MOBILE RADIO

MASTR® Personal Series

PROGRESS LINE

PE MODELS

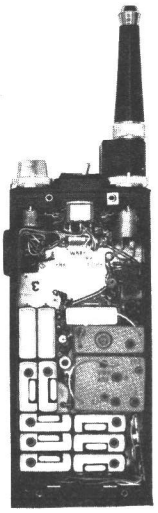
SYSTEMS BOARD AND CASE ASSEMBLY 19D417103G4

(5 - FREQUENCY WITH TYPE 99 DECODER)

Maintenance Manual LBI4700C

DATAFILE FOLDER DF4109

SYSTEM BOARD AND CASE ASSEMBLY 19D417103G4



SPECIFICATIONS *

MODEL NUMBERS	
19D417103G4	30-50 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 A704 provides system interconnections between the transmitter, receiver tone options and operating controls in the 30 to 50 MHz, Five-Frequency with Type 99 Decoder PE Models. The System Board contains transmitter oscillator modules A4 through A8 and receiver oscillator modules A9 through A11. In addition to the oscillator modules, the system board contains Audio Module A1, 5.4 Volt Regulator Module A2, Filter Module A3, optional Compressor Module A50, 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.

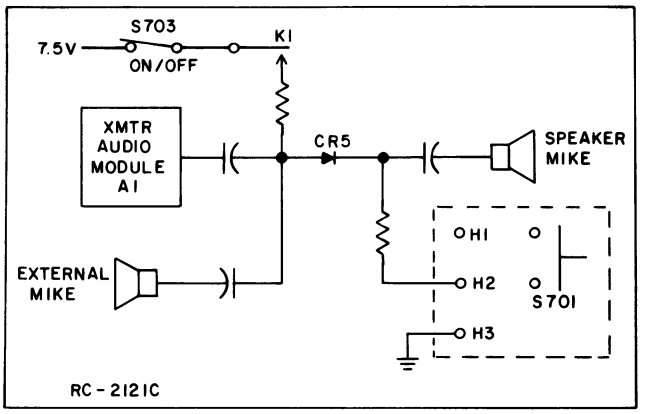


Figure 1 - Audio Switching Circuit

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.

PTT SWITCH (A705)

Solid State PTT switch S701 forward biases diode CR2 to energize relay K1 and key the radio. When S701 is pressed PNP, transistor Q1 conducts. Transistor Q1

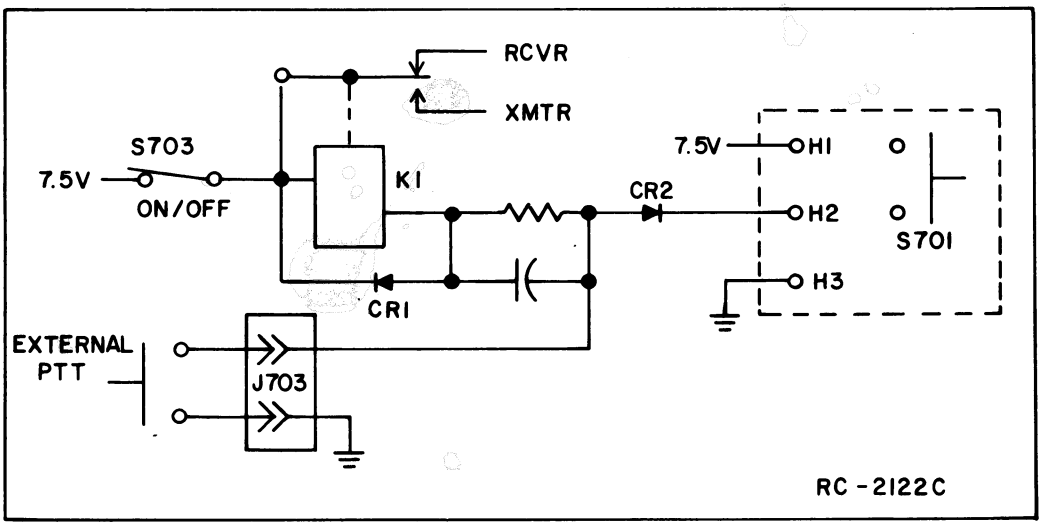


Figure 2 - DC Switching Circuit

conducting applies a positive voltage to the base of NPN transistor Q2, causing Q2 to also conduct. Transistor Q2 conducting, provides a conduction path to ground for diode CR2. Relay K1 is energized and the radio is keyed.

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.

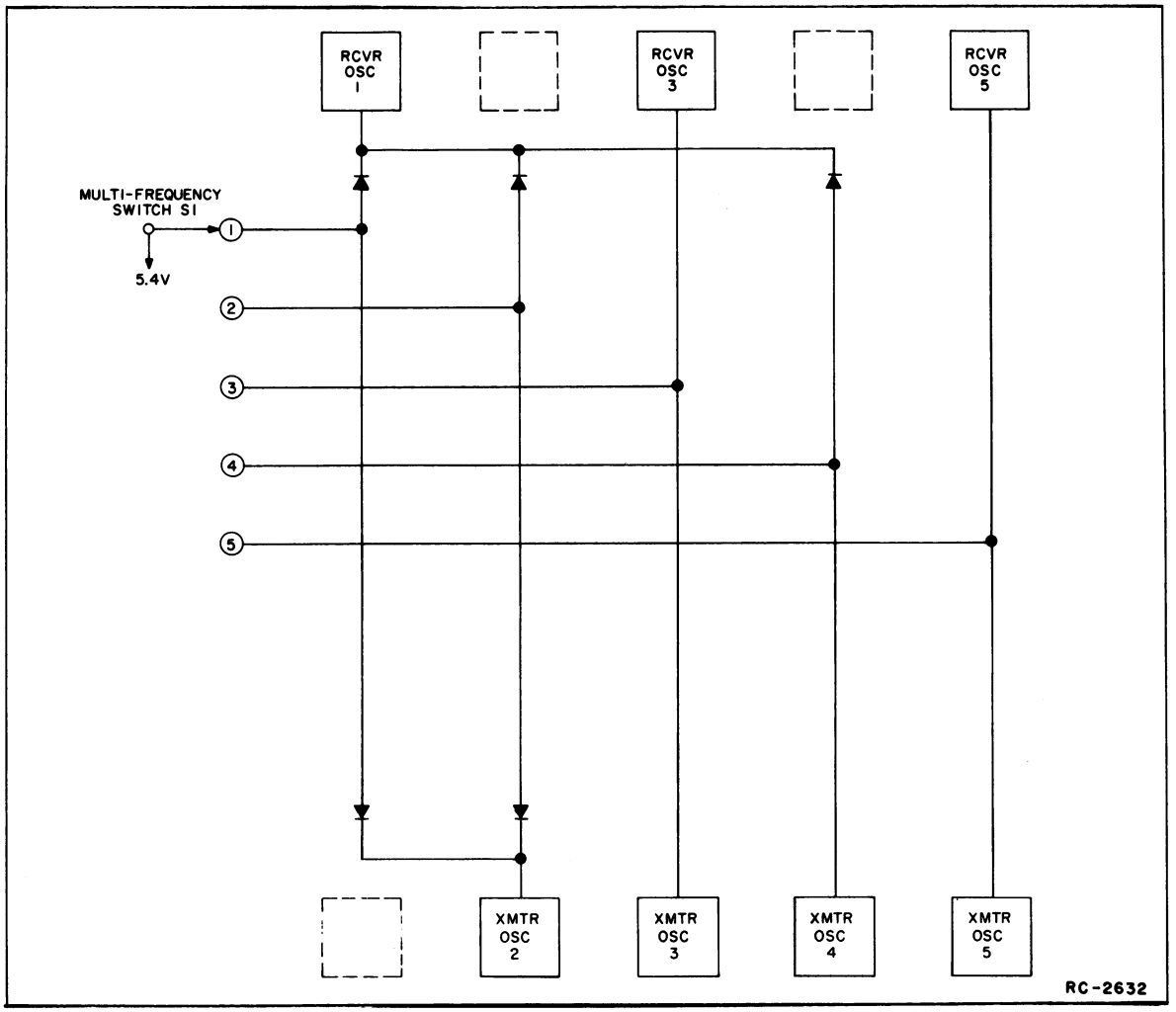
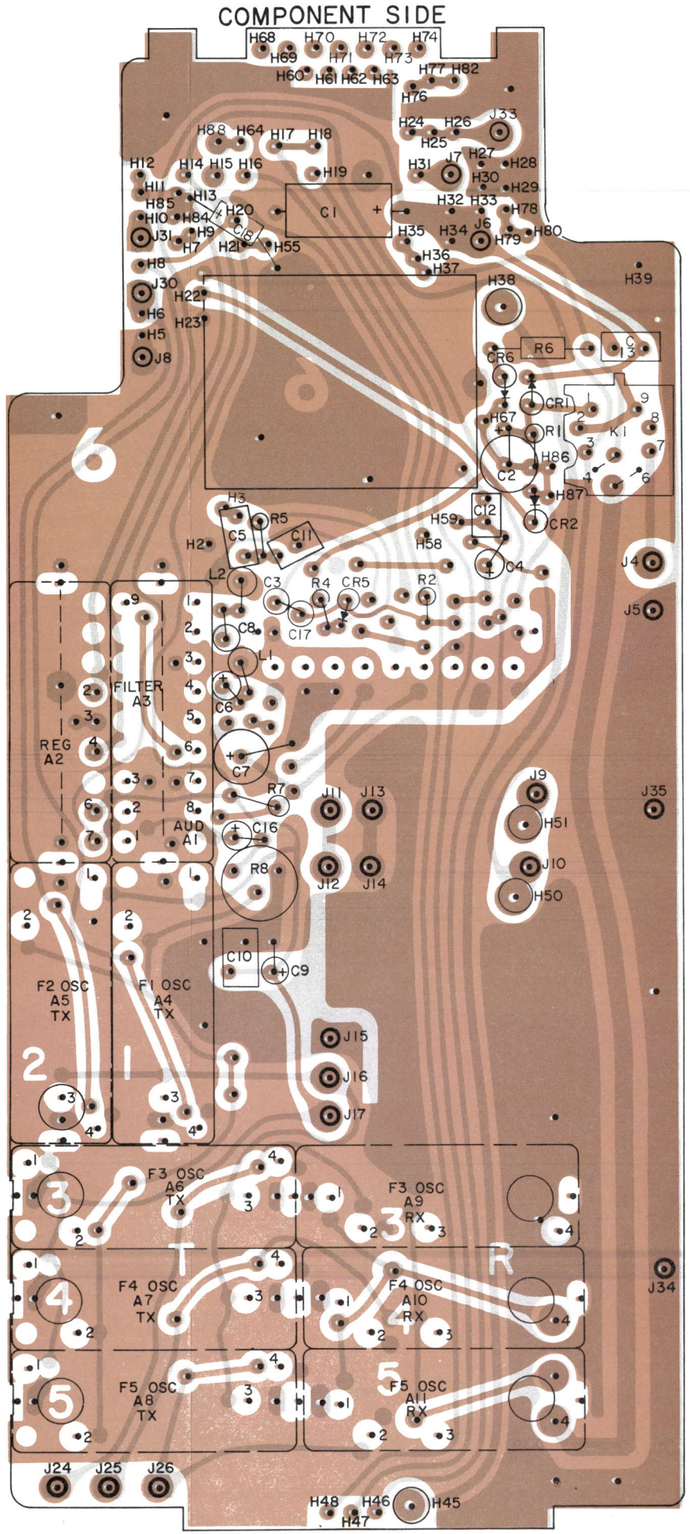
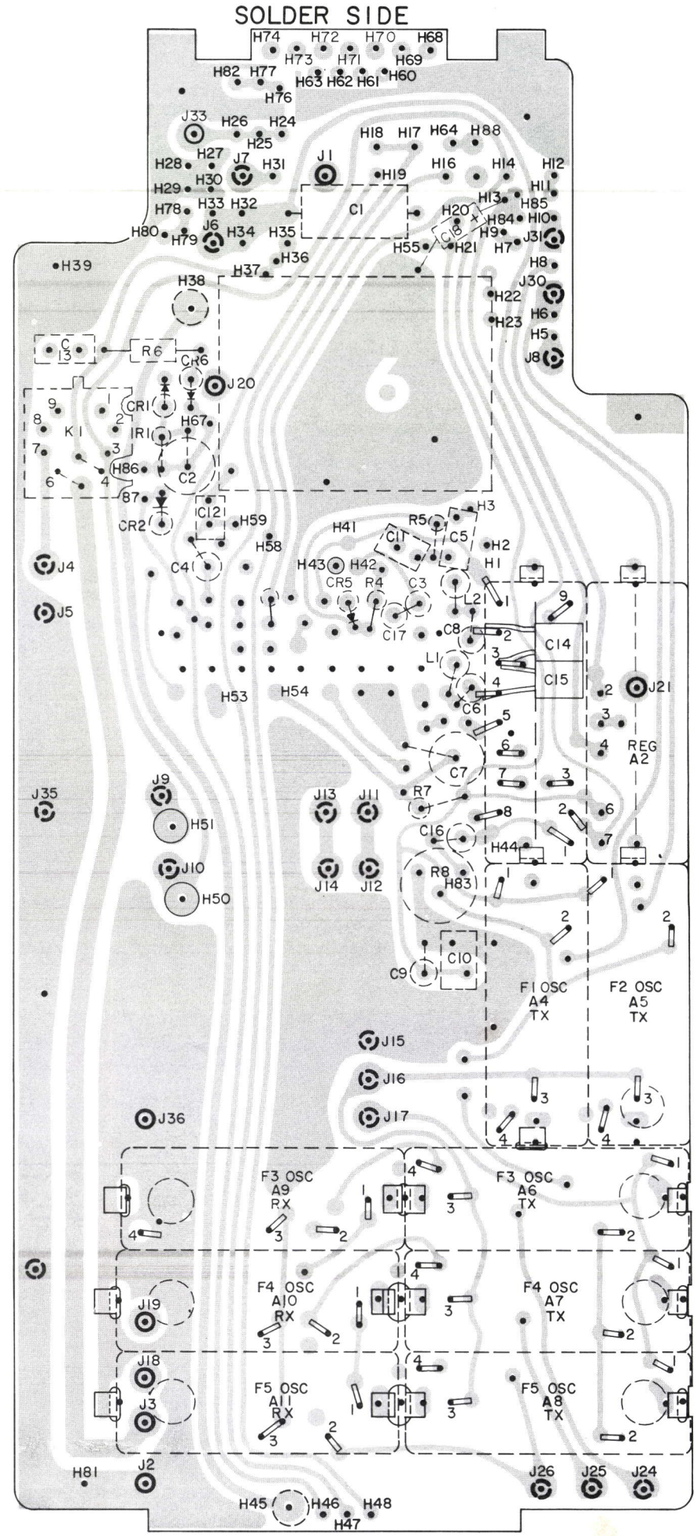


Figure 3 - Repeating Oscillator Modules





(19D416986, Sh. 2, Rev. 6)
(19D416986, Sh. 3, Rev. 6)

(19D417964, Rev. 5)

(19D416986, Sh. 2, Rev. 6)

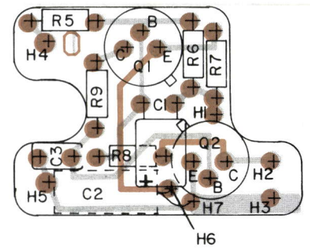
RUNS ON SOLDER SIDE
RUNS ON BOTH SIDES
RUNS ON COMPONENT SIDE

OUTLINE DIAGRAM

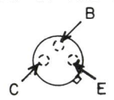
30—50 MHz SYSTEM BOARD

4 Issue 4

A705



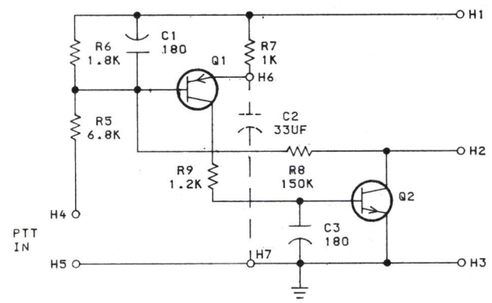
LEAD IDENTIFICATION FOR Q1 AND Q2



IN-LINE OR TRIANGULAR
TOP VIEW

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

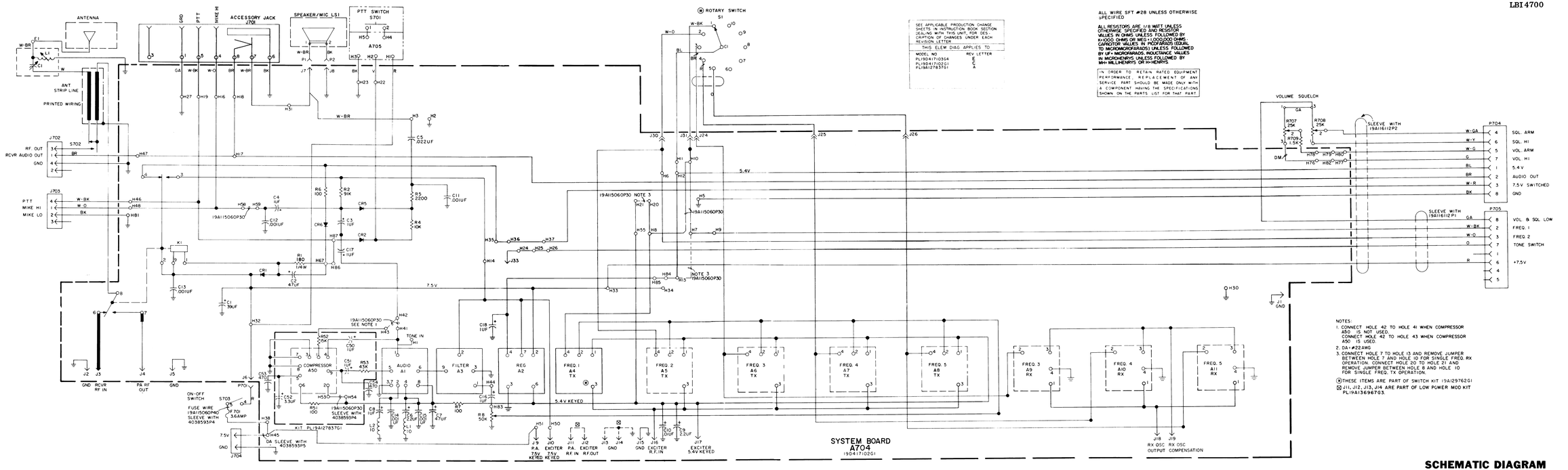
(19B233296, Rev. 0)
(19B232970, Sh. 1, Rev. 0)
(19B232970, Sh. 2, Rev. 1)



NOTE:
C2 IS PART OF KIT 19A136579

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.

(19B232959, Rev. 1)



(19A621971, Rev. 13)

SCHEMATIC DIAGRAM

30—50 MHz SYSTEM BOARD

PARTS LIST

LBI4699C

SYSTEM BOARD/CASE ASSEMBLY
19D417103G4
AND
ASSOCIATED ASSEMBLIES

SYMBOL	GE PART NO.	DESCRIPTION
A704		SYSTEM BOARD 19D417103G1
A1	19C320354G1	Transmitter Audio Module.
A2*	19C328070G1	5.4 Volt Regulator Module. In REV B & earlier:
	19C311805G2	5.4 Volt Regulator Module.
A3	19C320345G1	Post Limiter Filter.
		NOTE: When reordering A4-A8, give GE Part Number and exact crystal frequency. Crystal Freq = Operating Freq / 3
A4 thru A8	4EG31A10	Transmitter Oscillator.
		NOTE: When reordering A9-A11, give GE Part Number exact crystal frequency.
		Crystal Freq. (30-36 MHz) = Fo ±20 / 3
		Crystal Freq. (36-42 MHz) = Fo ±23 / 3
		Crystal Freq. (42-50 MHz) = Fo ±20 / 3
A9 thru A11	4EG28A17 4EG28A18	Receiver Oscillator. (30-36 MHz, 42-50 MHz) Receiver Oscillator. (36-42 MHz)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5491674P32	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	19A116264P2	Ceramic: 0.022 µf ±20%, 50 VDCW.
C6	5491674P8	Tantalum: 2.2 µf +40-20%, 10 VDCW; sim to Sprague Type 162D.
C7	5491674P42	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 162D.
C8	5491674P1	Tantalum: 1.0 µf +40-20%, 10 VDCW; sim to Sprague Type 162D.
C9	5491674P8	Tantalum: 2.2 µf +40-20%, 10 VDCW; sim to Sprague Type 162D.
C10	19A116192P1	Ceramic: 0101 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C11 thru C15	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C16	5491674P28	Tantalum: 1.0 µf ±20%, 25 VDCW; sim to Sprague Type 162D.
C17	5491674P1	Tantalum: 1.0 µf +40-20%, 10 VDCW; sim to Sprague Type 162D.
C18*	5491674P1	Tantalum: 1.0 µf +40-20%, 10 VDCW; sim to Sprague Type 162D. Added by REV C.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CR2	5459922P1	Silicon; sim to Type 1N1200A.
CR5	5459922P1	Silicon; sim to Type 1N1200A.
CR6	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.

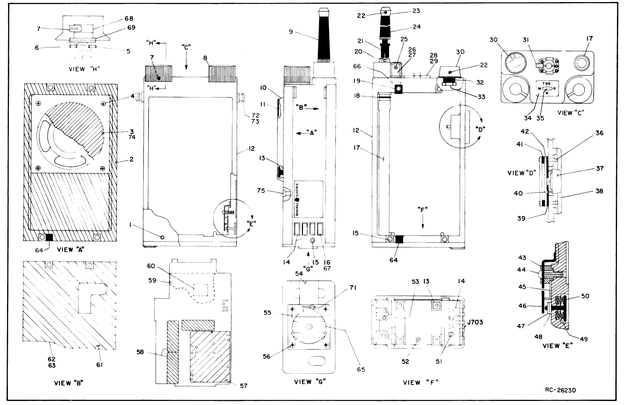
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1* thru J4*	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
		Earlier than REV A:
	19A116366P1	Contact, electrical: sim to Cambion 460-3232-01-03.
J6 thru J8	19A116366P2	Contact, electrical: sim to Cambion 460-3233-01-03.
J9* thru J21*	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
		Earlier than REV A:
	19A116366P1	Contact, electrical: sim to Cambion 460-3232-01-03.
J24* thru J26*	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
		Earlier than REV A:
	19A116366P1	Contact, electrical: sim to Cambion 460-3232-01-03.
J30* and J31*	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
		Earlier than REV A:
	19A116366P1	Contact, electrical: sim to Cambion 460-3232-01-03.
J33 and J34	19A116366P2	Contact, electrical: sim to Cambion 460-3233-01-03.
J35*	19A116366P4	Contact, electrical: sim to Concord 10-891-1.
		Earlier than REV A:
	19A116366P1	Contact, electrical: sim to Cambion 460-3232-01-03.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1*	19B209562P2	Hermetic sealed: between 45-100 ohms ±10%, 2 form C contacts, 5.0 VDC nominal, 1.0 w max operating; sim to GE 5SC51002A2.
		In REV A:
	19B209562P1	Hermetic sealed: 98 ohms ±10%, 2 form C contacts, 6.0 VDC nominal, 1.0 w max operating; sim to GE 5SC5100LA2. Added by REV A.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 and L2	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4K.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1*	3R152P181J	Composition: 180 ohms ±5%, 1/4 w.
		In REV A:
	3R152P221J	Composition: 220 ohms ±5%, 1/4 w.
		Earlier than REV A:
	3R151P391J	Composition: 390 ohms ±5%, 1/8 w.
R2	3R151P913J	Composition: 91K ohms ±5%, 1/8 w.
R4	3R151P103J	Composition: 10K ohms ±5%, 1/8 w.
R5	3R151P223J	Composition: 2.2K ohms ±5%, 1/8 w.
R6 and R7	3R151P101K	Composition: 100 ohms ±10%, 1/8 w.
R8	19A116412P9	Variable, cermet: 50K ohms ±10%, 0.5 w; sim to Beilpot Model 62 PM50K.
XK1*	19A115834P5	- - - - - - - - - - SOCKETS - - - - - - - - - - Contact, electrical: sim to AMP 3-331272-5. (Quantity 7). Deleted by REV A.
A705*		PUSH TO TALK SWITCH BOARD 19D233566G2 (Added by REV F)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C3	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A129187P1	Silicon, PNP.
Q2	19A116201P3	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R5	3R151P682J	Composition: 6.8K ohms ±5%, 1/8 w.
R6	3R151P182J	Composition: 1.8K ohms ±5%, 1/8 w.
R7	3R151P102J	Composition: 1K ohms ±5%, 1/8 w.
R8	3R151P154J	Composition: 150K ohms ±5%, 1/8 w.
R9	3R151P122J	Composition: 1.2K ohms ±5%, 1/8 w.
A705*		PUSH TO TALK SWITCH BOARD 19D233566G1 (Added by REV E) (Deleted by REV F)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C3	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C4*	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM. Added by REV A.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A129187P1	Silicon, PNP.
Q2	19A116201P3	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R151P103J	Composition: 10K ohms ±5%, 1/8 w.
R2	3R151P332J	Composition: 3.3K ohms ±5%, 1/8 w.
R3	3R151P154J	Composition: 150K ohms ±5%, 1/8 w.
R4	3R151P182J	Composition: 1.8K ohms ±5%, 1/8 w.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1	19A116854P1	Terminal, solderless.
		- - - - - - - - - - FUSES - - - - - - - - - -
F701	19A127884G1	Fuse Kit.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J701	19B216594G2	Connector, female: 6 contacts.
J702		See Mechanical Parts RC2623 item 14, 16.
J703		See Mechanical Parts RC2623 item 14, 51, 67.
J704		See Mechanical Parts RC2623 item 54-56, 65, 71.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1*	19A127836G3	Sensitive: 95 ohms ±10%, 2 form C contacts, 5.5 to 9.0 VDC (over the temp range indicated); sim to C.P. Clare MF140lG01. Deleted by REV B.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P701	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
P704 and P705	19A127509G1	Plug: 8 contacts.
P706*	19A127509G1	Plug: 8 contacts. Deleted by REV B.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R707	19A116227P1	Resistor/switch: variable, carbon film, 25K ohms ±20%, 1/8 w, (includes S705), SPDT, 3 amps at 125 VAC; sim to Mallory Type MCC.
R708	19A116227P2	Variable, carbon film: 25K ohms ±10%, 1/8 w; sim to Mallory Type MCC.
R709	3R151P152K	Composition: 1.5K ohms ±10%, 1/8 w.
R710*	3R151P103K	Composition: 10K ohms ±10%, 1/8 w. Deleted by REV B.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S701		See Mechanical Parts RC2623, items 36-42.
S702		See Mechanical Parts RC2623, items 43-50.
S703		(Part of R707).
S704*	19A116648P5	Toggle: SPDT, sim to C and K Components 7107SDG. Deleted by REV B.
		ASSOCIATED ASSEMBLIES
		FRONT COVER ASSEMBLY 19C317416G2 STANDARD 19C317416G6 HI POWER
		- - - - - - - - - - LOUDSPEAKERS - - - - - - - - - -
LS1	19A116090P1	Permanent magnet: 2.00 inch, 8 ohms ±10% voice coil imp, 450 Hz ±112 Hz resonant; freq range 400 to 3000 Hz.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
		MULTI-FREQUENCY MODIFICATION KIT 19A129726G1
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19B219976G1	Switch Assembly.
		LOADING COIL ASSEMBLY 19C320365G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116462P3	Variable: less than 2 pf to more than 20 pf, 100 VDCW, -320 PPM/°C.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B219759G1	Coil, Includes:
	19B209436P1	Tuning slug.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B216897G3	Rear Cover Assembly. (See RC2623, items 61, 62).
	19B216897G4	Rear Cover Assembly. Clip type. (See RC2623, items 61, 63).
	19B219769G1	Antenna Assembly. (See RC2623, item 20-24).
	19D413532G1	Battery, rechargeable. Nickel Cadmium.
	19A127884G1	Fuse Kit.
	403B381P4	Alignment tool. Fork tip.
	19B219079G1	Alignment tool. Allen tip.
		MECHANICAL PARTS (SEE RC2623)
1	19A116543P1	Cap screw, socket head: No. 2-56 x 1/4.
2	19C317394P4	Gasket.
3	19B206527P2	Diaphragm: No. 2 inches dia.
4	MS51950CC6	Screw, phillips head: No. 2-56 x 1/8.
5	19A127319P1	Nut: No. 1/4-32.
6	4037064P18	Washer, non-metallic.
7	NT08P703C6	Set screw: No. 3-48 x 3/16.
8	19B232784G1	Knob assembly. Includes item 7, 68.
9	19B219768G1	Antenna assembly. (Includes item 20-23).
10	19D413531P2	Grille. (STANDARD).
	19B206509P2	Grille. (HI-POWER).
11	KP27029P2	Nameplate. (GE Monogram - STANDARD).
	KP27029P3	Nameplate. (GE Monogram - HI-POWER).

SYMBOL	GE PART NO.	DESCRIPTION
12	19D413542G14	Case assembly. (Includes items 14, 15, 18, 33-39, 48, 49).
13	19B216858P1	Insert.
14	19A127753P1	Contact. (Part of J702 and J703).
15	19A134548P1	Insert, screw thread: No. 2-56.
16	19B216862P2	Contact. (Part of J702).
17	19A127779G5	Antenna tube.
18	19A116854P1	Terminal, solderless. (E1).
19	19B216875P1	Support.
20	19C320383P3	Antenna rod. (Part of item 9).
21	19C320353P1	Bushing (Part of item 9).
22	NY09720C13	Set screw: No. 3-48 x 3/16.
23	19A129649P1	Antenna Cap. (Part of item 9).
24	19B219770G1	Spacer Assembly. (Part of item 9).
25	19A116869P1	Tap screw: No. 2-32 x 1/4.
26	19C320359P1	Cover.
27	19A129559P1	Gasket.
28	19C317050P1	Protective Cover.
29	19A129390P1	Disc.
30	19A130426G2	Knob.
31	19B219540P1	Catch.
32	19B216520P4	Washer, nylon: 1/4 inch.
33	19A127319P2	Nut: No. 1/4-28.
34	19B216926P8	Decorative cap. (TYPE 99).
35	19C320721P1	Seal. (Used with TYPE 99 Switch).
36	M41P1006	Screw, slotted, steel: No. 0-80 x 3/8. (Part of S701).
37	19C328416G1	Button assembly. (Part of S701).
38	19C328407P1	Collar. (Part of S701).
39	19A137621P1	Plate. (Part of S701).
40	19A137620P1	Spring. (Part of S701).
41	N207P1C6	Nut, hex: thd. size No. 0-80. (Part of S701).
42	19B209643P2	Switch. (Part of S701).
43	19B216865P1	Insulator (Part of S702).
44	N447P5004C	Cap screw: 2-56 x 1/4. (Part of S702).
45	19B216864P1	Contact. (Part of S702).
46	19B216863P1	Spring contact. (Part of S702).
47	N910P6C6	Retaining ring. (Part of S702).
48	19A127754P1	Gasket (Part of S702).
49	19A127755P1	Spring (Part of S702).
50	19B216862P1	Contact. (Part of S702).
51	X330N605F22	Eyelet, brass: 1/16 x 5/32.
52	X330N603F22	(Not Used).
53	19A127762P1	Strap.
54	19B216891G1	Spring assembly. (Part of J704).
55	19D413467P1	Fastener (Part of J704).
56	19A115794P3	Flat head screw: steel, self-locking, 2-56 x 5/16. (Part (Part of J704).
57	19B219799P1	(Not Used).
58	19C311491P3	Can. (Used with Regulator, Oscillator Compensator, and Compressor Circuits).
59	19B219510P1	Insulator. (Located between System and Receiver Boards).
60	19A116270P1	Tape, pressure sensitive. (Specify length).
61	19C317394P6	Gasket.



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 - System Board and Case Assembly 19D417103G4
Incorporated into initial shipment.

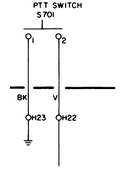
REV. B - To make compatible with more options.
Changed K1 and printed wire runs.

REV. C - To improve battery pack connector.
Added insulator.

REV. D - To improve case design.
Incorporated metal nuts for PTT switch mounting screws.

REV. E - To improve reliability and change Knobs. Added PTT switch A705. Changed S701. Changed Knobs.

Schematic Diagram was:



REV. A - System Board 19D417102G1
To make compatible with more options. Changed K1 and printed wire runs.

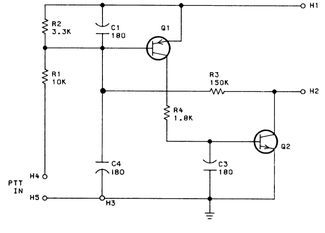
REV. B - To improve PTT relay performance. Changed K1 and R1.

REV. C - To incorporate a new 5.4V regulator module. Changed A2 and added C18.

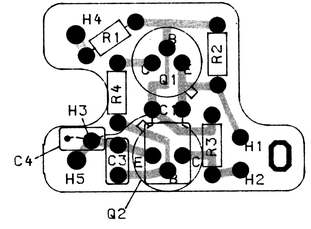
REV. A - PTT Switch 19B232586G1
To improve RF filtering. Added C4.

REV. F - System Board and Case Assembly 19D417103G4
To optimize performance. Change A705.

Schematic Diagram was:



Outline Diagram was:



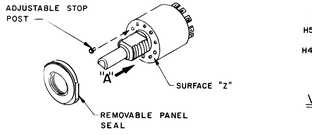


Figure 1 - Stop Post Adjustment

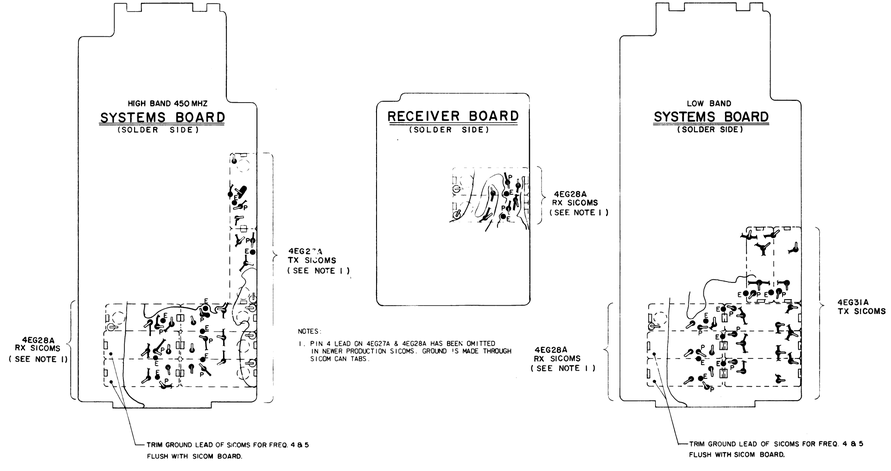


Figure 2 - Oscillator Module and Diode Installation

(19D417138, Sh. 2, Rev. 3)

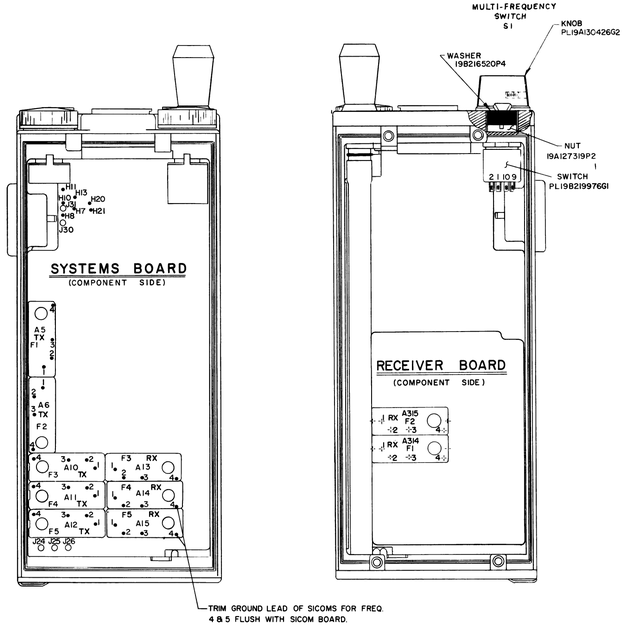


Figure 3 - Oscillator Mounting Positions & S1 Connection Points

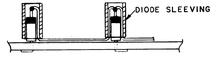


Figure 4 - Typical Diode Mounting

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

MULTI-FREQUENCY MODIFICATIONS

(19D417138, Sh. 1, Rev. 2 & Sh. 2, Rev. 3)

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.