

# MASTR

**PROGRESS LINE**  
TONE/AUDIO PANEL 19D413943G1



## SPECIFICATIONS \*

Used With	Satellite Receivers
Tone Frequency	1950 Hz $\pm$ 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	30 milliamperes @ 10 Volts DC
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.

## CIRCUIT ANALYSIS

The Tone/Audio circuitry consists of a tone oscillator, amplifiers, tone gate, emitter-follower, and line driver. The +10 Volts supply, audio and Carrier Operated Switch (COS) voltage are taken from power supply Types EP-38-A or EP-39-A.

Applying power to the tone/audio board 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 to the audio pair. Instructions for setting R7 are contained in the Satellite Receiver Adjustment Procedure.

When the receiver is squelched (no 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.

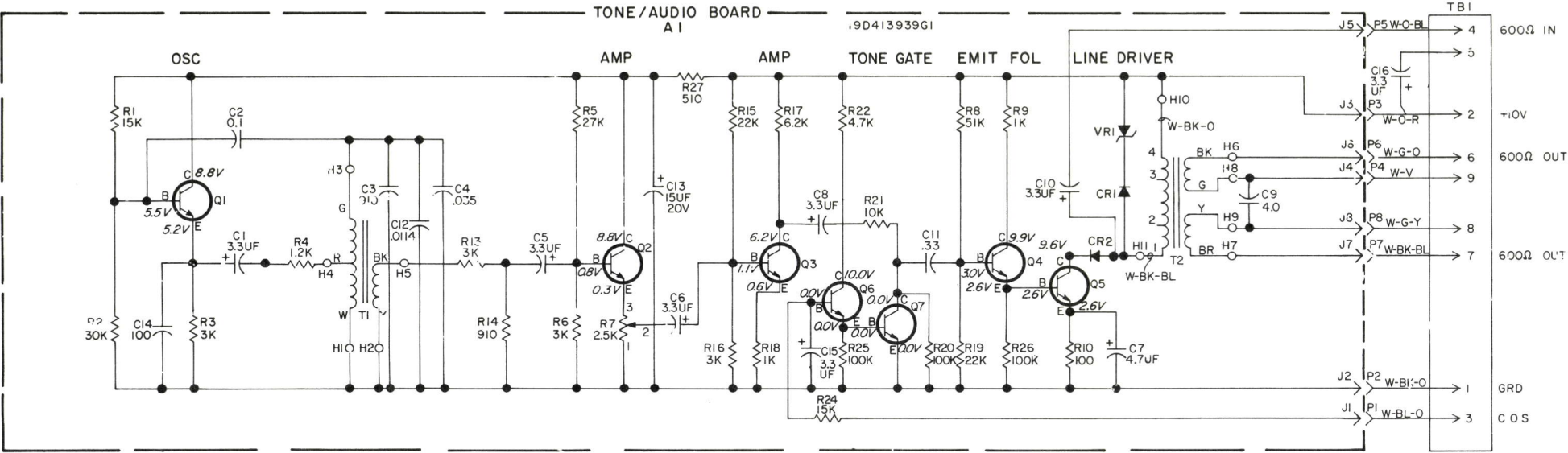
When the receiver is unsquelched, the COS voltage turns on tone gate Q6 and Q7. Turning on Q7 shunts the tone to ground. The receiver audio is coupled through blocking capacitor C10 and applied to transformer T2.

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

## 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.

SCHEMATIC DIAGRAM



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 MICROFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

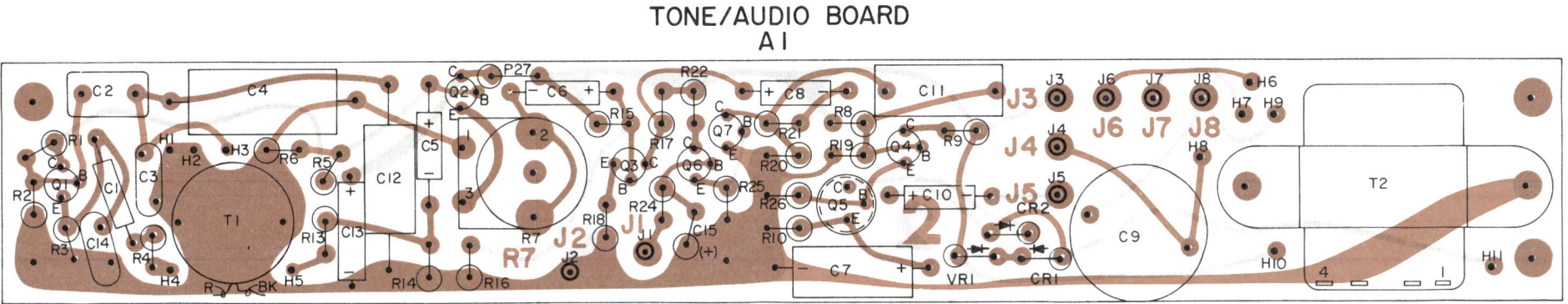
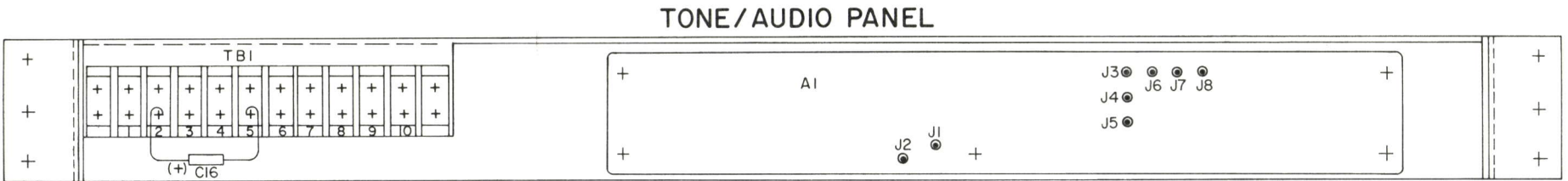
IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

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 PL19D413943G1	REV LETTER C

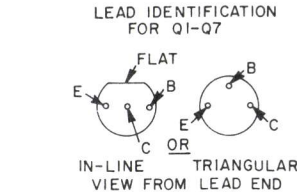
NOTE:  
1. ALL WIRES APE #N22.

(19D413941, Rev. 5)

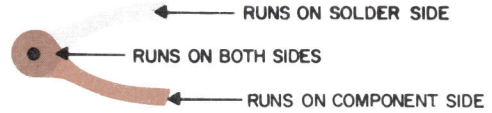
OUTLINE DIAGRAM



(19D416430, Rev. 2)  
(19D413937, Sh. 1, Rev. 2)  
(19D413937, Sh. 2, Rev. 2)



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



SCHEMATIC & OUTLINE DIAGRAM

TONE/AUDIO PANEL 19D413943G1

PARTS LIST

LBI-4311A  
TONE/AUDIO PANEL  
19D413943G1

SYMBOL	GE PART NO.	DESCRIPTION
A1		TONE AUDIO BOARD 19D413939G1
		----- CAPACITORS -----
C1	5496267P9	Tantalum: 3.3 $\mu$ f $\pm$ 20%, 15 VDCW; sim to Sprague Type 150D.
C2	19A116080P7	Polyester: 0.1 $\mu$ f $\pm$ 20%, 50 VDCW.
C3	5496372P380	Ceramic disc: 910 pf $\pm$ 5%, 500 VDCW, temp coef -4700 PPM.
C4	19B209322P9	Polystyrene: 0.035 pf $\pm$ 2%, 100 VDCW.
C5 and C6	5496267P9	Tantalum: 3.3 $\mu$ f $\pm$ 20%, 15 VDCW; sim to Sprague Type 150D.
C7*	5491674P11	Tantalum: 4.7 $\mu$ f $\pm$ 20%, 20 VDCW; sim to Sprague Type 162D.  In REV B and earlier:
	5496267P15	Tantalum: 47 $\mu$ f $\pm$ 20%, 20 VDCW; sim to Sprague Type 150D.
C8	5496267P9	Tantalum: 3.3 $\mu$ f $\pm$ 20%, 15 VDCW; sim to Sprague Type 150D.
C9	7486445P5	Electrolytic, non polarized: 4 $\mu$ f +150% -10%, 150 VDCW.
C10	5496267P9	Tantalum: 3.3 $\mu$ f $\pm$ 20%, 15 VDCW; sim to Sprague Type 150D.
C11	19A116080P10	Polyester: 0.33 $\mu$ f $\pm$ 20%, 50 VDCW.
C12	19B209322P7	Polystyrene: 0.0114 pf $\pm$ 2%, 100 VDCW.
C13	5496267P14	Tantalum: 15 $\mu$ 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. Added by REV B.
C15*	5496267P9	Tantalum: 3.3 $\mu$ f $\pm$ 20%, 15 VDCW; sim to Sprague Type 150D. Added by REV B.
		----- DIODES AND RECTIFIERS -----
CR1* and CR2	4037822P2	Silicon.  Earlier than REV A:
	19A116062P2	Selenium.
		----- JACKS AND RECEPTACLES -----
J1 thru J8	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		----- TRANSISTORS -----
Q1 thru Q4	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q5	19A115300P1	Silicon, NPN; sim to Type 2N3053.
Q6 and Q7	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		----- RESISTORS -----
R1	3R77P153J	Composition: 15,000 ohms $\pm$ 5%, 1/2 w.
R2	3R77P303J	Composition: 30,000 ohms $\pm$ 5%, 1/2 w.
R3	3R77P302J	Composition: 3000 ohms $\pm$ 5%, 1/2 w.
R4	3R77P122J	Composition: 1200 ohms $\pm$ 5%, 1/2 w.
R5	3R77P273J	Composition: 27,000 ohms $\pm$ 5%, 1/2 w.

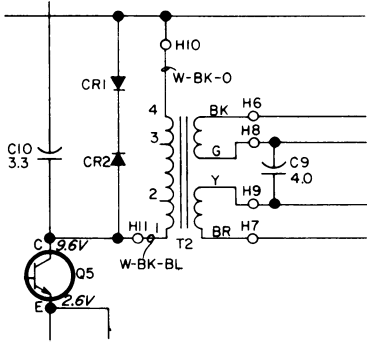
SYMBOL	GE PART NO.	DESCRIPTION
R6	3R77P302J	Composition: 3000 ohms $\pm$ 5%, 1/2 w.
R7	19B209358P4	Variable, carbon film: approx 50 to 2500 ohms $\pm$ 20%, 0.2 w; sim to CTS Type U-201.
R8	3R77P513J	Composition: 51,000 ohms $\pm$ 5%, 1/2 w.
R9	3R77P102J	Composition: 1000 ohms $\pm$ 5%, 1/2 w.
R10	3R77P101J	Composition: 100 ohms $\pm$ 5%, 1/2 w.
R13	3R77P302J	Composition: 3000 ohms $\pm$ 5%, 1/2 w.
R14	3R77P911J	Composition: 910 ohms $\pm$ 5%, 1/2 w.
R15	3R77P223J	Composition: 22,000 ohms $\pm$ 5%, 1/2 w.
R16	3R77P302J	Composition: 3000 ohms $\pm$ 5%, 1/2 w.
R17	3R77P622J	Composition: 6200 ohms $\pm$ 5%, 1/2 w.
R18	3R77P102J	Composition: 1000 ohms $\pm$ 5%, 1/2 w.
R19	3R77P223J	Composition: 22,000 ohms $\pm$ 5%, 1/2 w.
R20	3R77P104J	Composition: 0.10 megohm $\pm$ 5%, 1/2 w.
R21	3R77P103J	Composition: 10,000 ohms $\pm$ 5%, 1/2 w.
R22	3R77P472J	Composition: 4700 ohms $\pm$ 5%, 1/2 w.
R23*	3R77P123J	Composition: 12,000 ohms $\pm$ 5%, 1/2 w. Deleted by REV B.
R24	3R77P153J	Composition: 15,000 ohms $\pm$ 5%, 1/2 w.
R25 and R26	3R77P104J	Composition: 0.10 megohm $\pm$ 5%, 1/2 w.
R27	3R77P511J	Composition: 510 ohms $\pm$ 5%, 1/2 w.
		----- TRANSFORMERS -----
T1	19B205360G1	Coil.
T2	19A115731P1	Audio freq: 300 to 6000 Hz, Pri (1-4): 22 ohms $\pm$ 15% DC res, Pri (2-3): 12.5 ohms $\pm$ 15% DC res, Sec 1: 13 ohms $\pm$ 15%, Sec 2: 13 ohms $\pm$ 15%.
		----- VOLTAGE REGULATORS -----
VR1*	19A116325P4	Silicon, Zener; sim to Type 1N5349. Added by REV A.
		----- CAPACITORS -----
C16*	5496267P9	Tantalum: 3.3 $\mu$ f $\pm$ 20%, 15 VDCW; sim to Sprague Type 150D. Added by REV B.
		----- PLUGS -----
P1 thru P8	4029840P2	Contact, electrical: sim to Amp 42827-2.
		----- TERMINAL BOARDS -----
TB1	19C301086P7	Feed-thru, phen: 10 terminals; sim to GE CR151D.
		HARNESS ASSEMBLY 19D413943G2 (Includes C16, P1-P8, TB1)
		----- MISCELLANEOUS -----
	4036555P1	Insulator, washer: nylon. (Used with Q5).
	7160508P2	Nut, sheet spring: sim to Tinnerman C1356-632-157. (Used with TB1).

PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter" which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - To prevent lightning damage to the output transistor. Changed CR1 and CR2, and added VR1.

Schematic was:



REV. B - To allow use of a standard tone gate transistor, and to prevent high frequency oscillation. Replaced white jumper between TB1-5 and TB1-2 with C14, replaced R23 with C15, and added C16.

REV. C - To allow the tone/audio panel to be adjusted below -20 dBm without distortion. Changed C7.

## ORDERING SERVICE PARTS

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

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

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

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

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

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**MAINTENANCE MANUAL**  
LBI-4294

DF-5041

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MOBILE RADIO DEPARTMENT  
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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