MOBILE RADIO

MASTR Personal Series

PROGRESS LINE

PE MODELS

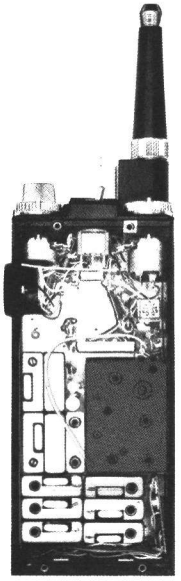
BOARD AND CASE ASSEMBLY 19D423294G3

(5-FREQUENCY WITH TYPE 99 DECODER)

Maintenance Manual LBI-30193

DF-4109

SYSTEM BOARD AND CASE ASSEMBLY 19D423294G3



SPECIFICATIONS *

MODEL NUMBERS	
19D423294G3	66 - 88 MHz
CONTROLS	Volume ON-OFF Switch Squelch Control Five-Frequency Selector Switch PTT Switch Tone Option Switch Collapsible Antenna Accessory Jack

*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

System Board A703 provides system interconnections between the transmitter, receiver, tone options and operating controls in the 66 to 88 MHz, Five-Frequency with Type 99 Decoder PE Models. The System Board contains transmitter oscillator modules A5 through A9 and receiver oscillator modules A10 through A12. In addition to the oscillator modules, the system board contains audio module A1, 5.4 Volt regulator module A2, compensator module A3, modulator module, system relay K1 and audio and DC switching circuitry.

Jacks J702 and J703 are connected to the system board and provide contacts for an external antenna, speaker, and microphone. J702 provides contacts for the external antenna and speaker, and J703 provides contacts for an external microphone. Placing the radio into the vehicular charger automatically connects the jack contacts to the external circuitry. The radio is also connected to the external antenna when placed in the desk charger.

CIRCUIT ANALYSIS

AUDIO SWITCHING

Audio switching for the Speaker/ Microphone LS1 is controlled by diode CR5 as shown in Figure 1.

Pressing PTT switch S701 forward biases diode CR5, permitting audio from LS1 to be applied to transmitter audio module A1.

Keying the external microphone permits audio to be applied directly to the Transmitter audio module.

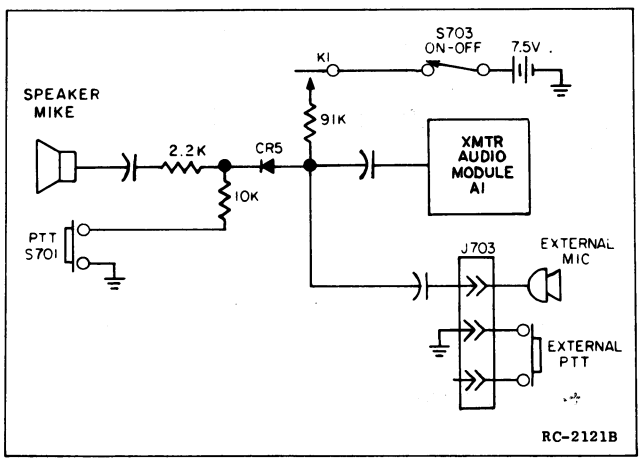


Figure 1 - Audio Switching Circuit

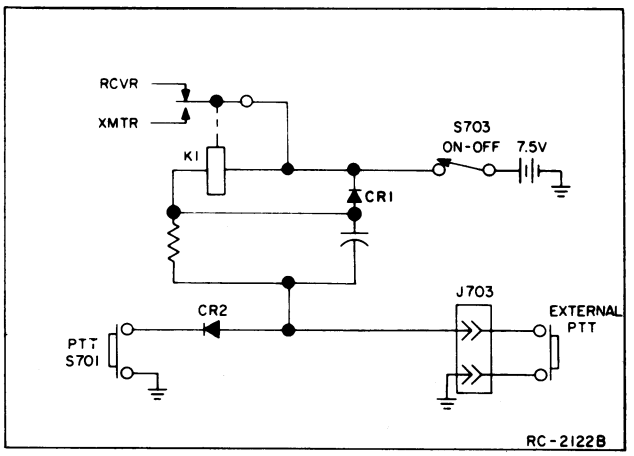


Figure 2 - DC Switching Circuit

DC SWITCHING

Operation of system relay K1 is controlled by diode CR2 (see Figure 2).

Pressing S701 forward biases CR2, completing the relay path to ground. This energizes relay K1, and switches the battery voltage to the transmitter audio and regulator modules. Energizing K1 also connects the transmitter output to the antenna.

REPEATING OSCILLATOR MODULES

Both the transmitter and receiver can be adapted to repeat the use of the same frequency without the use of additional Oscillator Modules. The Oscillator Module is replaced by a diode, allowing the frequency selector switch to have the same frequency on one or more switch positions even though only one Oscillator Module is used for each of the repeated channels. A typical diagram with repeated Oscillator Modules is shown in Figure 3.

Complete instructions for multi-frequency modifications are contained in the Multi-Frequency Modification Diagram (see Table of Contents).

For radios equipped with Channel Guard, Type 90 Encoders/Decoders or Type 99 Decoders, repeating Oscillator Modules also permits switching or disabling tones on the same RF frequency with the multi-frequency switch. Also, the tone and RF frequency can be changed at the same time.

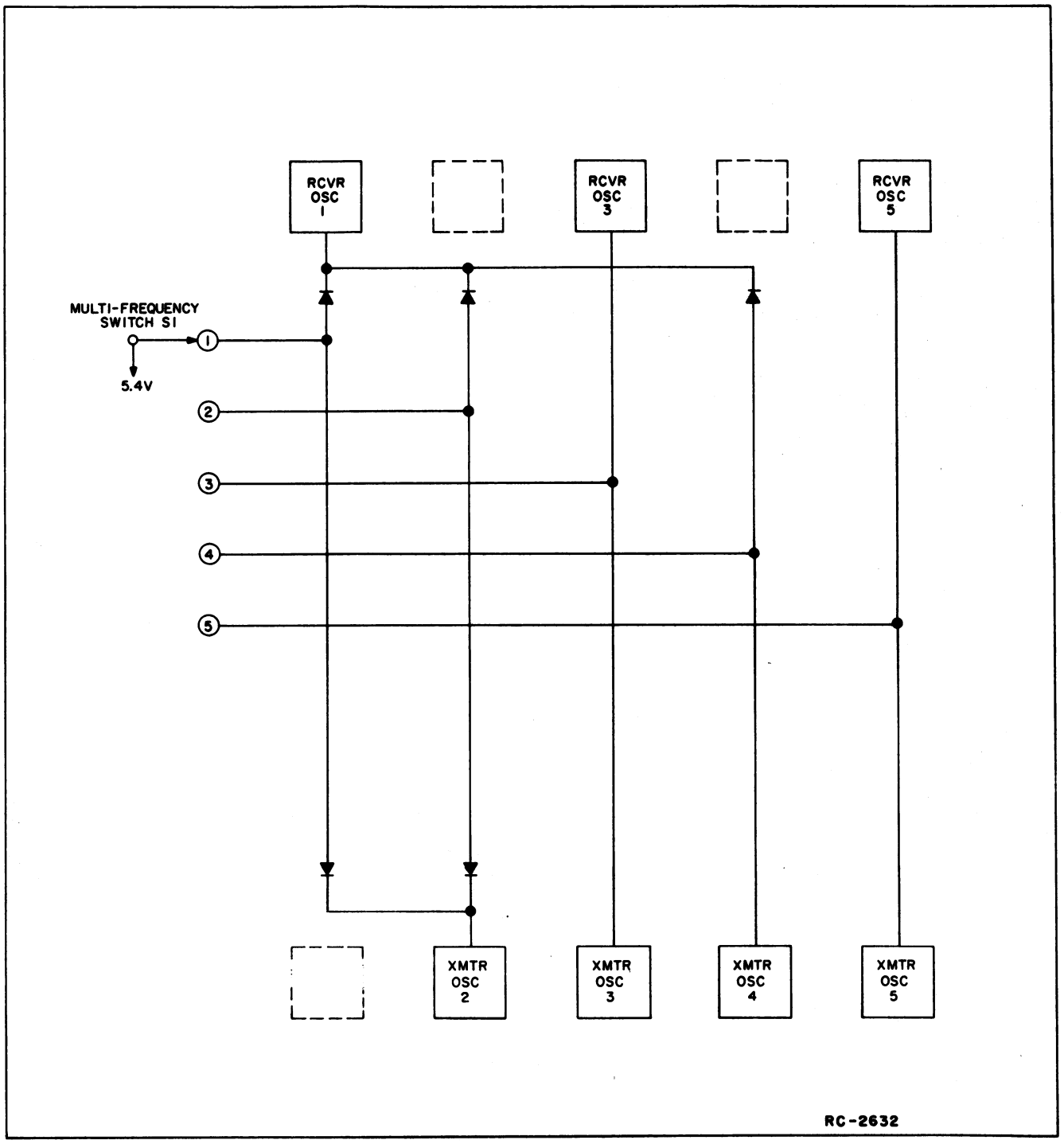
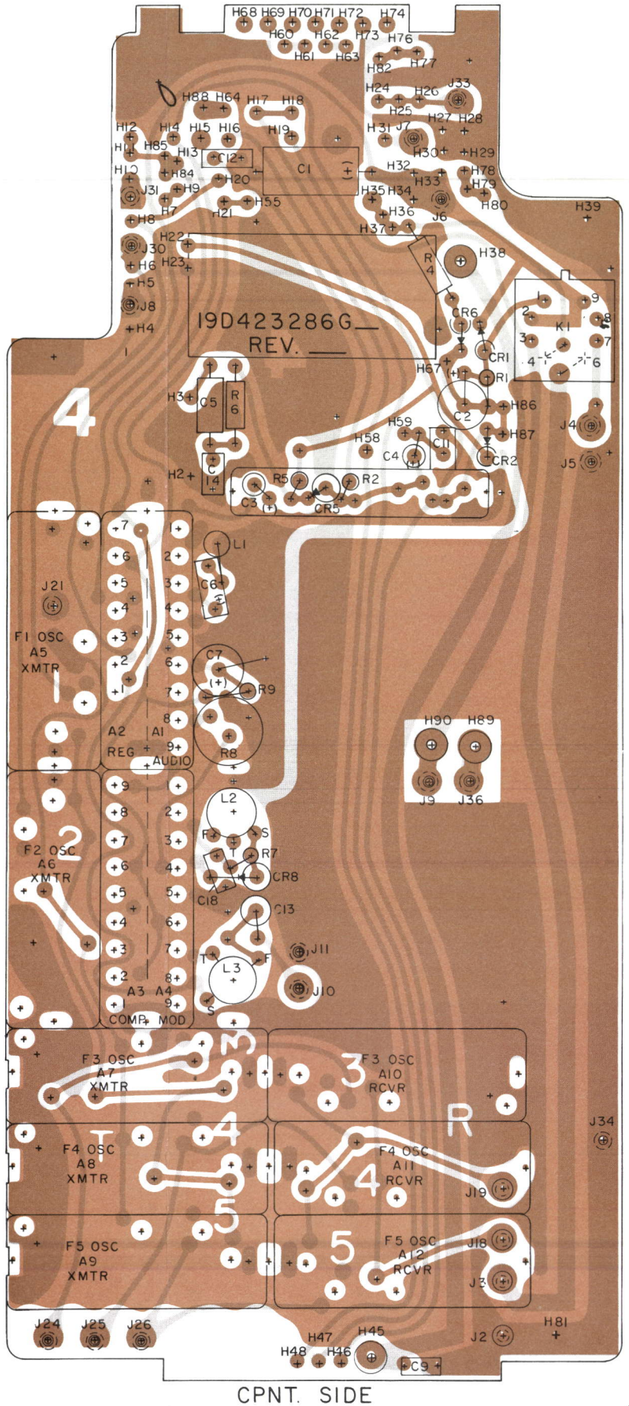
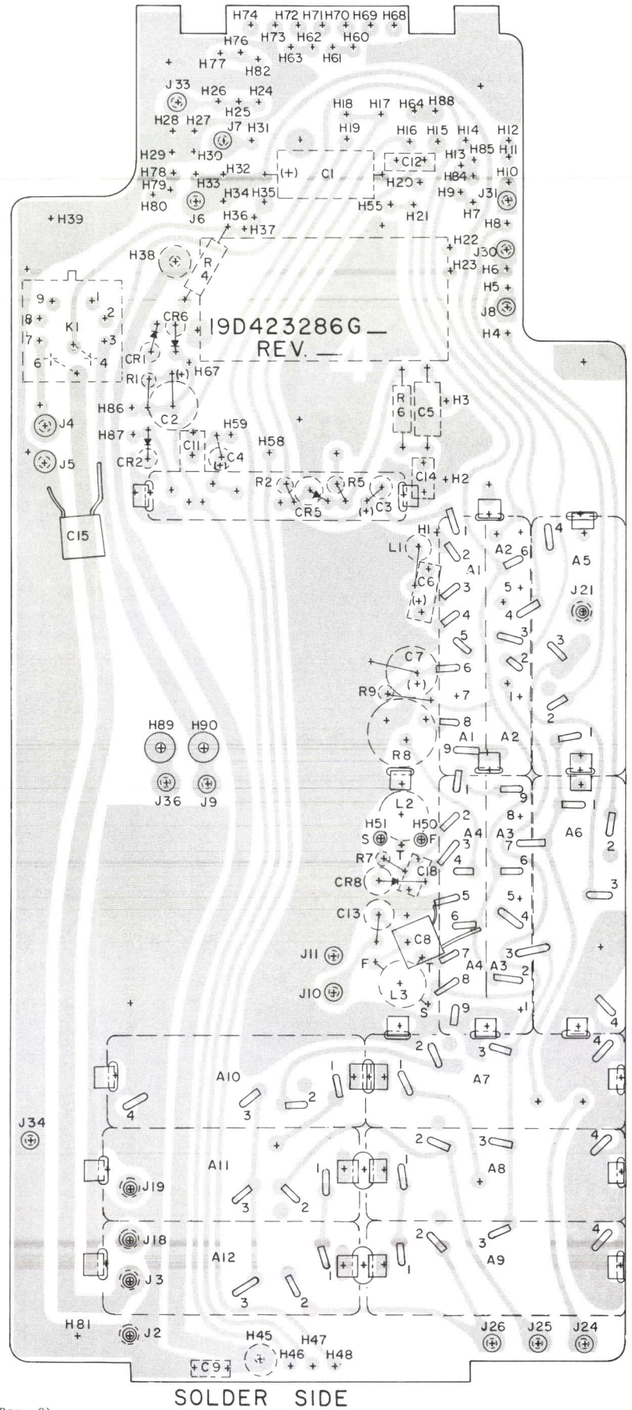


Figure 3 - Repeating Oscillator Modules



CPNT. SIDE

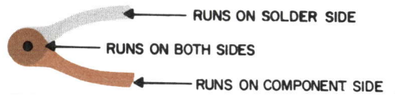
(19D417006, Sh. 2, Rev. 4)
(19D417006, Sh. 3, Rev. 4)



SOLDER SIDE

(19D424126, Rev. 0)

(19D417006, Sh. 2, Rev. 4)



OUTLINE DIAGRAM

66—88 MHz SYSTEM BOARD

4 Issue 1

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
PL19D423286G3	A
PL19D423294G3	A

ALL WIRE SFT #28 UNLESS OTHERWISE SPECIFIED.

ALL RESISTORS ARE 1/8 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.

NOTES:

1. ▲USED IN LOW SPLIT 66-75 MHZ
   ■USED IN MID SPLIT 75-87 MHZ
2. DA = #22AWG
3. ⊗THESE ITEMS ARE PART OF KIT 19A129762G1

(19R622174, Rev. 4)

SCHEMATIC DIAGRAM

66—88 MHz SYSTEM BOARD

Issue 1

PARTS LIST

LBI-30192

SYSTEM BOARD/CASE ASSEMBLY
19D432284G3
AND
ASSOCIATED ASSEMBLIES

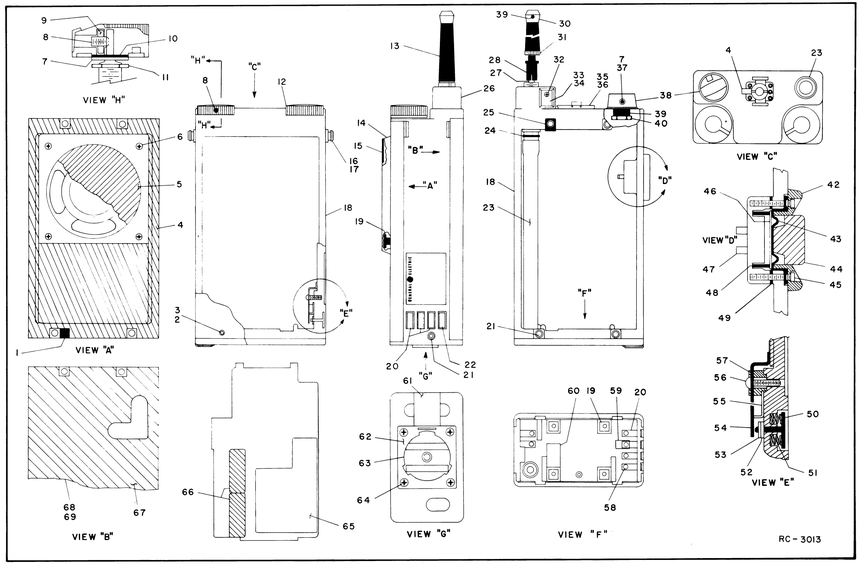
SYMBOL	GE PART NO.	DESCRIPTION
A703		SYSTEM BOARD 19D432286G3
A1	19C320063G1	Transmitter Audio Module.
A2	19C311905G2	Regulator Module.
A3	19C320060G1	Oscillator Compensator Module.
A4	19C320084G1	Modulator Module.
		NOTE: When reordering A5 thru A9, give GE Part Number and exact crystal frequency. Crystal Freq = Operating Freq. / 6
A5 thru A9	4EG27A13	Transmitter Oscillator.
		NOTE: When reordering A10 thru A12, give GE Part Number and exact crystal frequency.
		66-75 MHz. Crystal Freq = Operating Freq. ÷ 20 / 3
		75-88 MHz. Crystal Freq = Operating Freq. ÷ 23 / 3
A10 thru A12	4EG28A30	Receiver Oscillator. 66-76 MHz.
	4EG28A31	Receiver Oscillator. 75-88 MHz.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5491674P30	Tantalum: 39 µf ±20%, 10 VDCW; sim to Sprague Type 162D.
C2	5491674P42	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 162D.
C3 and C4	5491674P1	Tantalum: 1.0 µf +40-20%, 10 VDCW; sim to Sprague Type 162D.
C5	19A116244P2	Ceramic: 0.022 µf ±20%, 50 VDCW.
C6	19C307102P19	Tantalum: 68 µf ±20%, 4 VDCW.
C7	5491674P42	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 162D.
C8	19A116114P7053	Ceramic: 47 pf ±5%, 100 VDCW; temp coef -750 PPM.
C9	19A116114P7065	Ceramic: 100 pf ±5%, 100 VDCW; temp coef -750 PPM.
C11	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C12	19A116114P2049	Ceramic: 39 pf ±10%, 100 VDCW; temp coef -80 PPM.
C13	5491601P120	Phenolic: 1.0 pf ±5%, 500 VDCW.
C14	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C15	19A116192P1	Ceramic: 0.01 pf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C18	19A116114P8065	Ceramic: 100 pf ±5%, 100 VDCW; temp coef -1500 PPM.
		- - - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A115250P1	Silicon.
CR2	5494923P1	Silicon; sim to Type 1N456.
CR5	5494923P1	Silicon; sim to Type 1N456.
CR6	19A115250P1	Silicon.
CR8	548576P99	Diode, silicon.
		- - - - - - - - - JACKS AND RECEPTACLES - - - - -
J1 thru J3	19A116366P4	Contact, electrical: sim to Concord 10-891-1.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
J6 thru J8	19A116366P2	Contact, electrical: sim to Cambion 3233-1.
J9 thru J11	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
J18 thru J21	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
J24 thru J26	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
J30 and J31	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
J33 and J34	19A116366P2	Contact, electrical: sim to Cambion 3233-1.
J36	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	19D209562P2	Relay, hermetic sealed: 45 to 102 ohms 2 form C contacts 5.0 VDC nominal, 1.0 w max operating; sim to GE 39C910GAX2.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19D209420P125	Coil, RF: 10.0 uh ±10%, 3.10 ohms DC res max; sim to Jeffers 4440-4.
L2	19A127798G1	Coil. Includes:
	19D209434P1	Tuning slug.
L3	19D216910G1	Coil. Includes:
	19D209439P1	Tuning slug.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P181J	Composition: 180 ohms ±5%, 1/4 w.
R2	3R151P913J	Composition: 91,000 ohms ±5%, 1/8 w.
R4	3R151P101K	Composition: 100 ohms ±10%, 1/8 w.
R5	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R6	3R151P222J	Composition: 2200 ohms ±5%, 1/8 w.
R7	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R8	19A116412P4	Variable, cermet: 2500 ohms ±10%; sim to Helipot Model 62 PR250K.
R9	3R151P101K	Composition: 100 ohms ±10%, 1/8 w.
		- - - - - - - - - - FUSES - - - - - - - - - -
F701	19A127884G1	Fuse Kit.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J701	19D216594G2	Connector, female: 6 contacts.
J702		See Mechanical Parts RC-3013 items 20, 22.
J703		See Mechanical Parts RC-3013 items 20, 59, 60.
J704		See Mechanical Parts RC-3013 items 62-65.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P701	19A115834P4	Contact, electrical: sim to AMP 3-332070-9.
P704 and P705	19A127569P1	Plug: 8 contacts.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R707	19A116227P1	Resistor/Switch: variable, carbon film, 25,000 ohms ±20%, 1/8 w, (Includes S703), SPST, 3 amp at 125 VAC.
R708	19A116227P2	Variable, carbon film: 25,000 ohms ±20%, 1/8 w.
R709	3R151P152K	Composition: 1500 ohms ±10%, 1/8 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S701		See Mechanical Parts RC-3013 items 42-49.
S702		See Mechanical Parts RC-3013 items 50-57.
S703		(Part of R707).

SYMBOL	GE PART NO.	DESCRIPTION
		ASSOCIATED ASSEMBLIES
		FRONT COVER ASSEMBLY 19C317416G2
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS1	19A116090P1	Permanent magnet: 2.00 inch, 8 ohms ±10% voice coil impd, 450 Hz ±12 Hz resonant; freq range 400 to 3000 Hz.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A115834P4	Contact, electrical: sim to AMP 3-333070-9.
		MULTI-FREQUENCY KIT 19A129762G1
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19D219976G1	Rotary: 1 section, 1 pole, (adjustable 2 to 10 positions), non-shorting; sim to Grayhill Co. 50MT03153-1-RH.
	5494922P1	Diode, silicon. (Used for repeated frequencies only).
		HI/LOW SPLIT MODIFICATION KIT 19A130604G1 66-76 MHz 19A130604G2 75-88 MHz
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C16	19A116114P2048	Ceramic: 36 pf ±5%, 100 VDCW; temp coef -80 PPM.
C17	19A116114P3051	Ceramic: 43 pf ±5%, 100 VDCW; temp coef -80 PPM.
		ANTENNA LOADING COIL KIT 19A130604G3 LOW SPLIT 19A130604G4 MID SPLIT
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19D227191G1	Coil. Includes:
	19D209436P1	Tuning slug.
L2	19D227191G2	Coil. Includes:
	19D209436P1	Tuning slug.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19D219768G1	Antenna Assembly. (Includes items 27-31).
	19D413522G6	Battery, rechargeable. Nickel Cadmium.
	19A127884G1	Fuse Kit.
	4038831P4	Alignment Tool. Fork tip.
	19D219079G1	Alignment Tool. Allen tip.
	19C320191P1	Antenna Strip Line.
		MECHANICAL PARTS (RC-3013)
1	19A130397P1	Ground Strap. (Used on front and rear covers).
2	9404298P	Lockwasher, internal tooth: No. 2.
3	19A116543P2	Cap screw, socket head: No. 2-56 x 3/16.
4	19C317394P4	Gasket.
5	19D304527P2	Diaphragm: No. 2 inches dia.
6	MS19P5003C13	Screw, phillips head: No. 2-56 x 1/8.
7	4037064P18	Washer, non-metallic.
8	NTOP703C6	Set screw: No. 3-48 x 3/16.
9	19A130517P1	Insert, tagged.
10	4035630P1	Washer: teflon.
11	19A127319P1	Nut: No. 1/4-32.
12	19D227042G2	Knob assembly. (Includes items 8, 9).
13	19D219768G1	Antenna assem ly. (Includes items 27-31).
14	19D413531P2	Grille.
15	RP270290P2	Nameplate (GE monogram).

SYMBOL	GE PART NO.	DESCRIPTION
16	19A127802P1	Rivet.
17	19A116773P905	Tap screw, Phillips POZIDRIV®: No. 4-24 x 5/16.
18	19D413542G6	Case assembly. (Includes items 20,21,25,42-49, 58).
19	19B216858P1	Insert.
20	19A127753P1	Contact (Part of J702 and J703).
21	19A116719P1	Insert, screw thread: No. 2-56; sim to Tridair Industries SPO256SS-3X.
22	19B216862P2	Contact (Part of J703).
23	19A127779G5	Antenna tube and insert.
24	19A116854P1	Solderless terminal.
25	19B216875P1	Support.
26	19A130904G3	Loading Coil Assembly, Low-Split. (Includes items 32-34).
	19A130904G4	Loading Coil Assembly, Mid-Split. (Includes items 32-34).
27	19C320283P3	Antenna rod (Part of item 13).
28	19C320352P1	Bushing (Part of item 13).
29	NTOP703C13	Set screw: No. 3-48 x 3/16. (Part of item 13).
30	19A129646P1	Antenna Cap (Part of item 13).
31	19B219770G1	Nut, spacer: thd. size No. 7/16 x 40. (Part of item 13).
32	19A116869P1	Tap screw, phillips: No. 2-32 x 1/4.
33	19C320359P1	Cover.
34	19A129559P1	Gasket.
35	19C317050P1	Protective Cover.
36	19A129390P1	Disc. (Located inside item 28).
37	19A130517P1	Insert, tagged.
38	19A130426G2	Knob assembly. (Includes items 8, 37, 39, 40).
39	19B216520P4	Washer.
40	19A127319P2	Nut.
41	19B219540P1	Support.
42	19C320559P1	Collar (Part of S701).
43	19C320558P1	Diaphragm (Part of S701).
44	19C320560P1	Button (Part of S701).
45	841P1004	Screw, machine: No. 0-80 x 1/4. (Part of S701).
46	19A129733P1	Contact plate (Part of S701).
47	19B219961G1	Terminal (Part of S701).
48	19A129734P1	Spring (Part of S701).
49	19A130926P1	Plate nut. (Part of S701).
50	19B216862P1	Contact (Part of S702).
51	19A127755P1	Spring (Part of S702).
52	19A127754P1	Gasket (Part of S702).
53	9910P6C6	Retaining ring. (Part of S702).
54	19B216863P1	Spring contact. (Part of S702).
55	19B216864P1	Contact (Part of S702).
56	8647P5004C	Cap screw: No. 2-56 x 1/4. (Part of S702).
57	19B216859P1	Insulator (Part of S702).
58	X330P605F22	Eyelet, brass: 1/16 x 5/32.
59	19A127760P1	(Not Used).
60	19A127762P1	Bushing.
61	19B216891G1	Spring assembly. (Part of J704).
62	19D413467P1	Fastener (Part of J704).
63	19A130549P1	Insulator.
64	NS3P5005E	Flat head screw: No. 2-56 x 5/16. (Part of J704).
65	19B219443P1	Insulator.
66	19C311491P3	Can. (Used with A1-A4).
67	19C317394P6	Gasket.
68	19B216897G3	Rear Cover Assembly (without clip).
69	19B216897G4	Rear Cover Assembly (with clip).



MULTI-FREQUENCY MODIFICATIONS

(19D417138, Sh. 1, Rev. 2 & Sh. 2, Rev. 2)

The multi-frequency modifications include instructions for adjusting the stop post on multi-frequency switch S1, for adding oscillator modules, for repeating frequencies, and repeating oscillator modules.

1- STOP POST ADJUSTMENT

CAUTION

Due to the small size of the stop posts, be very careful when making adjustments to avoid losing the stops.

1. Remove the multi-frequency switch as directed in the Disassembly Procedure (see Table of Contents in LBI-4709).
2. Turn the shaft fully counterclockwise as viewed from the knob end.
3. Unscrew the panel seal to gain access to the stop post (see Figure 1).
4. Install the stop post in the appropriate hole as shown in the following chart.

NO. OF FREQS	MOVE ADJUSTABLE STOP TO
2	H2
3	H3
4	H4
5	H5

5. Replace the panel seal with the side marked "Bottom" against surface "Z".
6. Re-install the Multifrequency Switch.

2- ADDING OSCILLATOR MODULES

1. After completing the stop post adjustment, connect the leads from multi-frequency switch S1 as shown in the following chart (see Figure 3 for connection points). Tape back all unused leads.

CONNECTION CHART			
FROM	TO	WIRE COLOR	S1 POSITION
S1-C1	H11 (solder)	SFT-BL	
S1-1	J31	SFT-W-BK	1
S1-2	J30	SFT-W-O	2
S1-3	J24	BR	3
S1-4	J25	R	4
S1-5	J26	O	5

2. Place the oscillator module(s) in the proper holes (see Figure 3). Then bend over tabs on the can and solder to the adjacent pads (see Figure 2).
3. Bend the leads of the oscillator module as shown in Figure 2 (or appropriate Outline Diagram) and solder to the adjacent pads.
4. For two or more transmitter frequencies and one receiver frequency, remove the jumper from H7 to H10 and add a sleeved jumper (#26 AWG) from H7 to H13 on the Systems Board.
5. For two or more receiver frequencies and one transmitter frequency, remove the jumper from H8 to H10 and add a sleeved jumper (#26 AWG) from H20 and H21 on the Systems Board.

3- REPEATING FREQUENCIES

For repeating both transmitter and receiver frequencies without adding additional oscillator modules, add a sleeved jumper (#26 AWG) between the frequencies to be repeated. For example, if transmitter and receiver channels 1 and 5 are to be repeated, add the jumper from S1-1 to S1-5.

4- REPEATING OSCILLATOR MODULES

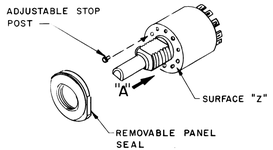
To repeat frequencies for the transmitter only or the receiver only, diodes can be used in place of oscillator modules.

1. Set the stop on S1 and install the oscillator modules whose frequencies are not to be repeated as directed in Section I and II.
2. Install the oscillator(s) whose frequencies are to be repeated as directed above except solder the Number 2 pin to the "E" pad instead of the "P" pad (see Figure 2).
3. For every channel that a frequency is being repeated, assemble a diode (5494922P1) in the space normally intended for the oscillator module by putting the annode lead in the Number 2 hole, bending it over and soldering to the "P" pad. The cathode lead will be terminated later.
4. For each different frequency that is repeated, an additional diode (5494922P1) is to be assembled in respective channel closest to the oscillator module being repeated. Assemble the diode in the Number 1 hole, annode lead down and sleeved, and connect to the associated "E" pad. Then run the jumper from this pad to the "P" pad of related oscillator module.

The cathode end of the diodes should be connected together using mid air connections. Make the connection and run the wire down the side of the diode along the component side of the board to the next diode, and so on until all the diode's cathodes are connected together. Route these wires to give the shortest connections. Now connect a lead to the cathode of the diode that is closest to the repeated oscillator module and run this lead down the side of the diode and through any empty hole or slot to the solder side of the board, and connect the lead to the "E" pad of the oscillator module. Next sleeve the diodes as shown in Figure 4.

Example: Channel 3 and 4 to be same as Channel 1.
Channel 1 and 5 to be same as Channel 2.
(This example applies TX Frequencies only).

1. Assemble the oscillator module in Channels 1 and 2 as normal except connect the Number 2 lead to the "E" pad instead of "P" pad.
2. Assemble (1) diode in the Number 2 hole, anode lead down, in each of Channels 1, 3, 4 & 5 and solder to "P" pads.
3. Since two frequencies are being repeated, two additional diodes will be required, one in the Number 1 hole of Channel 3 and the other in the Number 1 hole of Channel 5. Sleeve, bend, and solder leads to the "E" pad. Connect jumper between the "E" pad of the Number 3 Channel and "P" pad of oscillator module Number 1. Connect a jumper between the "E" pad of Number 5 Channel and "P" pad of oscillator module Number 2.
4. Connect the top lead (cathode) of diodes (3) in Channel 3 and 4 to each other by soldering jumper wire to leads, dressing the wire down the side of the diodes and along the board. Connect a jumper from the top of diode in the Number 1 hole of Channel 3 to the "E" pad of oscillator module Number 1. Run the wire down through the board using any available hole or slot to the solder side. Connect the jumper from the diode in Channel Number 5 to oscillator module Number 2 in the same manner.



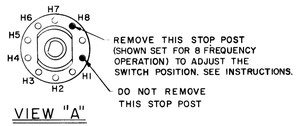
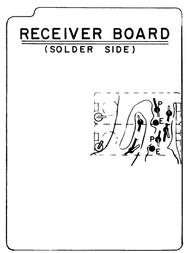


Figure 1 - Stop Post Adjustment



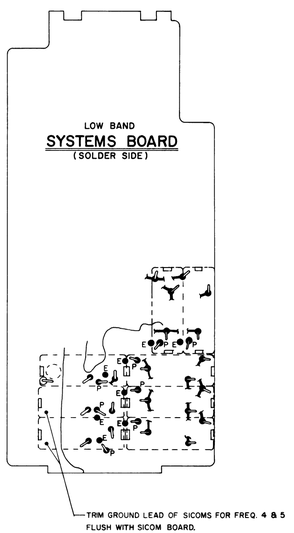
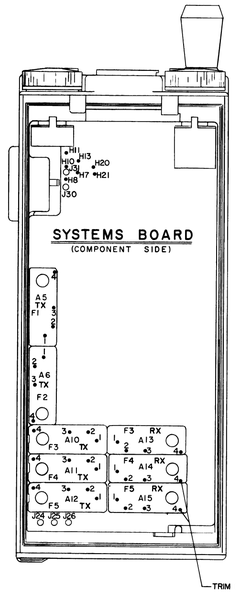


Figure 2 - Oscillator Module and Diode Installation



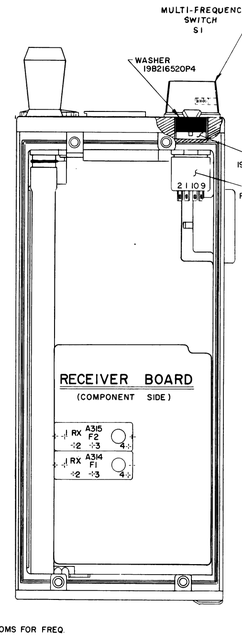


Figure 3 - Oscillator Mounting Positions & S1 Connection Points

Figure 4 - Typical Diode Mounting

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.

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