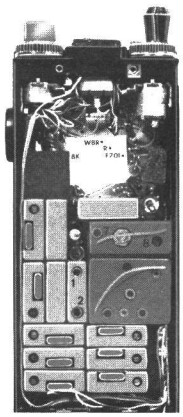
MOBILE RADIO

MASTR Personal Series

PROGRESS LINE

REMOTE PE MODELS
SYSTEMS BOARD AND CASE ASSEMBLY 19D413548G10

DF-409



SYSTEM BOARD AND CASE ASSEMBLY 19D413548G10

SPECIFICATIONS *

MODEL NUMBERS

19D413548G10	138 - 174 MHz
CONTROLS	Volume ON-OFF Switch Squelch Control Eight-Frequency Selector Switch PTT Switch Tone Option Switch Collapsible Antenna Speaker/Microphone Accessory Jack

*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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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 A710 provides system interconnections between the transmitter, receiver, tone options, and operating controls in the 138 to 174 MHz, eight-frequency, remote operated PE Series. The system board contains transmitter oscillator modules A5, A6, and A10 through A15. Other modules on the system board are the Audio Amplifier Module A1, 5.4-Volt Regulator Module A2, Compensator Module A3 and optional Compressor Module A50. The system board also contains system relay K1 and DC switching circuitry.

Accessory jack J701 and jacks J702 and J703 are connected to the system board and provide connections for external speakers, microphones and antennas. Accessory jack J701 provides connections for a remote speaker/microphone. Jack 702 connects an external speaker and antenna. Jack J703 connects an external microphone. Jacks J702 and J703 are used when the PE Radio is plugged into either a vehicular or desk charger.

The Remote speaker/microphone Type EM-33-G, provides for the remote operated PE Radio PTT switch S1 as well as a remote speaker and microphone.

CIRCUIT ANALYSIS

DC switching between the transmitter and receiver is accomplished by operation of system relay K1. Operation of system relay K1 is controlled by an external PTT switch or by PTT switch S1 on the remote Speaker/Microphone. Pressing either switch completes the relay path to ground (see Figure 1). This energizes relay K1 and switches the battery voltage to the transmitter audio and regulator modules. Energizing K1 also connects the transmitter power output to the antenna.

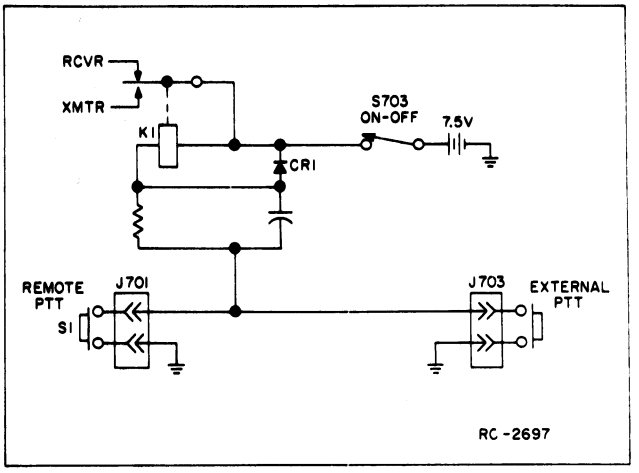


Figure 1 - DC Switching Circuit

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 multi-frequency 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 2.

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

For radios equipped with Channel Guard or Type 90 Encoders/Decoders, repeating Oscillator Modules also permit 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.

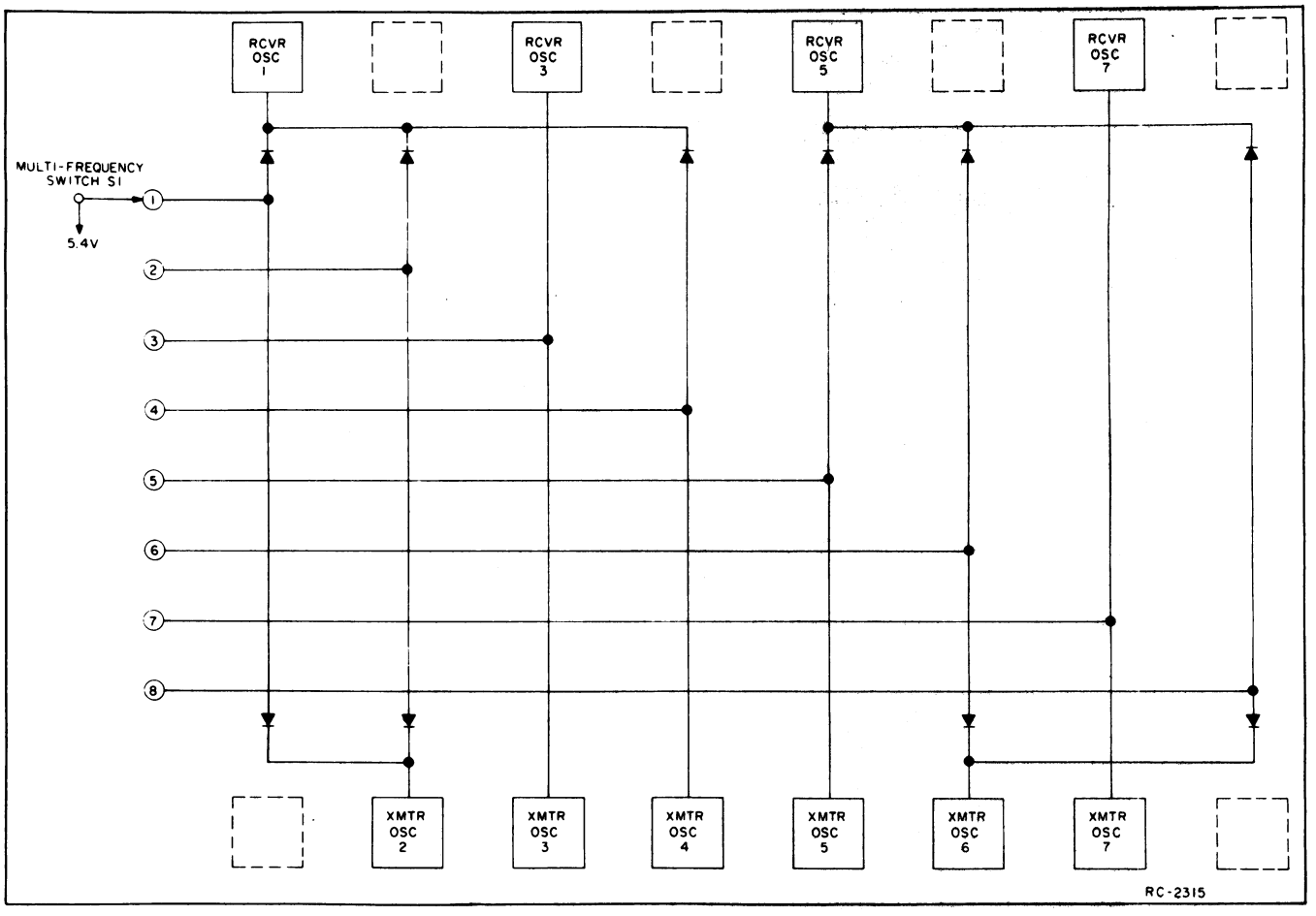
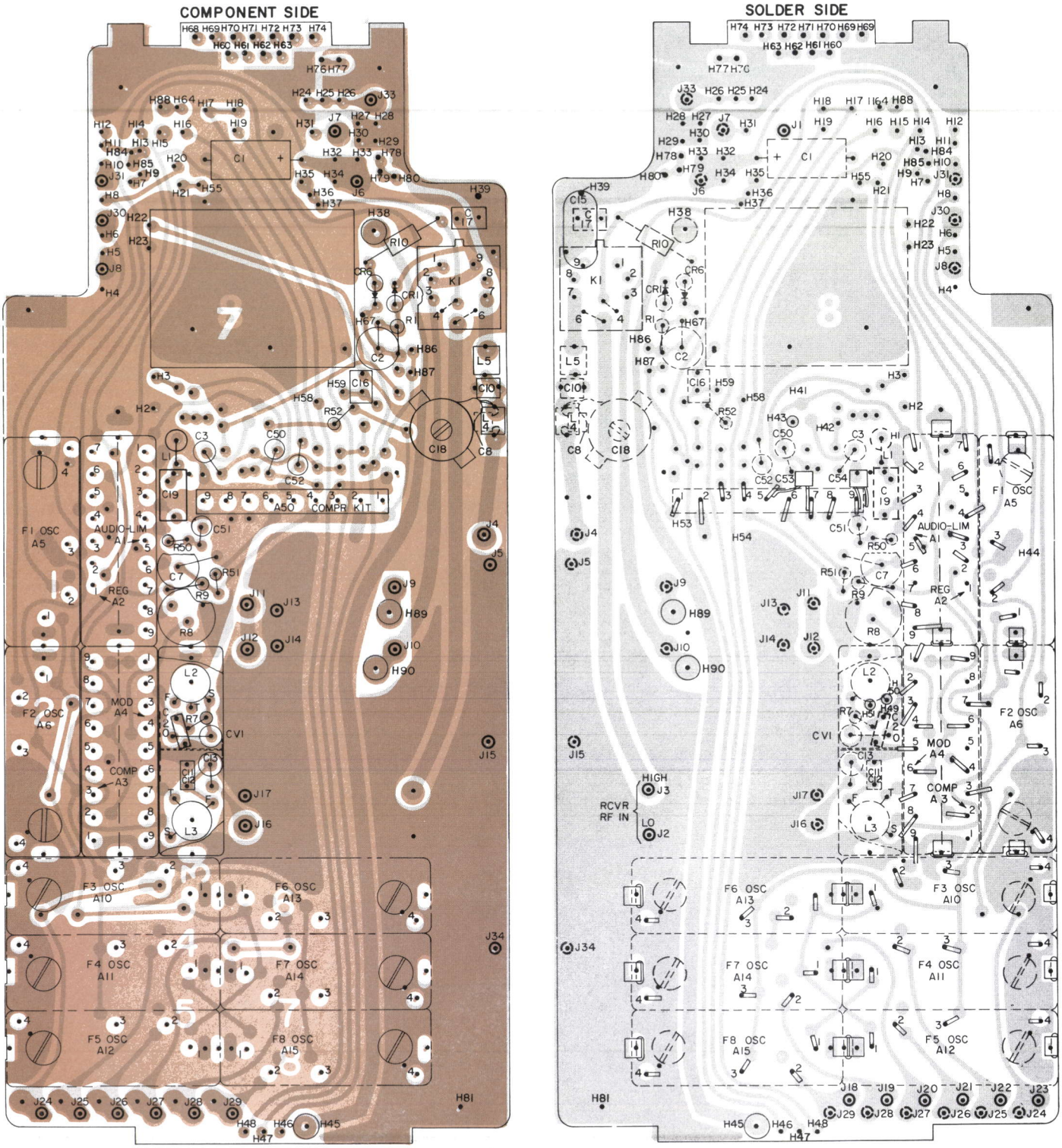


Figure 2 - Repeating Oscillator Modules



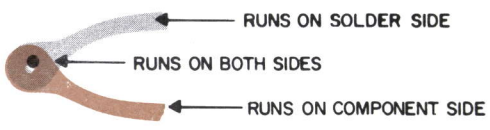
(19D416505, Sh. 1, Rev. 7)
(19D416505, Sh. 2, Rev. 8)

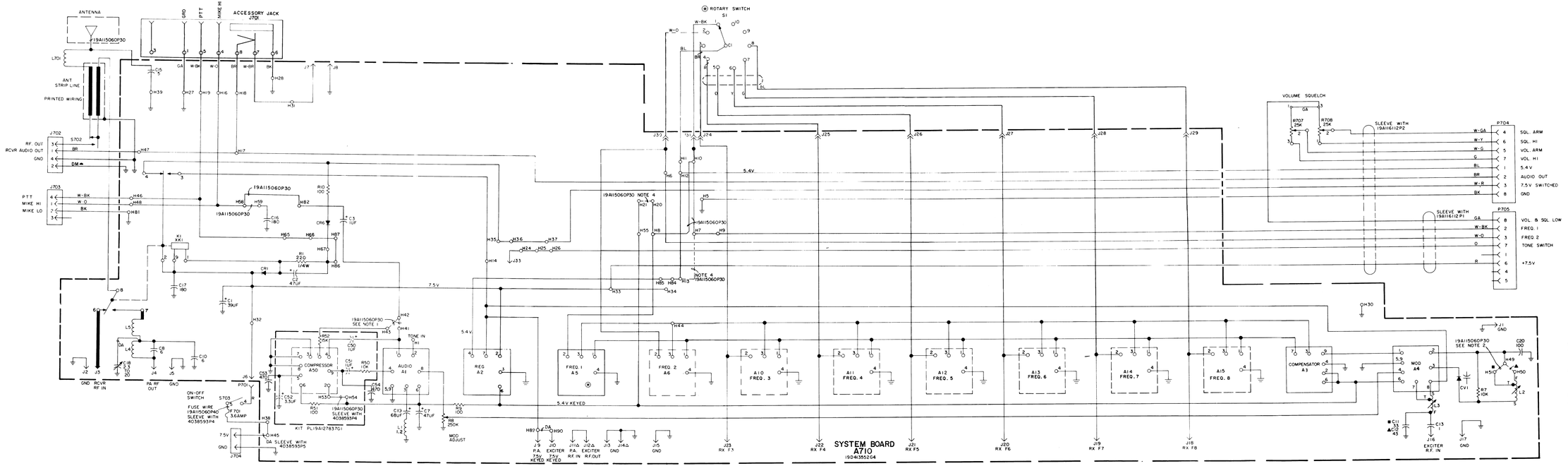
(19D416505, Sh. 2, Rev. 8)

(19D423222, Rev. 1)

OUTLINE DIAGRAM

SYSTEM BOARD & CASE ASSEMBLY





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
PL 19D403548G1U	C
PL19D403552G4	B
PL19A127837G1	A

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 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.

NOTES:
1. CONNECT HOLE 42 TO HOLE 41 WHEN COMPRESSOR A50 IS NOT USED. CONNECT HOLE 42 TO HOLE 43 WHEN COMPRESSOR A50 IS USED.
2. ▲USED IN LO SPLIT (132-150.8 MHZ) ■USED IN HI SPLIT (150.8-174MHZ) ▲PRESENT IN HI POWER UNITS △NOT PRESENT IN HI POWER UNITS
3. DA=#22 AWG
4. Ⓜ THESE ITEMS ARE PART OF SWITCH KIT PL19A129268G1.
5. CONNECT HOLE 7 TO HOLE 13 AND REMOVE JUMPER BETWEEN HOLE 7 AND HOLE 10 FOR SINGLE FREQ RX OPERATION. CONNECT HOLE 20 TO HOLE 21 AND REMOVE JUMPER BETWEEN HOLE 8 AND HOLE 10 FOR SINGLE FREQ TX OPERATION.

(198621916, Rev. 10)

SCHEMATIC DIAGRAM

SYSTEM BOARD & CASE ASSEMBLY

PARTS LIST

LBI-4768A

SYSTEM BOARD/CASE ASSEMBLY
19D413548G10
AND
ASSOCIATED ASSEMBLIES

SYMBOL	GE PART NO.	DESCRIPTION
A710		SYSTEM BOARD 19D413553G04
A1	19C320062G1	Transmitter Audio Module.
A2	19C311905G2	Regulator Module.
A3	19C330006G1	Oscillator Compensator Module.
A4	19C330084G1	Modulator Module.
		NOTE: When reordering give GE Part Number and exact crystal frequency. Crystal Freq = Operating Freq 12
A5 and A6	4E627A10	Transmitter Oscillator.
A10 thru A15	4E627A10	Transmitter Oscillator.
		- - - - - - - - - - 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	5491674P1	Tantalum: 1.0 µf +40-20%, 10 VDCW; sim to Sprague Type 162D.
C7	5491674P42	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 162D.
C8	19A116114P20	Ceramic: 6 pf ±5%, 100 VDCW; temp coef 0 PPM.
C10	19A116114P20	Ceramic: 6 pf ±5%, 100 VDCW; temp coef 0 PPM.
C13	5491601P130	Phenolic: 1.0 pf ±5%, 500 VDCW.
C15	5496218P36	Ceramic disc: 5.0 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C16 and C17	19A116114P10073	Ceramic: 180 pf ±5%, 100 VDCW; temp coef -3300 PPM.
C18	19B209351P2	Variable: 2.3 to 20 pf, 200 VDCW; -450 ±200 PPM/°C; sim to Hatebushita ECV-1Z-W20P32.
C19	19C307102P19	Tantalum: 68 pf ±20%, 4 VDCW.
C20	19A116114P8065	Ceramic: 100 pf ±5%, 100 VDCW; temp coef +1500 PPM.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1	19A115100P1	Silicon; sim to Type 1N458A.
CR6	19A115250P1	Silicon.
CV1	5495769P9	Silicon, capacitive.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 thru J5	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
J6 thru J8	19A116366P2	Contact, electrical: sim to Cambion 3233-1.
J9 thru J31	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
J33 and J34	19A116366P2	Contact, electrical: sim to Cambion 3233-1.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	19B209562P1	Relay, hermetic sealed: 98 ohms ±10%, 2 form C contacts, 6.0 VDC nominal, 1.0 w max operating; sim to Wabco 83430101-98.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B209420P114	Coil, RF: 1.20 µh ±10%, 0.18 ohms DC res max; sim to Jeffers 4436-1.
L2	19A127788G1	Coil: 6.05-6.9 µh. Includes:
	19B209436P1	Tuning slug.
L3	19B219910G1	Coil.
L4 and L5	19B216320P3	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P221J	Composition: 220 ohms ±5%, 1/4 w.
R7	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R8	19A116412P4	Variable, carbon: 250,000 ohms ±10%, 1/2 w; sim to Helipot Model 62 PF.
R9 and R10	3R151P101K	Composition: 100 ohms ±10%, 1/8 w.
		- - - - - - - - - - FUSES - - - - - - - - - -
F701	19A127884G1	Fuse Kit.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J701	19B216594G2	Connector, female: 6 contacts.
J702		See Mechanical Parts RC-2717, items 11, 13, 39.
J703		See Mechanical Parts RC-2717, items 11, 39.
J704		See Mechanical Parts RC-2717, items 43-45, 58.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L701	19A127815P1	Coil.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P701	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
P704 and P705	19A127569P1	Plug: 8 contacts.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R707	19A116227P1	Resistor/Switch: variable, carbon film, 25,000 ohms ±20%, 1/8 w, (Includes S703), DPST, 3 amps at 125 VAC.
R708	19A116227P2	Variable, carbon film: 25,000 ±20%, 1/8 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S701		See Mechanical Parts RC-2717, items 28-30.
S702		See Mechanical Parts RC-2717, items 31-38.
S703		(Part of R707).
		ASSOCIATED ASSEMBLIES
		HI/LOW SPLIT MODIFICATION KIT 19A127838G1 HI SPLIT 19A127838G2 LOW SPLIT
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C11	19A116114P2047	Ceramic: 33 pf ±5%, 100 VDCW; temp coef -80 PPM.
C12	19A116114P2051	Ceramic: 43 pf ±5%, 100 VDCW; temp coef -80 PPM.
		MULTI-FREQUENCY MODIFICATION KIT 19A128268G1
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19B219315G1	Rotary: 1 section, 1 pole, (nd) 2-10 positions), non-shorting; sim to Grayhill 30WT2S15-1-NP.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
	5494922P1	Diode, silicon. (Quantity 16).

SYMBOL	GE PART NO.	DESCRIPTION
		COMPRESSOR KIT 19A127837G1
A50	19C311907G2	Audio Compressor Board.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C50 and C51	5491674P1	Tantalum: 1.0 µf +40 -20%, 10 VDCW; sim to Sprague Type 162D.
C52	5491674P36	Tantalum: 3.3 µf ±20%, 10 VDCW; sim to Sprague Type 162D.
C53 and C54	19A116192P2	Ceramic: 470 pf ±20%, 50 VDCW; sim to Erie 811-000-X5R.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R50	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R51	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
R52	3R151P153J	Composition: 15,000 ohms ±5%, 1/8 w.
R53	3R151P433J	Composition: 43,000 ohms ±5%, 1/8 w.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B216897G5	Front Cover Assembly. (See RC-2717, items 2, 3, 53).
	19B216897G3	Rear Cover Assembly. (See RC-2717, items 53, 54, 56).
	19B216897G4	Rear Cover Assembly. Clip type. (See RC-2717, items 53, 54, 55).
	4EM33G10	Speaker/Mike. (Bang-up Button).
	4EM33G11	Speaker/Mike. (VELCO® Hanger).
	19B219953G3	Antenna Assembly. (See RC-2717, items 8, 16-19).
	19D413522G1	Battery, rechargeable. Nickel Cadmium.
	4038831P4	Alignment tool. Fork tip.
	19B219079G1	Alignment tool. Allen tip.
	19C321191P1	Antenna Strip Line.
		MECHANICAL PARTS (REF RC-2717)
1	19A116543P2	Cap screw, socket head: No. 2-56 x 3/16.
2	19C317394P6	Gasket.
3	19B216897G6	Front Cover.
4	19A127319P1	Nut: No. 14-32.
5	4035630P1	Washer.
6	8709703C13	Set screw: No. 3-48 x 3/16.
7	19B227043G2	Knob. (SQUELCH, ON-OFF-VOLUME). (Includes items 6, 57, 58).
8	19B219953G3	Antenna assembly. (Includes items 8, 16-19).
9	MP257868P2	Nameplate. (GE monogram).
10	19D413542G6	Case assembly. (Includes items 11, 12, 15, 23, 30-32, 41-43).
11	19A127753P1	Contact. (Part of J102 and J703).
12	19A116719P1	Insert, screw thread: No. 2-56.
13	19B216862P2	Contact. (Part of J702).
14	19A127779G8	Antenna tube.
15	19B216875P1	Support.
16	19A129649P1	Antenna Cap. (Part of item 8).
17	19C330383P2	Antenna rod. (Part of item 8).
18	19A129652P1	Nut, knurled: tbd size 7/16-40. (Part of item 8).
19	19C330352P1	Bushing (Part of item 8).
20	19C317050P1	Protective Cover.
21	19A129390P1	Disc.

SYMBOL	GE PART NO.	DESCRIPTION
22	19A130426G2	Knob. Includes items 23 and 55.
23	8709903C6	Set screw: No. 4-40 x 3/16.
24	19A129723P1	Rivet.
25	19B216540P1	Catch.
26	19B216520P4	Washer, nylon: 1/4 inch.
27	19A127319P2	Nut: No. 1/4-28.
28	19C320046P1	Collar.
29	841P10049	Screw, slotted, steel: No. 0-80 x 1/4.
30	19C320558P1	Diaphragm.
31	19B216865P1	Insulator. (Part of S702).
32	9647P6004C	Cap screw: 2-56 x 1/4. (Part of S702).
33	19B216864P1	Contact. (Part of S702).
34	19B216863P1	Spring contact. (Part of S702).
35	9N109C13	Retaining ring. (Part of S702).
36	19A127734P1	Gasket. (Part of S702).
37	19A127735P1	Spring. (Part of S702).
38	19B216862P1	Contact. (Part of S702).
39	9330P605F22	Eyelet, brass: 1/16 x 5/32.
40	9330P602F22	Eyelet, brass: 1/16 x 1/16.
41	19B216858P1	Insert.
42	19A127763P1	Strap.
43	19B216861G1	Spring assembly. (Part of J704).
44	19D413467P1	Fastener (Part of J704).
45	883P5005E	Flat head screw: brass, 2-56 x 3/16. (Part of J704).
46	19B216847P1	Insulator, pressure sensitive.
47	19C311491P3	Cam. (Used with Regulator, Oscillator Compensator, and Compressor Circuits).
48	19B216510P1	Insulator. (Located between System and Receiver Boards).
49	19A116370P1	Tape, pressure sensitive. (Specify length).
50	19A130397P1	Strap. (Both covers).
51	19C317394P6	Gasket.
52	19B216897G3	Rear Cover Assembly. (Without clip).
53	19B216897G4	Rear Cover Assembly. (With clip).
54	840429P	Lockwasher, internal tooth: No. 2.
55	19A134259P1	Insert, threaded.
56	4037064P18	Washer, non-metallic.
57	19A130517P1	Insert, tap.
58	19A130369P1	Insulator.

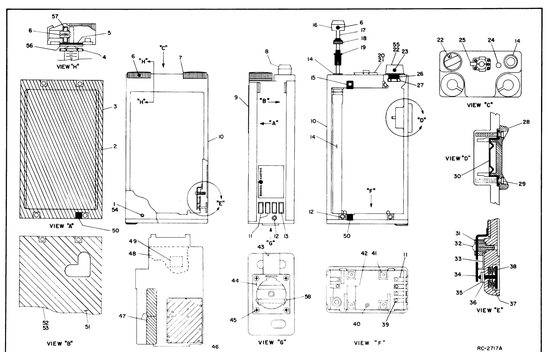
PRODUCTION CHANGES

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, B & C - Case Assembly 19D413548G10 incorporated into initial shipment.

REV. A & B - System Board 19D413552G4 incorporated into initial shipment.

REV. A - Compressor Kit 19A127837G1 incorporated into initial shipment.



*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

MULTI-FREQUENCY MODIFICATIONS

(19D416567, Sh. 1, Rev. 5 & 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).
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.

STOP POST ADJUSTMENTS	
NO. OF FREQS	MOVE ADJUSTMENT STOP TO:
2	H2
3	H3
4	H4
5	H5
6	H6
7	H7
8	H8

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)	BL	
S1-1	J31	W-BK	1
S1-2	J30	W-O	2
S1-3	J24	B	3
S1-4	J25	R	4
S1-5	J26	O	5
S1-6	J27	Y	6
S1-7	J28	G	7
S1-8	J29	BL	8

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

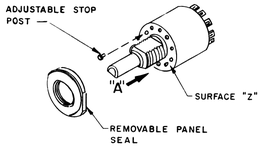
To repeat frequencies for the transmitter only or the receiver only, diodes can be used in place of oscillator modules.

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 anode 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, anode 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 5 and 6 to be same as Channel 2.

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 3, 4, 5, & 6 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.



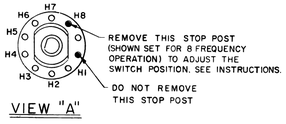


Figure 1 - Stop Post Adjustment

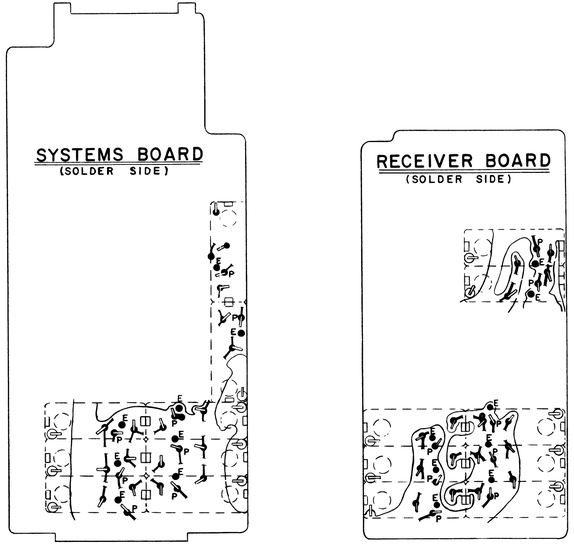
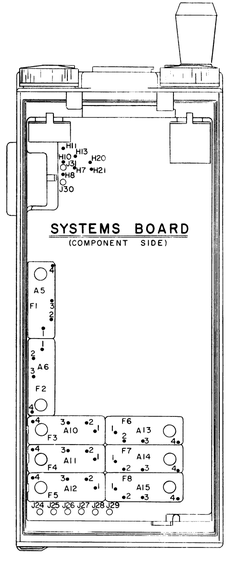


Figure 2 - Oscillator Module and Diode Installation

(19D416567, Sh. 2, Rev. 2)



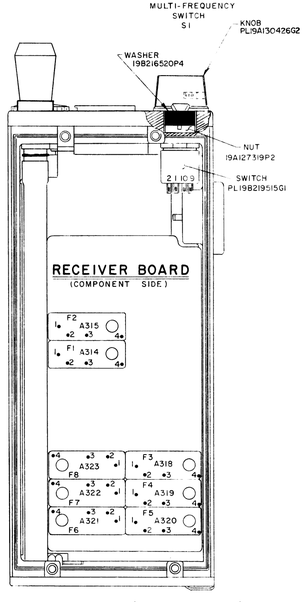


Figure 3 - Oscillator Mounting Positions & S1 Connection Points

(19D416567, Sh. 1, Rev. 5)

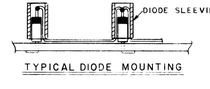


Figure 4 - Typical Diode Mounting

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 No.

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

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GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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