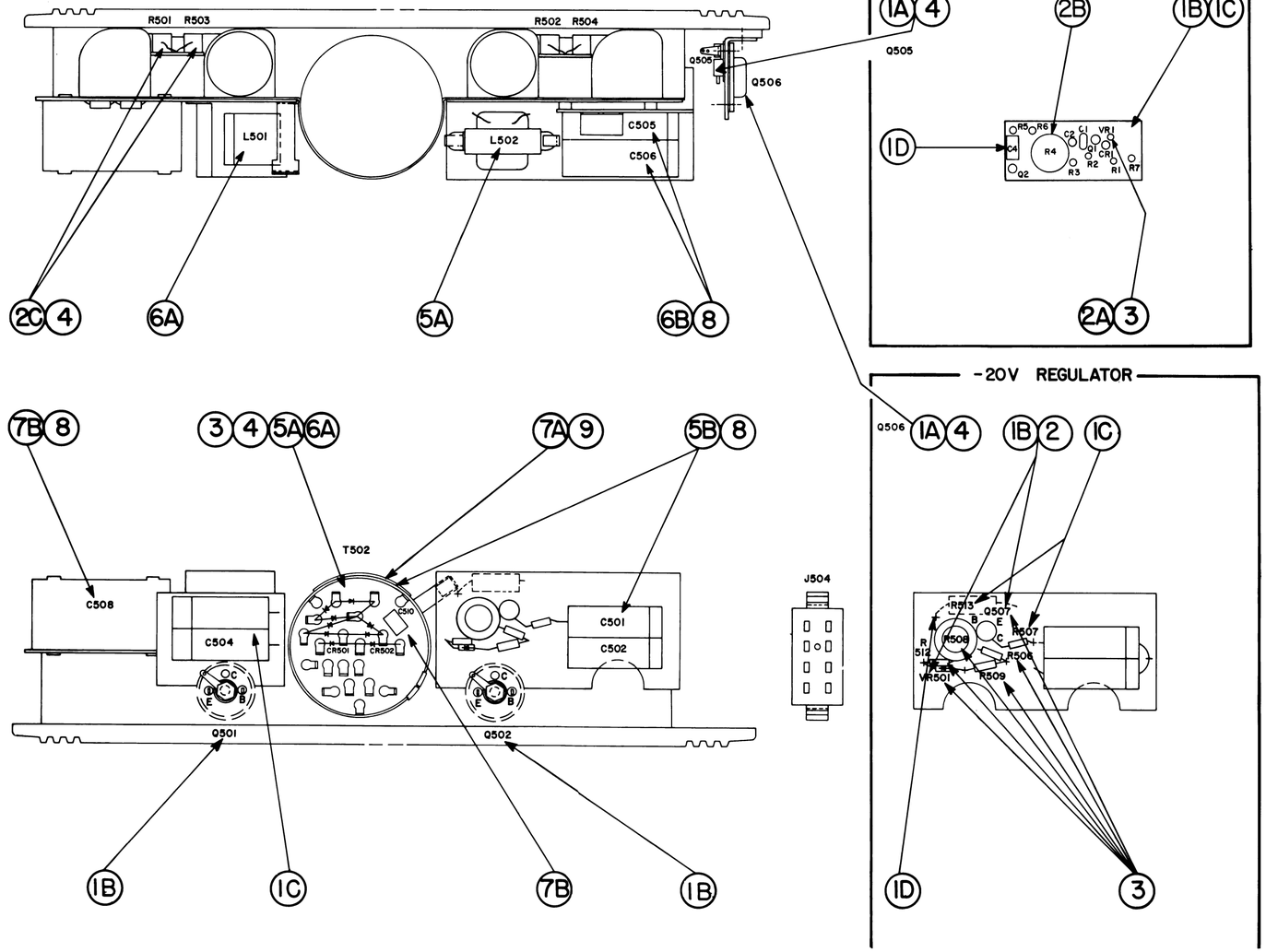



Figure 7 - Disassembly of Power Supply

# STEP 1 - QUICK CHECKS

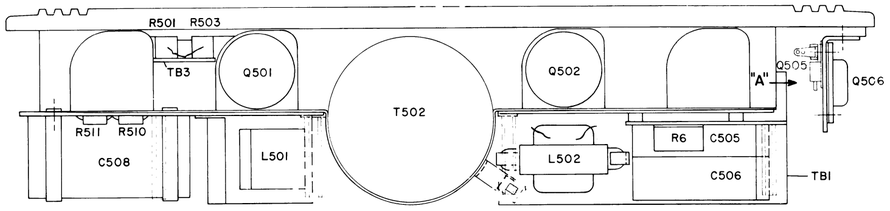
| SYMPTOM | PROCEDURE |
|---|---|
| No power supply output voltages at P505 when unit is keyed | Check for 12 volts at J504-3-7. If O.K., go to Step 2; otherwise check:<br>1. A. Check fuse assembly for open circuit. If fuse is open, check:<br>B. Collector-to-emitter short in Q501, Q502, primary wiring short.<br>C. If Q501 or Q502 is shorted, check for shorted C504. |
| | With 12 volts at J504, check the following steps:<br>2. A. Open fuse in system cable.<br>B. Keying relay in system should close when PTT switch is depressed.<br>C. Open R501, R503. |
| | 3. Check T502 for shorts and opens. Check for shorted winding turns by applying a 1/2-volt P-P from an audio signal generator to the primary winding of T502. Check output of each secondary winding with a scope. No output indicates shorted turns. |
| Output voltages low | 4. Open R501, R503, diodes in affected circuit. |
| No -45 volts at P505-2. | 5. A. Open CR501, CR502, L502, T502.<br>B. Shorted C502, C501, T502. |
| No 300 volts at P505-1. | 6. A. Open CR503, CR504, CR507, CR509, L501, T502.<br>B. Shorted C505, C506. |
| No 450 volts at P505-9 | 7. A. Oper CR507 through CR510 (two or more), T502.<br>B. Shorted C508, C510. |
| Excessive output ripple voltages | 8. Open diodes, C501, C502, C505, C506, C508, C510. |
| Reverse or high output voltage on bias output | 9. Check for short between bias output winding and B+ output winding of T502. |
| 10-VOLT REGULATOR | |
| No 10 volts regulated at P505-7 | 1. Check for the following:<br>A. Open Q505.<br>B. 12 volts input.<br>C. Open DS1 (where applicable).<br>D. Shorted C4.<br>E. Open fuse in vehicle system. |
| Output voltage too high, cannot be adjusted by R6 | 2. A. Check for open VR1.<br>B. Defective R4. |
| Very low output voltage | 3. Check for a shorted VR1 |
| Output voltage equals input voltage | 4. Shorted Q505. |
| -20 VOLT REGULATOR | |
| No -20 volt regulated at P505-3 | 1. Check for the following:<br>A. Open Q506.<br>B. Shorted Q507 and/or VR501.<br>C. Open R507, R513.<br>D. -45 volts at TB1-18. |
| Very low output voltage | 2. Shorted Q507 or VR501. |
| Output voltage too high, cannot be adjusted by R508 | 3. Open VR501, Q507, R506, R508, R509, R512. |
| Output voltage equals input voltage | 4. Shorted Q506. |

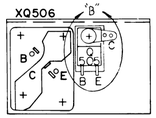


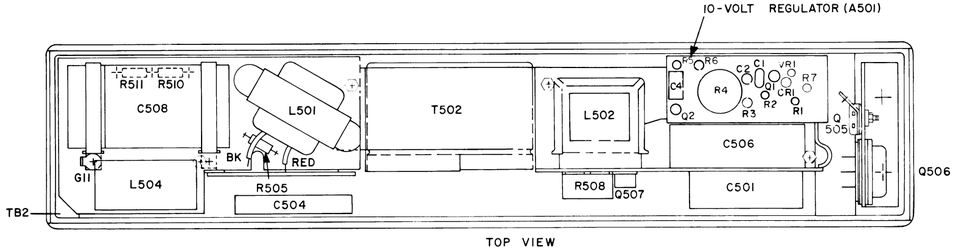

RC-1155C

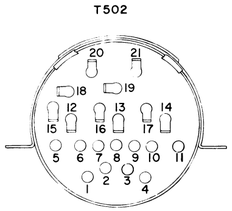
## TROUBLESHOOTING PROCEDURE

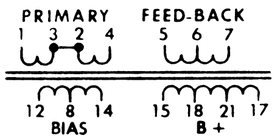
30/35-WATT MASTR POWER SUPPLY
MODEL 4EP37B10

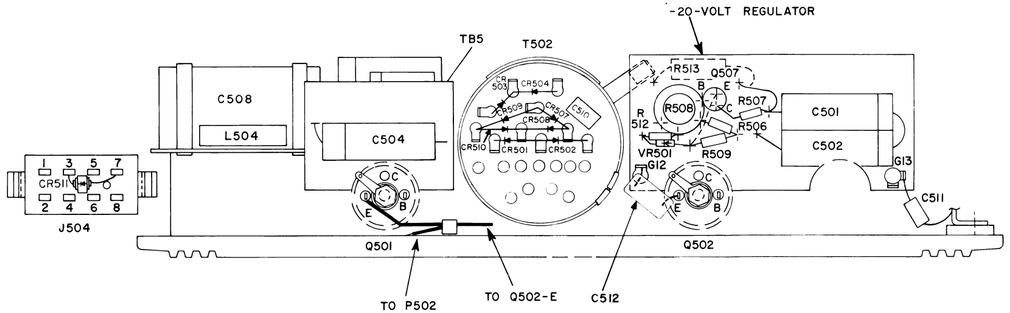


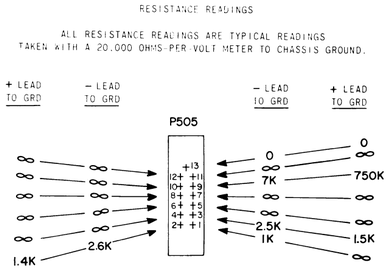



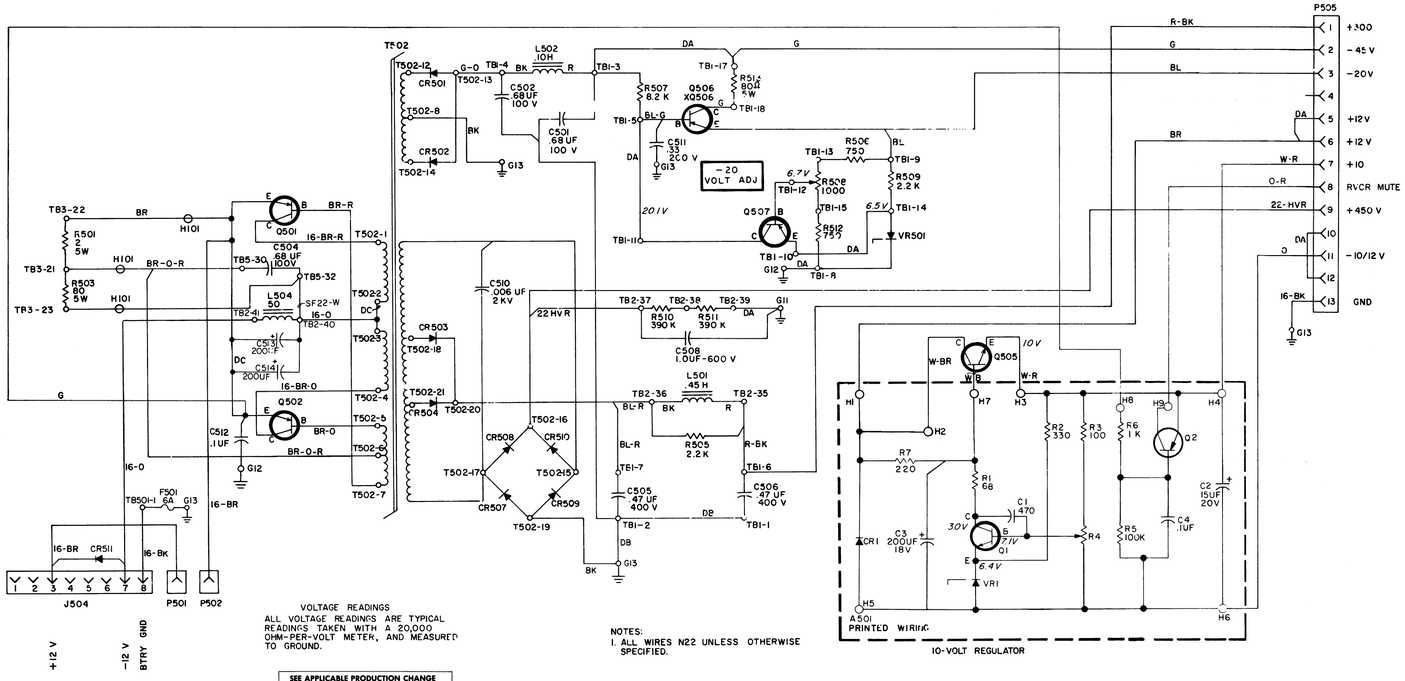




(19D402568, Rev. 10)

## OUTLINE DIAGRAM

30/35-WATT MASTR POWER SUPPLY
MODEL 4EP37B10




SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

| THIS ELEM DIAG APPLIES TO | |
|---|---|
| MODEL NO | REV LETTER |
| 4EP37B10 | U |

NOTE

For 60-watt input (Class A Citizens Band) move the two red wires from T502-16 to T502-20.

# SCHEMATIC DIAGRAM

30/35-WATT MASTR POWER SUPPLY
MODEL 4EP37B10

Issue 9

## PARTS LIST

LBI-3581J

12 VOLT 30 WATT POWER SUPPLY
MODEL 4EP37B10
19D402277G2

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| A501* | | 10 VOLT REGULATOR BOARD 19C317751G1 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C1 | 7774750P1 | Ceramic disc: .00047 µf +100 -0%, 500 VDCW. |
| C2 | 5496267P14 | Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D. |
| C3 | 19A115680P10 | Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT. |
| C4 | 19A116080P107 | Polyester: 0.1 µf ±10%, 50 VDCW. |
| | | - - - - - - - - DIODES AND RECTIFIERS - - - - - - |
| CR1 | 4037822P1 | Silicon. |
| | | - - - - - - - - INDICATING DEVICES - - - - - - - - |
| DS1* | 4034664P1 | Lamp, incandescent: 28 v; sim to GE 2148. Deleted by REV R. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q1* | 19A116755P1 | Silicon, NPN; sim to Type 2N3947. |
| | | In REV T and earlier: |
| | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| Q2* | 19A115852P1 | Silicon, PNP; sim to Type 2N3906. |
| | | In REV T and earlier: |
| | 19A115768P1 | Silicon, PNP; sim to Type 2N3702. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - - |
| R1 | 3R77P680K | Composition: 68 ohms ±10%, 1/2 w. |
| R2 | 3R77P331J | Composition: 330 ohms ±5%, 1/2 w. |
| R3 | 3R77P101J | Composition: 100 ohms ±5%, 1/2 w. |
| R4 | 19A115681P1 | Variable: 1000 ohms ±20%, 3 w. |
| R5 | 3R77P102K | Composition: 0.10 megohm ±10%, 1/2 w. |
| R6* | 3R77P102K | Composition: 1000 ohms ±10%, 1/2 w. |
| | | In REV L and earlier: |
| | 3R77P103K | Composition: 10,000 ohms ±10%, 1/2 w. |
| R7* | 3R77P221J | Composition: 220 ohms ±5%, 1/2 w. Added by REV R. |
| | | - - - - - - - - VOLTAGE REGULATORS - - - - - - - - |
| VR1 | 4036887P6 | Silicon, Zener. |
| | | In Models of REV G, H, J and K: |
| A501* | | 10 VOLT REGULATOR BOARD 19C303420G7 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C4 | 7774750P1 | Ceramic disc: .00047 µf +100 -0%, 500 VDCW. |
| C5 | 5496267P14 | Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D. |
| C6 | 19A115680P10 | Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT. |
| | | - - - - - - - - DIODES AND RECTIFIERS - - - - - - |
| CR3 | 4037822P1 | Silicon. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - INDICATING DEVICES - - - - - - - - |
| DS1 | 4034664P1 | Lamp, incandescent: 28 v; sim to GE 2148. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q5 | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - - |
| R8 | 3R77P680K | Composition: 68 ohms ±10%, 1/2 w. |
| R9 | 3R77P331J | Composition: 330 ohms ±5%, 1/2 w. |
| R10 | 3R77P101J | Composition: 100 ohms ±5%, 1/2 w. |
| R11 | 19A115681P1 | Variable: 1000 ohms ±20%, 3 w. |
| | | - - - - - - - - VOLTAGE REGULATORS - - - - - - - - |
| VR4 | 4036887P6 | Silicon, Zener. |
| A501* | | In Models of REV D, E and F: 10-VOLT REGULATOR BOARD 19C303420G6 |
| | | - - - - - - - - - - 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 H. |
| CR3* | 4037822P1 | Silicon. Added by REV H. |
| | | - - - - - - - - INDICATING DEVICES - - - - - - - - |
| DS1 | 4034664P1 | Lamp, incandescent: 28 v; sim to GE2148. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q5 | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - - |
| R8* | 3R77P680K | Composition: 68 ohms ±10%, 1/2 w. |
| | | In Models of REV D 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: 1000 ohms ±20%, 3 w. |
| | | - - - - - - - - VOLTAGE REGULATORS - - - - - - - - |
| VR4 | 4036887P6 | Silicon, Zener. |
| A501* | | In Models of REV C and earlier: 10-VOLT REGULATOR BOARD 19C303420G1 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C1 | 5496267P10 | Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D. |
| | | - - - - - - - - DIODES AND RECTIFIERS - - - - - - |
| CR1 | 4037822P1 | Silicon. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - - |
| Q1* | 4037993P1 | Germanium, PNP; sim to Type 2N1303. Deleted by REV C. |
| 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. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| 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 | 3R77P680K | Composition: 68 ohms ±10%, 1/2 w. |
| | | - - - - - - - - VOLTAGE REGULATORS - - - - - - - - |
| VR1 | 4036887P9 | Silicon, Zener. |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C501 and C502 | 19B209004P11 | Polyester: 0.68 µf ±10%, 100 VDCW; sim to Sprague 157P. |
| C504 | 19B209004P11 | Polyester: 0.68 µf ±10%, 100 VDCW; sim to Sprague 157P. |
| C505 and C506 | 5491656P42 | Polyester: 0.47 µf ±20%, 400 VDCW; sim to GE Type 61F. |
| C508 | 5491656P39 | Polyester: 1 µf +30% -10%, 600 VDCW; sim to GE Type 61F. |
| C510 | 5490825P4 | Ceramic disc: 6000 pf ±10%, 2000 VDCW; sim to RMC Type JF Discap. |
| C511 | 19A115028P17 | Polyester: 0.33 µf ±20%, 100 VDCW. |
| C512* | 19A115028P14 | Polyester: 0.1 µf ±20%, 100 VDCW. Added by REV B. |
| C513* and C514* | 19A115680P10 | Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT. Added by REV N. |
| | | - - - - - - - - DIODES AND RECTIFIERS - - - - - - |
| CR501 thru CR504 | 4037822P1 | Silicon. |
| CR507 thru CR510 | 19A115845P4 | Silicon. |
| CR511* | 19A116783P1 | Silicon. Added by REV T. |
| | | - - - - - - - - - - FUSES - - - - - - - - - - |
| F501* | 19A116658P14 | Enclosed link: 6 amp at 250 v; sim to Bussman GJV 6. Added by REV T. |
| | | - - - - - - - - JACKS AND RECEPTACLES - - - - - - |
| J504 | 19A121524G1 | Connector, phen: 8 contacts rated at 15 amps at 1100 VRMS. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - - |
| L501 | 19A121120P1 | 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 ind min at 0.15 amp DC, 12 ohms ±10% DC res, 720 v peak, 300 VDC operating. |
| L504 | 19A115392P1 | Coil, RF: 50 µh ±10% ind at 1000 Hz, .02 ohm DC res. |
| | | - - - - - - - - - - PLUGS - - - - - - - - - - |
| P501 and P502 | 19B209151P1 | Terminal, solderless; sim to Amp 42284-5. |
| P505 | 19B204781P1 | Phen: 13 female contacts. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - - |
| Q501 and Q502 | 5490810P1 | Germanium, PNP. |
| Q505* | 19A116742P1 | Silicon, NPN. |
| | 19A116203P3 | Silicon, NPN. (REV K-T). |
| | 19A116118P1 | Silicon, NPN. (REV J). |
| | 19A115948P1 | Silicon, NPN. (REV F, G, and H). |
| | 19A115527P1 | Silicon, NPN. (REV D and E). |
| | 19A115267P1 | Germanium, PNP. (REV A, B, and C). |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| Q506 | 19A115341P1 | Germanium, PNP. |
| Q507* | 19A115852P1 | Silicon, PNP; sim to Type 2N3906. |
| | | In REV T and earlier: |
| | 19A115768P1 | Silicon, PNP; sim to Type 2N3702. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - - |
| R501 | 5493035P3 | Wirewound, ceramic: 2 ohms ±5%, 5 w; sim to Hamilton Hall Type HR. |
| R503 | 5493035P4 | Wirewound, ceramic: 80 ohms ±5%, 5 w; sim to Hamilton Hall Type HR. |
| R505 | 3R77P222K | Composition: 2200 ohms ±10%, 1/2 w. |
| R506 | 3R77P751J | Composition: 750 ohms ±5% 1/2 w. |
| R507 | 3R77P822K | Composition: 8200 ohms ±10%, 1/2.w. |
| R508 | 19B209113P3 | Variable, wirewound: 1000 ohms ±20%, 2.5 w. |
| R509 | 3R77P222K | Composition: 2200 ohms ±10%, 1/2 w. |
| R510 and R511 | 3R77P394K | Composition: 0.39 megohm ±10%, 1/2 w. |
| R512 | 3R77P751J | Composition: 750 ohms ±5%, 1/2 w. |
| R513 | 5493035P4 | Wirewound, ceramic: 80 ohms ±5%, 5 w; sim to Hamilton Hall Type HR. |
| | | - - - - - - - - - - TRANSFORMERS - - - - - - - - - - |
| T502 | 19C304106G2 | Transformer. |
| | | - - - - - - - - TERMINAL BOARDS - - - - - - - - |
| TB1 | 19C303431G1 | Eyelet board. |
| TB2 | 19B204509G1 | Eyelet board. |
| TB3 | 19B204463G1 | Eyelet board. |
| TB5 | 19C303422G1 | Eyelet board. |
| | | - - - - - - - - VOLTAGE REGULATORS - - - - - - - - |
| VR501 | 4036887P6 | Silicon, Zener. |
| | | - - - - - - - - - - SOCKETS - - - - - - - - - - |
| XQ505* | 5491888P1 | Transistor, phen: sim to Cinch 133-92-10-034. Deleted by REV D. |
| XQ506 | 5491888P1 | Transistor, phen: sim to Cinch 133-92-10-034. |
| | | MECHANICAL PARTS (SEE RC-1173) |
| 1 | 7763541P4 | Cable clamp. (Used with P505 cable). |
| 2 | 4036555P1 | (Not Used). |
| 3 | 7140624P6 | Spacer. (Used with A501). |
| 4 | 19C303429P1 | Support. (Used with A501). |
| 5 | 7160861P2 | Speed nut. (Used with T502). |
| 6 | 19A121220P1 | Support. (Used with power supply cover). |
| 7 | 19B204454G2 | (Not Used). |
| 8 | 19D402261P1 | Heat sink. |
| 9 | 7160861P10 | (Not Used). |
| 10 | 7142162P89 | (Not Used). |
| 11 | 19B204431P1 | Support. (Used with Q505 and Q506). |
| 12 | 4029974P1 | Transistor insulator. (Used with Q506). |
| 13 | 4031291P1 | Transistor insulator. (Used ith Q501 and Q502). |
| 14 | 4034215P1 | Bushing. (Used with Q501 and Q502). |
| 15 | 4024225P1 | Flat washer. (Used with Q501 and Q502). |
| 16 | X405P9C13 | Lockwasher. No. 10. (Used with Q501 and Q502). |
| 17 | 4032596P1 | Nut. No. 10-32. (Used with Q501 and Q502). |
| 18 | 4036835P1 | Solder terminal. (Used with Q501 and Q502). |
| 19 | 19A115221P3 | Mica washer. (Used with Q501 and Q502). |
| 20 | 7160861P4 | Speed nut. (Used with power supply cover). |
| 21 | 19A116023P2 | Insulator. (Used with Q505). |
| 22 | 19A115222P3 | Insulator, bushing. (Used with Q505). |

## 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 to the 10-volt regulator board A502.

REV. B - To reduce power supply switching spike from primary power supply leads. Added C512.

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

REV. D - To improve reliability of 10-volt regulator. Changed Q505 and 10-volt regulator circuit.

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

REV. F - To incorporate different transistor. Changed Q505.

REV. G - To reduce alternator noise to the receiver. Changed 10-volt regulator board A501.

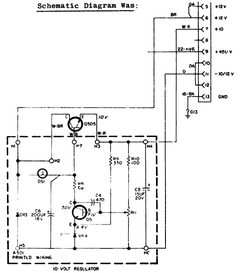
REV. H - To provide protection against reverse polarity. Deleted CR2 and added CR3 to 10-volt regulator A501.

REV. J - To incorporate different transistor. Changed Q505.

REV. K - To provide a more reliable connection to the 10-volt regulator transistor. Changed Q505.

REV. L - To incorporate a transistor switch on the 10-volt regulator board for receiver muting. Added C4, R5, R6, Q2 and new regulator board.

Schematic Diagram Was:




REV. M - To improve receiver muting when operating -20% battery voltage. Changed R6.

REV. N - To reduce residual spike deviation. Added C513 & C514.

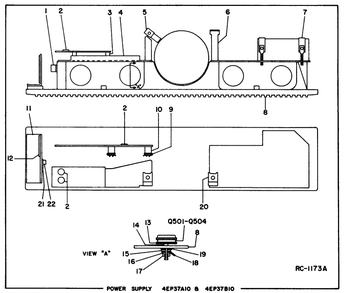
REV. P - To improve electrical performance and mechanical construction. Added standoffs. Changed DA wire from between TB5-32 and TB2-40 to EP22-W.

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

REV. S - To improve filtering. Changed connection of C513 and C514.

REV. T - Provide reverse polarity protection. Add CR511, F501 and TB501.

REV. U - To improve reliability of 20-volt regulator circuit. Changed Q507. Improve reliability of 10-volt regulator. Chnaged Q1 and Q2.




POWER SUPPLY 4EP37A10 & 4EP37B10

*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

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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.

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**MAINTENANCE MANUAL**

LBI-3503

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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