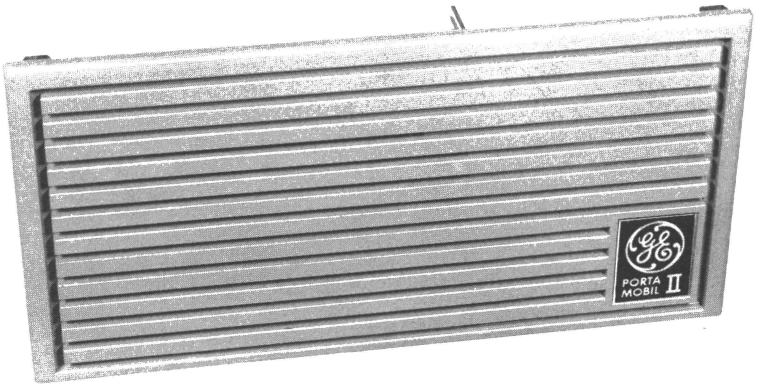
MOBILE RADIO

Porta-Mobile II™

AUDIO POWER AMPLIFIER 19C321258G5 THROUGH G7



SPECIFICATIONS *

USED WITH:	PMII
PL NUMBER	AUDIO POWER OUTPUT
19C321258G5 & G7	10 Watts (@ rated audio)
19C321258G6 (Option 2102)	1/2 Watt (@ rated audio)
AUDIO POWER INPUT	500 milliwatts (@ rated audio)
SPEAKER IMPEDANCE	8 ohms
FREQUENCY RESPONSE	300 to 3000 Hz ±4 dB (1000 Hz reference)
DISTORTION	Less than 10%

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

GENERAL ELECTRIC

Maintenance Manual LBI30765C
DATAFILE FOLDER - DF8397

AUDIO POWER AMPLIFIER 19C321258G5 THROUGH G7

TABLE OF CONTENTS

WARNING

Although the highest DC voltage in Porta•Mobile II™ Equipment is supplied by a portable or vehicular battery, high currents may be drawn under short circuit conditions. These currents can possibly heat metal objects such as tools, rings, watchbands, etc., enough to cause burns. Be careful when working near energized circuits! High-level RF energy in the transmitter Power Amplifier assembly can cause RF burns upon contact. Keep away from these circuits when the transmitter is energized!

DESCRIPTION

Audio Power Amplifier 19C321258 groups 5, 6 and 7, is constructed in the front cover for the PMII case assembly. Amplifier groups 5 and 7 provide 10 Watts audio power output, and group 6 provides 1/2 Watt audio power output. Amplifier groups 5 and 7 consists of a power amplifier circuit, audio mute circuit and a 7.5 volt regulator circuit. Group 6 consists of a 7.5 volt regulator and a speaker. Group 5 is used in motorcycle applications and group 7 is used in portable applications. Group 6 is an option also used in portable applications.

CIRCUIT ANALYSIS

Amplifier

Receiver audio output interfaces with the audio power amplifier through the system board and connects to P1501-4 (AUD IN HI). Receiver audio is coupled through transformer T1 to the base of power transistors Q6 and Q7. Power transistors Q6 and Q7 are part of a class B common emitter amplifier circuit with a transformer input and a transformer output. Transistor Q8 in the emitter bias circuit provides temperature compensation for audio power output stability. The collector output is coupled through audio power transformer T1501. Transformer T1501 has a tap for 10 Watts operation connected to P1501-8 (AUD OUT HI 10 W).

Audio Mute

The audio mute circuit consist of transistors Q1 and Q2. Transistor Q2 completes the negative path for the primary and secondary of transformer T1. When a positive DC voltage level from the receiver audio PA is present at P1501-7 (AUD SQ. MUTE) and coupled through Q1 to the base of Q2, Q2 conducts completing the negative path and full audio is heard from the speaker. When the DC voltage level at P1501-7 drops, Q2 stops conducting as hard and the audio is muted.

7.5 Volt Regulator

The 7.5 Volt Regulator circuit provides a continuous and keyed 7.5 volts for the operation of the transmitter, receiver and tone and control options. The regulator circuit consists of pass transistor Q5 and regulator module A1. A typical regulator circuit is shown in Figure 1.

The 10-Volt supply is connected to P1501-12 and is applied to the emitter of pass transistor Q5. The collector voltage of Q5 is held at 7.5 Volts by regulator transistors Q1 and Q2. If the collector voltage of Q5 starts to increase above 7.5 Volts, Q2 will conduct harder causing the bias on the base of Q1 to decrease. Q1 will conduct less causing Q5 to conduct less

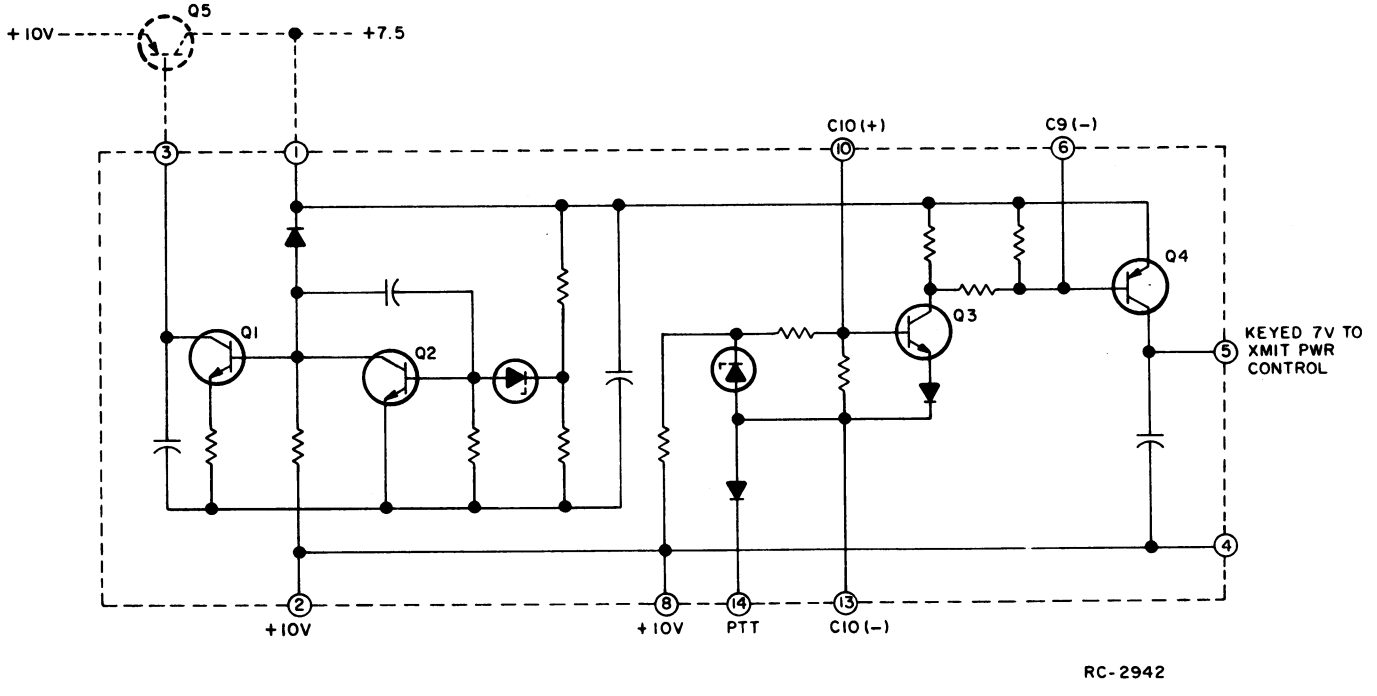


Figure 1 - Typical Regulator Circuit

to hold the collector voltage at 7.5 Volts. If the collector voltage of Q5 starts to decrease below 7.5 Volts, Q2 will conduct less causing Q1 to conduct harder. Q1 conducting harder causes Q5 to conduct harder to again hold the collector voltage of Q5 at 7.5 Volts.

Transistors Q3 and Q4 provides a keyed +7 Volts for the transmitter power control circuit. When the PTT switch is pushed the emitter circuit of transistor Q3 is completed and Q3 conducts. Q3 conducting causes the bias on the base of NPN transistor Q4 to go low. The bias on Q4 going low causes Q4 to conduct. Q4 conducting places regulated +7 Volts on Pin 5 of the regulator module and P1501-13 (7.5 V Tx KEYED).

TROUBLESHOOTING

Should a service problem arise, the following Quick-Checks can assist the service technician.

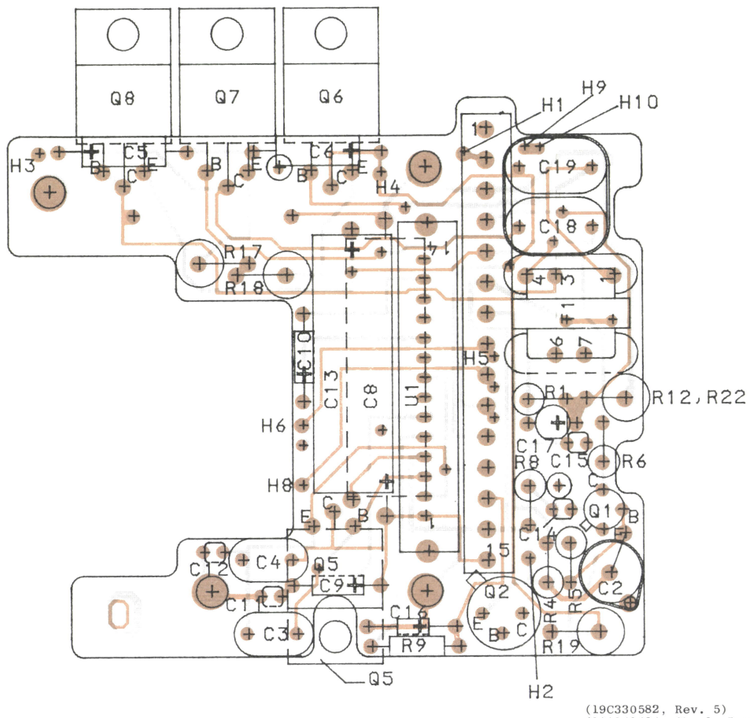
SYMPTOM	CHECK FOR:
1. No Audio	1. +10 Volts at P1501-5. 2. Receiver audio at P1505-4. 3. Defective power transistor Q6 or Q7.
2. Low Audio	1. DC voltage at P1505-7. 2. Defective audio mute transistors Q1 and Q2. 3. Defective C1, C2 or C7.
3. No regulated 7.5 Volts	1. +10 Volts at P1501-12. 2. Defective C8, C9 or C10. 3. Defective Q5. 4. Defective U1/U2.

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

GENERAL ELECTRIC*
U.S.A.

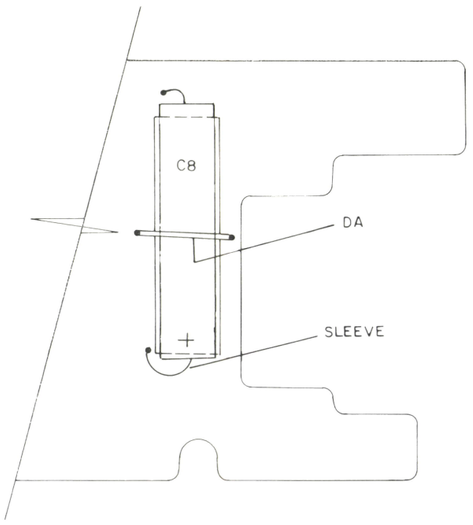
A1505 / A1507

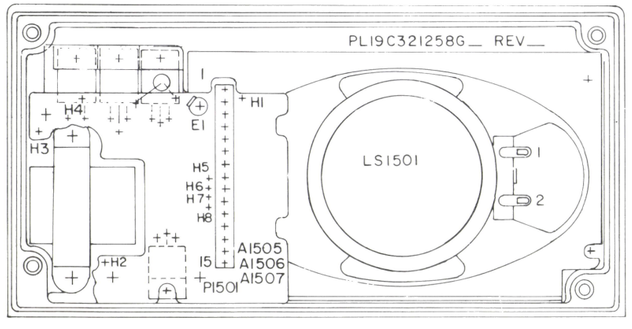
COMPONENT SIDE



(19C330582, Rev. 5)
(19A143484, Sh. 1, Rev. 0)
(19A143484, Sh. 2, Rev. 0)

SOLDER SIDE

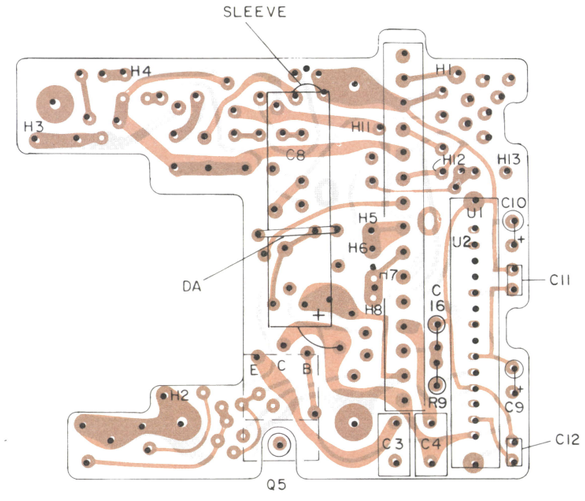




OUTLINE DIAGRAM

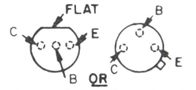
AUDIO POWER AMPLIFIER
19C321258G5, 6 & 7

A1506
COMPONENT SIDE



(19D429811, Sh. 2, Rev. 0)
(19D429811, Sh. 3, Rev. 0)

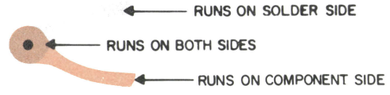
LEAD IDENTIFICATION
FOR Q1 & Q2



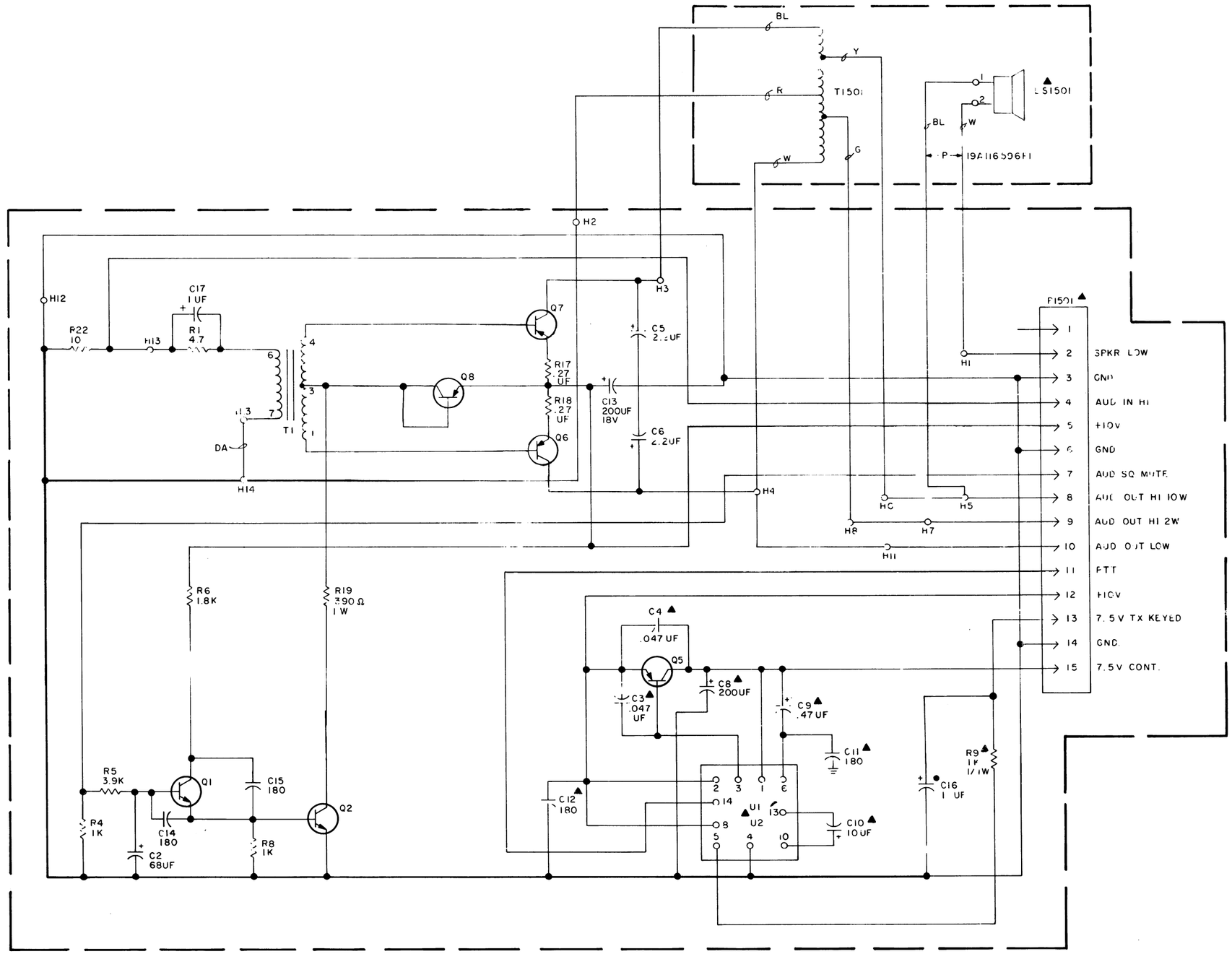
IN-LINE TRIANGULAR

TOP VIEW

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



(19D430325, Rev. 1)



NOTES

1. COMPONENTS MARKED THUS "▲" ARE USED WITH ALL OTHER COMPONENTS TO MAKE UP GROUP 5, BUT ARE ONLY ONES PRESENT IN GROUP 6.
2. ADD JUMPERS BETWEEN HOLES 6 & 13 AND HOLES 11 & 12 IN GROUP 6 ONLY.
3. "●" NOT PRESENT IN LOW BAND UNITS.

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.

MODEL NO.	REV LETTER
PL19C321265G5	E
PL19C321265G6	
PL19C321265G7	E

(19D429823, Rev. 6)

SCHEMATIC DIAGRAM

AUDIO POWER AMPLIFIER 19C321258G5, 6 & 7

PARTS LIST

FRONT COVER
AND
AUDIO POWER AMPLIFIER
19C321258G5 10 WATT (MOTORCYCLE)
19C321258G6 1/2 WATT (PORTABLE)
19C321258G7 10 WATT (PORTABLE)
ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
A1505 thru A1507		PA BOARD A1505 19C321265G5 10 Watt REV E A1506 19C321265G6 1/2 WATT A1507 19C321265G7 10 WATT REV E
		- - - - - - - - - CAPACITORS - - - - - - - - -
C2	5496267P11	Tantalum: 68 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C3 and C4	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C5 and C6	5496267P13	Tantalum: 2.2 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C7*	5496267P12	Tantalum: 150 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Deleted in G5 & G7 by REV A.
C8	19A115680P26	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TTX.
C9 and C10	5491674P27	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 162D.
C11 and C12	19A700229P73	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C13	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TTX.
C15	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C16	5491674P1	Tantalum: 1.0 µf +40-20%, 10 VDCW; sim to Sprague Type 162D.
C17	19A134202P14	Tantalum: 1 µf ±20%, 35 VDCW.
C18* and C19*	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW. Added by REV B. Deleted by REV C.
		- - - - - - - - - DIODES AND RECTIFIERS - - - - -
CR1* and CR2*	4037822P1	Silicon, 1000 mA, 400 PIV. Deleted in G5 & G7 by REV B.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q2	19A115300P4	Silicon, NPN.
Q5	19A116942P1	Silicon, PNP.
Q6	19A116942P1	Silicon, PNP.
Q7*	19A116942P1	Silicon, PNP.
		In G5 & G7 of REV A & earlier:
	19A130324G3	Silicon, PNP.
Q8*	19A116942P1	Silicon, PNP. Added by REV B.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	19A700113P7	Composition: 4.7 ohms ±5%, 1/2 w.
R4	19A700113P63	Composition: 1K ohms ±5%, 1/2 w.
R5	19A700113P77	Composition: 3.9K ohms ±5%, 1/2 w.
R6	19A700113P69	Composition: 1.8K ohms ±5%, 1/2 w.
R8	19A700113P63	Composition: 1K ohms ±5%, 1/2 w.
R9	19A700106P63	Composition: 1K ohms ±10%, 1/4 w.
R19	3R79P910J	Composition: 91 ohms ±5%, 2 w.
R20	19C314256P22059	Metal film: 20.5 ohms ±1%, 1/4 w.
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT2	5490828P54	Thermistor: 50 ohms ±10%, color code blue; sim to Carborundum Type B0807J-16. (Part of Q6).
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19A134159P1	Audio freq: 300- 4000 Hz, Pri: 5.7 ohms ±15%, Sec: 10.7 ohms max.
		- - - - - - - - - INTEGRATED CIRCUITS - - - - - - - - -
U1	19D417627G3	Regulator: 7.5 volt.
U2	19D417627G1	Regulator: 7.5 volt.
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS1501	19B209541P1	Permanent magnet: 3 x 5 inch, 8 ohms ±10% imp, at 0.5 watt input; sim to Oaktron T-4014.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1501	19A134167P1	Audio freq: 300- 4000 Hz, 0.33 ohms DC res at 25 ±3°C non-operating.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C321253G1	Front Cover assembly. (Includes LS1501, gasket, grille plate).
	19A134542P1	Gasket, front cover. (Part of front cover 19C321253G1).
	19D417614P1	Grille plate. (Part of front cover 19C321253G1).
	19B226372P1	Clamp plate. (Secures LS1501 to cover).
	19B226409P1	Spacer.
	NP279872	Nameplate. (GE - PORTA MOBIL II).
	19A134343P1	Bumper plastic. (Located on LS1501 magnet).
	19A134016P1	Insulator, bushing. (Used with Q5-Q7).
	19A116023P1	Insulator, plate. (Used with Q5-Q7).
	4036555P1	Insulator, washer: nylon. (Used with Q2).
	19A121175P29	Insulator, plate. (Used with C8 & C13).
	19A116364P5	Contact, electrical: sim to AMP 86147-1 (Strip Form).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

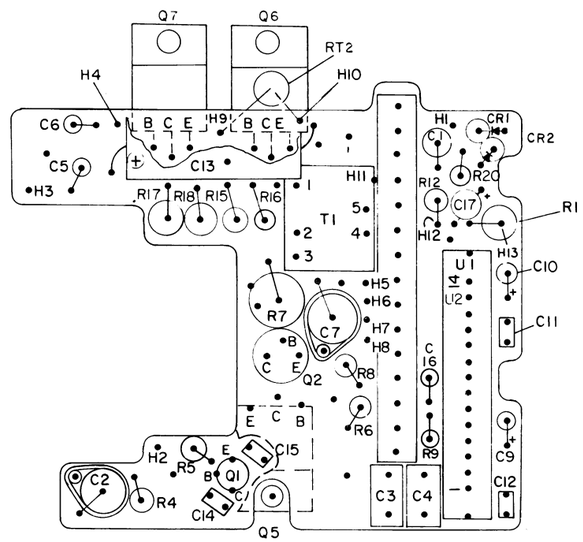
PRODUCTION CHANGES

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.

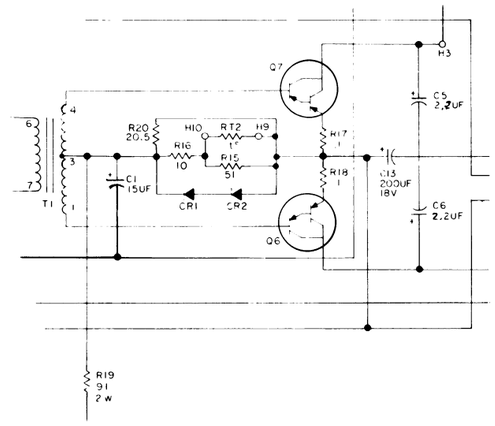
REV. A - PA BOARD 19C321265G5 & G7
To improve audio response.
Deleted C7 and added jumper.
Deleted R19 and added R21 on 19C321265G7 only.

REV. B - To improve audio fidelity at low power levels.
Deleted CR1, CR2, R15, R16, R20, R21 and RT2.
Added C18 & C19.
Changed R19, R18 & R19.

Outline Diagram was:



Schematic Diagram was:



REV. C - To improve audio.
Deleted C18 & C19.
Deleted R12.
Deleted R22.

REV. D - To re-lay out component to facilitate assembly.
Changed Printed wire board.

Outline Diagram was:

Refer to Outline Diagram in REV. B.

REV. E - To improve audio deleted C1. C1 was:
5496267P14 15 µf ± 20%, 20 VDCW ;
similar to Sprague type 150D.