

MASTR

PROGRESS LINE

TONE/AUDIO PANEL 19D413943G3 & G5



SPECIFICATIONS *

Used With	Satellite Receivers
Tone Frequency	1950 Hz ± 10 Hz
Tone Output	
Receiver Squelched	-20 to +11 dBm
Receiver Unsquelched	Less than -60 dBm
Audio Output	-20 to +11 dBm
Output Impedance	600 ohms
Input Power	
19D413943G3 Panel	30 milliamperes @ 10 Volts DC
19D413943G5 Panel	117 VAC, 50/60 Hz $\pm 10\%$
Switching Voltage	2 Volts with less than 100 millisecond rise time
Dimensions	One 19-inch rack unit
Temperature Range	-30°C to +60°C (-22°F to +140°F)

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

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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

The Tone/Audio Panel is used in tone signaling applications in Receiver Voting Systems. Whenever the Satellite Receiver is squelched, a 1950 Hz tone from the Tone/Audio Panel is applied to the Voting Selector through the audio pair. When the receiver is unsquelched, the 1950 Hz tone is removed and the receiver audio is applied to the Voting Selector.

Two Tone/Audio Panels are available. The 19D413943G3 panel is used with General Electric MASTR Local Control, Remote Control, Repeater and Remote/Repeater stations. The 19D413943G5 panel contains its own 120 VAC Power Supply and may be used with any Satellite Receiver which is equipped with a Carrier Operated Relay (COR) or Carrier Operated Switch (COS) function.

The 19D413943G5 (Option 7692) Tone/Audio Panel is designed for mounting in a 19-inch rack. No harness is supplied with this panel for interconnection with the Satellite Receiver.

CIRCUIT ANALYSIS

The circuitry of the Tone/Audio Panels consist of a tone oscillator, amplifiers, tone gating circuits, an emitter-follower and a line driver. The +10 Volts required for operating the 19D413943G3 panel circuitry is taken from the EP-38-A or EP-39-A Power Supply.

Applying power to the Tone/Audio board (A2) starts oscillator Q1. Feedback for the oscillator is supplied through C2. The oscillator output is coupled through T1 to the base of amplifier Q2. Potentiometer R7 in the emitter of Q2 is used to set the tone output level applied to the audio pair. Instructions for setting R7 are contained in the Satellite Receiver Adjustment Procedure.

When the receiver is squelched (no COR or COS voltage), the output of Q3 is applied to emitter-follower Q4 and line driver Q5. The line driver output is coupled through the 600-ohm line matching transformer T2 to

the audio pair.

When the receiver is unsquelched, the COS voltage is applied to the base of Q8 through R24-C16 and R32. Q8 is turned on, turning off Q9. Turning off Q9 turns on tone gate Q6 and Q7. Conduction of Q7 shunts the tone to ground. The receiver audio is coupled through capacitors C10 and C18 and through transformer T2 to the audio pair. Q8 and Q9 provide a slow-to-operate and fast release switching function for the tone gate. The turn-on voltage for Q6 is slowed by the charging of C17 in the collector of Q9. This guarantees that the voting receiver is providing full audio output before the tone is gated off. When the receiver squelches, capacitor C16 discharges and operates the switch quickly to allow the squelch tail from the receiver to mash the tone burst.

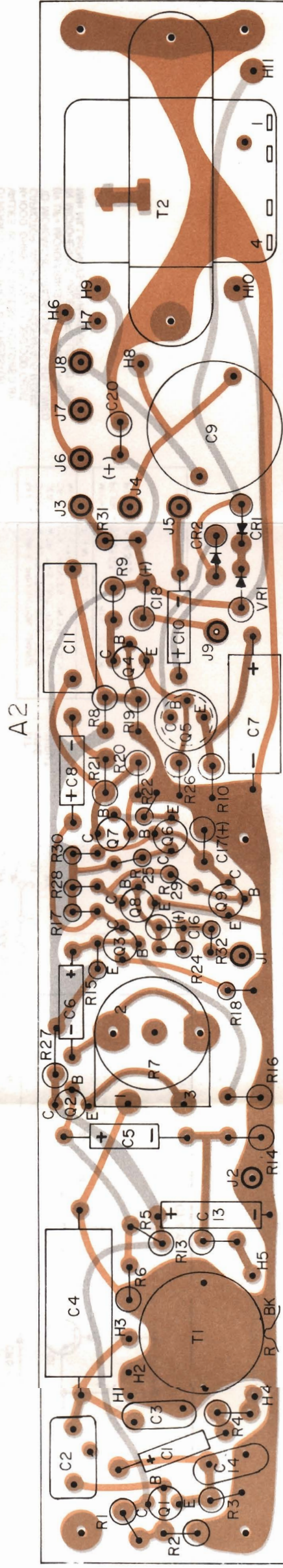
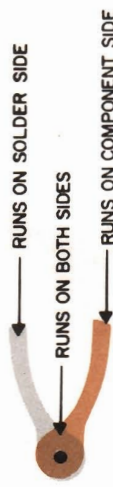
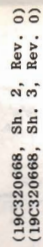
Diodes CR1 and CR2 and Zener diode VR1 protect the tone/audio circuitry from line surges.

The Power Supply (A3) provided with the 19D413943G5 panel consists of power transformer T1, full-wave bridge rectifier CR1-CR4 and the 10 VDC regulator circuit. Placing the OFF-ON switch S1 in the ON position applies 117 Volts AC to the primary of T1. The primary is fused by F1. The AC is rectified by CR1-CR4, filtered by C2 and applied to the regulator Q1 and VR1. The regulated +10 VDC is applied to the tone/audio circuits.

Diode CR5 is normally back biased but, if the supply voltage fails, the diode will become forward biased and an auxiliary battery connected to TB1-10 will be automatically substituted for the power source. When the supply voltage is restored, the diode is again reverse-biased. This automatically disconnects the battery.

MAINTENANCE

The Tone/Audio Panel should require a minimum of maintenance. If service is required, refer to the DC voltage readings on the Schematic Diagram.

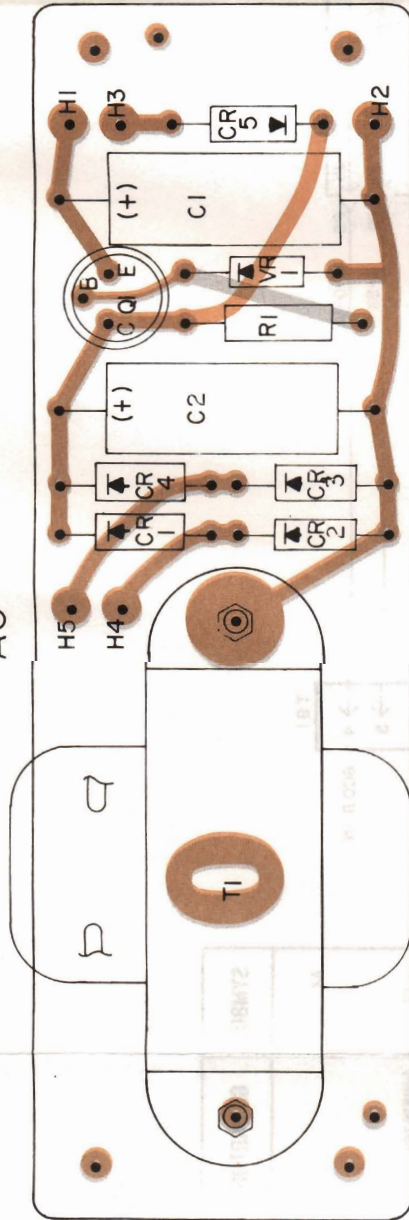


(19D417258, Sh. 2, Rev. 1)
(19D417258, Sh. 3, Rev. 1)

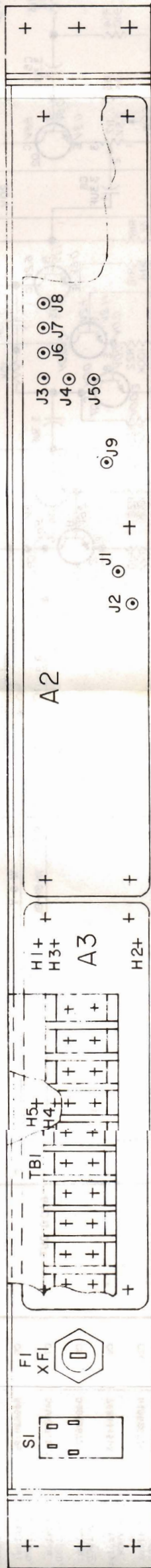
(19D417663, Rev. 0)

OUTLINE DIAGRAM
TONE/AUDIO PANEL 19D413943G3 & G5

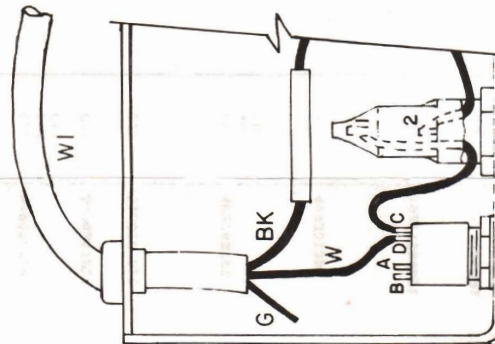
A3



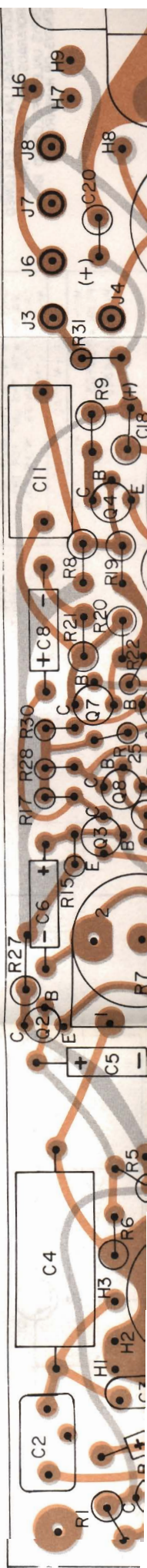
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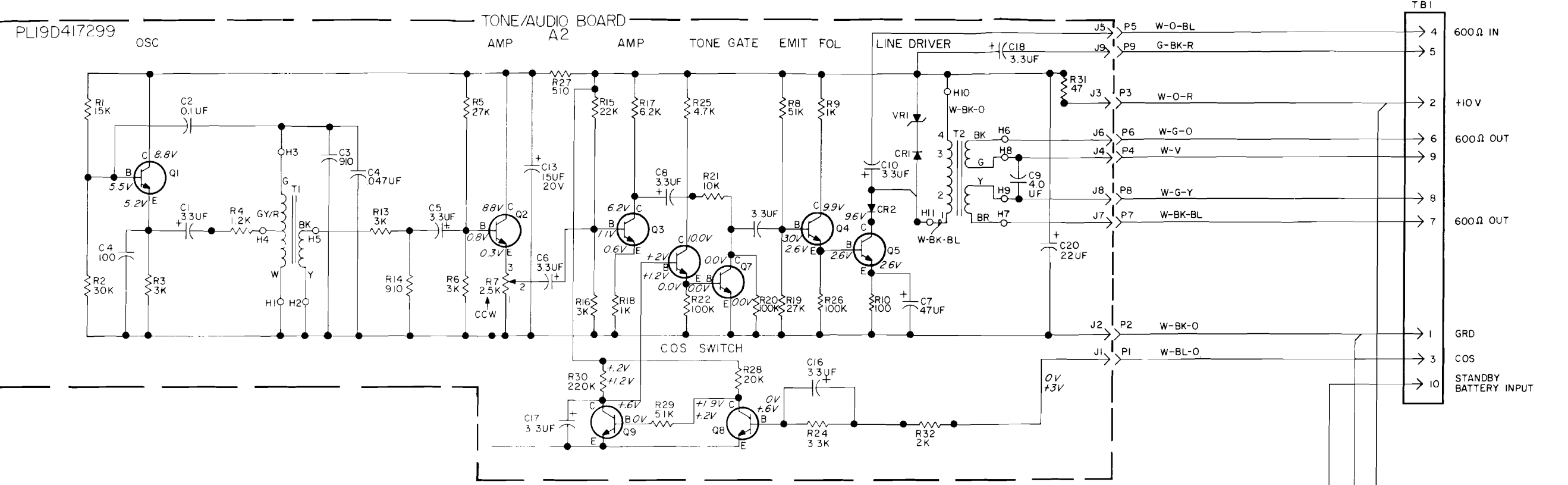


REAR VIEW



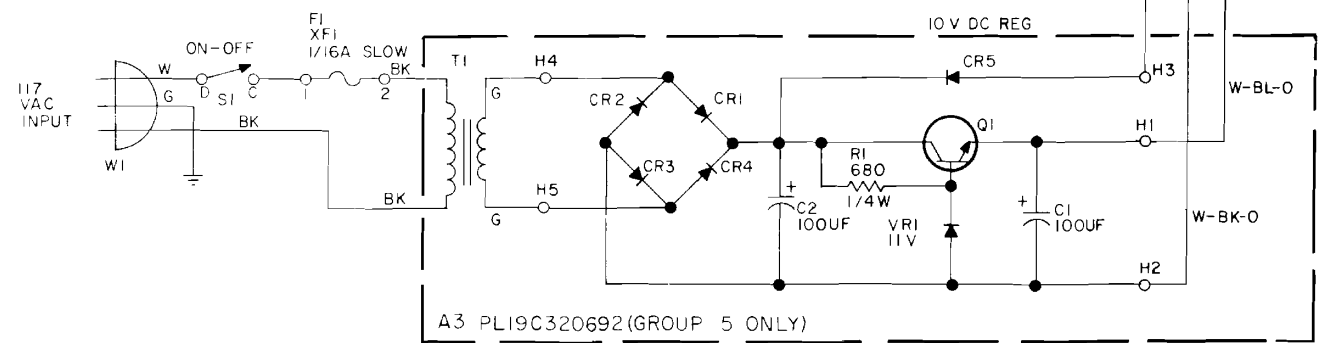
A2





ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICO FARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS

SEE APPLICABLE PREPARED PANEL SHEETS IN INSTR. FOR BOMB SECTION DEALING WITH THIS UNIT FOR DES. CHANGES AND CHANGES IN REPAIR RELATION TO THIS	
THIS BOARD HAS AMPLIFIED	
MODEL NO.	REV. LETTER
PLI9D413943G3	
PLI9D413943G5	



NOTE
1. ALL WIRES ARE #22.

(19D417303, Rev. 6)

SCHEMATIC DIAGRAM

TONE/AUDIO PANEL 19D413943G3 & G5

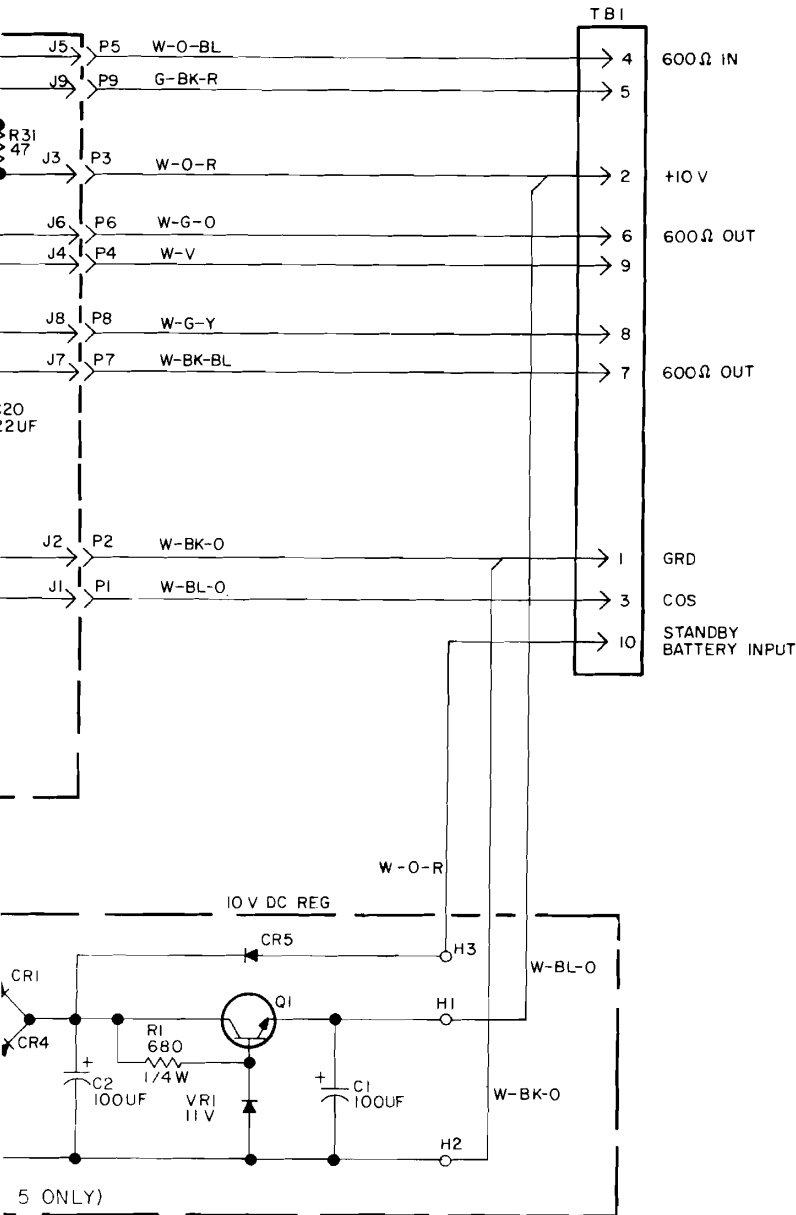
SYMBOL	GE PART NO.	DESCRIPTION
R7	19B209358P4	Variable, carbon film: approx 50 to 2500 ohms ±20%, 0.2 w; sim to CTS Type U-201.
R8	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.
R9	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R10	3R152P101J	Composition: 100 ohms ±5%, 1/4 w.
R13	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R14	3R152P911J	Composition: 910 ohms ±5%, 1/4 w.
R15	3R152P223J	Composition: 22,000 ohms ±5%, 1/4 w.
R16	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R17	3R152P622J	Composition: 6200 ohms ±5%, 1/4 w.
R18	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R19	3R152P273J	Composition: 27,000 ohms ±5%, 1/4 w.
R20	3R152P104J	Composition: 0.10 megohm ±5%, 1/4 w.
R21	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R22	3R152P104J	Composition: 0.10 megohm ±5%, 1/4 w.
R24	3R152P332J	Composition: 3300 ohms ±5%, 1/4 w.
R25	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w.
R26	3R152P104J	Composition: 0.10 megohm ±5%, 1/4 w.
R27	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R28	3R152P203J	Composition: 20,000 ohms ±5%, 1/4 w.
R29	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w.
R30	3R152P224J	Composition: 0.22 megohm ±5%, 1/4 w.
R31	3R152P470J	Composition: 47 ohms ±5%, 1/4 w.
R32	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
- - - - - TRANSFORMERS - - - - -		
T1	19B205360G1	Coil.
T2	19A115731P1	Audio freq: 300 to 6000 Hz, Pri (1-4): 22 ohms ±15% DC res, Pri (2-3): 12.5 ohms ±15% DC res, Sec 1: 13 ohms ±15%, Sec 2: 13 ohms ±15%.
- - - - - VOLTAGE REGULATORS - - - - -		
VR1	19A116325P4	Silicon, Zener; sim to Type 1N5349.
A3		POWER SUPPLY BOARD 19C320692G1
- - - - - CAPACITORS - - - - -		
C1 and C2	5496267P16	Tantalum: 100 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
- - - - - DIODES AND RECTIFIERS - - - - -		
CR1 thru CR5	4037822P1	Silicon.
- - - - - RESISTORS - - - - -		
R1	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
- - - - - TRANSISTORS - - - - -		
Q1	19A115300P1	Silicon, NPN; sim to Type 2N3053.
- - - - - TRANSFORMERS - - - - -		
T1	19A116444P1	Power, step down: Pri: 117 VRMS, 50/60 Hz, Sec: 16 VRMS (no load).
- - - - - VOLTAGE REGULATORS - - - - -		
VR1	4036887P8	Silicon, Zener.
- - - - - FUSES - - - - -		
F1	7487942P6	Slow blowing: 1/16 amp at 250 v; sim to Bussmann MDL-1/16.

SYMBOL	GE PART NO.	DESCRIPTION
- - - - - PLUGS - - - - -		
P1 thru P9	4029840P2	Contact, electrical: sim to Amp 42827-2.
- - - - - SWITCHES - - - - -		
S1	5491899P2	Toggle: DPST, 6 amps at 125 VAC/VDC; sim to Cutler-Hammer 8370K8.
- - - - - TERMINAL BOARDS - - - - -		
TB1	19C301086P7	Feed-thru, phen: 10 terminals; sim to GE CR151D.
- - - - - CABLES - - - - -		
W1	19A116740P1	Power: 3 wire conductors, approx 8 feet long.
- - - - - SOCKETS - - - - -		
XF1	19B209005P1	Fuseholder: 15 amps at 250 v; sim to Littelfuse 342012.
HARNESS ASSEMBLY 19D413943G4 (19D413943G3) (Includes P1-P9, TB1)		
HARNESS ASSEMBLY 19D413943G6 (19D413943G5) (Includes P1-P9, TB1)		
- - - - - MISCELLANEOUS - - - - -		
	7160508P2	Nut, sheet spring: sim to Tinnerman C1356-632-24. (Secures TB1).
	19B209260P26	Terminal, solderless: sim to AMP 31251-LOOSE PC. (Used with W1).
	19A116768P8	Bushing, strain relief: sim to Heyco SR-5P-4. (Used with W1).
	7115195P2	Hexnut: No. 15/32-32. (Used with S1).
	7115130P13	Lockwasher: No. 1/2; sim to Shakeproof 1224-2. (Used with S1).
	4036555P1	Insulator, washer: nylon. (Used with Q5 on A2, Q1 on A3).

PARTS LIST

LBI-4584

TONE/AUDIO PANEL
19D413943G3 W/O POWER SUPPLY
19D413943G5 WITH POWER SUPPLY



(19D417303, Rev. 6)

SYMBOL	GE PART NO.	DESCRIPTION
A2		TONE AUDIO BOARD 19D417299G1
		----- CAPACITORS -----
C1	5496267P9	Tantalum: 3.3 μ f \pm 20%, 15 VDCW; sim to Sprague Type 150D.
C2	19A116080P7	Polyester: 0.1 μ f \pm 20%, 50 VDCW.
C3	5496372P380	Ceramic disc: 910 pf \pm 5%, 500 VDCW, temp coef -4700 PPM.
C4	19C307114P4702G	Polystyrene: 47,000 pf \pm 2%, 100 VDCW, temp coef -120 \pm 30 PPM.
C5	5496267P7	Tantalum: 100 μ f \pm 20%, 10 VDCW; sim to Sprague Type 150D.
C6	5496267P9	Tantalum: 3.3 μ f \pm 20%, 15 VDCW; sim to Sprague Type 150D.
C7	5496267P15	Tantalum: 47 μ f \pm 20%, 20 VDCW; sim to Sprague Type 150D.
C8	5496267P9	Tantalum: 3.3 μ f \pm 20%, 15 VDCW; sim to Sprague Type 150D.
C9	7486445P5	Electrolytic, non polarized: 4 μ f \pm 100% -10%, 150 VDCW.
C10	5496267P9	Tantalum: 3.3 μ f \pm 20%, 15 VDCW; sim to Sprague Type 150D.
C11	19A116080P10	Polyester: 0.33 μ f \pm 20%, 50 VDCW.
C13	5496267P14	Tantalum: 15 μ f \pm 20%, 20 VDCW; sim to Sprague Type 150D.
C14	7489162P27	Silver mica: 100 pf \pm 5%, 500 VDCW; sim to Electro Motive Type DM-15.
C16 and C17	5496267P9	Tantalum: 3.3 μ f \pm 20%, 15 VDCW; sim to Sprague Type 150D.
C18	5496267P16	Tantalum: 100 μ f \pm 20%, 20 VDCW; sim to Sprague Type 150D.
C20	5496267P10	Tantalum: 22 μ f \pm 20%, 15 VDCW; sim to Sprague Type 150D.
		----- DIODES AND RECTIFIERS -----
CR1 and CR2	4037822P2	Silicon.
		----- JACKS AND RECEPTACLES -----
J1 thru J9	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		----- TRANSISTORS -----
Q1 thru Q4	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q5	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q6 thru Q9	19A115889P1	Silicon, NPN; sim to Type 2N2712.
		----- RESISTORS -----
R1	3R152P153J	Composition: 15,000 ohms \pm 5%, 1/4 w.
R2	3R152P303J	Composition: 30,000 ohms \pm 5%, 1/4 w.
R3	3R152P302J	Composition: 3000 ohms \pm 5%, 1/4 w.
R4	3R152P122J	Composition: 1200 ohms \pm 5%, 1/4 w.
R5	3R152P273J	Composition: 27,000 ohms \pm 5%, 1/4 w.
R6	3R152P302J	Composition: 3000 ohms \pm 5%, 1/4 w.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and GE Part Number.

Service Parts may be obtained from Authorized GE Communication Equipment Service Stations or through any GE Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. GE Part Number for component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-4582

DF-5041

**MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502**

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PRINTED IN U.S.A.