MOBILE RADIO

MAINTENANCE MANUAL

LINE AMPLIFIER MODEL 4EA23A10

(with Options 4216 Thru 4219)

Maintenance Manual LBI 3743 J

DATAFILE FOLDER DF8397

EA-23-A

SPECIFICATIONS *

Input Impedance	600 ohms terminating, 7500 ohms bridging
Output Impedance	3.5 ohms
Input Level	-20 dBm (75 millivolts RMS) for threshold of compression
Compression Range	With an audio input increase of 30 dB beyond start of compression, output level increases less than 3 dB
Power Output	4 watts with less than 5% distortion
Frequency Response	300 to 6000 Hz, ±3 dB
Power Requirement	20 watts @ 117 volts AC, ±10%, 50/60 Hz
Temperature Range	-30°C to +60°C (-22°F to +140°F)
Dimensions (H x W x D)	5-1/2" x 11-3/8" x 12-1/8"

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

GENERAL ELECTRIC

TABLE OF CONTENTS

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

General Electric Line Amplifier Model 4EA23A10 is a compact, attractively styled line-to-speaker amplifier designed to amplify audio signals from telephone-line level (-20 to +18 dBm) to speaker level (4 watts). The amplifier is fully transistorized -- utilizing silicon transistors for added reliability.

The audio section of the Line Amplifier contains a compression-amplifier for equalizing audio input levels over a wide range of line input levels. This prevents sudden blasting from the speaker when a strong signal is received.

The power supply contains a voltage regulator circuit to provide a closely-controlled supply voltage for the transistorized audio board. This permits stable operation of the amplifier over a wide range of input voltages.

Options available for use with the Line Amplifier are listed in Figure 1.

Option Number	Description
4216	L-Pad Control (required with Options 4218 and 4219) - Provides a chassis-mounted output level control for the amplifier, and adds an L-Pad control for the internal speaker.
4217	DC Blocking Capacitor - Isolates the amplifier when a DC control voltage is on the telephone line.
4218	Line Output Option - Provides an output transformer to drive a 600-ohm line.
4219	External Speaker with L-Pad Control (Model 4EZ16A20) - Up to three external speakers can be connected in parallel.

Figure 1 - Option Chart for the Line Amplifier

CONNECTIONS

All telephone line external speaker connections are made to terminal board TB1501 located at the rear of the Line Amplifier. Make the connections as follows:

Telephone Line Input - Connect the telephone input pair to TB1501-6 and -9. If a DC control voltage is present on the line, make sure that the optional DC blocking capacitor is installed.

External Speaker Option - Connect the lead to the external speaker(s) to TB1501-1 and -2 (ground).

Line Output Transformer Option - Connect the telephone line output pair to TB1501-3 and -4.

Power Cable - Connect the power cable (W1501) to a 117-VAC, 50/60 Hz source.

In addition to the above connections, it is recommended that a connection be made from the case of the amplifier to a good earth ground. After all connections have been made, refer to the Adjustment Procedure (Page 6) before placing the unit in operation.

CIRCUIT ANALYSIS

The Line Amplifier consists of audio board A1501 and a self-contained power supply. The loudspeaker, VOLUME control and power-on light are mounted on the front panel of the amplifier.

AUDIO BOARD A1501

The audio board contains the compressor amplifier (Q2 through Q7) and an audio power amplifier stage (Q8). A second audio power amplifier (Q1501) is mounted in a heat-sink on the chassis of the Line Amplifier.

LINE INPUT

Audio from the telephone pair is coupled through line-matching transformer T1502 to the audio board. The audio input (from J17) is connected through LINE INPUT control R7 to the compressor-amplifier (Figure 2).

COMPRESSOR-AMPLIFIER

The compressor-amplifier circuit consists of gain control stage Q2, high gain audio amplifiers Q3 through Q6, and DC amplifier Q7.

When audio is applied to the compressor-amplifier, resistor R9 and the AC impedance of transistor Q2 to act as a voltage divider for the AC input signal. The audio signal

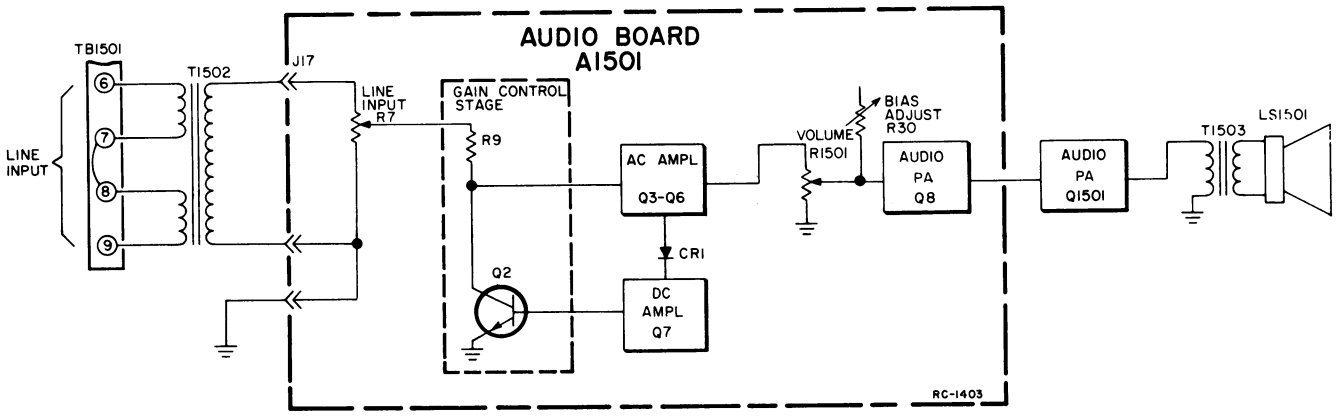


Figure 2 - Block Diagram

is amplified by a four stage, direct-coupled amplifier (Q3 through Q6). Both AC and DC feedback in the amplifier circuit provides extremely stable operation.

One portion of the amplified output is fed through VOLUME control R1501 to the audio PA stage. The remaining portion is rectified by detector CR1, filtered by C8 and amplified by DC current amplifier Q7. This DC output is fed back to the base of gain control transistor Q2.

The amount of DC feedback to the gain control stage determines the AC impedance of Q2. When the input level rises, the AC amplifier output starts to increase. The output is detected, amplified, and fed back to the base Q2. The increase in feedback reduces the AC impedance of Q2, which decreases the audio voltage to the AC amplifier, keeping the amplifier output constant.

When the audio input decreases, the output of the AC amplifier starts to decrease, reducing the feedback to Q2. This raises the AC impedance of Q2 and increases the audio voltage to the AC amplifier, keeping the amplifier output constant.

AUDIO POWER AMPLIFIERS

Following the compressor-amplifier, the audio voltage is connected through VOLUME Control R1501 to the audio power amplifier stages (Q8 and Q1501). The output of the amplifiers is coupled through audio transformer T1503 to the loudspeaker.

IMPEDANCE CHANGES

When only one Line Amplifier is used, R8 (on Audio Board A1501) is in the circuit for an input impedance of 600 ohms. If more than one Line Amplifier is used in parallel, remove R8 from each Line Amplifier for a bridging impedance of 7500 ohms.

POWER SUPPLY

Turning the OFF-ON switch (S1501) to the ON position applies 117 volts AC to the primary of power transformer T1501. The primary is fused by F1501. The output of the transformer is applied to full-wave bridge rectifiers CR1501 and CR1502, and is filtered by C1501, L1501 and C1502.

An unregulated voltage is used to supply the collectors of the audio power amplifiers. A regulated output supplies the AC and DC amplifiers, and provides base bias for the audio power amplifiers. The voltage regulator consists of C1503, R1502 and zener diode VR1501. Bias Adjust potentiometer R30 is set at the factory for 0.65 volts (measured across R34), and will normally require no further adjustment.

OPTIONS

EXTERNAL SPEAKERS (Option 4216)

With the External Speaker option, the Line Amplifier can be used to drive up to three external speakers, with a total audio power of 4 watts. Each speaker is equipped with a volume control for individual adjustment.

With the external speaker, L-pad AT1 (Option 4216) is mounted in place of VOLUME control R1501 on the front panel, and is used to adjust the internal speaker volume. R1501 is mounted on the amplifier chassis, and is used to set the maximum speaker level.

LINE OUTPUT TRANSFORMER (Option 4218)

The output transformer option provides a bridging transformer (T1) so that the Line Amplifier can be used to drive a 600-ohm line.

L-pad AT1 (option 4216) is installed on the front panel in place of VOLUME control R1501, and is used to adjust the volume of LS1501. R1501 is mounted on the amplifier chassis, and is used to set the line output level.

The audio output of the speaker is three watts when the bridging transformer is used. The transformer does not have a split winding, and DC control voltages cannot be impressed on the output pair.

When the transformer option is used, the Line Amplifier will drive the telephone line at a level of +18 dBm. For 0 dBm on the line, remove the 13-ohm resistor (R3) from TB1-2 and -3. The speaker output will remain at three watts.

DC BLOCKING CAPACITOR (Option 4217)

The DC blocking capacitor is a non-polarized capacitor that is mounted on the amplifier chassis. The capacitor replaces the jumper between TB1501-7 and -8 whenever a DC control voltage is present on the input pair.

TROUBLESHOOTING PROCEDURE

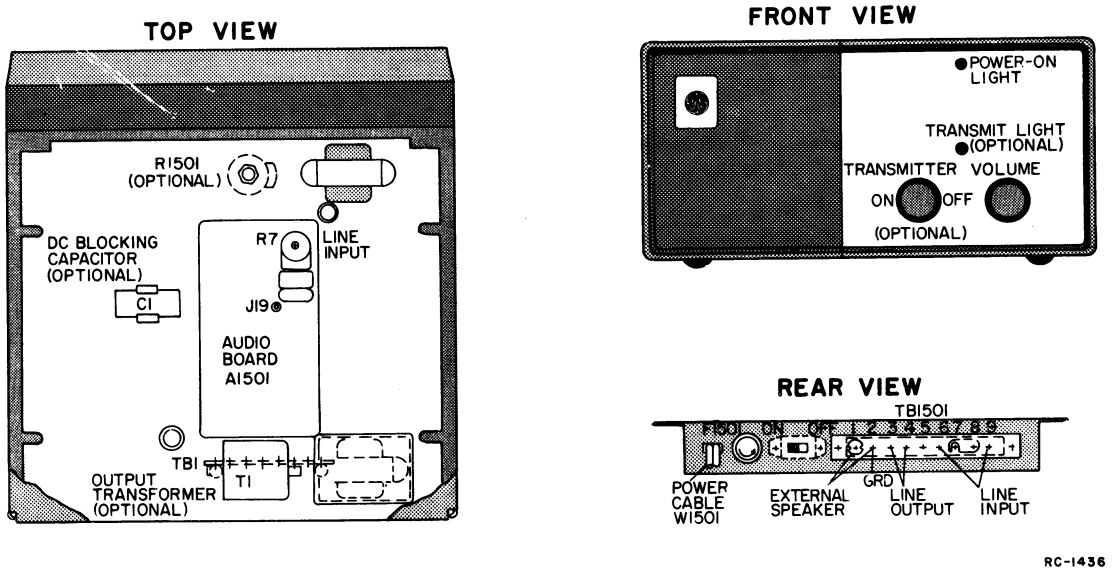
SYMPTOM	PROCEDURE
No audio from the speaker	1. Check the audio input with an AC-VTVM across TB1501-6 and -9. 2. Make sure that the VOLUME control is not set at a minimum (fully counterclockwise). 3. Check the audio at J17 (on the audio board) with an AC-VTVM. If no audio, check T1502. 4. Check the setting of LINE INPUT control R7 (refer to the alignment procedure). 5. Check supply voltages at J1, J2 and J13 on the audio board (refer to the Schematic Diagram). 6. Check Bias Adjust control R30 for a setting of 0.65 volt DC measured across R34. If R30 cannot be adjusted for the correct reading, Check Q8. 7. Check the DC voltages on Q3 thru Q8 (refer to the Schematic Diagram).

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

GENERAL ELECTRIC*
U.S.A.

ADJUSTMENT PROCEDURES

Before adjusting the Line Amplifier, make sure that the AC power line and all telephone line connections have been made. Turn the power switch (S1501) to the ON position.



LINE INPUT

The LINE INPUT control (R7) has been adjusted at the factory so that the threshold of compression is 75 millivolts RMS (-20 dBm). This control should be readjusted during installation so that the threshold of compression is no higher than necessary. Excessive compression will accentuate line noise during pauses in transmission.

1. Apply a +18 dBm, 1000 Hz signal across the source end of the telephone line having the largest line loss (this may be a base station or remote control console). If the source is intended to operate at a level of less than +18 dBm output, set the signal generator for this lower level.

2. Adjust the LINE INPUT control (R7) for threshold of compression indicated by a reading of 0.4 volt DC measured from J19 (on the audio board) to ground.

LINE OUTPUT TRANSFORMER OPTION

1. Make sure that the telephone line output (or some other 600-ohm load) is connected across TB1501-3 and -4.

2. Connect an AC-VTVM across TB1501-3 and -4.

3. Apply a 1000-Hz signal across TB1501 -6 and -9. Increase the signal level to produce threshold of compression. (0.4 volt DC measured from J19 to ground).

4. Adjust R1501 (on the amplifier chassis) for a meter reading of 6 volts RMS (+18 dBm) or desired output level. For 0 dBm on the line, remove R3 from TB1-2 and -3. The speaker output will remain at three watts.

EXTERNAL SPEAKER OPTION

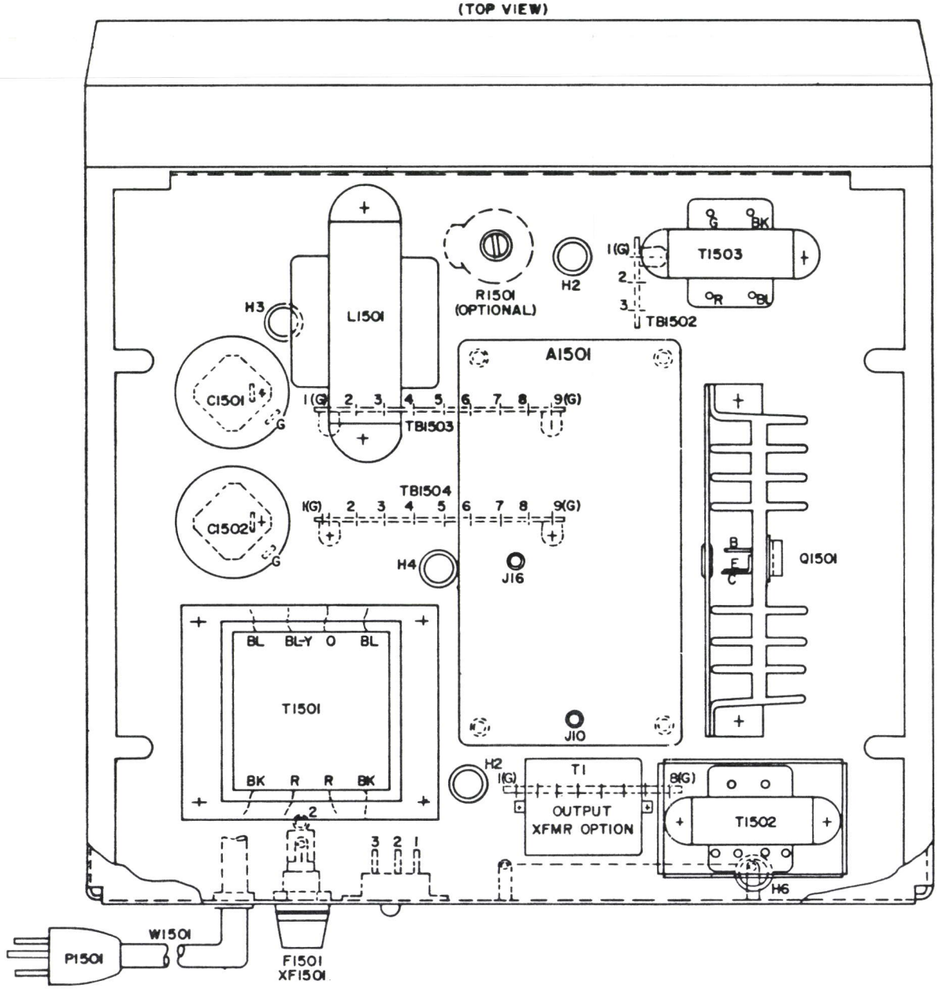
1. Disconnect the external speakers and connect an AC-VTVM across TB1501-1 and -2.

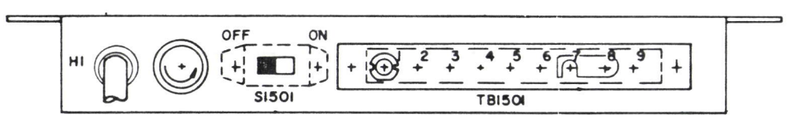
2. Turn the VOLUME control (on the front panel) fully counterclockwise.

3. Apply a 1000-Hz signal across TB1501-6 and -9. Increase the signal level to produce threshold of compression (0.4 volt DC measured from J19 to ground.

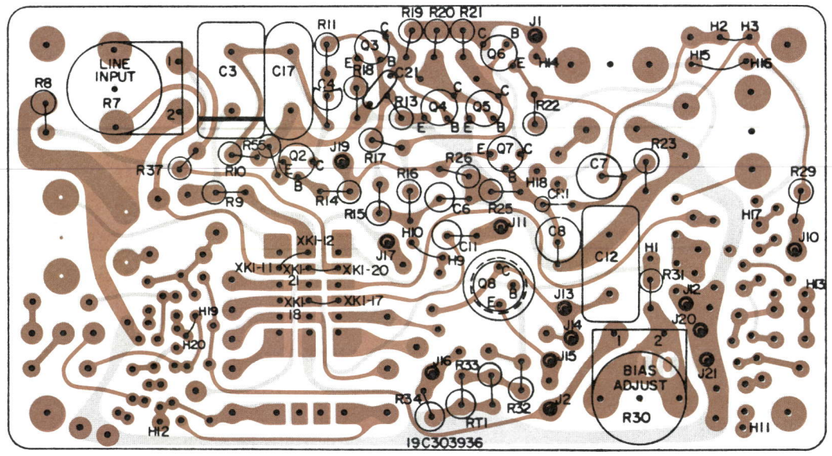
4. Adjust R1501 (on the amplifier chassis) for an AC-VTVM reading of 3.5 volts.

CHASSIS
(TOP VIEW)

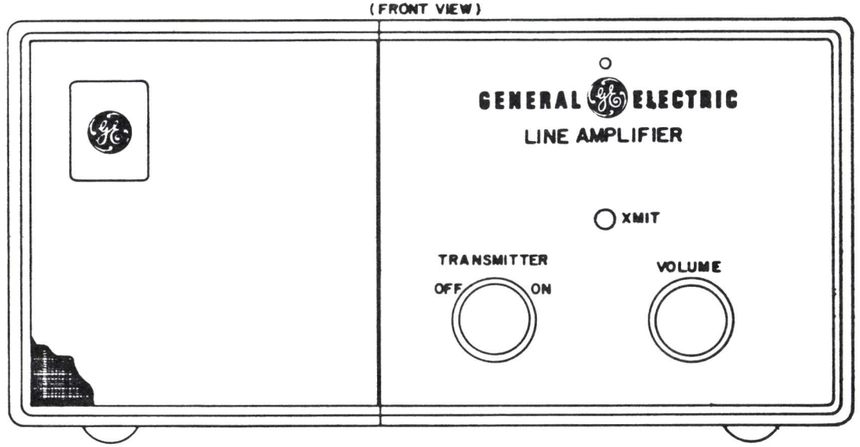




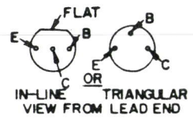
AUDIO BOARD
A1501



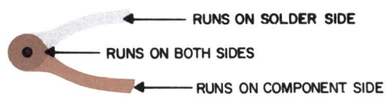
FRONT PANEL
(FRONT VIEW)



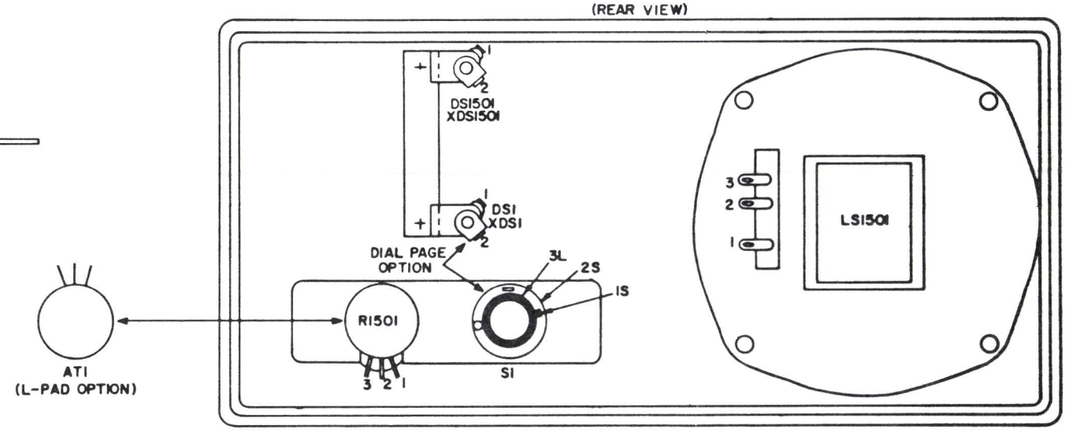
LEAD IDENTIFICATION



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



FRONT PANEL
(REAR VIEW)

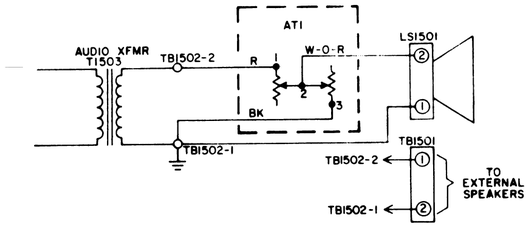


OUTLINE DIAGRAM

LINE AMPLIFIER MODEL 4EA23A10

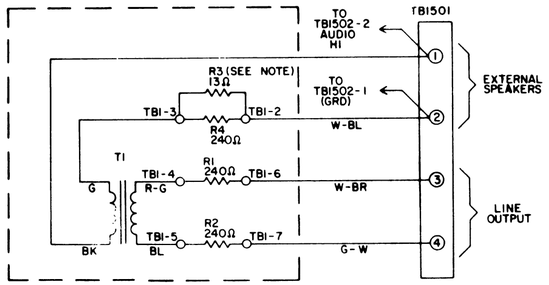
(19R621396, Rev. 5)
(19C303937, Sh. 1, Rev. 10)
(19C303937, Sh. 2, Rev. 10)

L-PAD OPTION 4216



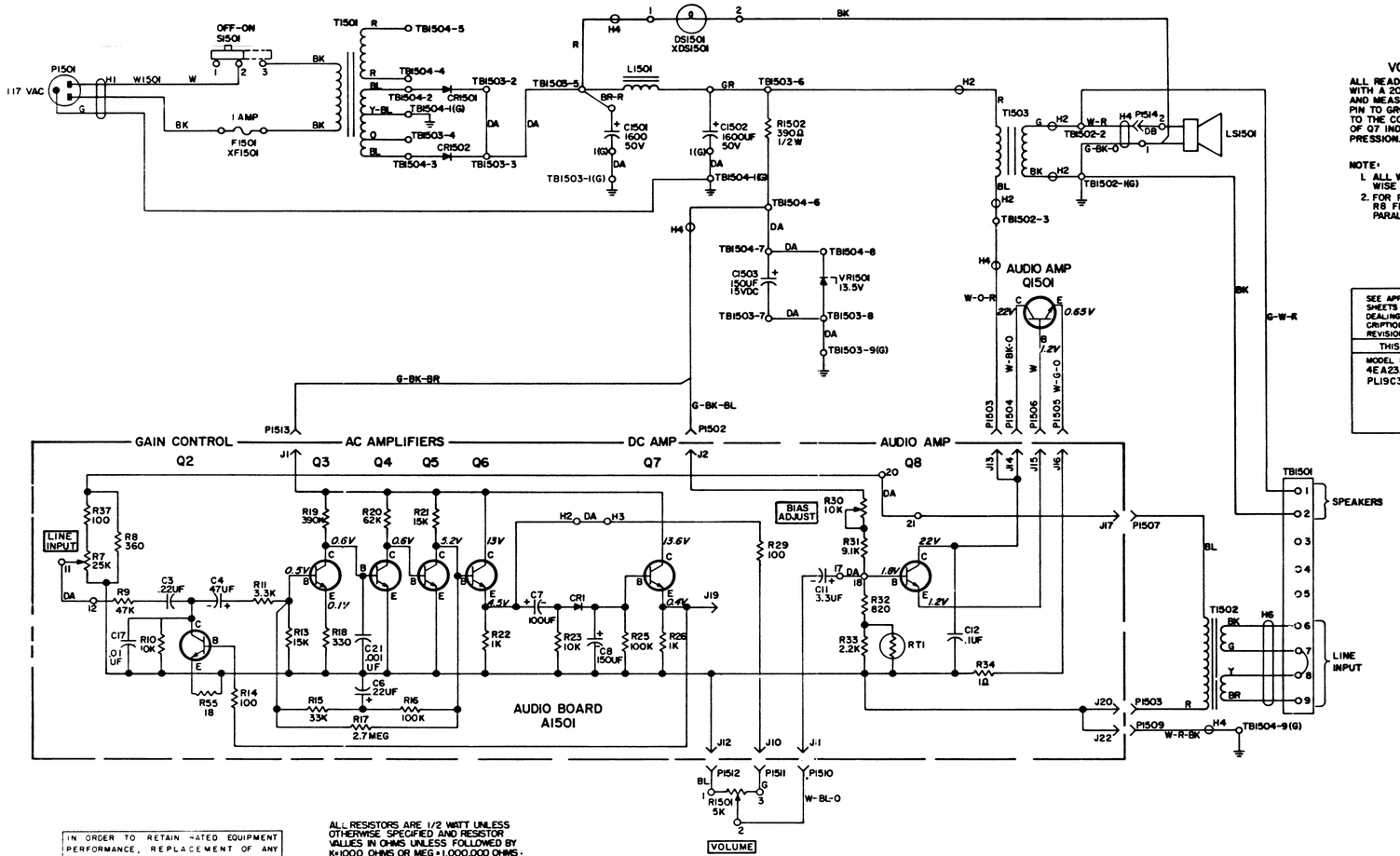
LINE DRIVER TRANSFORMER OPTION 4218

(REQUIRES L-PAD OPTION 4216)



NOTE -

THE LINE OUTPUT TRANSFORMER IS SHIPPED CONNECTED FOR A LINE OUTPUT OF +18 DBM. FOR A LINE OUTPUT OF 0 DBM, REMOVE R3.



VOLTAGE READINGS

ALL READINGS ARE DC VOLTAGES TAKEN WITH A 20,000 OHM-PER-VOLT METER, AND MEASURED FROM THE TRANSISTOR PIN TO GROUND WITH NO SIGNAL APPLIED TO THE CONSOLE. READING AT EMITTER OF Q7 INDICATES THRESHOLD OF COMPRESSION.

NOTE:

1. ALL WIRE IS N22 UNLESS OTHERWISE NOTED.
2. FOR PARALLEL OPERATION REMOVE R8 FROM A150I BOARD IN ALL PARALLEL UNITS.

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
4EA23A10	F
PL19C030936G4	E

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.

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.

SERVICE SHEET

FOR OPTIONS 4216, 4218 & 4219

(RC-1439)

SCHEMATIC DIAGRAM

LINE AMPLIFIER MODEL 4EA23A10

(19D402712, Rev. 18)

PARTS LIST

LBI3742J

LINE AMPLIFIER
MODEL 4EA23A10
(19D402711G1)

SYMBOL	GE PART NO.	DESCRIPTION
		FRONT PANEL 19D402709G1
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1501	19C307037P20	Lamp, incandescent: 28 v; sim to GE 757.
		- - - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS1051	19A116910P1	Permanent magnet: 5 inch, 3.2 ohms ±15%, 5 w. max operating; sim to Pioneer 002009.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1501	5496870P11	Variable, carbon film: 5K ohms ±20%, sim to Mallory LC(5K).
		- - - - - - - - - - - - SOCKETS - - - - - - - - - -
XDS1501*	19B209342P1	Lampholder: sim to Leecraft 7-04.
		In Model 4EA23A10 earlier than REV A:
	19B209342P2	Lampholder: sim to Leecraft 7-04-1.
		CHASSIS 19C311057G1
A1501		AUDIO BOARD 19C303936G4
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C3	19A115028P116	Polyester: 0.22 uf ±20%, 200 VDCW.
C4	5496267P2	Tantalum: 47 uF ±20%, 6 VDCW; sim to Sprague Type 150D.
C5*	19A115028P107	Polyester: 0.0 uf ±20%, 200 VDCW. Deleted in Model 4EA23A10 by REV B.
C6	5496267P10	Tantalum: 22 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
C7	5496267P107	Tantalum: 100 uf ±20%, 10 VDCW, sim. to Sprague Type 150D.
C8	5496267P103	Tantalum: 150 uf ±20%, 6 VDCW, sim. to Sprague Type 150D.
C11*	5496267P9	Tantalum: 3.3 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
		In Model 4EA23A10 of REV A and earlier:
	5496267P10	Tantalum: 22 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
C12	19A115028P114	Polyester: 0.1 uf ±20%, 200 VDCW.
C17*	19A115028P107	Polyester: 0.0 uf ±20%, 200 VDCW. Added to Model 4EA23A10 by REV C.
C21	19A700233P7	Ceramic: 1000 pF ±20%, 50 VDCW.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 and J2	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J10 and J17	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J19 and J20	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J22	4033513P4	Contact, electrical: sim to Bead Chain L93-3.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q2*	19A115362P1	Silicon, NPN; sim to Type 2N2925.
		In Audio Board 19C303936G4 earlier than REV A:
	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q3 and Q4	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q5 thru Q7	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q8	19A115300P2	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R7*	19B209358P7	Variable, carbon film: approx 800 to 25K ohms ±20%, 0.25 w; sim to CTS Type U-201.
		In Audio Board 19C303936G4 of REV A and earlier:
	19B209115P6	Variable, carbon film: 25K ohms ±20%, .05 w; sim to CTS Type UPM-70.
R8	3R77P361J	Composition: 360 ohms ±5%, 1/2 w.
R9*	19A700113P99	Composition: 33K ohms ±5%, 1/2 w.
		In Audio Board 19C303936G4 of REV A and earlier:
	3R77P473K	Composition: 47K ohms ±10%, 1/2 w.
R10	19A700113P87	Composition: 10K ohms ±5%, 1/2 w.
R11	19A700113P75	Composition: 3.3K ohms ±5%, 1/2 w.
R13	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R14	19A700113P39	Composition: 100 ohms ±5%, 1/2 w.
R15	19A700113P99	Composition: 33K ohms ±5%, 1/2 w.
R16*	19A700113P111	Composition: 100K ohms ±5%, 1/2 w.
		In Model 4EA23A10 of REV A and earlier:
	3R77P333J	Composition: 33K ohms ±5%, 1/2 w.
R17	3R77P275J	Composition: 2.7 megohms ±5%, 1/2 w.
R18	19A700113P51	Composition: 330 ohms ±5%, 1/2 w.
R19*	3R77P394J	Composition: 390K ohms ±5%, 1/2 w.
		In Model 4EA23A10 of REV A and earlier:
	3R77P513J	Composition: 51K ohms ±5%,, 1/2 w.
R20*	3R77P623J	Composition: 62K ohms ±5%, 1/2 w.
		In Model 4EA23A10 of REV A and earlier:
	3R77P243J	Composition: 24K ohms ±5%, 1/2 w.
R21	19A700113P91	Composition: 15K ohms ±5%, 1/2 w.
R22	19A700113P63	Composition: 1K ohms ±5%, 1/2 w.
R23	3R77P103K	Composition: 10K ohms ±10%, 1/2 w.
R25	3R77P104K	Composition: 0.10 megohm ±10%, 1/2 w.
R26	19A700113P63	Composition: 1K ohms ±5%, 1/2 w.
R29	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R30*	19B209358P6	Variable, carbon film: approx 300 to 10K ohms ±20%, 1/4 w; sim to CTS Type U-201.
		In REV B and C:
	19B209358P5	Variable, linear taper: 200-5000 ohms ±20%, 1/4 w; sim to CTS U-201.
		In Audio Board 19C303936G4 of REV A and earlier:
	19B209113P7	Variable, wirewound: 5K ohms ±20%, 2.5 w; sim to CTS Series 110.
R31	3R77P912J	Composition: 9.1K ohms ±5%, 1/2 w.
R32	19A700113P61	Composition: 820 ohms ±5%, 1/2 w.
R33	3R77P222K	Composition: 2200 ohms ±10%, 1/2 w.
R34	19B209022P15	Wirewound: 1 ohm ±5%, 2 w; sim to IRC Type BWH.
R37	19A700113P39	Composition: 100 ohms ±5%, 1/2 w.
R55*	19A700113P21	Composition: 18 ohms ±5%, 1/2 w. Added by REV C.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT1	19B209143P2	Rod: 4000 ohms ±10%, 1 w max; sim to Globar Type 789F-12.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1501 and C1502	7476442P20	Electrolytic, twist prong: 1600 uf + -10+250%, 50 VDCW; sim to PR Mallory WP-068.
C1503	5496267P12	Tantalum: 150 uF ±20%, 15 VDCW; sim to Sprague Type 150D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1501 and CR1502	19A704142P1	Rectifier, silicon; general purpose.
		- - - - - - - - - - FUSES - - - - - - - - - -
F1501	7487942P5	Cartridge, slow blow: 1 amps at 250 v; sim to Bussmann MDL 1.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1501	19A115671P1	Reactor: .210 h at .750 amps DC, 75 ohms DC res max, 20 VDC operating.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1501		(Part of W1501).
P1502 thru P1513	4029840P2	Contact, electrical: 24-18 wire Size, sim to Amp 42827-2.
P1514	4036634P1	Contact, electrical; sim to AMP 42428-2.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1501*	19A116118P3	Silicon, NPN.
		In REV E and earlier:
	19A115527P2	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1502	3R77P391K	Composition: 390 ohms ±10%, 1/2 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1501	7145098P3	Slide: SPDT, 0.75 amp at 125 VAC or 0.5 amp at 125 VDC; sim to Stackpole SS-32.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1501	19A115677P1	Power, step-down, step-up: Pri: 117 VRMS ±20%, Sec: 5.7/18/125 VDC.
T1502	19A115672P1	Audio freq: 0.3-6 KHz freq range, Pri: 9 ohms ±15%, DC res, Sec 1: 15 ohms ±15% DC res, Sec 2: 15 ohms ±15% DC res.
T1503	19A115612P1	Audio freq: 0.3-3 KHz freq range, Pri: 24.5 ohms ±5% imp, 1.38 ohms DC res, Sec: 3.3 ohms imp, 0.18 ohm DC res.
		- - - - - - - - - - TERMINAL BOARDS - - - - - - - - - -
TB1501	7117710P9	Phen: 9 terminals; sim to Cinch 1790.
TB1502	7775500P2	Phen: 3 terminals.
TB1503 and TB1504	7775500P119	Phen: 7 terminals.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1501	4036887P10	Silicon, Zener.
		- - - - - - - - - - - - CABLES - - - - - - - - - - - -
W1501*	19A134567P1	Power, 3 wire, 13 amps at 125 VAC, approx. 6 ft. long.
		In REV D and earlier:
	4036441P1	Power: approx 6 feet long, with 2-contact plug (P1501); sim to GE2073-1.02

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - - SOCKETS - - - - - - - - - - - -
XF1501	19B209005P1	Fuseholder: 15 amps at 250 v; sim to Littelfuse 342012.
		EXTERNAL SPEAKER VOLUME CONTROL KIT 19A122343G1
		- - - - - - - - - - ATTENUATORS - - - - - - - - - -
AT1	19A122344G1	L-pad, variable: 3.5 ohms ±15%, 4 w max.
		DC BLOCKING CAPACITOR KIT 19A122335G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A122362G1	Electrolytic, non-polarized: 4 uF +100% -10%, 150 VDCW.
		LINE OUTPUT TRANSFORMER KIT 19A122342G1
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1	7487236P1	Audio freq: Pri: 3.5 ohmimp, Sec 1: 600 ohms ±10% imp. Sec 2: 100 ohms ±10% imp.
		TERMINAL ASSEMBLY 19A122341G1 (Used in 19A122342G1)
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3R77P241J	Composition: 240 ohms ±5%, 1/2 w.
R3	3R77P130J	Composition: 13 ohms ±5%, 1/2 w.
R4	3R77P241J	Composition: 240 ohms ±5%, 1/2 w.
		- - - - - - - - - - TERMINAL BOARDS - - - - - - - - - -
TB1	7775500P118	Phen: 8 terminals.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B205512G2	Casting. (Used in 19D402709G1).
	19C303769P1	Grille. (Used in 19D402709G1).
	NP248900	Nameplate (GE Monogram).
	4037559P9	Rubber bumper: sim to Atlantic India Rubber 165-A. (Used in 19D402709G1).
	19B209342P3	Tube, paper: sim to Leecraft 700-50. (Used with DS1501 in 19D402709G1).
	19A122210P1	Lens, green. (Used in 19D402709G1).
	19A115679P1	Knob, push-on: black; sim to Rohden 25107.5-7E. (Used with R1501 in 19D402709G1).
	19A702464P4	Bushing, strain relief. (Used with W1501 in 19C311057G1).
	19A122366P1	Heat sink. (Used with Q1501 in 19C311057G1).
	19A701332P4	Insulator, washer: nylon. (Used with Q8 in 19C303936G4).
	19A122161G2	Top cover. (Used in 19D402711G1).
	19A121759P1	Turn screw: 1/4 - 20. (Used with Top cover, 19A122161G2 in 19D402711G1).
	4036436P2	Nut, push-on: sim to Paster 8063-21-00. (Used with Top cover, 19A122161G1 in 19D402711G1).
	4035439P1	Heat sink, transistor: sim to Birtcher 3AL-635-2R. (Used in 19C303936G4).
	7118719P4	Clip, spring tension: sim to Prestole E-50005-003. (Used with C1 in 19A122335G1 Blocking Capacitor Kit).
	19A115730P1	Insulator, washer. (Used with Q1501).
	19A116023P1	Insulator, plate. (Used with Q1501).

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.

LINE AMPLIFIER MODEL 4EA23A10
REV. A - To provide a better ground connection for the power-on light. Added connection from XDS1501-2 to LS1501-1.

REV. B - To reduce noise, and to make compatible with future system requirements. Deleted C5 and changed C11, R16, R19, R20 and R21.

REV. C - To decrease broadcast pick-up from telephone line. Added C17.

REV. D - To improve low frequency recovery time of compressor amplifier. Added R55.

COMPONENT BOARD 19C303936-G4
REV. A - To facilitate procurement of parts. Changed Q2.

REV. B - To improve system performance with the new telephone line requirements. Changed R7, R9 and R30.

REV. C - To improve low frequency recovery time of compressor amplifier. Added R55.

LINE AMPLIFIER 4EA23A10
REV. E - To incorporate a 3-wire power cord. Changed W1501.

COMPONENT BOARD 19C303936G4

REV. D - To adjust range of amplifier bias adjust. Changed R30.

LINE AMPLIFIER 4EA23A10

REV. F - To improve audio operation. Changed Q1501.

COMPONENT BOARD 19C303936G4

REV. E - To eliminate spurious oscillations. Added C21.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES