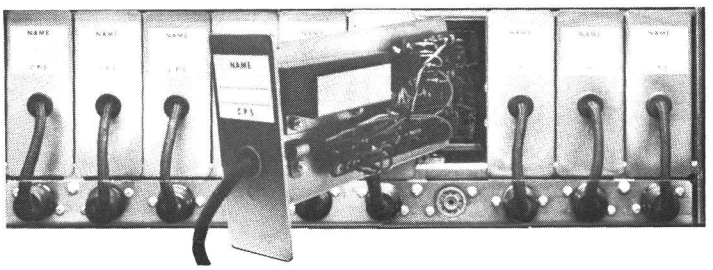
MOBILE RADIO

MASTR Progress Line

SHARED REPEATER PANEL (OPTIONS 7645 & 7646)

Maintenance Manual LBI-3699F
DF-5032



SPECIFICATIONS *

Tone Frequencies	71.9 to 203.5 Hz
Tone Frequency Stability	±0.2%
Decoder Response (threshold bandwidth)	3% ± 0.5% of Tone Frequency
Audio Response	300 to 3000 Hz
Temperature Range	-30°C to +60°C (-22°F to +140°F)

Option No.	Description	Used With
7645	Tone Panel 19D402486-G1	MASTR Professional Progress Line Repeater Station
7646	Tone Module 19D402608-G1 and Tone Network 19B205280-G1 thru -G34	Tone Panel Option 7645

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

SHARED REPEATER PANEL

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

The General Electric Shared Repeater is a Channel Guard Repeater Station combination capable of providing repeater service for up to 10 different users (or fleets) sharing the same radio frequency. The Shared Repeater provides each user with a separate Channel Guard tone frequency, permitting him to hear only those calls from other units in his own system.

Encoder/Decoder modules are used to identify the tone frequency of each RF modulated signal -- and to re-transmit the message to the user's mobiles. Normally, the first signal received will be decoded and re-transmitted before the next message is received. In some instances, however, a stronger signal may override a signal that is already in the process of being re-transmitted by the station.

SYSTEM OPERATION

A signal received from a mobile unit by the repeater station is fed into the control panel audio coupler and the tone panel low-pass filter (Figure 1).

The low-pass filter eliminates voice frequencies and feeds the Channel Guard tone frequencies into the tone modules containing the tone frequency networks FL601 thru FL610. A tone coded signal that matches one of the tone frequency networks will activate Tone Controlled switch A705 to trigger the carrier-operated switch or relay and key the transmitter.

Tone from the frequency matching network is also fed into the transmitter to modulate the RF signal. The tone/voice-

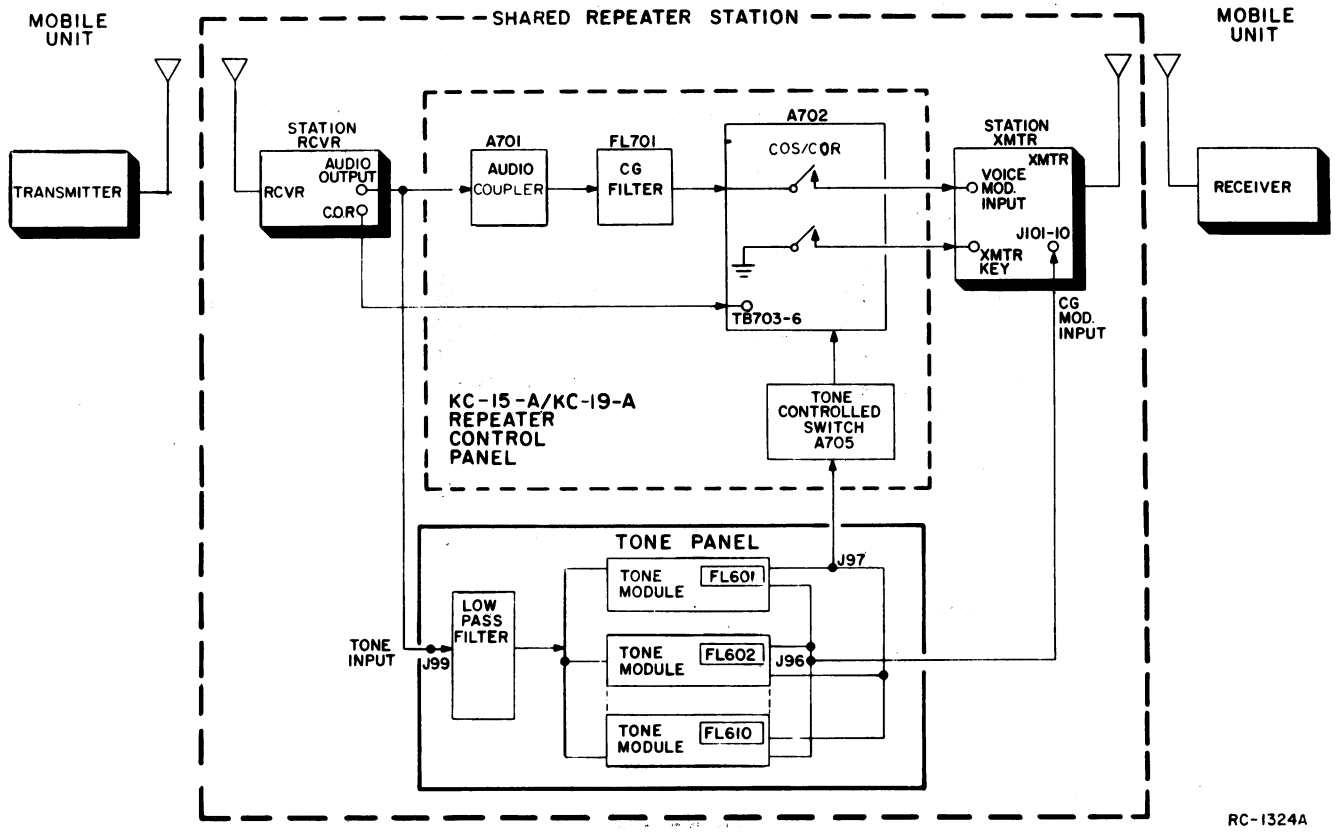


Figure 1 - Shared Repeater Block Diagram

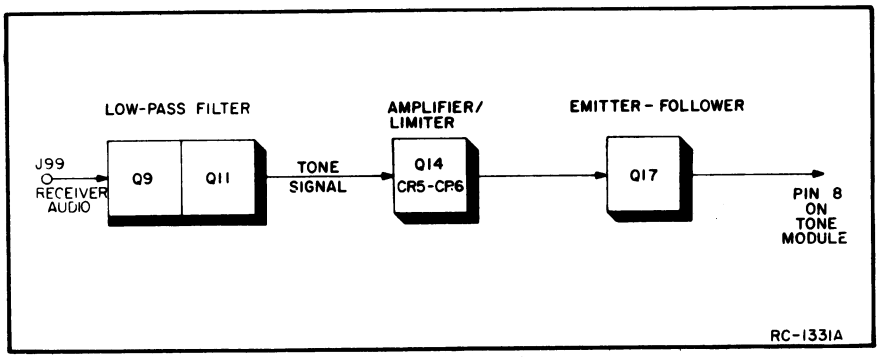


Figure 2 - Low-Pass Filter/Amplifier Block Diagram

modulated signal is then received by the user's Channel Guard mobile receiver.

Signals received by the Repeater Station that are not modulated by one of the station Channel Guard frequencies will be attenuated by the tone frequency networks (FL601-FL610).

CIRCUIT ANALYSIS

TONE PANEL

The Tone Panel circuit board contains the tone gate, low-pass filter, amplifiers, tone gate hold circuits, and provisions for inserting up to 10-slide-in Tone Modules. Each tone module contains a tone frequency network operating at a Channel Guard frequency within the 71.9 to 203.5 Hz range.

Low-Pass Filter

Audio from the station receiver is fed to a low-pass filter on the Tone Panel. The filter blocks the voice frequency signals and allows the Channel Guard tones to pass (Figure 2).

Amplifier and Emitter-Follower

Tones from the low-pass filter are

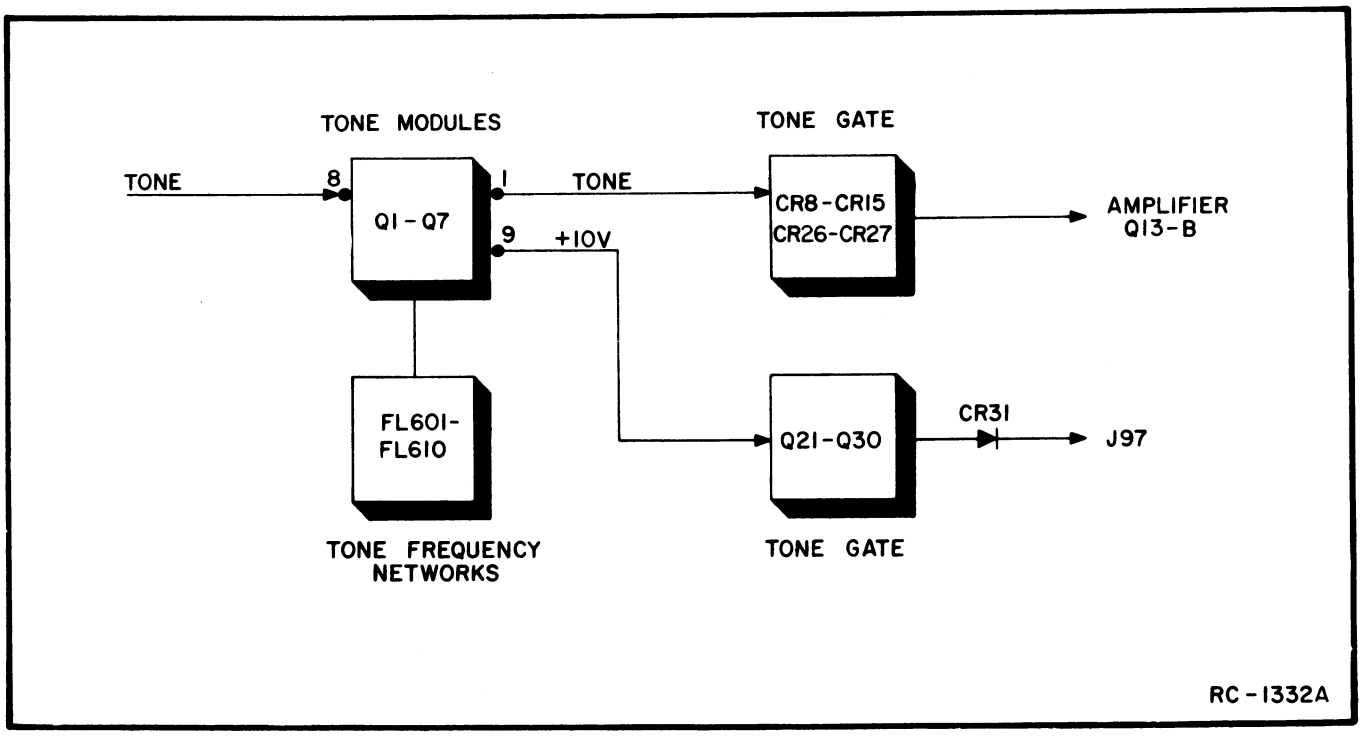


Figure 3 - Tone Gate/Tone Module Block Diagram

coupled through C20 to the base of amplifier Q14. Signals are limited by diodes CR5 and CR6, and fed to the base of emitter-follower Q17. Following Q17, the signals are coupled to pin 8 of each Tone Module to drive the frequency networks.

Tone Gate

The +10 volts from a tone module will fire only 1 of the tone gate transistors (Q21-Q30) located on the Tone Panel.

The resulting positive voltage (+10 volts) at the emitter of Q21 (for example) will then produce a voltage drop across R65 to turn on CR8, allowing the output of the tone module to pass through C28 and R75 to the base of amplifier Q13. The +10 volts at the emitter of Q21 is coupled through diodes CR16 and CR31 to activate Tone Controlled Switch A705 (Figure 3).

Amplifiers

The tone signal from the operating tone gate stage is amplified by Q13 and Q1 with de-emphasis provided by R2, C1, C3 and R10. The amplified output signal at J96 will produce a constant transmitter deviation at all transmitting frequencies.

NOTE

If the station transmitter contains an Integrated Circuit Oscillator Module (ICOM), amplifier Q1 and the de-emphasis circuits are by passed. See RC-1624.

Tone Gate Hold

Transistors Q18 and Q19 form a one-shot multivibrator timing circuit to keep the tone path from module to transmitter open during sudden fades or tone drop-outs. Assume, for example, that tone module with FL601 is functioning and diode CR8 is turned on by tone gate Q21. If the tone input to FL601 momentarily disappears, the DC voltage at tone module pin 9 will drop back to low value, cutting Q31 OFF. A negative-going edge at C45 will momentarily bias the base of Q18 negative through diode CR32, causing the collector voltage at Q18 to rise toward +10 volts, as Q18 turns off.

The positive voltage at the collector of Q18 turns Q20 ON, and the positive voltage produced at Q20 emitter feeds thru R129 and CR38 to keep tone gate diode CR8 on for the duration of the Q18-Q19 timing cycle. The positive voltage to the Tone Controlled Switch (at J97) is maintained during this interval by the decay time constant of C46 with R111, and the input impedance of the Tone Controlled Switch.

TONE MODULE AND FREQUENCY NETWORK

Tone signals from the Tone Panel are fed to the base of amplifier Q1. The audio signal from the amplifier is fed to the base of common-emitter amplifier Q2, providing a 180° phase shift through R3, R2 and C1 for the positive feedback necessary to provide high gain in Q1-Q2.

Negative feedback is provided through the Tone Frequency Network from the collector to the base of Q1 at all frequencies, except at the tone network frequency. Q1

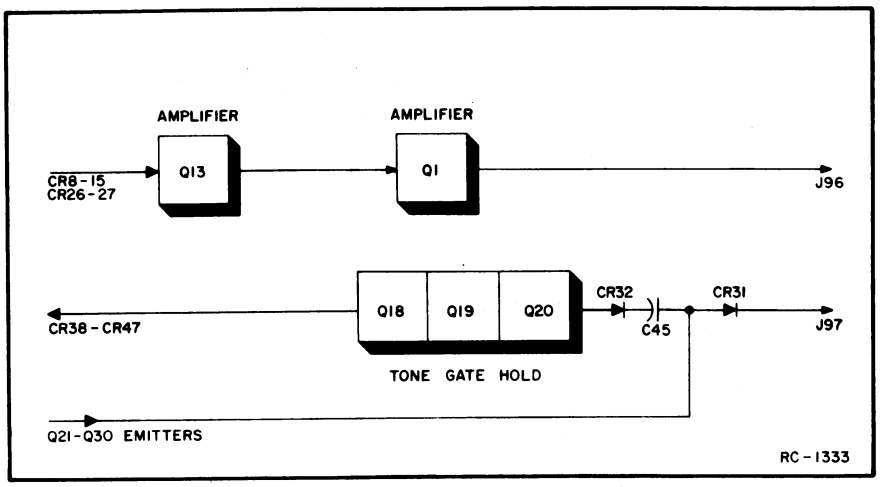


Figure 4 - Amplifier/Tone Gate Hold Block Diagram

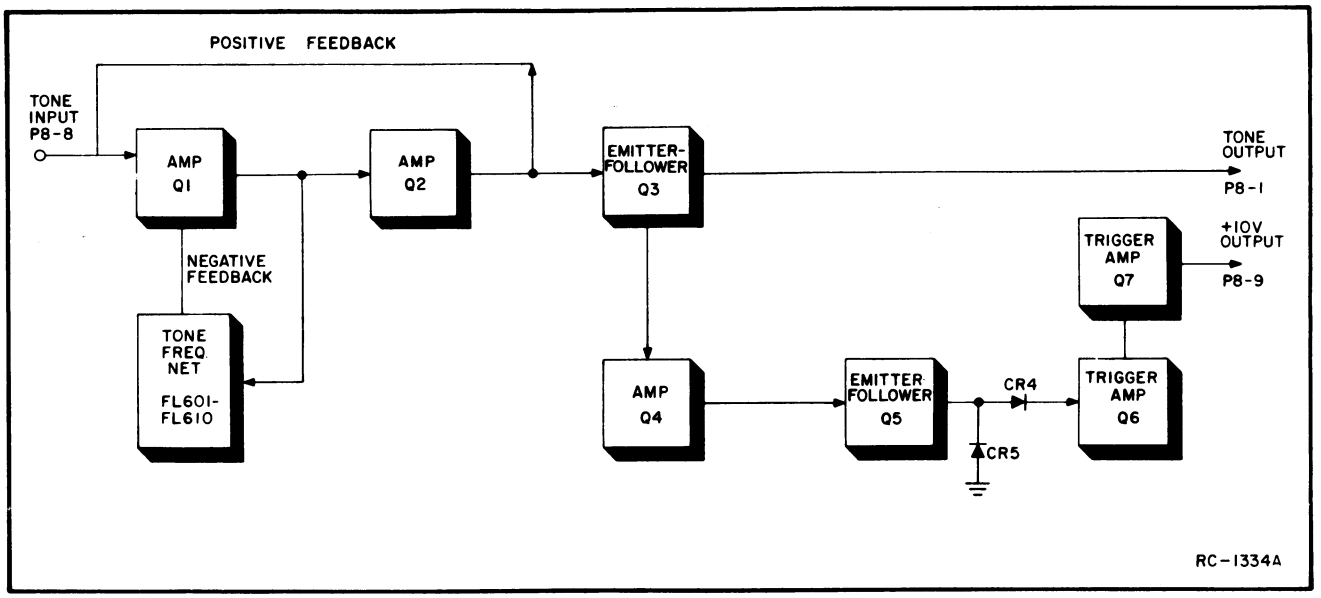


Figure 5 - Tone Module Block Diagram

will amplify only at the network frequency. The positive feedback from C1 increases the gain of Q1-Q2. Protection against noise falsing is provided by the incoming noise signal to Q1. (Figure 5).

The tone output from emitter follower Q3 is fed to the tone gate stage on the Tone Panel and to the base of amplifier Q4. Amplified by Q4, the signal is isolated from the CR4-CR5 detector circuit by emitter-follower Q5. When the DC potential is above the threshold level of trigger circuit Q6-Q7, Q6 will turn ON and Q7 will turn OFF, thereby producing a +10 volt output. The Q8 circuit is used in Remote operations only.

TONE CONTROLLED SWITCH/10-VOLT REGULATOR (part of Repeater Control Panel)

Tone Controlled Switch/10-Volt Regulator is mounted on the Repeater Control Panel (KC-15-A/KC-19-A) directly behind the audio coupler unit on the component wiring side of the panel.

Tone Controlled Switch

The Tone Controlled Switch will operate only when a greater than +6 volt signal is fed into it from the tone gate stage of the Tone Panel. The voltage input turns on Q3 to activate the carrier-operated switch or relay, keying the transmitter. Zener diode VR2 prevents Q3 from turning on until the proper operating voltage is received from the Tone Panel.

10-Volt Regulator

The regulator supplies a regulated +10 volts to the Tone Panel, Tone Modules, and the Tone Frequency Networks. The regulator is supplied by a +13 regulated voltage taken from the EP-38-A Power Supply.

Resistor R1 provides the base bias to turn Q1 on. Zener diode VR1 provides a voltage reference for the regulator. R3, R4 and R5 form a voltage divider that can be varied by potentiometer R5 to adjust the base voltage of Q2, thereby adjusting the output voltage exactly to +10 volts.

MODIFICATIONS

The station transmitter, power supply and control panel are modified for Shared Repeater Operation. If the station transmitter is equipped with an Integrated Circuit Oscillator Module (ICOM), the tone panel is also modified.

Power Supply

A two-conductor shielded cable (7134854-P5) has been connected between P101 and TB501 as shown in Figure 6 to couple tone through power supply to the transmitter input.

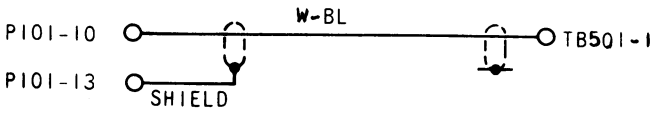


Figure 6 - Power Supply Tone Cable Connections

Transmitter

The Transmitter Exciter has been modified as in Channel Guard applications. A two-conductor shielded cable (19B205478-G1) has been connected from terminals 10 and 15 of J101 to J7 and J8 on the Exciter Board as shown in Figure 7. This cable couples the tone signal to the transmitter tone modulator circuit.

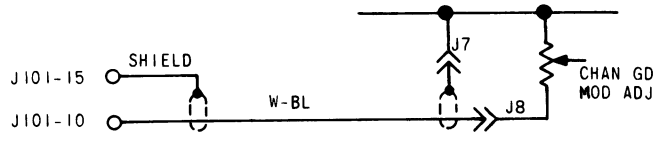


Figure 7 - Transmitter Tone Cable Connections

Repeater Control Panel (4KC15A10 or 4KC19A10)

1. Tone Controlled Switch A705 (19C303974-G1) has been installed and connected as shown on the Outline and Schematic Diagram on page 8.

2. The jumper between TB703-1 and -4 (on KC-15-A) or the jumper between TB703-1 and -3 (on KC-19-A) has been removed.

Tone Panel 19D402486-G1

When the station transmitter is equipped with an ICOM Module, A601 on the tone panel contains a 19B216215-G1 Modification Kit. The modification produces the flat audio response required for modulating an ICOM equipped transmitter. Installation Diagram RC-1624 describes the modification and provides a tone panel circuit diagram showing the modification kit installed.

MAINTENANCE

The Transmitter, Receiver and Power Supply are essentially standard and servicing should be performed according to the standard techniques outlined in the unit Maintenance Manuals. The Tone Controlled Switch/10-Volt Regulator is mounted on the KC-15-A Repeater Control Panel, otherwise the panel servicing is identical to the prescribed procedures in the unit Maintenance Manual.

TONE OUTPUT LEVELS

The tone levels applied to the transmitter modulator (measured at J85 on the tone panel) are shown in the following chart. These levels are used for transmitters without Integrated Circuit Oscillator Modules (ICOM's). When the transmitter is equipped with an ICOM, the tone panel is modified according to RC-1624 to provide a flat output (approximately 1 volt) at J85 over the entire range of tone frequencies.

Tone Frequency	Minimum Output At J85*
71.9 Hz	1.0 V
74.4 Hz	0.95 V
77.0 Hz	0.9 V
79.7 Hz	0.86 V
82.5 Hz	0.8 V
85.4 Hz	0.76 V
88.5 Hz	0.71 V
91.5 Hz	0.68 V
94.8 Hz	0.66 V
97.4 Hz	0.61 V
100.0 Hz	0.6 V
103.5 Hz	0.57 V
107.2 Hz	0.54 V
110.9 Hz	0.5 V
114.8 Hz	0.47 V
118.8 Hz	0.44 V
123.0 Hz	0.42 V
127.3 Hz	0.38 V
131.8 Hz	0.36 V
136.5 Hz	0.33 V
141.3 Hz	0.31 V
146.2 Hz	0.29 V
151.4 Hz	0.27 V
156.7 Hz	0.26 V
162.2 Hz	0.24 V
167.9 Hz	0.22 V
173.8 Hz	0.2 V
179.9 Hz	0.19 V
186.2 Hz	0.18 V
192.8 Hz	0.17 V
203.5 Hz	0.15 V

* In Volts, measured with AC-VTVM

TROUBLESHOOTING

Troubleshooting and servicing those units that are unique to the Shared Repeater Station are described in the following Troubleshooting Procedure Chart.

TROUBLESHOOTING PROCEDURE

SYMPTOM	CHECK THE FOLLOWING:
One individual mobile cannot operate Repeater Station. All other mobiles on same frequency OK.	Mobile transmitter for proper Channel Guard frequency and tone deviation.
One fleet of mobiles (with a common Channel Guard frequency) cannot operate Repeater. Other fleets (with other Channel Guard frequencies) OK.	I - TONE MODULE AND TONE FREQUENCY NETWORK
	a. That tone frequency network corresponds to proper Channel Guard tone frequency.
	b. For tone of proper frequency at pin 8 and amplified tone at pin 1 of tone module.
	c. For approximately 2VDC (no tone) and 10 VDC (with tone) at pin 9.
	d. If tone appears at pin 1, but no DC at pin 9, check Q5, Q6 and Q7.
	e. If tone or DC voltage do not appear, check Q1, Q2, and Q3.
	f. Substitute a replacement network, if necessary.
	g. If tone and DC are both OK, go to Step II.
	II. - TONE PANEL
	a. For tone at Q13-B and +DCV at TB703-3 of Control Panel (KC-15-A) or TB703-5 (KC-19-A) with the tone applied.
	b. Tone gate stage (Q21-30) and associated diodes, if no tone is measured in Step II-a.
Repeater is keyed by mobiles, but does not re-transmit any tones.	a. Tone amplifiers Q13 and Q1.
	b. Cabling to transmitter P101-10.
	c. Modulator circuit of transmitter.
No mobiles can key transmitters.	a. For voltage swing of 0 to +1.5-2VDC at TB703-6 on Repeater Control Panel. Also audio should be heard from test speaker when mobile comes on. If not, check receiver.
	b. If receiver is OK, jumper TB703-4 to TB703-1 (on KC-15-A) or TB703-3 to TB703-1 (on KC-19-A). When mobile is received, transmitter should key and be voice modulated (but not necessarily tone modulated). If not, check COS/COR, 5-second delay, 3-minute timer, and transmitter keying circuits.
	c. If transmitter operates as in Step b above with jumper, then measure voltage at TB703-3 (KC-15-A) or TB703-5 (KC-19-A). If voltage swings from approximately 1VDC to 6VDC or more with tone signal applied, the trouble is in Tone Controlled Switch (A705) Q3. If voltage does not swing up, go to Step d.
	d. For a tone signal at pin 8 of all tone modules with a mobile signal being received. If no signal is present, trace signal through stages Q9, Q11, Q14, and Q17.

INSTRUCTIONS:

1. CABLES SHOULD BE CONSTRUCTED IN ACCORDANCE WITH WIRING INSTRUCTIONS A4031623.

2. ALL WIRES ARE #16 AWG. EXCEPT:
   WIRES #46,47,49,50,51, & 52 ARE #22SJ.
   TERMINATE WIRES AS FOLLOWS:

WIRE#	TO KC-19-A	TERMINAL
44,45, & 48	WITH	A7147264P1
46, 49,50,51 43,52, & 47 TOGETHER WITH 19B209260P101	WITH	87491825P1

   TERMINATE WIRE NO.S 46,47,49,50,51, & 52 PER A7136250.

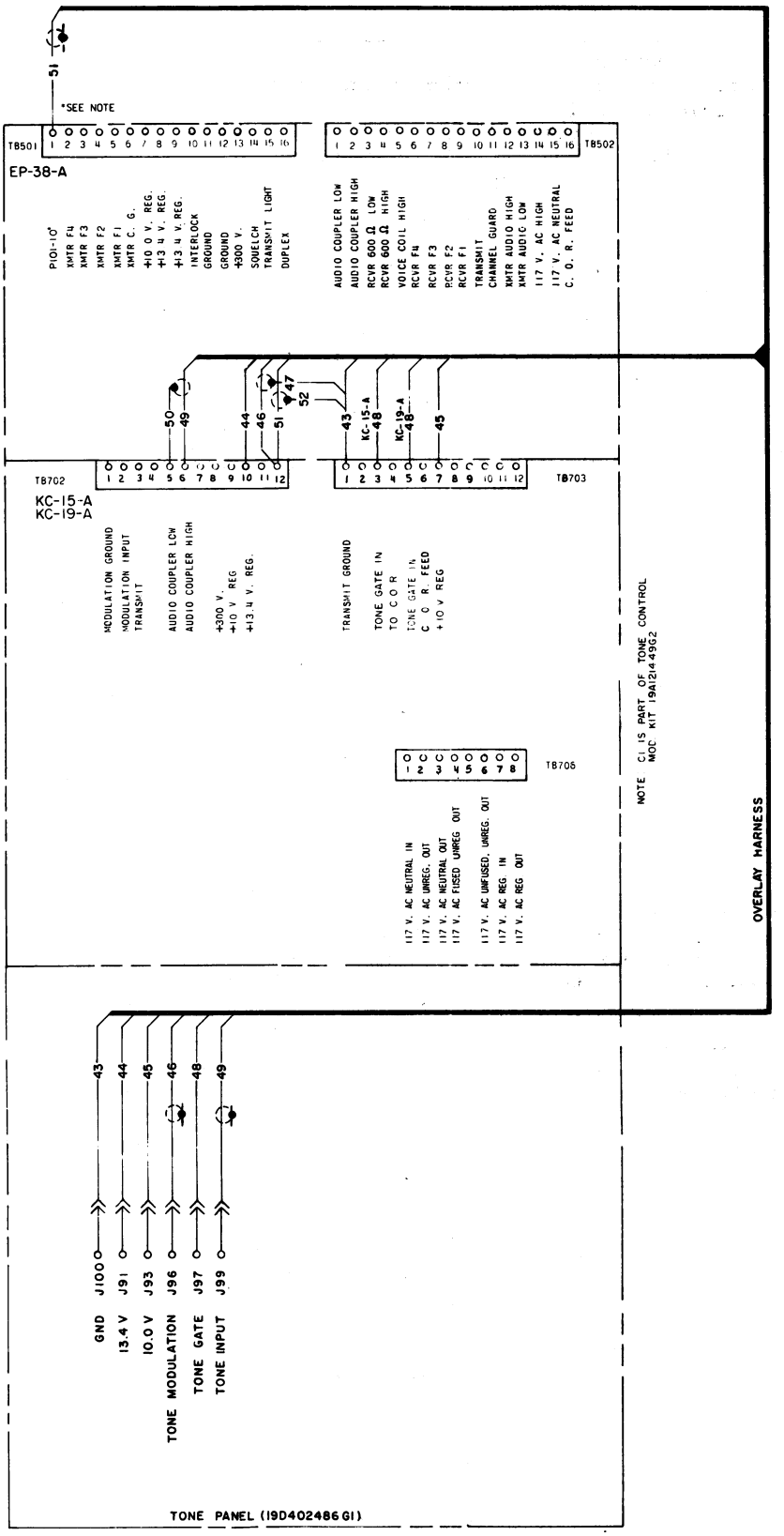
WIRE#	TO EP-38-A	TERMINAL
51	WITH	87491825P1

WIRE#	TO TONE PANEL	TERMINAL
43,44,45,46,48, & 49	WITH	A4029840P3

3. MARK WIRES IN CABLE ON BOTH ENDS WITH CORRESPONDING WIRE NUMBER USING MARKER STRIP 19B209090.

4. CABLE SHOULD BE CONSTRUCTED IN SUCH A WAY AS TO ALLOW ENOUGH SLACK TO PERMIT MOUNTING A 3.5" OPTION PANEL BETWEEN EP-38-A AND KC-19-A AND A 3.5" OPTION PANEL BETWEEN KC-19-A AND TONE PANEL.

*NOTE ON EP38A12 REMOVE #18 O-W WIRE FROM TB501-1. CUT END OFF AND TAPE. TIE BACK IN HARNESS.



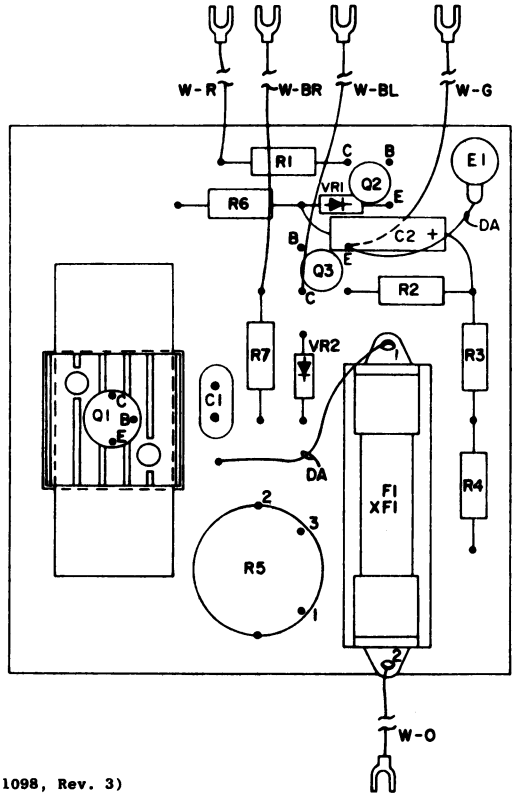
(19D402664, Rev. 5)

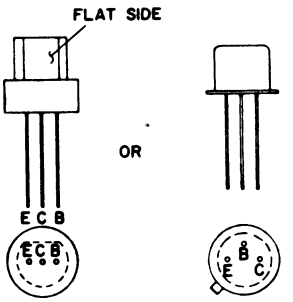
INTERCONNECTION DIAGRAM

SHARED REPEATER

OUTLINE DIAGRAM

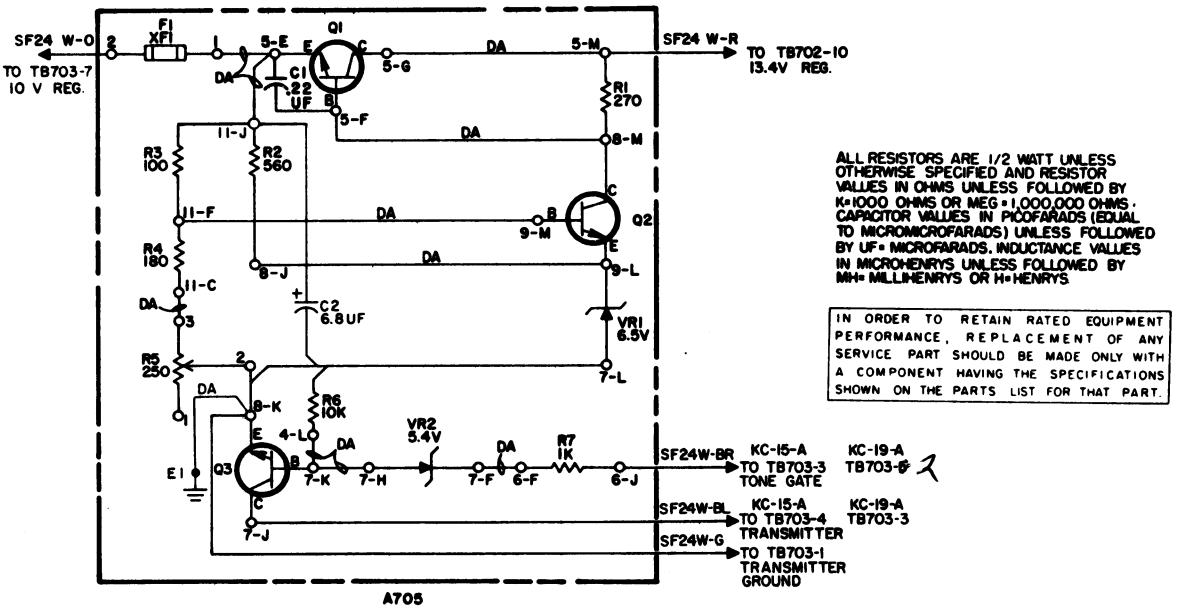
TONE CONTROL SWITCH (A705)





(19C311098, Rev. 3)

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 PICOFARADS (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.

(19B205199, Rev. 6)

(DF-5032)

OUTLINE & SCHEMATIC DIAGRAM

TONE CONTROLLED SWITCH & 10-VOLT REGULATOR
19C303974G1

PARTS LIST

LBI-3689B

TONE CONTROLLED SWITCH
AND
10 V REGULATOR
19C303974G1
A705

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19B209243P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C2*	5496267P18	Tantalum: 6.8 µf ±20%, 35 VDCW; sim to Sprague Type 150D. Added by REV A.
		- - - - - - - - TERMINALS - - - - - - - -
E1*	4036835P4	Terminal; sim to Shakeproof 2177-04-000. Added by REV B.
		- - - - - - - - - - FUSES - - - - - - - - - -
F1	7487942P2	Slow blowing: 3/8 amp at 250 v; sim to Bussmann MDL-3/8.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115300P1	Silicon, NPN; sim to Type 2N3053.
Q2 and Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P271J	Composition: 270 ohms ±5%, 1/2 w.
R2	3R77P561J	Composition: 560 ohms ±5%, 1/2 w.
R3	3R77P101J	Composition: 100 ohms ±5%, 1/2 w.
R4	3R77P181J	Composition: 180 ohms ±5%, 1/2 w.
R5	19B209113P1	Variable, wirewound: 250 ohms ±20%, 2.5 w.
R6	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R7	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1	4036887P6	Silicon, Zener.
VR2	4036887P5	Silicon, Zener.
		- - - - - - - - - - SOCKETS - - - - - - - - - - -
XF1	7141008P1	Fuseholder: 5 amps at 125 v; sim to Littelfuse E-357001.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A122048P1	Heat sink. (Used with Q1).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

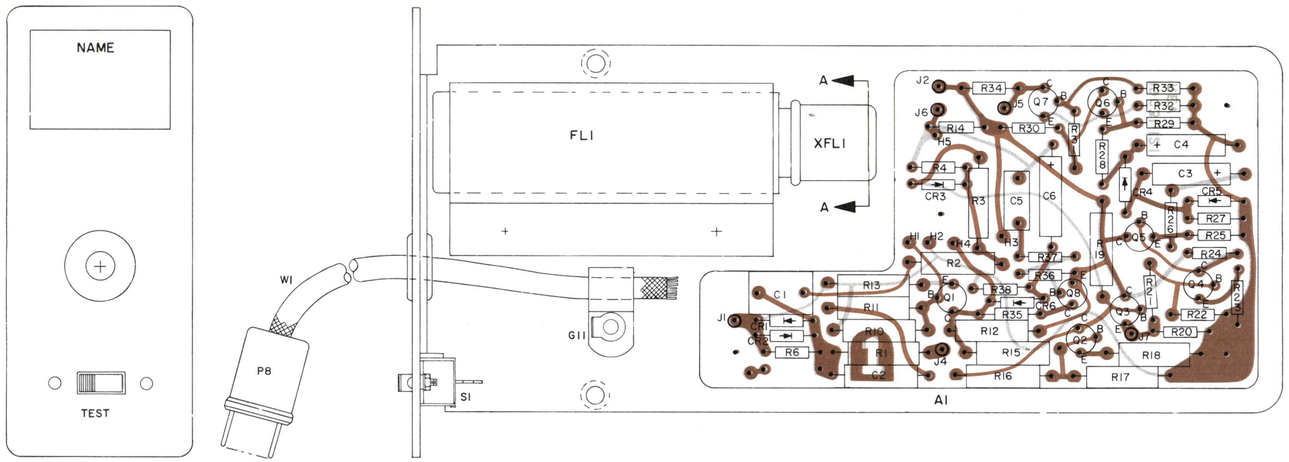
PRODUCTION CHANGES

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 - To eliminate voltage transients on 10-volt line when transmitter is unkeyed, preventing false operation of Tone Switch. Added C2.

REV. B - To eliminate voltage transients which cause the transmitter to key when the channel guard tone is removed from the RF signal. Added ground connection, E1, to the emitter of Q3.

OUTLINE DIAGRAM



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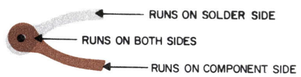
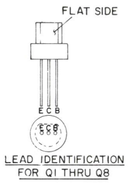
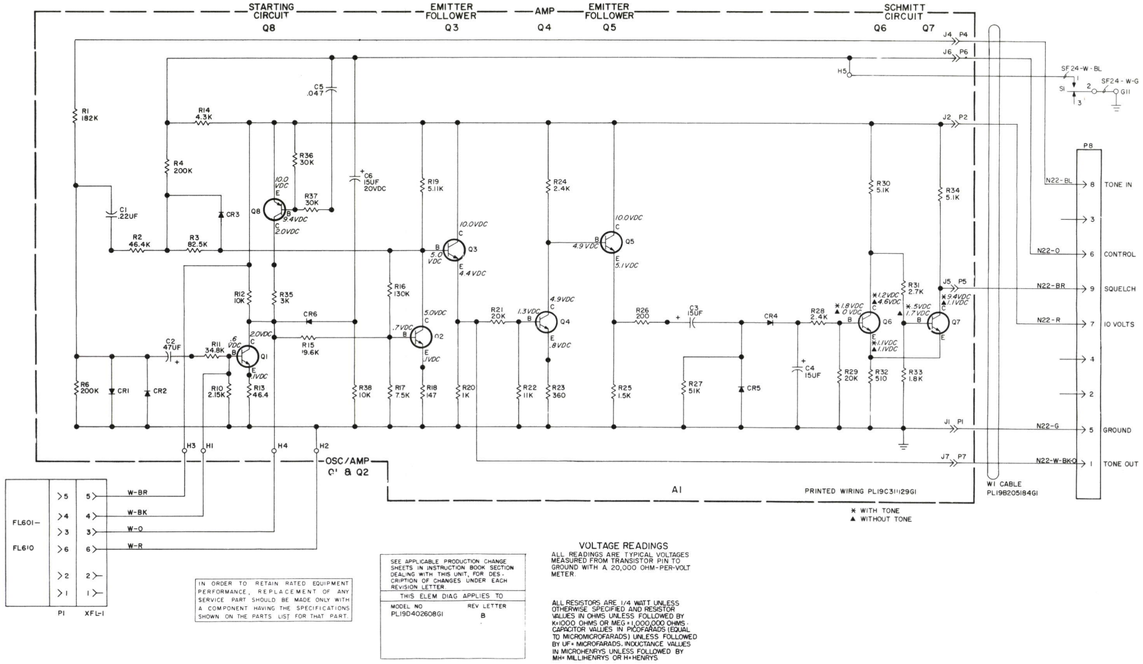
(19C311120, Sh. 1, Rev. 1)
(19C311120, Sh. 2, Rev. 1)





LEAD IDENTIFICATION
FOR Q1 THRU Q8

SCHEMATIC DIAGRAM



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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
PLI9D402608G1	B

VOLTAGE READINGS

ALL READINGS ARE TYPICAL VOLTAGES MEASURED FROM TRANSISTOR PIN TO GROUND WITH A 20,000 OHM-PER-VOLT METER.

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

(19D402762, Rev. 3)

SCHEMATIC & OUTLINE DIAGRAM

TONE MODULE & TONE FREQUENCY NETWORK
19D402608G1

Issue 5

PARTS LIST

LBI-3700C

TONE MODULE
19D402608G1

SYMBOL	GE PART NO.	DESCRIPTION
A1*		COMPONENT BOARD 19C311129G1 (Added by REV A)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C2	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C3 and C4	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C5	19A115028P111	Polyester: .047 µf ±20%, 200 VDCW.
C6	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	5494922P1	Silicon; sim to Type 1N456.
CR3 thru CR6	19A115250P1	Silicon.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 and J2	4033513P15	Contact, electrical: sim to Bead Chain R40-1A.
J4 thru J7	4033513P15	Contact, electrical: sim to Bead Chain R40-1A.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q4	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q5 thru Q7	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q8	19A115768P1	Silicon, PNP; sim to Type 2N3702.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	5495948P426	Deposited carbon: 182,000 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R2	5495948P365	Deposited carbon: 46,400 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R3	5495948P389	Deposited carbon: 82,500 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R4	3R152P204J	Composition: 0.2 megohm ±5%, 1/4 w.
R6	3R152P204J	Composition: 0.2 megohm ±5%, 1/4 w.
R10	19A116278P233	Metal film: 2150 ohms ±2%, 1/2 w.
R11	19A116278P353	Metal film: 34,800 ohms ±2%, 1/2 w.
R12	19A116278P301	Metal film: 10,000 ohms ±2%, 1/2 w.
R13	19A116278P65	Metal film: 46.4 ohms ±2%, 1/2 w.
R14	3R152P432J	Composition: 4300 ohms ±5%, 1/4 w.
R15	19A116278P329	Metal film: 19,600 ohms ±2%, 1/2 w.
R16	19A116278P412	Metal film: 130,000 ohms ±2%, 1/2 w.
R17	19A116278P285	Metal film: 7500 ohms ±2%, 1/2 w.
R18	19A116278P117	Metal film: 147 ohms ±2%, 1/2 w.
R19	19A116278P269	Metal film: 5110 ohms ±2%, 1/2 w.
R20	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R21	3R152P203J	Composition: 20,000 ohms ±5%, 1/4 w.
R22	3R152P113J	Composition: 11,000 ohms ±5%, 1/4 w.
R23	3R152P361J	Composition: 360 ohms ±5%, 1/4 w.
R24	3R152P242J	Composition: 2400 ohms ±5%, 1/4 w.
R25	3R152P152J	Composition: 1500 ohms ±5%, 1/4 w.
R26	3R152P201J	Composition: 200 ohms ±5%, 1/4 w.
R27	3R152P513J	Composition: 51,000 ohms ±5%, 1/4 w.
R28	3R152P242J	Composition: 2400 ohms ±5%, 1/4 w.
R29	3R152P203J	Composition: 20,000 ohms ±5%, 1/4 w.
R30	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w.
R31	3R152P272J	Composition: 2700 ohms ±5%, 1/4 w.
R32	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R33	3R152P182J	Composition: 1800 ohms ±5%, 1/4 w.
R34	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w.
R35	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R36 and R37	3R152P303J	Composition: 30,000 ohms ±5%, 1/4 w.
R38	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XFL1	7768887P17	Tube, phen: 7 pins; sim to Elco 04-710-02.
		IN MODELS EARLIER THAN REV A
		COMPONENT BOARD 19C303864G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19B209243P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C2	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C3 and C4	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	5494922P1	Silicon; sim to Type 1N456.
CR3 thru CR5	4036936P1	Silicon.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 thru J7	4033513P16	Contact, electrical: sim to Bead Chain R52-1.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q4	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q5 thru Q7	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	5495948P426	Deposited carbon: 182,000 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R2	5495948P365	Deposited carbon: 46,400 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R3	5495948P389	Deposited carbon: 82,500 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R4	3R77P204J	Composition: 0.2 megohm ±5%, 1/2 w.
R5	5495948P438	Deposited carbon: 243,000 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R6	5495948P430	Deposited carbon: 200,000 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R10	5495948P233	Deposited carbon: 2150 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R11	5495948P353	Deposited carbon: 34,800 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R12	5495948P301	Deposited carbon: 10,000 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R13	5495948P65	Deposited carbon: 46.4 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R14	3R77P432J	Composition: 4300 ohms ±5%, 1/2 w.
R15	5495948P329	Deposited carbon: 19,600 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R16	5495948P412	Deposited carbon: 130,000 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R17	5495948P285	Deposited carbon: 7500 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R18	5495948P117	Deposited carbon: 147 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R19	5495948P269	Deposited carbon: 5110 ohms ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R20	3R77P102J	Composition: 1000 ohms ±5%, 1/2 w.
R21	3R77P203J	Composition: 20,000 ohms ±5%, 1/2 w.
R22	3R77P113J	Composition: 11,000 ohms ±5%, 1/2 w.
R23	3R77P361J	Composition: 360 ohms ±5%, 1/2 w.
R24	3R77P242J	Composition: 2400 ohms ±5%, 1/2 w.
R25	3R77P152J	Composition: 1500 ohms ±5%, 1/2 w.
R26	3R77P201J	Composition: 200 ohms ±5%, 1/2 w.
R27	3R77P513J	Composition: 51,000 ohms ±5%, 1/2 w.
R28	3R77P242J	Composition: 2400 ohms ±5%, 1/2 w.
R29	3R77P203J	Composition: 20,000 ohms ±5%, 1/2 w.
R30	3R77P512J	Composition: 5100 ohms ±5%, 1/2 w.
R31	3R77P272J	Composition: 2700 ohms ±5%, 1/2 w.
R32	3R77P511J	Composition: 510 ohms ±5%, 1/2 w.
R33	3R77P182J	Composition: 1800 ohms ±5%, 1/2 w.
R34	3R77P512J	Composition: 5100 ohms ±5%, 1/2 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XFL1	7768887P17	Tube, phen: 7 pins; sim to Elco 04-710-02.
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1		TONE FREQUENCY NETWORK 19B205280
	19B205280G1	71.9 Hz
	19B205280G2	77.0 Hz
	19B205280G3	82.5 Hz
	19B205280G4	88.5 Hz
	19B205280G5	94.8 Hz
	19B205280G6	100.0 Hz
	19B205280G7	103.5 Hz
	19B205280G8	107.2 Hz
	19B205280G9	110.9 Hz
	19B205280G10	114.8 Hz
	19B205280G11	118.8 Hz
	19B205280G12	123.0 Hz
	19B205280G13	127.3 Hz
	19B205280G14	131.8 Hz
	19B205280G15	136.5 Hz
	19B205280G16	141.3 Hz
	19B205280G17	146.2 Hz
	19B205280G18	151.4 Hz
	19B205280G19	156.7 Hz
	19B205280G20	162.2 Hz
	19B205280G21	167.9 Hz
	19B205280G22	173.8 Hz
	19B205280G23	179.9 Hz
	19B205280G24	186.2 Hz
	19B205280G25	192.8 Hz
	19B205280G26	203.5 Hz
	19B205280G30	74.4 Hz
	19B205280G31	7.97 Hz
	19B205280G32	85.4 Hz
	19B205280G33	91.5 Hz
	19B205280G34	97.4 Hz
S1*	19B209040P7	- - - - - - - - - - SWITCHES - - - - - - - - - - Slide: SPDT, 0.5 amp at 125 v; sim to Continental-Wirt Type G-132. (Added by REV B).
W1		- - - - - - - - - - CABLES - - - - - - - - - - CABLE 19B205184G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	4036634P2	Contact, electrical: sim to AMP 42429-2.
P4 thru P7	4036634P2	Contact, electrical: sim to AMP 42429-2.
P8		Includes the following:
	5491563P4	Shell, connector: sim to Methode C860-1V.
	5491563P2	Connector, phen: 9 pins; sim to Methode M860.

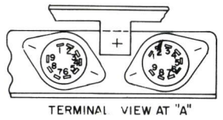
PRODUCTION CHANGES

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.

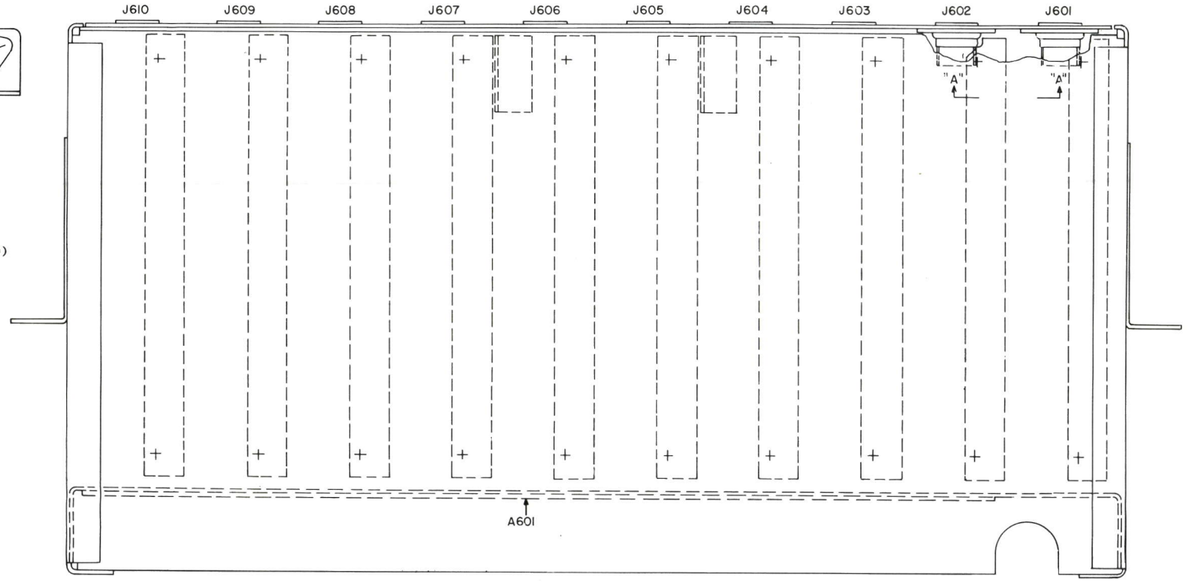
REV. A - To make Tone Module compatible with Shared Remote Equipment. Changed Component Board A1.

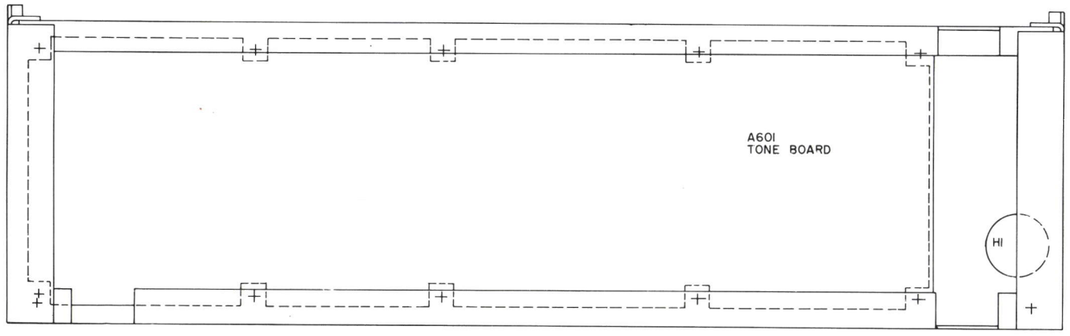
REV. B - To provide test switch. Added S1.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

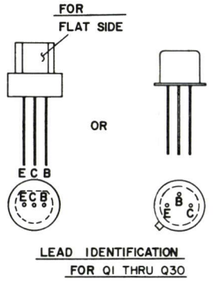


(19D402823, Rev. Rev. 0)



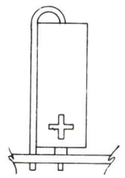


A601

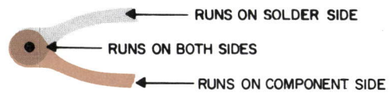


LEAD IDENTIFICATION
FOR Q1 THRU Q30

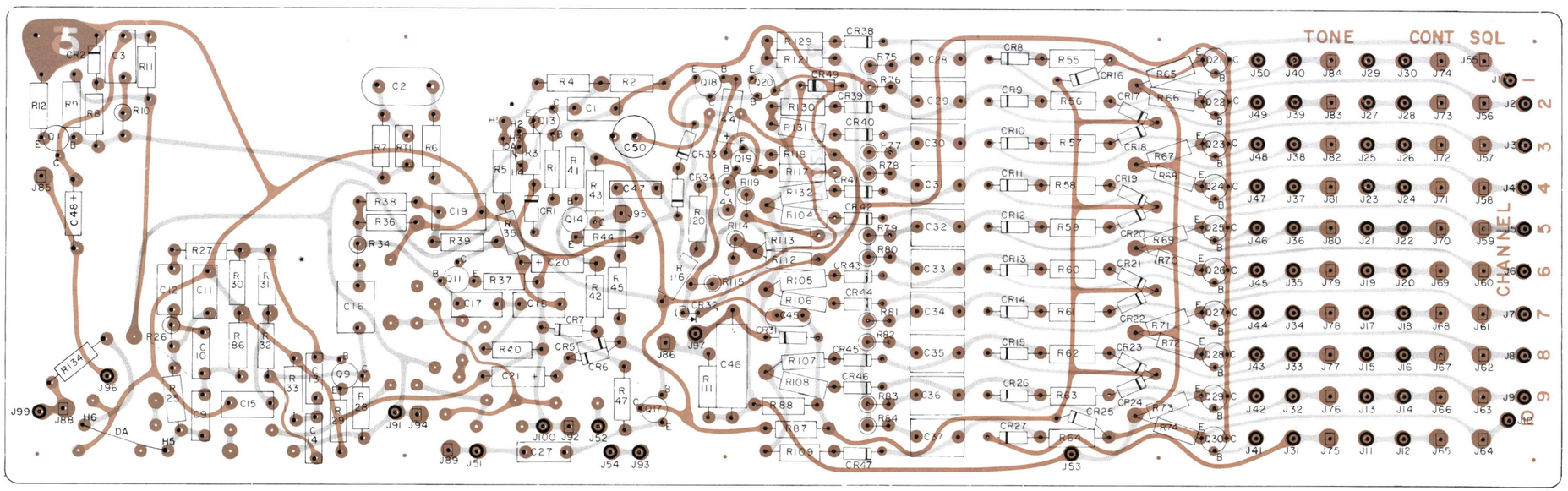
NOTE: COLOR BAND INDICATES CATHODE END OF DIODES.



LEAD IDENTIFICATION
FOR C50

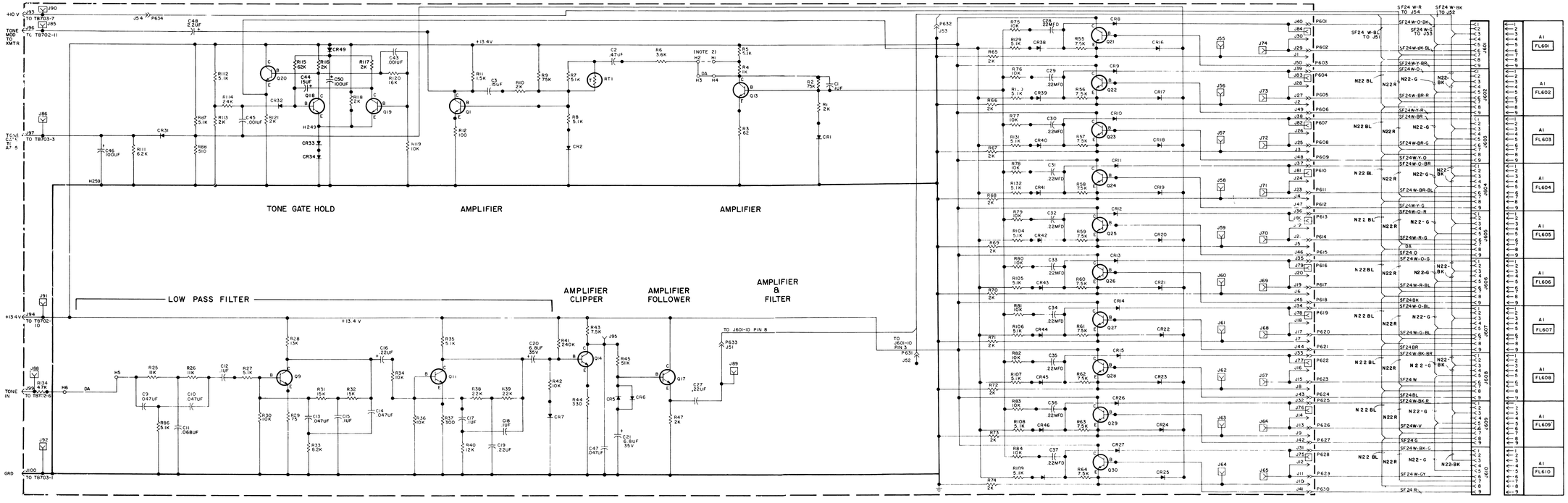


(19D402741, Rev. 7)
(19D402756, Sh. 1, Rev. 5)
(19D402756, Sh. 2, Rev. 5)



OUTLINE DIAGRAM

TONE PANEL 19D402486G1



BOARD, TONE
PL19D402615G2

NOTES:

1. ALL CIRCUITS PRINTED WIRING EXCEPT WHERE OTHERWISE SHOWN.
2. IN SHARED REMOTE STATION APPLICATIONS, DA WIRE IS REMOVED FROM BETWEEN H3 AND H4 AND CONNECTED BETWEEN H1 AND H2.

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 1/8 WATT UNLESS OTHERWISE SPECIFIED. RESISTOR VALUES IN OHMS, UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES ARE INDICATED (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

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
19D402486G1	E

SCHEMATIC DIAGRAM

TONE PANEL 19D402486G1

(19X620746, Rev. 11)

PARTS LIST

LBI3690F

TONE PANEL
19D402488G1

SYMBOL	GE PART NO.	DESCRIPTION
A601		TONE BOARD 19D402815G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C2*	19A116080P21	Polyester: 0.47 µf ±20%, 50 VDCW.
		In REV C and earlier:
	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C3	19A116080P8	Polyester: 0.15 µf ±20%, 50 VDCW.
C8*	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D. Deleted by REV B.
C9* and C10*	8A116080P205	Polyester: 0.047 µf ±5%, 50 VDCW.
		In Models of REV A and earlier:
	19B209243P5	Polyester: .047 µf ±20%, 50 VDCW.
C11*	19A116080P206	Polyester: 0.068 µf ±5%, 50 VDCW.
		In REV B-D:
	19A116080P207	Polyester: 0.1 µf ±5%, 50 VDCW.
		In Models of REV A and earlier:
	19B209243P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C12	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C13* and C14*	19A116080P205	Polyester: .047 µf ±5%, 50 VDCW.
		In Models of REV A and earlier:
	19B209243P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C15*	19A116080P207	Polyester: 0.1 µf ±5%, 50 VDCW.
		In Models of REV A and earlier:
	19B209243P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C16	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C17* and C18*	19A116080P207	Polyester: 0.1 µf ±5%, 50 VDCW.
		In Models of REV A and earlier:
	19B209243P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C19*	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
		In Models of REV A and earlier:
	19B209243P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C20 and C21	5496267P18	Tantalum: 6.8 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C22* and C23*	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW. Deleted by REV B.
C24* and C25*	777475095	Ceramic disc: 0.0015 µf +100% -0%, 500 VDCW. Deleted by REV B.
C26*	777475P8	Ceramic disc: 0.0033 µf +100% -0%, 500 VDCW. Deleted by REV B.
C27 thru C37	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C43	774750P4	Ceramic disc: 0.001 µf +100% -0%, 500 VDCW.
C44	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C45	777475097	Ceramic disc: 0.001 µf +100% -0%, 500 VDCW.
C46	5496267P16	Tantalum: 100 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C47*	19A116080P5	Polyester: .047 µf ±20%, 50 VDCW. Added by REV A.
C48*	5496267P13	Tantalum: 2.2 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
		In REV B and C:
	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW. Added by REV A.

SYMBOL	GE PART NO.	DESCRIPTION
C49*	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW. Added by REV A. Deleted by REV D.
C50*	19A115680P107	Electrolytic: 100 µf +150% -10%, 15 VDCW; sim to Mallory Type TTX. Added by REV C.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	19A115250P1	Silicon.
CR5 thru CR27	19A115250P1	Silicon.
CR31 thru CR34	19A115250P1	Silicon.
CR38 thru CR47	19A115250P1	Silicon.
CR49*	19A115250P1	Silicon. Added by REV C.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J54	4033513P4	Contact, electrical: sim to Dead Chain L83-3.
J55 thru J86	403153?P1	Terminal: sim to Alden Products 654T.
J88 and J89	403153?P1	Terminal: sim to Alden Products 654T.
J91	4033513P4	Contact, electrical: sim to Dead Chain L83-3.
J92	403153?P1	Terminal: sim to Alden Products 654T.
J93	4033513P4	Contact, electrical: sim to Dead Chain L83-3.
J94 and J95	403153?P1	Terminal: sim to Alden Products 654T.
J96 thru J101	4033513P4	Contact, electrical: sim to Dead Chain L83-3.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115123P1	Silicon, NPN.
Q4*	19A115123P1	Silicon, NPN. Deleted by REV B.
Q9	19A115123P1	Silicon, NPN.
Q10*	19A115123P1	Silicon, NPN. Deleted by REV B.
Q11	19A115123P1	Silicon, NPN.
Q13 and Q14	19A115123P1	Silicon, NPN.
Q17 thru Q20	19A115123P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R7?P203J	Composition: 2K ohms ±5%, 1/2 w.
R2	3R7?P753J	Composition: 75k ohms ±5%, 1/2 w.
R3	3R7?P620J	Composition: 62 ohms ±5%, 1/2 w.
R4	3R7?P103J	Composition: 1K ohms ±5%, 1/2 w.
R5	3R7?P512J	Composition: 5.1K ohms ±5%, 1/2 w.
R6	3R7?P362J	Composition: 3.6K ohms ±5%, 1/2 w.
R7 and R8	3R7?P512J	Composition: 5.1K ohms ±5%, 1/2 w.
R9	3R7?P753J	Composition: 75K ohms ±5%, 1/2 w.
R10	3R7?P203J	Composition: 2K ohms ±5%, 1/2 w.
R11	3R7?P153J	Composition: 1.5K ohms ±5%, 1/2 w.
R12	3R7?P101J	Composition: 100 ohms ±5%, 1/2 w.
R20*	3R7?P272J	Composition: 2.7K ohms ±5%, 1/2 w. Deleted by REV B.
R21*	3R7?P963J	Composition: 36K ohms ±5%, 1/2 w. Deleted by REV B.
R22*	3R7?P103J	Composition: 1K ohms ±5%, 1/2 w. Deleted by REV B.
R23*	3R7?P511J	Composition: 510 ohms ±5%, 1/2 w. Deleted by REV B.

SYMBOL	GE PART NO.	DESCRIPTION
R24*	3R7?P201J	Composition: 200 ohms ±5%, 1/2 w. Deleted by REV B.
R25* and R26*	3R7?P113J	Composition: 11K ohms ±5%, 1/2 w.
		In Models of REV A or earlier:
	3R7?P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R27	3R7?P513J	Composition: 5.1K ohms ±5%, 1/2 w.
R28	3R7?P133J	Composition: 13K ohms ±5%, 1/2 w.
R29	3R7?P75OJ	Composition: 75 ohms ±5%, 1/2 w.
R30	3R7?P103J	Composition: 10K ohms ±5%, 1/2 w.
R31 and R32	3R7?P153J	Composition: 15K ohms ±5%, 1/2 w.
R33	3R7?P822J	Composition: 8.2K ohms ±5%, 1/2 w.
R34	3R7?P103J	Composition: 10K ohms ±5%, 1/2 w.
R35	3R7?P513J	Composition: 5.1K ohms ±5%, 1/2 w.
R36	3R7?P103J	Composition: 10K ohms ±5%, 1/2 w.
R37	3R7?P301J	Composition: 300 ohms ±5%, 1/2 w.
R38 and R39	3R7?P223J	Composition: 22K ohms ±5%, 1/2 w.
R40	3R7?P133J	Composition: 13K ohms ±5%, 1/2 w.
R41	3R7?P244J	Composition: 240K ohms ±5%, 1/2 w.
R42	3R7?P103J	Composition: 10K ohms ±5%, 1/2 w.
R43	3R7?P75?J	Composition: 7.5K ohms ±5%, 1/2 w.
R44	3R7?P331J	Composition: 330 ohms ±5%, 1/2 w.
R45	3R7?P513J	Composition: 51K ohms ±5%, 1/2 w.
R47	3R7?P202J	Composition: 2K ohms ±5%, 1/2 w.
R48*	3R7?P202J	Composition: 2K ohms ±5%, 1/2 w. Deleted by REV B.
R49* and R50*	3R7?P513J	Composition: 5.1K ohms ±5%, 1/2 w. Deleted by REV B.
R51*	3R7?P200J	Composition: 20 ohms ±5%, 1/2 w. Deleted by REV B.
R52* and R53*	3R7?P153J	Composition: 15K ohms ±5%, 1/2 w. Deleted by REV B.
R54*	3R7?P682J	Composition: 6.8K ohms ±5%, 1/2 w. Deleted by REV B.
R55 thru R64	3R7?P75?J	Composition: 7.5K ohms ±5%, 1/2 w.
R65 thru R74	3R7?P203J	Composition: 2K ohms ±5%, 1/2 w.
R75 thru R84	3R7?P103J	Composition: 10K ohms ±5%, 1/2 w.
R86*	3R7?P513J	Composition: 5.1K ohms ±5%, 1/2 w.
		In Models of REV A and earlier:
	3R7?P47?J	Composition: 4.7K ohms ±5%, 1/2 w.
R87	3R7?P513J	Composition: 5.1K ohms ±5%, 1/2 w.
R88	3R7?P511J	Composition: 510 ohms ±5%, 1/2 w.
R104 thru R109	3R7?P513J	Composition: 5.1K ohms ±5%, 1/2 w.
R111	3R7?P22J	Composition: 6.2K ohms ±5%, 1/2 w.
R112	3R7?P513J	Composition: 5.1K ohms ±5%, 1/2 w.
R113*	3R7?P203J	Composition: 2K ohms ±5%, 1/2 w.
		In REV and earlier:
	3R7?P103J	Composition: 1K ohms ±5%, 1/2 w.
R114	3R7?P243J	Composition: 24K ohms ±5%, 1/2 w.
R115	3R7?P62?J	Composition: 62K ohms ±5%, 1/2 w.
R116 thru R118	3R7?P202J	Composition: 2K ohms ±5%, 1/2 w.

SYMBOL	GE PART NO.	DESCRIPTION
R119	3R7?P103J	Composition: 10K ohms ±5%, 1/2 w.
R120	3R7?P163J	Composition: 16K ohms ±5%, 1/2 w.
R121	3R7?P202J	Composition: 2K ohms ±5%, 1/2 w.
R129 thru R132	3R7?P512J	Composition: 5.1K ohms ±5%, 1/2 w.
R134*	3R7?P47?J	Composition: 4.7K ohms ±5%, 1/2 w.
		In Models of REV A and earlier:
	3R7?P101K	Composition: 100 ohms ±10%, 1/2 w. Added by REV A.
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT1	5490828P21	Rod: 1250 ohms ±10%, 0.38 w max; sim to Carborundum Type 402B-11.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J601 thru J610	7480533P11	Connector, tube, phen: 9 pins; sim to Elco 04-902-27.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P601 thru P634	4029840P2	Contact, electrical: sim to AMP 42827-2.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - -
	19D402488G2	Harness. (Includes J601-J610, P601-P634).

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 adjust input level and to improve attenuation of filter. Added C47-C49 and R134.

REV. B - To change response of bandpass filter to prevent voice blocking and faulting. Changed C9-C11, C13-C15, C17-C19, R25, R26, R86 and R134. Deleted C8, C22-C26, Q4, Q10, R20-R23 and R48-R54. Added jumper from R134 to junction of RT1-C9.

REV. C - To eliminate a transmitted thumping noise when the transmitter is keyed in a community repeater application. Added C50 and CR49. Changed R113.

REV. D - To improve modulation level over the frequency range. Changed C2 and C48. Deleted C49

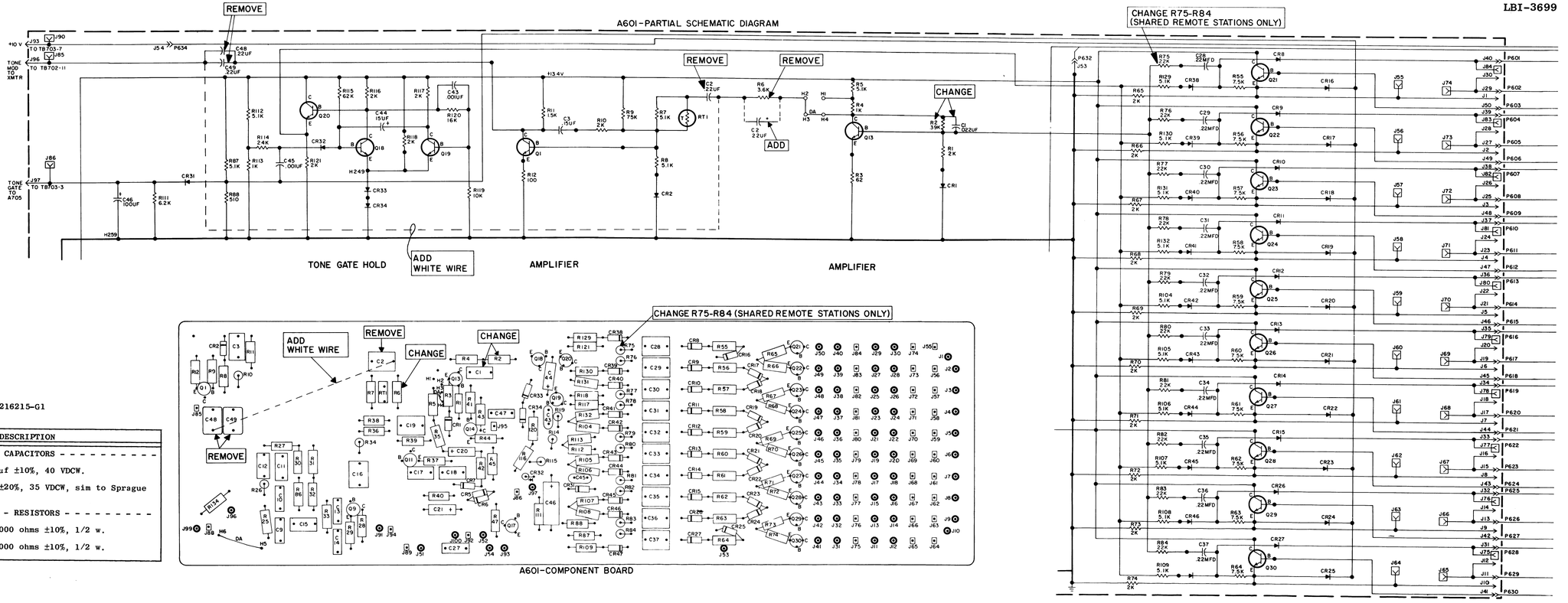
REV. E - To improve frequency response at 210 Hz. Changed C11.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

MODIFICATIONS:

1. Remove C2, C48 & C49.
2. Replace C1 (.1μf) with .022μf capacitor.
3. Replace R2 (72,000 ohm) with 39,000 ohm resistor.
4. Replace R6 with 22μf capacitor.
5. Connect 5N 22-W wire as shown on printed board and schematic diagrams.
6. Shared Remote Stations Only
   Replace resistors R75-R84 (10,000 ohms) with 22,000 ohm resistors.

A601-PARTIAL SCHEMATIC DIAGRAM



A601-COMPONENT BOARD

PARTS LIST

MODIFICATION KIT 19B216215-G1

QUANTITY	GE PART NUMBER	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
1	19B209243-P103	Polyester: .022 μf ±10%, 40 VDCW.
1	5496267-P19	Tantalum: 22 μf ±20%, 35 VDCW, sim to Sprague Type 150D.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
1	3R77-P393K	Composition: 39,000 ohms ±10%, 1/2 w.
10	3R77-P223K	Composition: 22,000 ohms ±10%, 1/2 w.

INSTALLATION INSTRUCTIONS

TONE PANEL MODIFICATION KIT 19B216215G1
(FOR USE WITH ICOM EQUIPPED TRANSMITTERS)

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-3699

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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