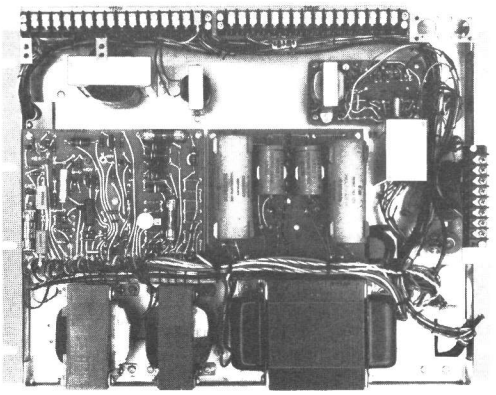
MOBILE RADIO

MASTR® PROGRESS LINE

TRANSMITTER-RECEIVER POWER SUPPLY MODEL 4EP38A12 & LINE AMPLIFIER MODELS 4EA24A12,13



SPECIFICATIONS *

MODEL NUMBER:	**4EP38A12**
DIMENSIONS (W x H):	19" x 14"
INPUT:	117 VAC ±20%, 50/60 Hz, 2.4 amps

OUTPUT:

	132—174 MHz 30 WATTS	25—50 MHz & 66—88 MHz 35/30 WATTS	406—470 MHz 35 WATTS	132—174 MHz 90 WATTS	25—50 MHz 100 WATTS	406—470 MHz 70 WATTS
Bias	-45 V @ 10 mA	-45 V @ 10 mA	-45 V @ 10 mA	-45 V @ 10 mA	-45 V @ 10 mA	-45 V @ 10 mA
Low B+	300 V @ 55 mA	300 V @ 52 mA	300 V @ 52 mA	300 V @ 105 mA	300 V @ 69 mA	300 V @ 105 mA
High B+	450 V @ 160 mA	450 V @ 150 mA	300 V @ 200 mA	680 V @ 220 mA	665 V @ 280 mA	665 V @ 270 mA
Regulated	-20 V @ 80 mA	-20 V @ 60 mA	-20 V @ 80 mA	-20 V @ 80 mA	-20 V @ 60 mA	-20 V @ 100 mA
Regulated	10 V @ 100 mA	10 V @ 100 mA	10 V @ 100 mA	10 V @ 100 mA	10 V @ 100 mA	10 V @ 100 mA
Regulated	12.6 V @ 3.8 amps	12.6 V @ 3.8 amps	12.6 V @ 3.8 amps	12.6 V @ 3.8 amps	12.6 V @ 3.8 amps	12.6 V @ 3.8 amps

FUSES:	F501 - 5 amps, 125 Volts F1 - 5 amps, 250 Volts F2 - 3/4 amp, 250 Volts F3 - 1/2 amp, 250 Volts
DUTY CYCLE:	Continuous
AMBIENT TEMPERATURE RANGE	-30°C (-22°F) to +60°C (+140°F)
METERING:	All voltages measured at terminal strips on wiring side of power supply board with a 20,000 ohm-per-volt multimeter.

MODEL NUMBER:	**4EA24A12,13** (DM, PM & VM Combinations only)
INPUT POWER:	30 milliamperes @ +10 VDC
OUTPUT IMPEDANCE:	600 ohms
AUDIO FREQUENCY CHARACTERISTICS:	
4EA24A12	Within +1 dB to -3 dB of a 6-dB/octave de-emphasis from 300 to 3000 Hz.
4EA24A13	Within +1 dB to -8 dB of a 6-dB/octave de-emphasis from 300 to 3000 Hz.
DISTORTION:	Less than 5%

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

4EP38A12 & 4EA24A12,13

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

POWER SUPPLY

The General Electric Transistorized Power Supply Model 4EP38A12 is a combined transmitter and receiver power supply for MASTR Progress Line Base Stations. The power supply provides:

- High B-plus for transmitter PA
- Low B-plus for the transmitter multiplier stages
- -45 Volts bias for the transmitter power amplifier
- Regulated -20 Volts for the transmitter exciter board
- Regulated +12.6 Volts for heaters, receiver audio, relays and lamps
- Regulated +10 Volts for the transmitter Channel Guard and receiver RF stages

The transmitter and receiver units are mounted on the front side of the Power Supply Panel. Power supply output voltages are connected to the transmitter and receiver through power cable plugs P103 and P443 respectively.

A fan is mounted on the front panel to provide air-cooling for the transmitter and regulator transistors. The fan turns on when the ambient temperature rises enough to operate thermostat switch S502, or when the station is keyed.

LINE AMPLIFIER

Line Amplifier Models 4EA24A12 and 4EA24A13 are used in MASTR DM, PM and VM Local/Remote and Remote Control station applications for matching the receiver output to a 600-ohm telephone pair. The line amplifier is also used in stations equipped with the receiver voting option.

The line amplifier provides the required de-emphasis, and amplifies the audio to drive the telephone pair. The line amplifier also contains a squelch circuit to eliminate noise feed-through to the telephone pair while the receiver is squelched. The amplifier assembly is mounted on the back of the power supply.

POWER TRANSFORMER HIGH & LOW VOLTAGE TAP CHART

Secondaries for the high voltage and low voltage supplies are tapped and are connected according to the high voltage B-plus required by the transmitter as shown in the chart below. The High B-plus readings shown in the chart are typical readings.

TRANSMITTER RATING	POWER TRANSFORMER SECONDARY TAPS (JUMPERS ON A501)	READING AT HIGH B+ OUTPUT AT A501-H57
132-174 MHz, 30 Watts	H60 to H65 H39 to H41	450 Volts
25-88 MHz, 30 Watts	H60 to H65 H39 to H41	450 Volts
406-470 MHz, 30-35 Watts	H60 to H65 H38 to H39	450 Volts
132-174 MHz, 80 Watts	H59 to H60 H38 to H39	680 Volts
25-50 MHz, 100 Watts	H59 to H60 H38 to H39	665 Volts
406-470 MHz, 60 Watts	H59 to H60 H38 to H39	665 Volts
132-174 MHz and 450-MHz limited 120-Watt input	H59 to H60 H38 to H39 H63 to H65	480 Volts
450-MHz limited 60-Watt input	H39 to H41 Remove F3	300 Volts
25-50 MHz and 132-174 MHz 250/330-Watt Exciter	H39 to H41 Remove F3	300 Volts
450-470 MHz 200 Watt Exciter	H38 to H39 Remove F3	300 Volts

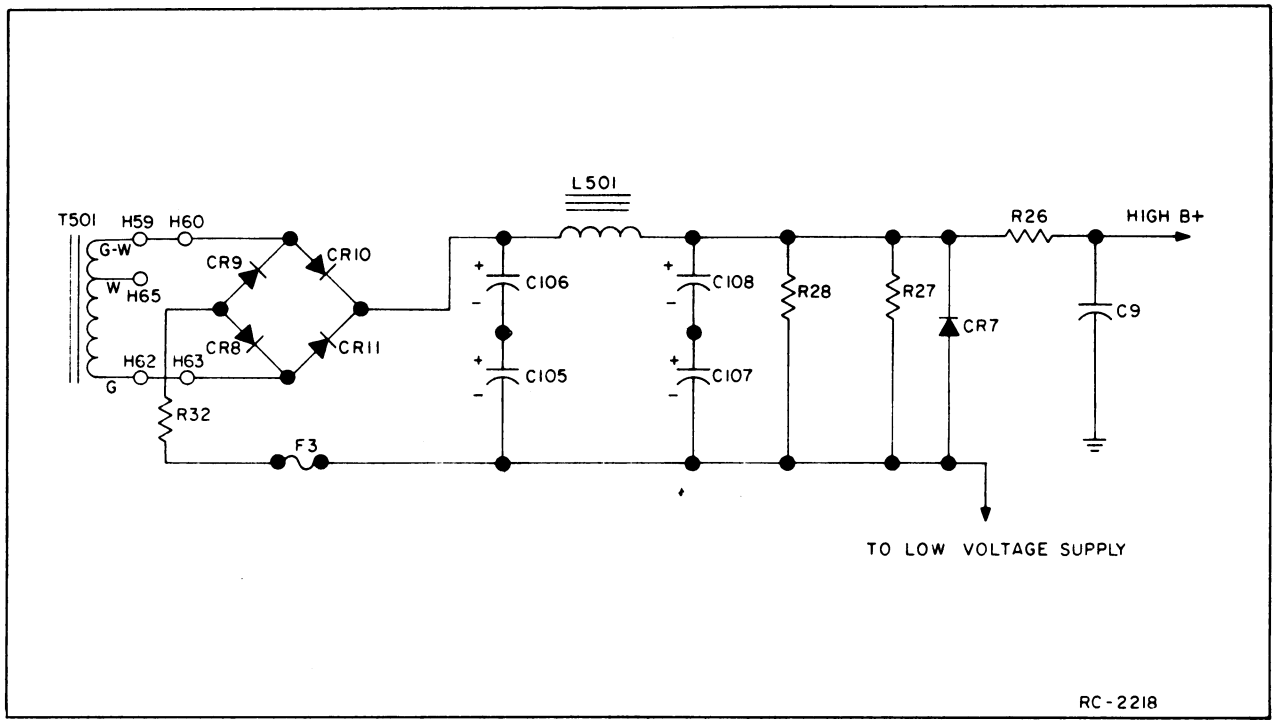


Figure 1 - High Voltage Supply Circuit

CIRCUIT ANALYSIS

POWER SUPPLY

When the power supply ON-OFF switch S501 is turned on, 117 Volts AC at 50/60 Hz from TB502-14 and -15 is applied across the primary (black leads) of power transformer T501. Fuse F501 is in series with switch S501 and TB502-14 to protect the power supply from overload.

The power transformer secondary consists of four windings (two with adjustable taps) to provide AC for the high and low B-plus supplies, bias and regulated supplies.

HIGH VOLTAGE SUPPLY (450-650 VOLTS)

The AC voltage developed across the high voltage secondary winding (green-white, white and green wires) is rectified by the bridge circuit silicon rectifiers CR8, CR9, CR10 and CR11. The rectified voltage is filtered by the pi-filter choke L501, capacitors C105, C106, C107 and C108. The 300 Volts B-plus from the low B-plus supply is "stacked" with the 150- or 350-Volt high B-plus supply (depending on tap setting) to provide the 450- or 650-Volt output of the high voltage supply.

300 Volts from the low voltage supply is connected into the high voltage bridge rectifier circuit at H30 through resistor R32.

Silicon rectifier CR7 is a protective device for the electrolytic filter capacitors. If fuse F3 should blow, reverse voltage across C105 through C107 will be shorted by CR7, thereby preventing damage to the capacitors. Resistors R27 and R28 are bleeder resistors.

LOW VOLTAGE SUPPLY (300 VOLTS)

T501 red, red-white, and orange secondary windings provide the 300-Volt AC voltage which is rectified by the bridge circuit of silicon rectifiers CR3, CR4, CR5 and

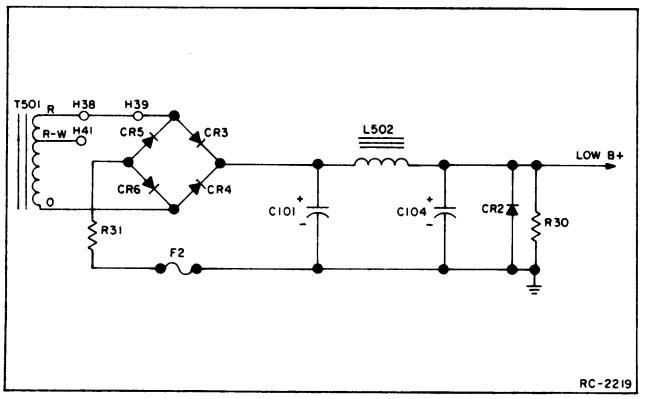


Figure 2 - Low Voltage Supply

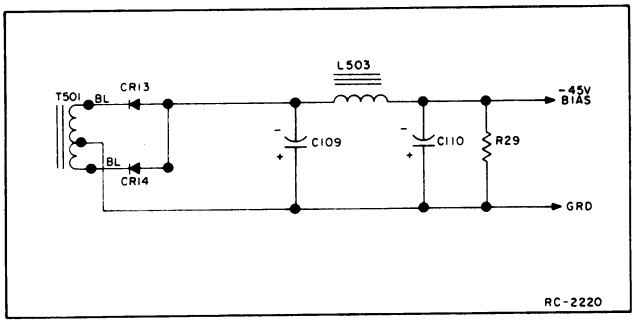


Figure 3 - -45 Volt Bias Supply

CR6. The rectified output voltage is filtered by pi-filter consisting of choke L502, capacitors C101 and C104. The output is in series with the high B-plus circuit to provide "stacking" for the high voltage circuit. Silicon rectifier CR2 is used as a protective device for the electrolytic filter capacitors. If fuse F2 should blow, reverse voltage across C101 and C104 will be shorted by CR2, thereby preventing damage to the capacitors (see Figure 2).

-45 VOLT BIAS SUPPLY (Figure 3)

The AC developed across the two blue wires (with center tap to ground) of the T501 secondary is rectified by full-wave silicon rectifiers CR13 and CR14. The rectified voltage is filtered by pi-filter choke L503 and capacitors C109 and C110 to supply a negative 45-Volt bias.

REGULATED -20 VOLT SUPPLY (Figure 4)

The -45 Volts unregulated is also taken off at the minus side of filter capacitor C110 and connects to the normally open contact 5R on relay K501. When the transmitter is keyed, K501 energizes and contacts 5R and 6R close, applying -45 Volts to the regulator circuit. Voltage dropping resistor R18 provides the negative bias to turn on Q504. Zener diode VR3 provides reference for the regulator.

When the output voltage attempts to go more negative, the voltage at the base of Q4 also goes more negative. This causes a change in the base-emitter bias on Q4, making it conduct more heavily. When Q4 conducts, there is less base bias on Q504, and less base current flow. With less base current flow, the voltage drop across Q504 is larger, and the output voltage tends to remain constant.

When the output voltage starts to go less negative, the forward bias on Q4 decreases. Q4 conducts less and reduces the voltage drop across R18 so that the forward bias on Q504 is increased and the output voltage remains constant.

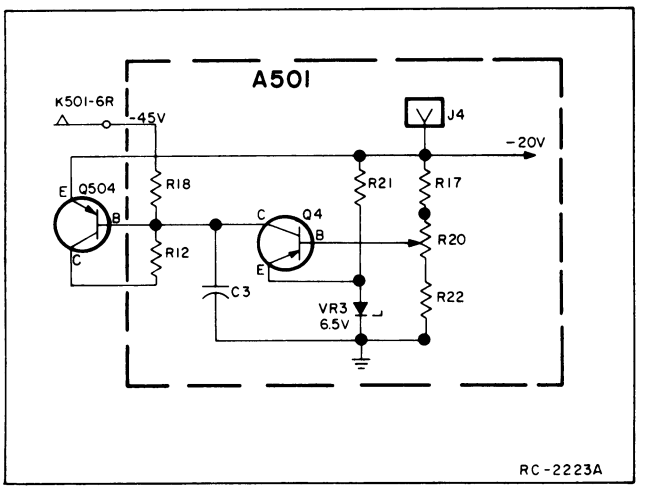


Figure 4 - Regulated -20 Volt Supply

Capacitor C3 prevents high frequency oscillation and also helps to filter the input voltage. R21 provides voltage to operate the zener diode VR3. R17, R20 and R22 form a voltage divider that can be varied by potentiometer R20 to adjust the base voltage of Q1 which sets the output at -20 Volts. This output is measured at jacks J1 and J4 on power supply board A501. The voltage is regulated to -20 Volts ±5%.

REGULATED 12.6-VOLT SUPPLY (Figure 5)

The AC developed across the two brown secondary wires of T501 is rectified by full-wave rectifier circuit CR501 and CR502. The output is taken off at the center tap of T501 and is filtered by choke input filter L504 and capacitors C102 and C103. The output of the filter circuit is applied to the emitters of Q501 and Q502 through R1 and R2. When the output of Q501 and Q502 tries to rise, the base of Q1 is made more positive. This increases the current flow through R3 and R4, decreasing the positive voltage at the base of driver transistor Q503. Q503 will then conduct more heavily, causing a greater voltage drop across R501. The bases of Q501 and Q502 will become more positive, causing them to conduct less. This keeps the voltage at the output terminal at the regulated voltage level. R1 and R2 equalize current through Q501 and Q502.

When the output of Q501 and Q502 tries to drop, Q1 will conduct less. This decreases the forward bias on Q503 to reduce the voltage drop across R501. This will cause Q501 and Q502 to conduct more heavily and hold the output voltage constant. Zener diode VR1 provides a voltage reference for regulator Q1. VR501 protects Q503 from current surges. C502 prevents high frequency oscillation in Q503 under light load conditions.

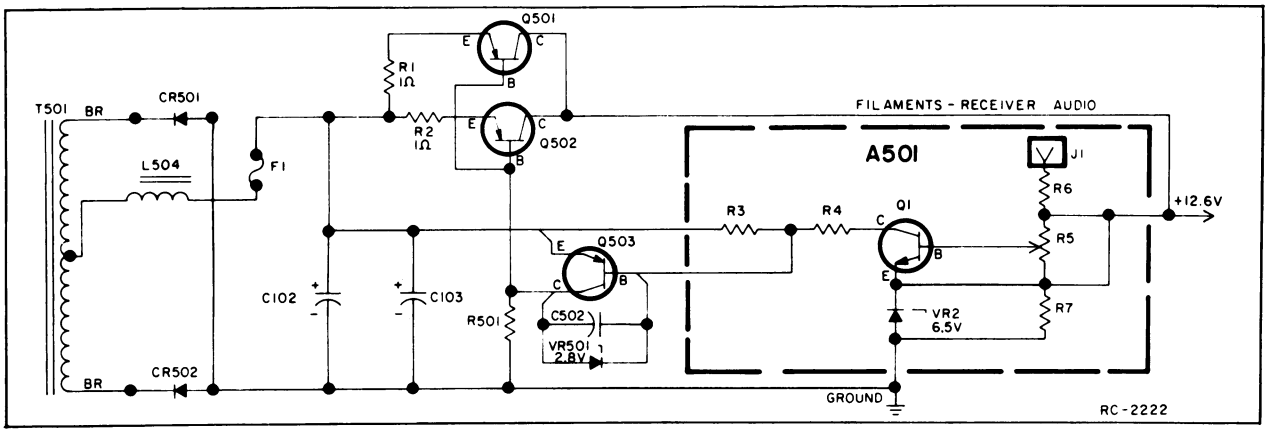


Figure 5 - Regulated 12.6-Volt Supply

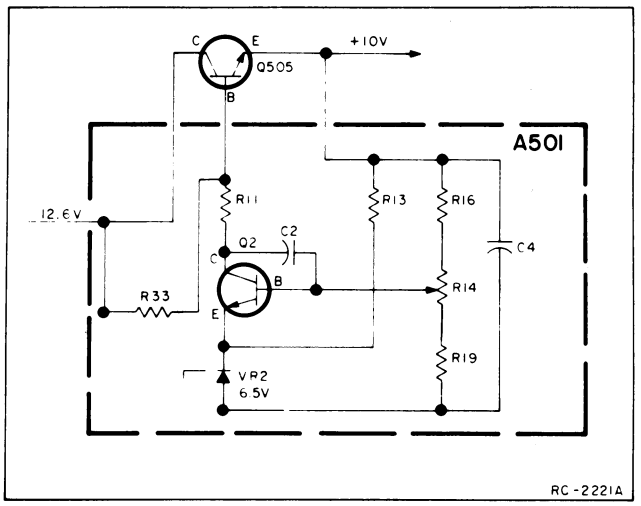


Figure 6 - Regulated +10-Volt Supply

The output is set by potentiometer R6 to produce a +12.6-Volt, ±5% reading. The output is measured at J1 and J2 on A501.

REGULATED +10-VOLT SUPPLY (Figure 6)

The input voltage to the 10-Volt regulator circuit is taken from the +12.6-Volt regulated supply.

When the supply voltage (or output) starts to increase, the voltage at the base of Q2 also increases. As the emitter voltage of Q2 is kept constant by zener diode VR2, the emitter-base voltage increases. This causes Q2 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 Q2 will conduct less. This increases the forward bias on Q505 and reduces the voltage drop across the transistor to keep the output constant.

Potentiometer R14 is used to set the emitter-base voltage of Q2 for the desired 10-Volt, ±5% output. R11 and R16 limit maximum current through Q2. R13 provides bias current for zener diode VR2, and R33 provides bias for Q505. C2 and C4 prevent high frequency oscillation. The output voltage is metered at J3 and J1 (GRD) on A501.

RECEIVER MUTING

Transistor Q3 operates as a switch for the receiver muting +10 Volts. A continuous +10 Volts is applied to the collector of Q2. When the transmitter is unkeyed, +12.6 Volts is applied to the base of the transistor, causing it to conduct. When conducting, the +10 Volts at the emitter of Q2 is coupled through P443-2 to the base of receiver DC amplifier Q9, turning it on. When Q9 conducts, DC amplifier Q10 is turned off, and the receiver operates normally.

Keying the transmitter grounds the base of Q3, turning it off. This removes the +10 Volts to receiver DC amplifier, turning it off. Turning off Q9 causes Q10 to turn on, which turns off the receiver audio amplifiers and mutes the receiver.

VOLTAGE SUPPLY RELAY (K501)

When the transmitter is keyed, K501 becomes energized and the following connections are made:

- High voltage supply stacked on low voltage supply
- Low voltage to transmitter

- Input to 20-Volt regulator
- 12.6 Volts is applied to TB501-15 to light the red transmitter pilot lamp (also mutes additional receivers if used)
- Starts blower

ANTENNA RELAY OPTION (K502)

In the normally closed position, antenna relay K502 connects the receiver to the antenna system. The relay becomes energized when the transmitter is keyed, thereby opening the receiver antenna circuit and connecting the transmitter into the antenna system.

Jack J503 is connected to the common lead of K502 and is mounted into the left hole in the antenna mounting bracket. The incoming antenna transmission line plugs into J503. The receiver antenna cable from K502 plugs into J441 on the receiver and transmitter antenna lead from K502 plugs into J103 on the transmitter.

MICROPHONE INPUT CIRCUIT

In Local/Remote, Remote or Repeater applications, the circuit connected to mike jack J902 is used to isolate the high impedance mike and the control panel which acts as a 600-ohm impedance across TB502-12 and -13.

CR1 is a back-biased diode in series with the audio input from the control panel. A +9-Volt drop across R15 provides +1 Volt with respect to ground at the cathode of CR1 which reverse biases the diode. The mike is then loaded only by the transmitter and R25 (both are relatively high impedances).

The control unit attached to TB502-12 and -13 supplies +10 Volts (when keyed) which is divided by voltage divider R23 and R24, producing 4.5 Volts on the anode of the diode. This forward biases the diode, allowing the audio from the control unit to modulate the transmitter.

C7, R24 and R25 are also used to equalize the high frequency response when the control panel is the audio source.

LINE AMPLIFIER

Line Amplifier Model 4EA24A12 is used in stations without Channel Guard, and Model 4EA24A13 is used in stations with Channel Guard. All connections to the amplifier board are made at TB1501. The LINE LEVEL ADJUST potentiometer R1501 is mounted on the power supply chassis adjacent to the VOLUME and SQUELCH controls. Supply voltage is provided by the power supply 10-Volt regulator. Receiver audio applied to the line amplifier is taken from volume high (R511-3) on the station power supply.

Model 4EA24A12

Audio from the receiver is applied to the base of 1st audio amplifier Q1. The output of Q1 is applied to de-emphasis network R5 and C2 which provides 6-dB per octave roll-off. Following the de-emphasis network is buffer-amplifier Q2. The output of the buffer stage is coupled through LINE LEVEL ADJUST potentiometer R1501 to the base of 2nd amplifier Q3. R1501 is normally set for 2.7 Volts (+11 dB) at the telephone pair. For standard remote control stations, instructions for setting R1501 are contained in the Adjustment Section (see Table of Contents). For stations equipped with the satellite receiver option, instructions for setting R1501 are contained in the Maintenance Manual for the satellite receiver.

The output of the 2nd amplifier is applied to line driver transistors Q4 and Q5. Q4 operates as a current amplifier and Q5 as a voltage amplifier. The line driver output is coupled through line-matching transformer T1 to line output terminals TB1501-6 and -7. In standard remote stations, the line output is connected to TB701-1 and -2 on remote control panel Model 4KC16A12. For stations with the satellite receiver option, the line output is connected to TB1-4 and TB1-5 on the Tone/Audio board.

The operation of line drivers Q4 and Q5 is controlled by squelch switch transistors Q6 and Q7. When the station receiver unsquelches, the COS feed voltage applied to the base of Q6 rises from zero to approximately 3 Volts DC. This voltage turns on Q6, which turns on Q7. Turning on Q7 completes the current path for the line drivers, turning them on and applying audio to the line output.

When the receiver squelches, the COS feed voltage drops to zero, turning off Q6 and Q7. The +5 Volts developed across divider network R20 and R21 is applied to the emitter of Q5. This reverse-biases Q5, turning the line drivers off.

The action of C6 and R18 provides a slight delay in turning Q7 on or off. This delay prevents a switching "pop" from being heard in the speaker.

Model 4EA24A13

Audio from the receiver is applied to the base of 1st audio amplifier Q1. The amplifier output is coupled through a de-emphasis network (R5 and C7) and applied to buffer amplifier Q2. Following the buffer is a 180 hertz notch filter for attenuating

the Channel Guard tone. The filter consists of C8 through C14, L1 and R25.

The filter output is coupled through LINE LEVEL ADJUST potentiometer R1501 to the base 2nd audio amplifier Q3. R1501 is normally set for 2.7 Volts (+11 dB) at the telephone pair. For standard remote control stations, instructions for setting R1501 are contained in the Adjustment Section (see Table of Contents). For stations equipped with the satellite receiver option, instructions for setting R1501 are contained in the Maintenance Manual for the satellite receiver.

The output of the 2nd amplifier is applied to line driver transistors Q4 and Q5. Q4 operates as a current amplifier and Q5 as a voltage amplifier. The line driver output is coupled through line matching transformer T1 to line output terminals TB1501-6 and -7. In standard remote stations, the line output is connected to TB701-1 and -2 on remote control panel Model 4KC16A12. For stations with the satellite receiver option, the line output is connected to TB1-4 and TB1-5 on the Tone/Audio board.

The operation of line drivers Q4 and Q5 is controlled by squelch switch transistors Q6 and Q7.

When the station receiver unsquelches, the COS feed voltage applied to the base of Q6 rises from zero to approximately 3 Volts DC. This voltage turns on Q6, which turns on Q7. Turning on Q7 completes the current path for the line drivers, turning them on and applying audio to the line output.

When the receiver squelches, the COS feed voltage drops to zero, turning off Q6 and Q7. The +5 Volts developed across divider network R20 and R21 is applied to the emitter of Q5. This reverse-biases Q5, turning the line drivers off.

The action of C6 and R18 provides a slight delay in turning Q7 on or off. This delay prevents a switching "pop" from being heard in the speaker.

INITIAL ADJUSTMENT

POWER SUPPLY

The adjustment for the power supply includes turning on power switch S501, and adjusting VOLUME control R511 and SQUELCH control R512 as directed in the applicable procedure.

Local and Local/Remote Stations

Set the VOLUME control (R511) to approximately mid-range, and set the SQUELCH control (R512) fully clockwise. This will enable the volume and squelch controls on the front panel to be adjusted for operation near mid-range.

Remote Control Stations

Set the VOLUME control (R511) to approximately mid-range, and set the SQUELCH control (R512) for quieting.

Repeater Stations

Set the VOLUME control (R511) for the desired listening level, and set the SQUELCH control (R512) for quieting.

LINE AMPLIFIER

In standard remote control stations, adjustment for the Line Amplifier consists of setting LINE LEVEL ADJUST R1501. To set R1501:

1. Make sure that TB701-1 and -2 on the remote control panel are terminated with the 600-ohm telephone pair, or a 620-ohm, 1/2-Watt resistor.

2. Connect a signal generator to the receiver antenna jack and apply a 1000 microvolt, 1000 Hz signal with two-thirds rated system deviation.

3. Adjust R1501 for an AC-VTVM reading of 2.7 Volts RMS (+11 dB) at TB701-1 and -2 on the remote control panel.

For stations equipped with the satellite receiver option, refer to the Maintenance Manual for the Satellite Receiver or Voting Selector.

MAINTENANCE

TEST CABLE

A 26-inch coax transmitter test cable is clipped to the outside of the fan ventilating cover on the front side of the power supply so that the transmitter can be swung out for servicing.

To troubleshoot the transmitter, disconnect the cable plug P103 from transmitter jack J103 (refer to Outline Diagram); then remove the extension cable from the ventilating cover and plug one end of the extension cable into J103 on the transmitter and the other end into P103 on the cable that was connected to the transmitter.

MUFFIN FAN LUBRICATION

Muffin fans equipped with a metal bearing cap are permanently lubricated and will require no oiling. For fans equipped with a rubber cap, Oiler Kit No. 19263 (list price $4.25 subject to change) is recommended for oiling the muffin fan. This kit permits oiling without removing the fan from its mounting. A syringe and a supply of oil are provided in the kit. Lubricate the fan at intervals as shown in the following chart.

For Ambient Temperature of: (Approx.)	Lubricate Fan:
80°F or Less	Every 18 to 24 months
100°F	Every 12 to 15 months
120°F or greater	Every 6 to 8 months

A good grade of light instrument oil, such as Aeroshell Fluid No. 12 or Esso Univis® P-38 should be used.

RELAY SERVICING

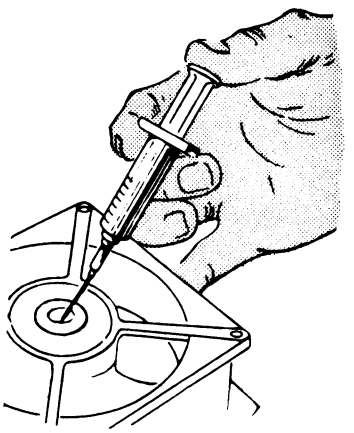
The relays in these units require little care. However, they should be inspected periodically to assure maximum operating efficiency. If the contacts become pitted, they should be cleaned with a burnishing tool to smooth out any metallic deposits. When relay contacts carry little or no current, the contacts do not clean themselves and an insulating coating is apt to form. This coating may be removed by cleaning the contacts with a burnishing tool. Do not oil the relay bearings. When relays are in dusty locations, lubricated bearings will collect dust and grit, and will wear more rapidly than non-lubricated bearings.

Some of the relays used are of the multiple-contact type and, in the unenergized position, should have contact spacings of approximately .010 to .020 inch. More important, the contact spacings on any multiple-contact relay should be equal so that the contact pressures will be equal when the relay is energized. The back pressure of the antenna relay should be at least 15 grams. Low back pressure will shorten the life of contacts, due to excessive arcing, and may also cause noise in the receiver due to chatter of the antenna relay contact under vibration.

OILING INSTRUCTIONS

To inject oil in the bearing:

1. Position the needle at an ange of 45° as shown, and pierce the rubber cap.
2. Depress plunger firmly until oil has gone down one calibration line.
3. Withdraw the needle and wipe off excess oil. Oil may be left in the syringe for future use.



POWER SUPPLY MODIFICATIONS (Figure 7)

A power supply modification is required whenever the station is used in local/ remote or remote stations equipped with the Intercom-Compressor board.

Modification Kit 7145278G2 provides a 3.5-ohm, 5-Watt resistor (R1) that is connected from the receiver audio high to ground. This resistor is used as the receiver load, and is required in all Intercom-Compressor applications.

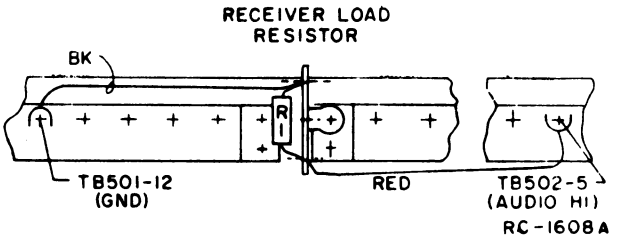


Figure 7 - Intercom-Compressor Modification

CARRIER OPERATED RELAY (Option 7610)

A Carrier Operated Relay (COR) assembly is available for the use with MASTR stations. The COR assembly provides four form C contacts for controlling external circuits whenever a carrier is received. Complete information on the COR is contained in LBI-4093.

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

GENERAL ELECTRIC*
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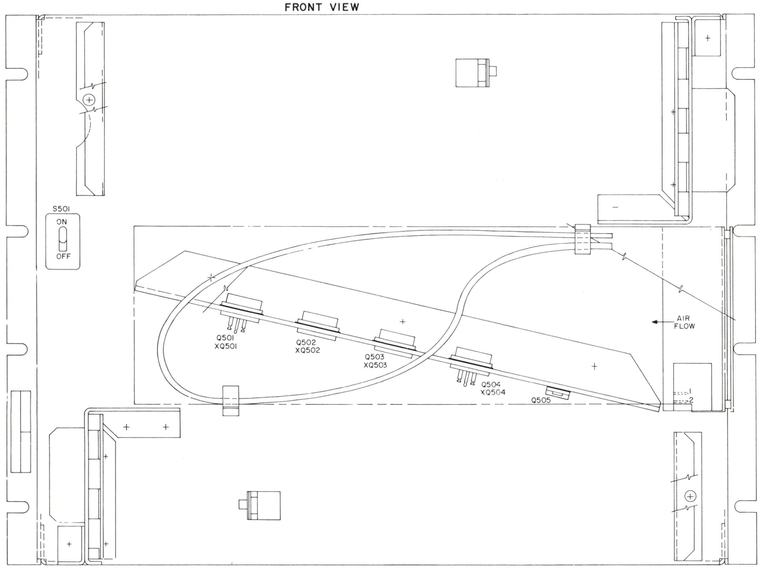
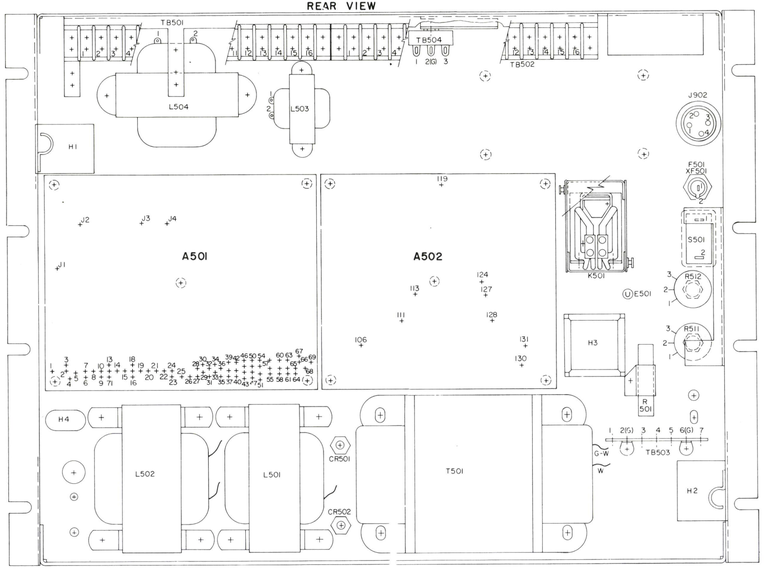
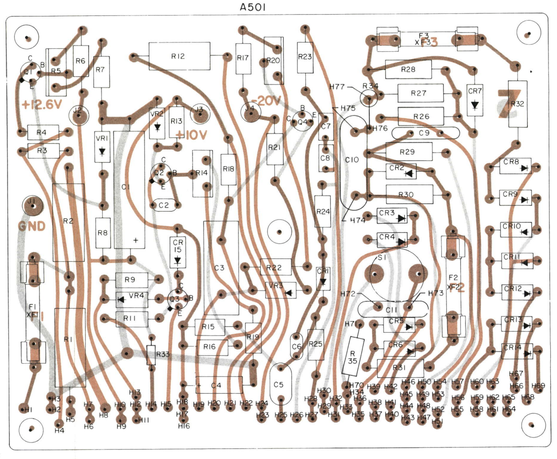
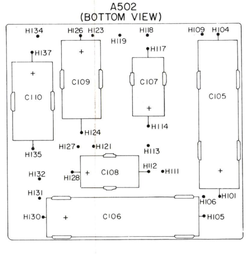
QUICK CHECKS

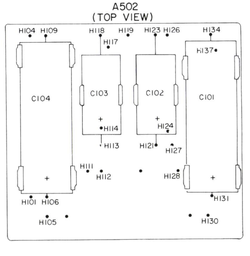
SYMPTOM	CHECK THE FOLLOWING:
No receiver noise when SQUELCH control opened	1. Fuse F501 and F1 2. Open Q3 collector 3. 12.6-Volt regulator 4. 10-Volt regulator
No high B+ but low B+ correct	1. Fuse F3 2. Resistor R32 3. Relay contacts K501-5L and -6L, or -3L and -4L. 4. Resistor R26 5. Diode CR12
No low B+	1. Fuse F2 2. Resistor R31 3. Relay contacts K501-1L and -2L
No -45 Volts bias	Diodes CR13 or CR14
Can modulate transmitter from local microphone, but cannot from remote microphone	Diode CR1 and associated circuitry
Receiver work mute	1. Shorted Q3 2. Excessive resistance in PTT line
10-VOLT REGULATOR	
No 10-Volt regulated output and DS1 burning brightly	Low resistance short on regulator output
No 10-Volt regulated output and DS1 not burning brightly	1. Open Q505 2. Open Q2 3. Resistor R33
Output voltage too high, and cannot be adjusted by R14	1. Open VR2 2. Open Q2 3. Shorted Q505 4. R14 defective
Very low output voltage	Shorted VR2
-20 VOLT REGULATOR	
No -20 Volt output	1. Open Q504 2. Relay contacts K501-5R and -6R
Very low output voltage	Shorted Q4 or VR3
Output voltage too high	Open VR3 or Q4
Output equals input	Shorted Q504
12.6-VOLT REGULATOR	
No 12.6-Volt regulated output	Fuse F1
Output voltage too high	Open Q1, VR1 or Q503
Output voltage too low	Shorted VR1

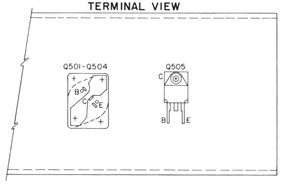


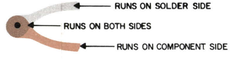


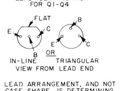












NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

(19B651777, Rev. 8)
(19D416172, Ss. 1, Rev. 7)
(19D416172, Ss. 2, Rev. 5)

OUTLINE DIAGRAM

TRANSMITTER-RECEIVER POWER SUPPLY
MODELS 4EP38A12

PARTS LIST

LBI4321J

TRANSMITTER/RECEIVER POWER SUPPLY
MODEL 4EP38A12

SYMBOL	GE PART NO.	DESCRIPTION
A501		COMPONENT BOARD 19C317926G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A115680P5	Electrolytic: 100 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C2	7774750P1	Ceramic disc: .00047 µf +100% -0%, 500 VDCW.
C3	19A115028P117	Polyester: 0.33 µf ±20%, 100 VDCW.
C4	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C5	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C6	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	19A116080P104	Polyester: 0.033 µf ±10%, 50 VDCW.
C8	19A116080P103	Polyester: 0.022 µf ±10%, 50 VDCW.
C9	19C301693P20	Ceramic disc: .006 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C10*	19A115028P54	Polyester: 0.1 µf ±20%, 400 VDCW. Added by REV F.
C11*	5494481P21	Ceramic disc: 10,000 pf ±20%, 500 VDCW; sim to RMC Type JF Discap. Added by REV F.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A115050P1	Germanium.
CR2* thru CR12*	4037822P7	Silicon, 1000 mA, 800 PIV.
		In REV B and earlier:
	4037822P2	Silicon, 1000 mA, 600 PIV.
CR13 and CR14	4037822P1	Silicon, 1000 mA, 400 PIV.
CR15*	4037822P1	Silicon, 1000 mA, 400 PIV. Added by REV E.
		- - - - - - - INDICATING DEVICES - - - - - - -
DS1*	4034664P1	Lamp, incandescent: 28 v; sim to GE2148. Deleted by REV A.
		- - - - - - - - - FUSES - - - - - - - - -
F1	1R16P8	Quick blowing: 5 amps at 250 v; sim to Littelfuse 312005 or Bussmann MTH-5.
F2	1R16P2	Quick blowing: 3/4 amp at 250 v; sim to Littelfuse 312.750 or Bussmann AGC-3/4.
F3	1R16P1	Quick blowing: 1/2 amp at 250 v; sim to Littelfuse 312.500 or Bussmann AGC-1/2.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	4037265P1	Jack, tip: black plastic body; sim to Component Mfg Service A-1128.
J2 and J3	4037265P2	Jack, tip: red plastic body; sim to Component Mfg Service A-1128.
J4	4037265P3	Jack, tip: green plastic body; sim to Component Mfg Service A-1128.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1* thru Q3*	19A116755P1	Silicon, NPN; sim to Type 2N3947.
		In REV A and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q4*	19A115852P1	Silicon, PNP; sim to Type 2N3906.
		In REV A and earlier:
	19A115768P1	Silicon, PNP; sim to Type 2N3702.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

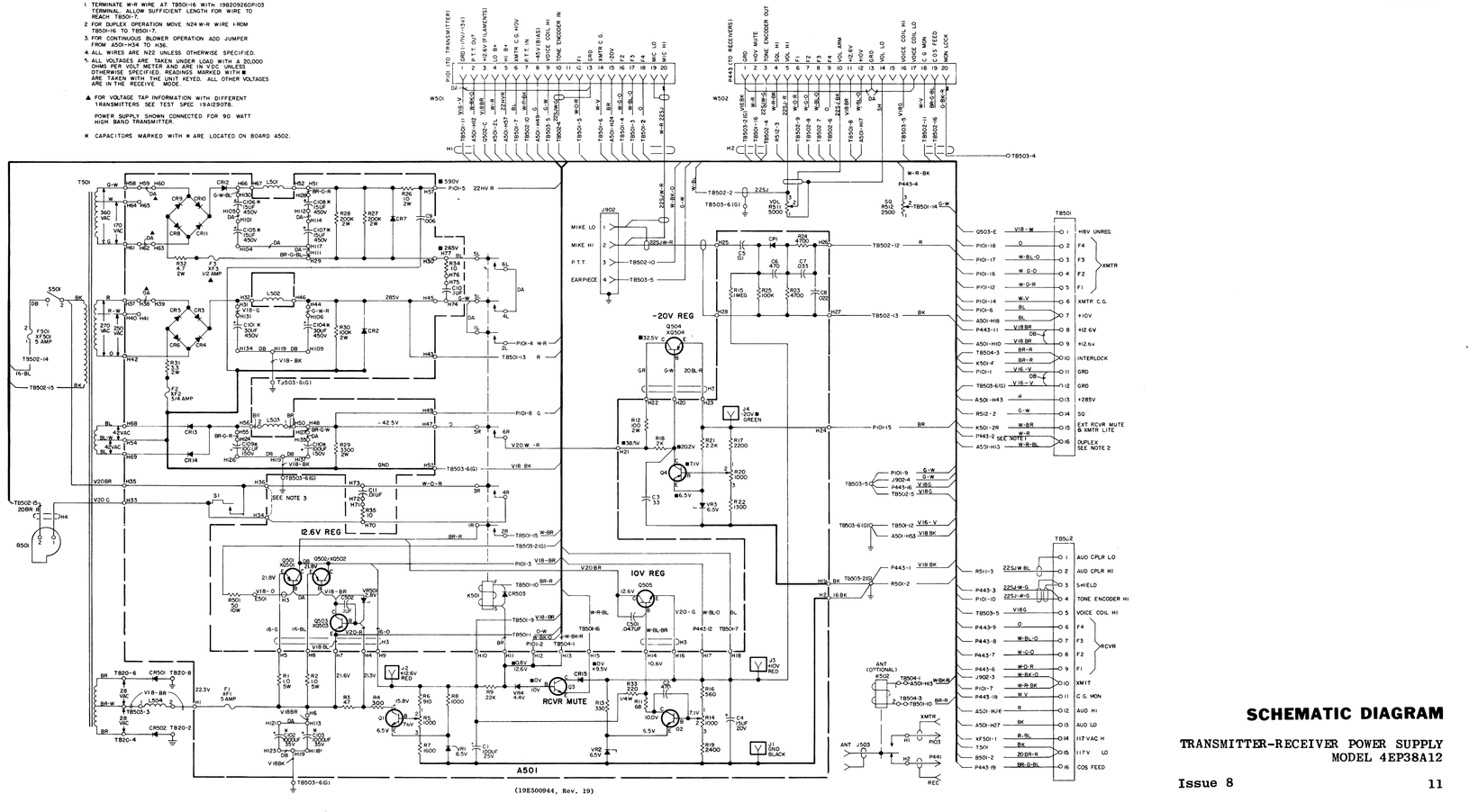
SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - RESISTORS - - - - - - - - -
R1 and R2	5493035P2	Wirewound: 1 ohm ±5%, 5 w; sim to Hamilton Hall Type HR.
R3	3R77P470J	Composition: 47 ohms ±5%, 1/2 w.
R4*	3R77P301J	Composition: 300 ohms ±5%, 1/2 w.
		In REV C and earlier:
	3R77P431J	Composition: 430 ohms ±5%, 1/2 w.
R5	19B209358P103	Variable, carbon film: approx 25 to 1K ohms ±10%, 0.2 w; sim to CTS Type X-201.
R6	3R77P911J	Composition: 910 ohms ±5%, 1/2 w.
R7	3R77P162J	Composition: 1.6K ohms ±5%, 1/2 w.
R8	3R77P102J	Composition: 1K ohms ±5%, 1/2 w.
R9	3R77P223K	Composition: 22K ohms ±10%, 1/2 w.
R11	3R77P680J	Composition: 68 ohms ±5%, 1/2 w.
R12	3R79P101K	Composition: 100 ohms ±10%, 2 w.
R13	3R77P331J	Composition: 330 ohms ±5%, 1/2 w.
R14	19B209358P103	Variable, carbon film: approx 25 to 1K ohms ±10%, 0.2 w; sim to CTS Type X-201.
R15	3R77P105J	Composition: 1.0 megohm ±5%, 1/2 w.
R16	3R77P561J	Composition: 560 ohms ±5%, 1/2 w.
R17	3R77P222J	Composition: 2.2K ohms ±5%, 1/2 w.
R18	3R77P202J	Composition: 2K ohms ±10%, 1/2 w.
R19	3R77P242J	Composition: 2.4K ohms ±5%, 1/2 w.
R20	19B209358P103	Variable, carbon film: approx 25 to 1K ohms ±10%, 0.2 w; sim to CTS Type X-201.
R21	3R77P222J	Composition: 2.2K ohms ±5%, 1/2 w.
R22	3R77P132J	Composition: 1.3K ohms ±5%, 1/2 w.
R23 and R24	3R77P472J	Composition: 4.7K ohms ±5%, 1/2 w.
R25	3R77P104J	Composition: 0.10 megohm ±5%, 1/2 w.
R26	19A116310P23	Composition: 10 ohms ±5%, 2 w.
R27* and R28*	19A116310P42	Composition: 0.20 megohm ±5%, 1/2 w.
		In REV C and earlier:
	3R79P204J	Composition: 0.20 megohm ±5%, 1/2 w.
R29	3R79P332J	Composition: 3.3K ohms ±5%, 1/2 w.
R30	3R79P104J	Composition: 0.10 megohm ±5%, 1/2 w.
R31	19B209022P27	Wirewound: 3.3 ohms ±5%, 2 w; sim to IRC Type BWH.
R32	19B209022P31	Wirewound: 4.7 ohms ±5%, 2 w; sim to IRC Type BWH.
R33*	3R152P221J	Composition: 220 ohms ±5%, 1/4 w. Added by REV A.
R34* and R35*	3R77P100J	Composition: 10 ohms ±5%, 1/2 w. Added by REV F.
		- - - - - - - - - SWITCHES - - - - - - - - -
S1	19A115687P2	Thermostat, switch: contacts close at approx 110° F ±6° F and open at approx 90° F ±5° F.
		- - - - - - - VOLTAGE REGULATORS - - - - - - -
VR1 thru VR3	4036887P6	Silicon, Zener.
VR4	4036887P4	Silicon, Zener.
		- - - - - - - - - SOCKETS - - - - - - - - -
XF1* thru XF3*	19A116688P1	Clip, fuse: sim to Littelfuse Inc 102068. (2 used with each socket).
		In REV B and earlier:
	7141008P1	Fuseholder: 5 amps at 125 v; sim to Littelfuse E-357001.

NOTES:
1. TERMINATE W-R WIRE AT TB501-16 WITH 19B209260P103 TERMINAL. ALLOW SUFFICIENT LENGTH FOR WIRE TO REACH TB501-7.
2. FOR DUPLEX OPERATION MOVE N24 W-R WIRE FROM TB501-16 TO TB501-7.
3. FOR CONTINUOUS BLOWER OPERATION ADD JUMPER FROM A501-H34 TO H36.
4. ALL WIRES ARE N22 UNLESS OTHERWISE SPECIFIED.
5. ALL VOLTAGES ARE TAKEN UNDER LOAD WITH A 20,000 OHMS PER VOLT METER AND ARE IN V-DC UNLESS OTHERWISE SPECIFIED. READINGS MARKED WITH ✱ ARE TAKEN WITH THE UNIT KEYED. ALL OTHER VOLTAGES ARE IN THE RECEIVE MODE.

▲ FOR VOLTAGE TAP INFORMATION WITH DIFFERENT TRANSMITTERS SEE TEST SPEC 19A129078.

POWER SUPPLY SHOWN CONNECTED FOR 90 WATT HIGH BAND TRANSMITTER.

✱ CAPACITORS MARKED WITH ✱ ARE LOCATED ON BOARD A502.



(19E500944, Rev. 19)

SCHEMATIC DIAGRAM

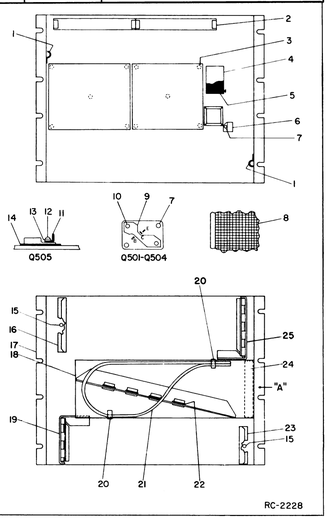
TRANSMITTER-RECEIVER POWER SUPPLY
MODEL 4EP38A12

SYMBOL	GE PART NO.	DESCRIPTION
A502		COMPONENT BOARD 19C317935G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C101	5493132P5	Electrolytic: 30 µf +50 -10%, 450 VDC#.
C102 and C103	5493132P1	Electrolytic: 1000 µf +250 -15%, 35 VDC#.
C104	5493132P5	Electrolytic: 30 µf +50 -10%, 450 VDC#.
C105 and C106	5493132P6	Electrolytic: 15 µf +50 -10%, 450 VDC#.
C107 and C108	7774786P42	Electrolytic: 15 µf +50% -10%, 450 VDC#; sim to Mallory Type TC.
C109 and C110	7774786P17	Electrolytic: 100 µf +100% -10%, 150 VDC#; sim to Mallory Type TC.
		- - - - - - - - - - MOTORS - - - - - - - - - -
B501*	19B209474P1	Fan, single phase: 115 VAC, 60 Hz; sim to Rotron "Centaur" Muffin Venturi Fan Model CT3A2.
		In REV G and earlier:
	5493477P1	Fan assembly, single phase: 115 VAC, 60 Hz, 14 w, ccw rotation; sim to Rotron "Gold Seal Venturi Muffin Fan".
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C501	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDC#.
C502	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDC#.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR501* and CR502*	19A116783P1	Silicon, axial leads, 100 VDC blocking, 6 amp.
		In REV D and earlier:
	19A115202P2	Silicon.
CR503	4037822P1	Silicon, 1000 mA, 400 PIV.
		- - - - - - - - - - FUSES - - - - - - - - - -
F501	5491272P8	Cartridge, medium blowing: 5 amps at 125 v; sim to Bussmann MDX-5.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J902		Includes:
	19A116061G2	Connector: 4 female contacts; sim to Amphenol Type 91-PM4F-1000.
	19A116061G3	Hex nut: 13/16-27N.
	19A116061G4	Lockwasher, internal tooth, 13/16.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K501	19C307092P2	Armature, open: 12 VDC nominal, 3 w max operating, 6 form A contacts rated at 3 amps at 115 VAC or 28 VDC; sim to Magnecraft 224S3A.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L501	19B209434P1	Reactor: 5 h ind min at 0.3 amp DC, 80 ohms DC res max, 1000 VDC operating.
L502	19B209071P1	Reactor: 3 h ind min at 0.4 amp DC, 30 ohms DC res max, 600 v peak, 300 VDC operating.
L503	19B209142P2	Reactor: 800 mh ind min at 0.1 amp DC, 30 ohms DC res max, 100 v peak, 45 VDC operating.
L504	19B209080P2	Reactor: 12 mh min, 0.3 ohm DC res max, 18 VDC operating.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P101		Includes:
	19C303506P1	Connector, phenolic: 20 contacts rated at 5 amps.
	19A121589G1	Cover, plastic.

SYMBOL	GE PART NO.	DESCRIPTION
P443		Includes:
	19C303506P1	Connector, phenolic: 20 contacts rated at 5 amps.
	19A121589G1	Cover, plastic.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q501* and Q502*	19A116760P1	Silicon, PNP. In REV F and earlier.
Q503	19A116760P1	Silicon, PNP.
Q504*	19A116760P1	Silicon, PNP. In REV. F and earlier.
Q505	19A116203P3	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R501	5493035P51	Wirewound: 50 ohms ±10%, 10 W; sim to Hamilton Hall Type HR.
R511	2R76P12	Variable, carbon film: 5K ohms ±20%, 3/8 w; sim to CTS Series 45.
R512	2R76P10	Variable, carbon film: 2.5K ohms ±20%, 3/8 w; sim to CTS Series 45.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S501	7144140P1	Toggle: SPST, 10 amps at 250 v or 15 amps at 115 v; sim to Hart 164.
		- - - - - - - - TRANSFORMERS - - - - - - - -
T501	19C307137P1	Power, step-down and step-up: Pri: 117 VRMS, 50/60 Hz.
		- - - - - - - - TERMINAL BOARDS - - - - - - - -
TB1	7775500P25	Phen: 9 terminals.
TB501 and TB502	19C301086P10	Feed-thru, phen: 16 terminals; sim to GE CR151D.
TB503	7775500P23	Phen: 7 terminals.
TB504	7775500P7	Phen: 3 terminals.
		- - - - - - - VOLTAGE REGULATORS - - - - - - -
VR501	4036887P2	Silicon, Zener.
		- - - - - - - - - - CABLES - - - - - - - - - -
W501*	19C320059G3	Transmitter: Includes P101. In REV A and earlier:
	19C320059G1	Transmitter: Includes P101.
W502	19C320059G2	Receiver: Includes P443.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XF501	19B209005P1	Fuseholder: 15 amps at 250 v; sim to Littelfuse 342012.
XQ501 thru XQ504	5491888P1	Transistor, power, phen: sim to Cinch 133-92-10-034.
		HARNESS ASSEMBLY 19D416088G2 (Includes TB501-TB503, W501, W502)
		ANTENNA RELAY KIT 19A121260G1 (1-RECEIVER)
K502	19B204628G1	Relay assembly. Includes:
	19C307103P1	Relay, armature, coaxial: 12 VDC nominal, 2 w max operating, 100 ohms ±15%, coil res, 1 form C contact rated at 100 w RF at 470 MHz; sim to FXR 300-10977.
	19B209044P16	Antenna cable, RF: 1900 VRMS max, approx 10 inches long; sim to Amphenol 421-055. (Used with J503).
	5491689P52	Receiver cable assembly, RF coaxial: includes phono type Plug (P441), 350 VRMS max, approx 27 inches long.
	19B209044P16	Transmitter cable, RF: 1900 VRMS max, approx 12 inches long; sim to Amphenol 421-055. (Used with P103).

SYMBOL	GE PART NO.	DESCRIPTION
J503	4029493P1	Connector, receptacle, coaxial. Sim to Amphenol 83-79S or equivalent. Military SO-239A.
	4029082P2	Coaxial: UHF connector hood; sim to Amphenol 83-76S.
P103	7104941P17	Plug, phono: sim to National Tel.
		ANTENNA RELAY KIT 19A121260G2 (2-RECEIVER)
K504	19B204628G2	Relay assembly. Includes:
	19C307103P1	Relay, armature, coaxial: 12 VDC nominal, 2 w max operating, 100 ohms ±15%, coil res, 1 form C contact rated at 100 w RF at 470 MHz; sim to FXR 300-10977.
	19B209044P16	Antenna cable, RF: 1900 VRMS max, approx 10 inches long; sim to Amphenol 421-055. (Used with P103).
J503 and J504	4029493P1	Connector, receptacle, coaxial. Military SO-239A. sim to Amphenol 83-79S or equivalent.
	4029082P2	Coaxial: UHF connector hood: sim to Amphenol 83-76S.
P103	7104941P17	Plug, phono; sim to National Tel.
		REPEATER CABLES (WITHOUT DUPLEXER)
	19A121309G1	Transmitter Antenna Cable. Includes:
	19B209044P16	RF cable: approx 5 inches long.
	7104941P17	Connector (Transmitter side).
	4029082P2	Coaxial: UHF connector hood: sim to Amphenol 83-76S.
	4029493P1	Connector, receptacle, coaxial, Military SO-239A, sim to Amphenol 83-79S or equivalent.
	7146725G7	Receiver Antenna Cable. Includes:
	5491689P64	RF Cable: approx 23 inches long. Includes 7104941P11 connector.
	4029082P2	Coaxial, UHF connector hood, sim to Amphenol 83-76S.
	4029493P1	Connector, receptacle, coaxial, Military SO-239A, sim to Amphenol 83-79S or equivalent.
		REPEATER CABLES (WITH DUPLEXER)
	19B205895G3	Transmitter Antenna Cable. Includes:
	19B209044P16	RF Cable: approx 14 inches long.
	19B209018P5	Connector (To Duplexer).
	7104941P17	Connector (To Transmitter).
	19B205895G4	Receiver Antenna Cable. Includes:
	19B209044P16	RF Cable: approx 22 inches long.
	19B209018P5	Connector (To Duplexer).
	7104941P17	Connector (To Receiver).
		MECHANICAL PARTS (SEE RC-2228)
1	7763541P6	Clip, spring tension.
2	7160508P2	Nut, sheet spring: sim to Tinnerman C1356-632-157. (Used to secure TB501 and TB502).
3	5491541P310	Hex spacer: 6-32 x 1-12. (Used with A501 and A502).
4	19A121032P1	Support. (Used with K501).
5	19A121245G1	Cover. (Used with K501).

SYMBOL	GE PART NO.	DESCRIPTION
6	4038930P1	Clip. (Secures R501).
7	19B201074P204	Tap screw, Phillips POZIDRIV®: No. 4-40 x 14. (Used with Q501-Q504, R501).
8	403858lG2	Fan Guard. (Used with B501).
9		Plate. (Part of socket assembly XQ501-XQ504).
10	N129P1308C13	Tap screw: No. 6 x 1/2. (Used with Q501-Q504).
11	7135118P2	Solderless terminal. (Used with Q505).
12	19B201074P206	Tap screw, Phillips POZIDRIV®: No. 4-40 x 3/8. (Used with Q505).
13	19A116022P1	Insulated bushing. (Used with Q505).
14	19A116023P2	Insulator, plate. (Used with Q505).
15	5490195P102	Fastener, snap-slide. (Locks Transmitter and Receiver Units in operating position).
16	19A121787G1	Support. (Used with Transmitter).
17	19C317851G1	Chassis.
18	19B219282G1	Tunnel cover. (Used with B501).
19	19B204374G1	Hinged support. (Used with Receiver).
20	403420BP1	Clip, spring tension. (Secures RF cable assembly).
21	5491689P55	Cable assembly, RF: includes phono type plug and jack, 350 VRMS max, approx 26 inches long.
22	4029974P1	Insulator, plate. (Used with Q501-Q504).
23	19A121788G1	Support. (Used with Receiver).
24	19A121039P1	Support. (Used with B501).
25	19B204375G1	Hinged support. (Used with Transmitter).



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 - 4EP38A12

To correct connections to Q504.
Moved the G-R wire from Q504-E to Q504-C.
Moved the BL-R wire from Q504-C to Q504-E.

REV. B - To improve regulation.
Changed R4.

REV. C - To incorporate new fuseholders on A501.
Changed XF1, XF2 and XF3.

REV. D - To improve harness.
Changed W501.

REV. E - To incorporate new diodes.
Changed CR501 and CR502.

REV. F - To prevent microphonics with fan start-up.
Changed Fan. Added grommet and flatwasher.

REV. A - 10 V Regulator 19C317926G1

To improve reliability of 10 Volt Regulator.
Deleted D61 and added R33.

REV. B - 10 V Regulator 19317926G1

To improve reliability of 10 Volt Regulator. Replace Q1-Q4.

REV. C - 10 V Regulator 19C317926G1

To incorporate diodes with higher breakdown voltage.
Changed CR2 through CR12.

REV. D - To incorporate improved bleeder resistors in high voltage circuit.
Changed R27 and R28.

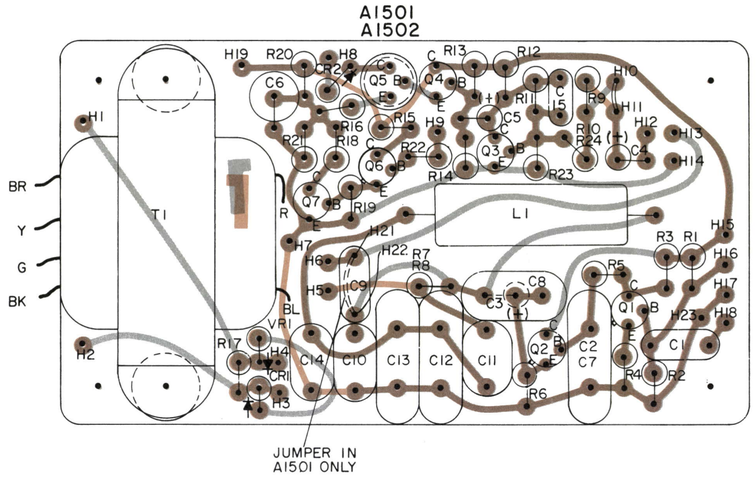
REV. E - To prevent the transmitter from being keyed by a short on the +10 Volt line.
Added CR15.

REV. F - To prevent repeaters with Channel Guard from being re-keyed after a 5 second drop out delay caused by a spike on +10 Volt line.
Added C10, C11, E24 and E35.

REV. G - 4EP38A12

To incorporate improved transistor.
Changed Q501, Q502 and Q504.

OUTLINE DIAGRAM

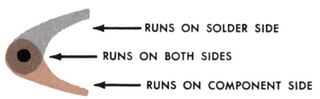


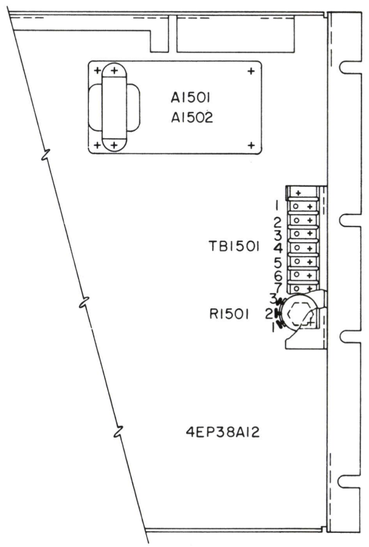
(19C320095, Rev. 2)
(19B216797, Sh. 1, Rev. 1)
(19B216797, Sh. 2, Rev. 1)

LEAD IDENTIFICATION
FOR Q1, Q2, Q5 & Q6

TRIANGULAR
VIEW FROM LEAD END

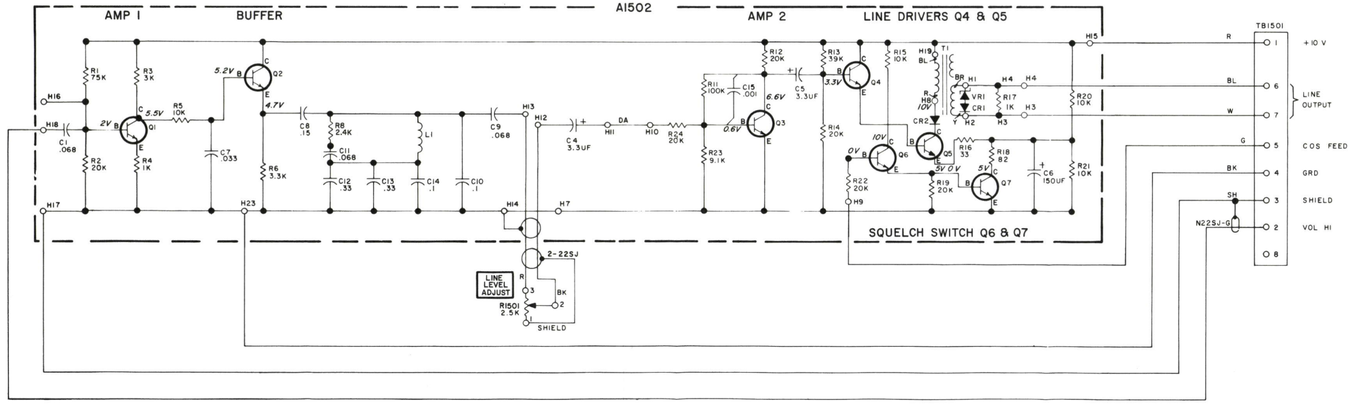
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.





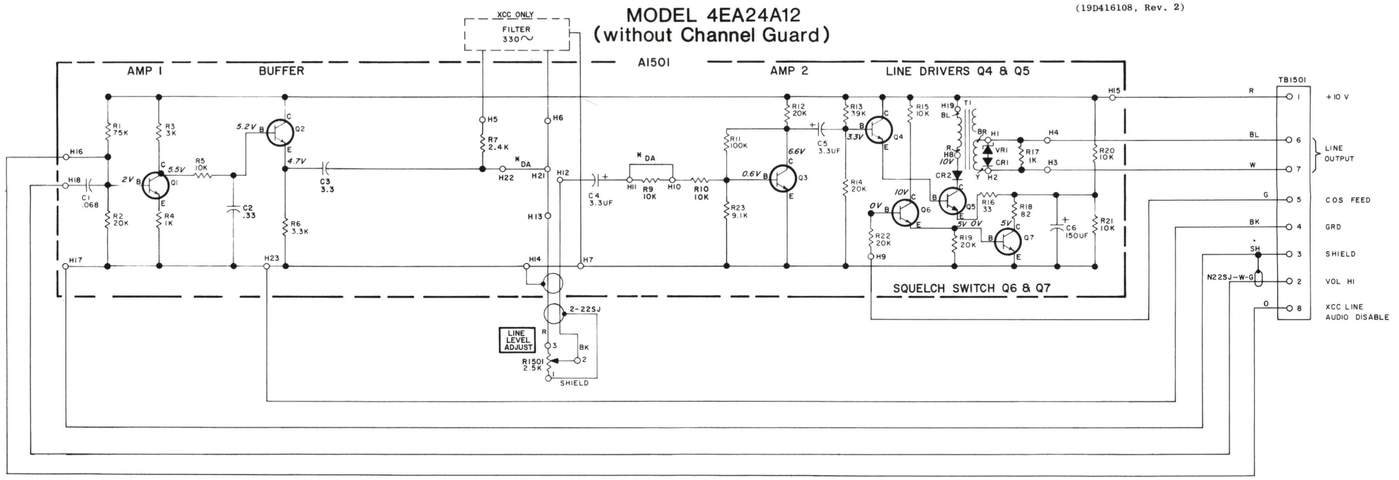
SCHEMATIC DIAGRAM

MODEL 4EA24A13
(with Channel Guard)



(19D416108, Rev. 2)

MODEL 4EA24A12
(without Channel Guard)



(19D416107, Rev. 2)

VOLTAGE READINGS

THESE READINGS ARE TYPICAL DC READINGS MEASURED FROM TRANSISTOR PINS TO GROUND WITH A 20,000 OHM-PER-VOLT METER, AND WITH NO SIGNAL APPLIED (RECEIVER SQUELCHED).

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

CPD 3184

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

NOTE:
* JUMPERS REMOVED IN XCC APPLICATION.
ALL WIRE IS N22 UNLESS OTHERWISE SPECIFIED

SCHEMATIC & OUTLINE DIAGRAM

LINE AMPLIFIER MODELS 4EA24A12, 13

PARTS LIST

LBI4322C

LINE AMPLIFIER
MODEL 4EA24A12 (19A129097G1)
MODEL 4EA24A13 (19A129097G2)

SYMBOL	GE PART NO.	DESCRIPTION
		LINE AMPLIFIER ASSEMBLY 19B219320G1,G2
A1501 and A1502		LINE AMPLIFIER BOARD A1501 19C317324G1 A1502 19C317324G2
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116080P6	Polyester: 0.068 µf ±20%, 50 VDCW.
C2	19B209243P14	Polyester: 0.33 µf ±20%, 250 VDCW.
C3 thru C5	5496267P9	Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 1D.
C6	5496267P3	Tantalum: 150 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C7	19A116080P4	Polyester: 0.033 µf ±20%, 50 VDCW.
C8	19A116080P108	Polyester: 0.15 µf ±10%, 50 VDCW.
C9	19A116080P106	Polyester: 0.068 µf ±10%, 50 VDCW.
C10	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C11	19A116080P106	Polyester: 0.068 µf ±10%, 50 VDCW.
C12 and C13	19B209243P114	Polyester: 0.33 µf ±10%, 250 VDCW.
C14	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C15	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1* and CR2*	4037822P2	Silicon. Added by REV A.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A115690P3	Reactor: 880 MH ind, 120 amp ±15% DC res; sim to Artted AC5672.
		- - - - - - - - - TRANSISTORS - - - - - - - -
Q1* and Q2*	19A116755P1	Silicon, NPN; sim to Type 2N3947.
		In REV A and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q3* and Q4*	19A116774P1	Silicon, NPN; sim to Type 2N5210.
		In REV A and earlier:
	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q5	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q6*	19A116755P1	Silicon, NPN; sim to Type 2N3947.
		In REV A and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q7*	19A116774P1	Silicon, NPN; sim to Type 2N5210.
		In REV and earlier:
	19A115362P1	Silicon, NPN; sim to Type 2N2925.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P753J	Composition: 75K ohms ±5%, 1/2 w.
R2	3R77P203J	Composition: 20K ohms ±5%, 1/2 w.
R3	3R77P302J	Composition: 3K ohms ±5%, 1/2 w.
R4	3R77P102J	Composition: 1K ohms ±5%, 1/2 w.
R5	3R77P103K	Composition: 10K ohms ±10%, 1/2 w.
R6	3R77P332K	Composition: 3.3K ohms ±10%, 1/2 w.
R7 and R8	3R77P242J	Composition: 2.4K ohms ±5%, 1/2 w.
R9 and R10	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R11	3R77P104J	Composition: 0.10 megohm ±5%, 1/2 w.
R12	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R13	3R77P393J	Composition: 39K ohms ±5%, 1/2 w.
R14	3R77P203J	Composition: 20K ohms ±5%, 1/2 w.
R15	3R77P103K	Composition: 10K ohms ±10%, 1/2 w.
R16	3R77P330J	Composition: 33 ohms ±5%, 1/2 w.
R17	3R77P102J	Composition: 1K ohms ±5%, 1/2 w.
R18	3R77P820J	Composition: 82 ohms ±5%, 1/2 w.
R19	3R77P203J	Composition: 20K ohms ±5%, 1/2 w.
R20 and R21	3R77P103K	Composition: 10K ohms ±10%, 1/2 w.
R22	3R77P203J	Composition: 20K ohms ±5%, 1/2 w.
R23	3R77P912J	Composition: 9.1K ohms ±5%, 1/2 w.
R24	3R77P203J	Composition: 20K ohms ±5%, 1/2 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19A115672P1	Audio freq: 300 to 6000 Hz, Pri: 9.0 ohms ±15% DC res, Sec 1: 15 ohms ±15% DC res, Sec 2: 15 ohms ±15% DC res.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - -
VR1*	19A116325P4	Silicon, Zener; sim to Type 1N5349. Added by REV A.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1501	2R75P50	Variable, carbon film: 2500 ohms ±20%, 1/2 w; sim to CTS Series 45.
		- - - - - - - - TERMINAL BOARDS - - - - - - - -
TB1501	19C301088P6	Feed-thru, phen: 8 terminals; sim to GE CR151D.
		HARNESS ASSEMBLY 19B219320G3 (Includes R1501 and TB1501)
		- - - - - - - - MISCELLANEOUS - - - - - - - - -
	4038555P1	Insulator, washer: nylon. (Used with Q5).
	N402P37C13	Flat washer, No. 6. (Located between T1 and printed board).
	N84P13005C6	Machine screw, Phillips head: No. 6-32 x 5/16. (Secures T1).
	N80P13004C6	Machine screw, Phillips head: No. 6-32 x 1/4. (Secures A1501, A1502).
	N404P13C13	Lock washer, internal tooth: No. 6. (Secures A1501, A1502).
	7165075P2	Hex nut, brass: thread size No. 3/8-32. (Secures R1501).
	7115130P9	Lockwasher: sim to Shakeproof 1220-2. (Secures R1501).
	19B201074P308	Tap screw, Phillips POZIDRIV®: No. 6-32 x 1/2. (Secures TB1501).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

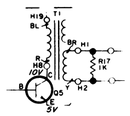
PRODUCTION CHANGES

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 - 4EA24A12 & 13

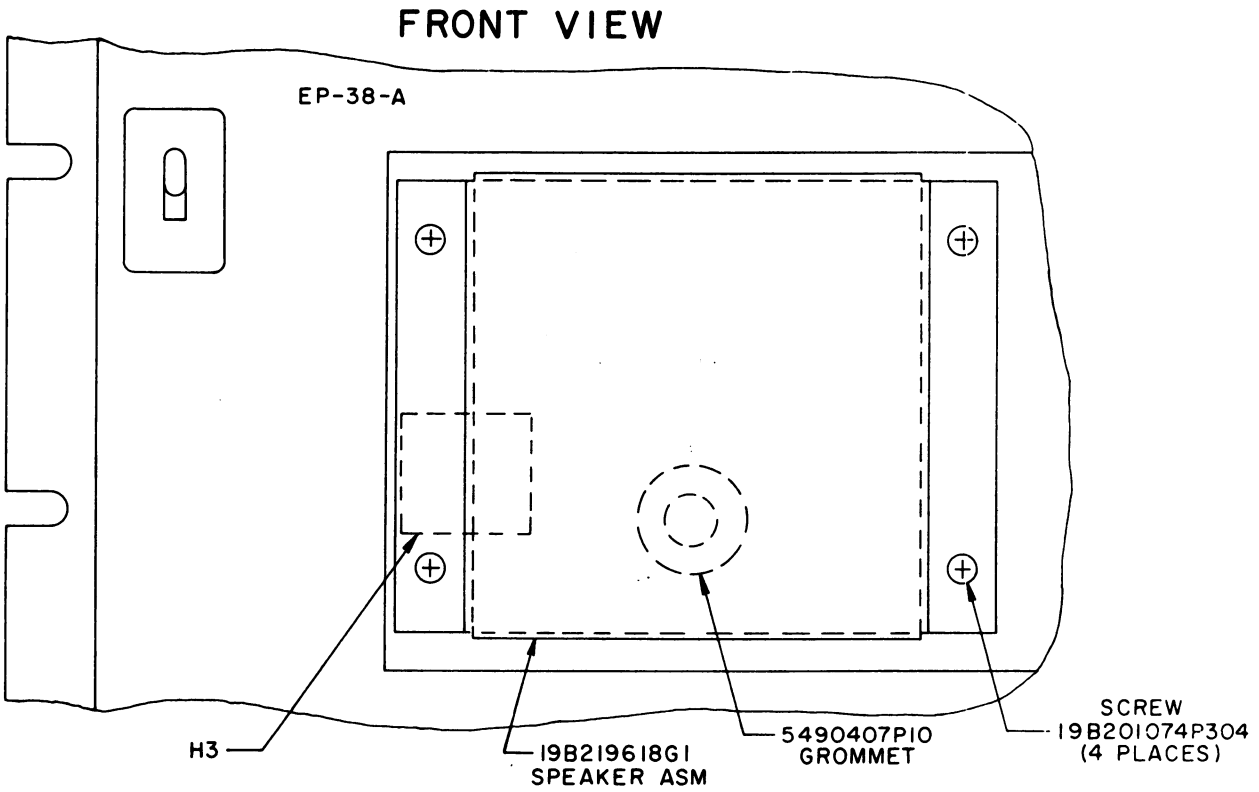
To add lightning protection circuitry for the Audio output Transistor. Added CR1, CR2 and VR1.

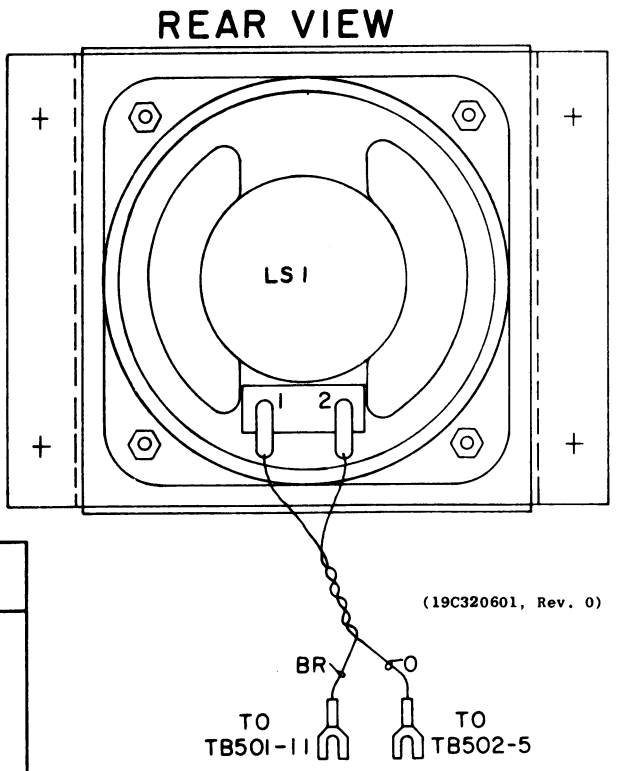
Schematic was:



REV. B - 4EA24A12 & 13

Improve Reliability. Changed Q1-Q4, Q6 and Q7.





(19C320601, Rev. 0)

PARTS LIST

LBI-4427

STATION SPEAKER
19B219618G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS1	19A115964P1	Weatherproof, Permanent Magnet: 3-1/2 inch, 18 ohm ±10% imp at 1000 Hz, 15-19 ohms DC; sim to Oaktron S-9847.
		- - - - - - - - - - MISCELLANEOUS - - - - - - -
	19B219615P1	Cover.
	19B209260P103	Terminal, solderless: sim to AMP 60495-1.
	5490407P10	Grommet.
	19B201074P304	Tap screw: No. 6-32 x 1/4.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

OUTLINE DIAGRAM

SPEAKER ASSEMBLY
19B219618G1