

 **MOBILE RADIO**

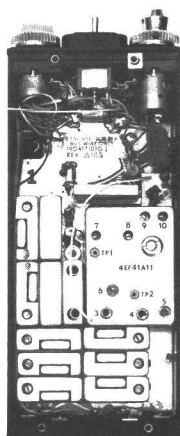
# MASTR<sup>®</sup> *Personal Series*

**PROGRESS LINE**

**PE MODELS**

**SYSTEMS BOARD AND CASE ASSEMBLY 19D417103G1**

**(5-FREQUENCY WITH TYPE 99 DECODER )**



## **SPECIFICATIONS \***

### MODEL NUMBERS

19D417103G1

138-174 MHz

### CONTROLS

Volume ON-OFF Switch  
Squelch Control  
Five-Frequency Selector Switch  
PTT Switch  
Tone Option Switch  
Flexible Antenna  
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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## 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 A701 provides system interconnections between the transmitter, receiver, tone options and operating controls in 138 MHz to 170 MHz, Five-Frequency with Type 99 Decoder PE Models. The System Board contains transmitter oscillator modules A5, A6, A10, A11 and A12, and receiver oscillator modules A13, A14 and A15. In addition to oscillator modules, the System Board contains 5.4 Volt Regulator Module A2, Compensator Module A3, Modulator Module A4, 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.

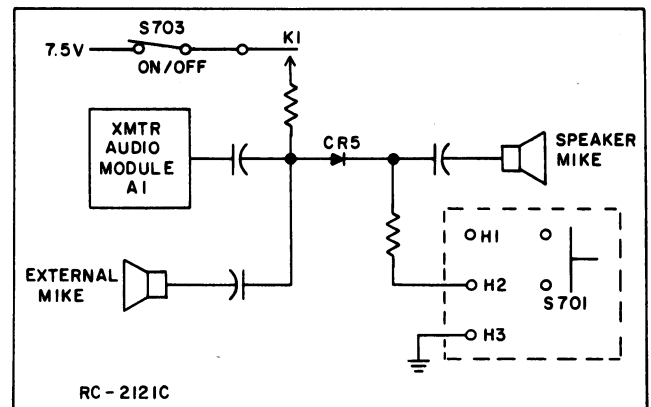


Figure 1 - Audio Switching Circuit

### 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.

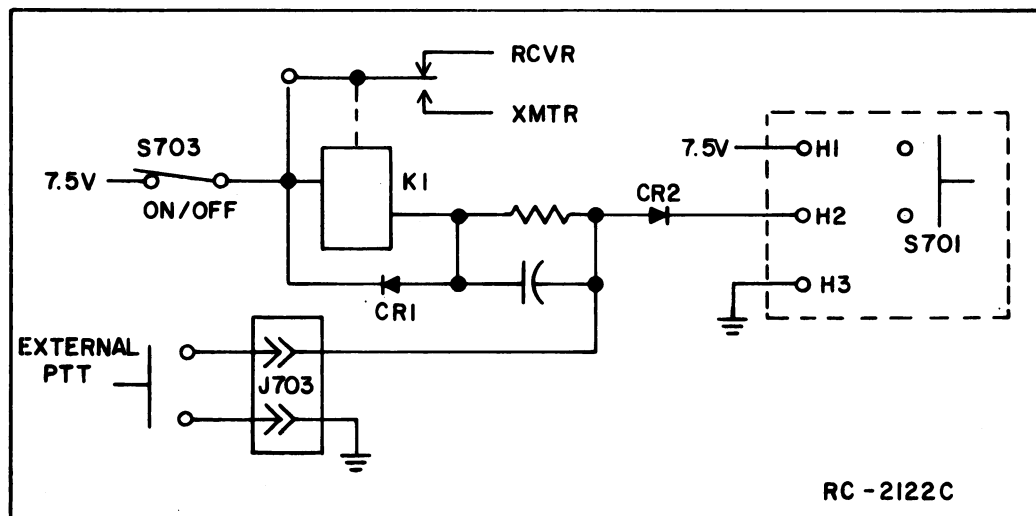


Figure 2 - DC Switching Circuit

## 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 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.

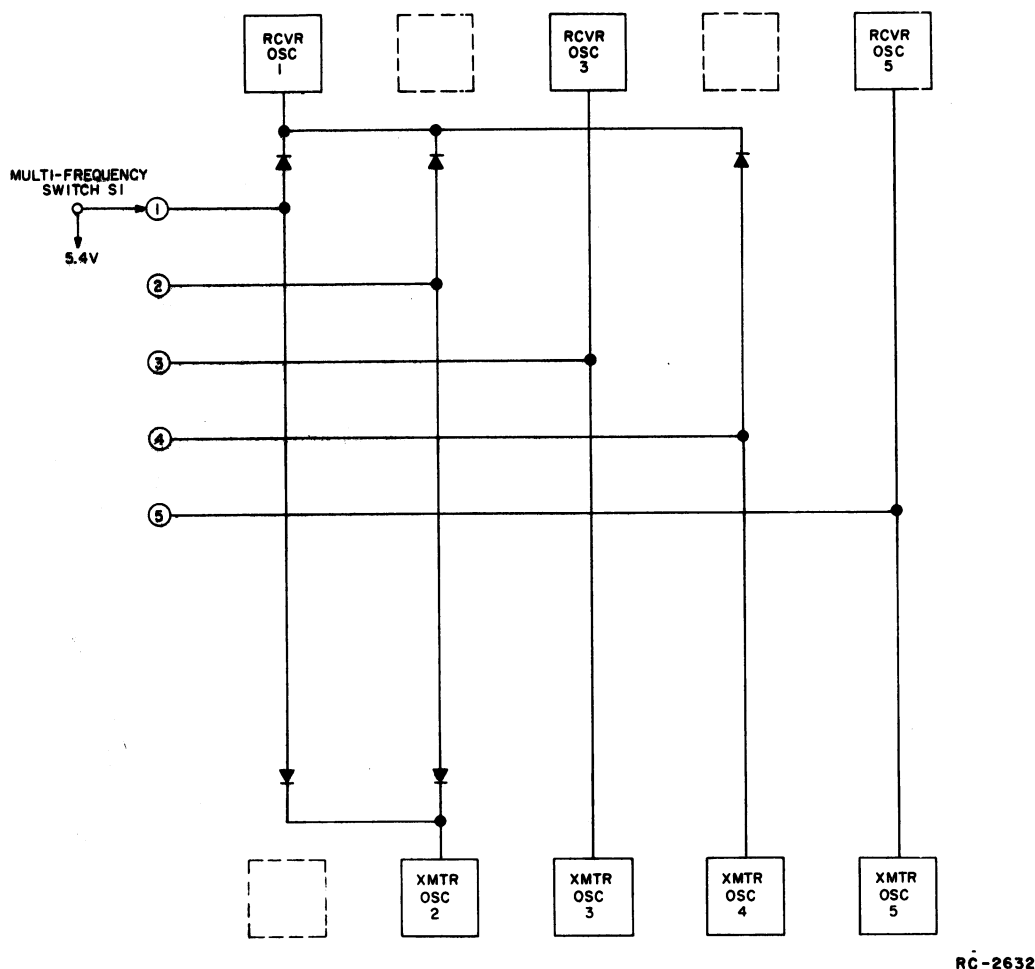
## REPEATING OSCILLATOR MODULES

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.



RC-2632

Figure 3 - Repeating Oscillator Modules

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION  
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

GENERAL  ELECTRIC  
U.S.A.

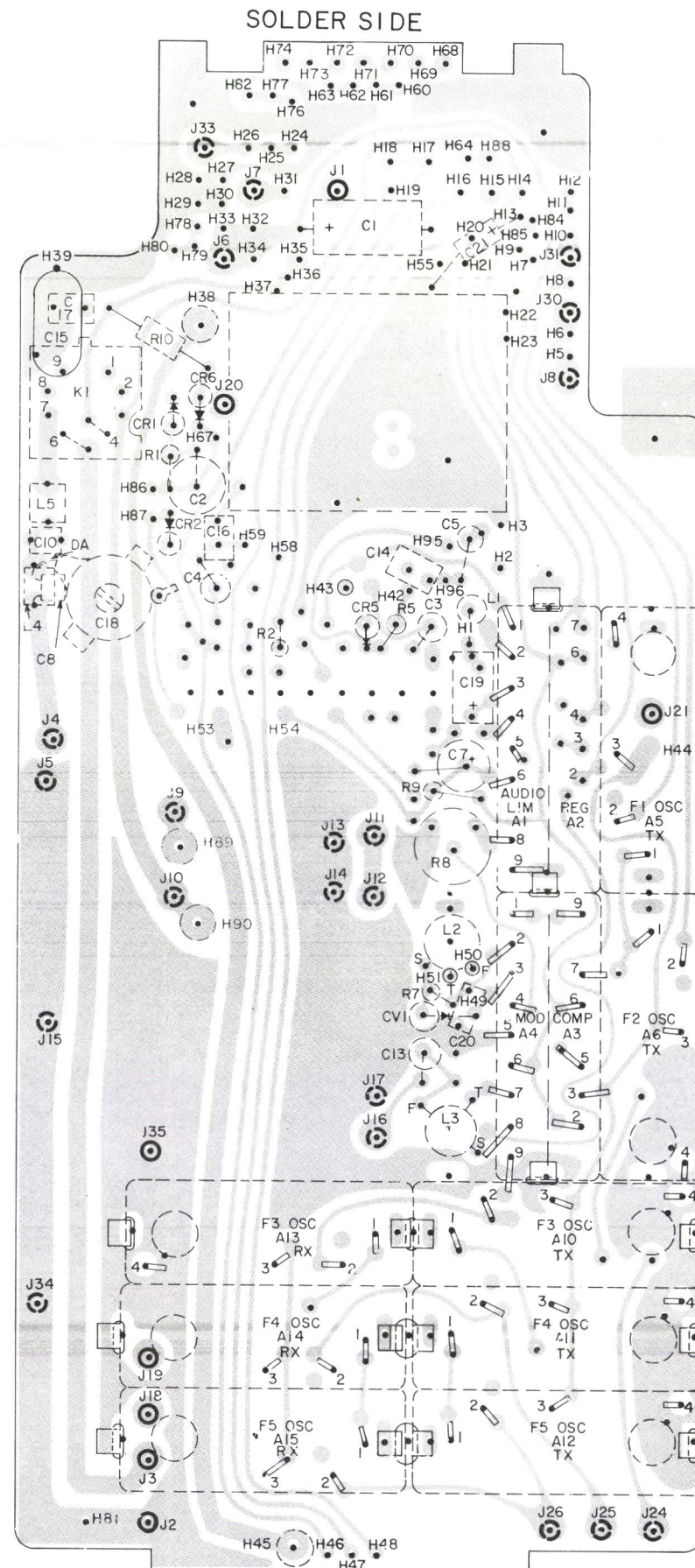
\* Trademark of General Electric Company U.S.A.  
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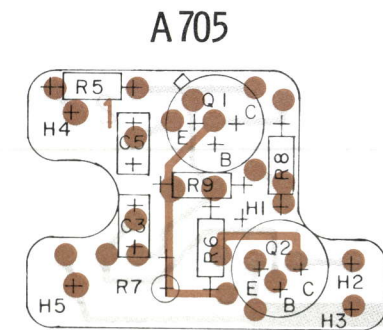


## OUTLINE DIAGRAM

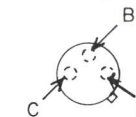
### 138—174 MHz SYSTEM BOARD



(19D416976, Sh. 2, Rev. 8)



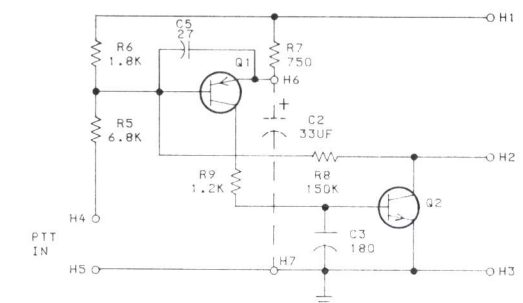
LEAD IDENTIFICATION  
FOR Q1 AND Q2



IN-LINE OR TRIANGULAR  
TOP VIEW

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

(19B232296, Rev. 3)  
(19B232970, Sh. 1, Rev. 1)  
(19B232970, Sh. 2, Rev. 2)



MODEL NO	REV LETTER
PL19B232586G2	C

NOTE:  
C2 IS PART OF KIT 19A136579

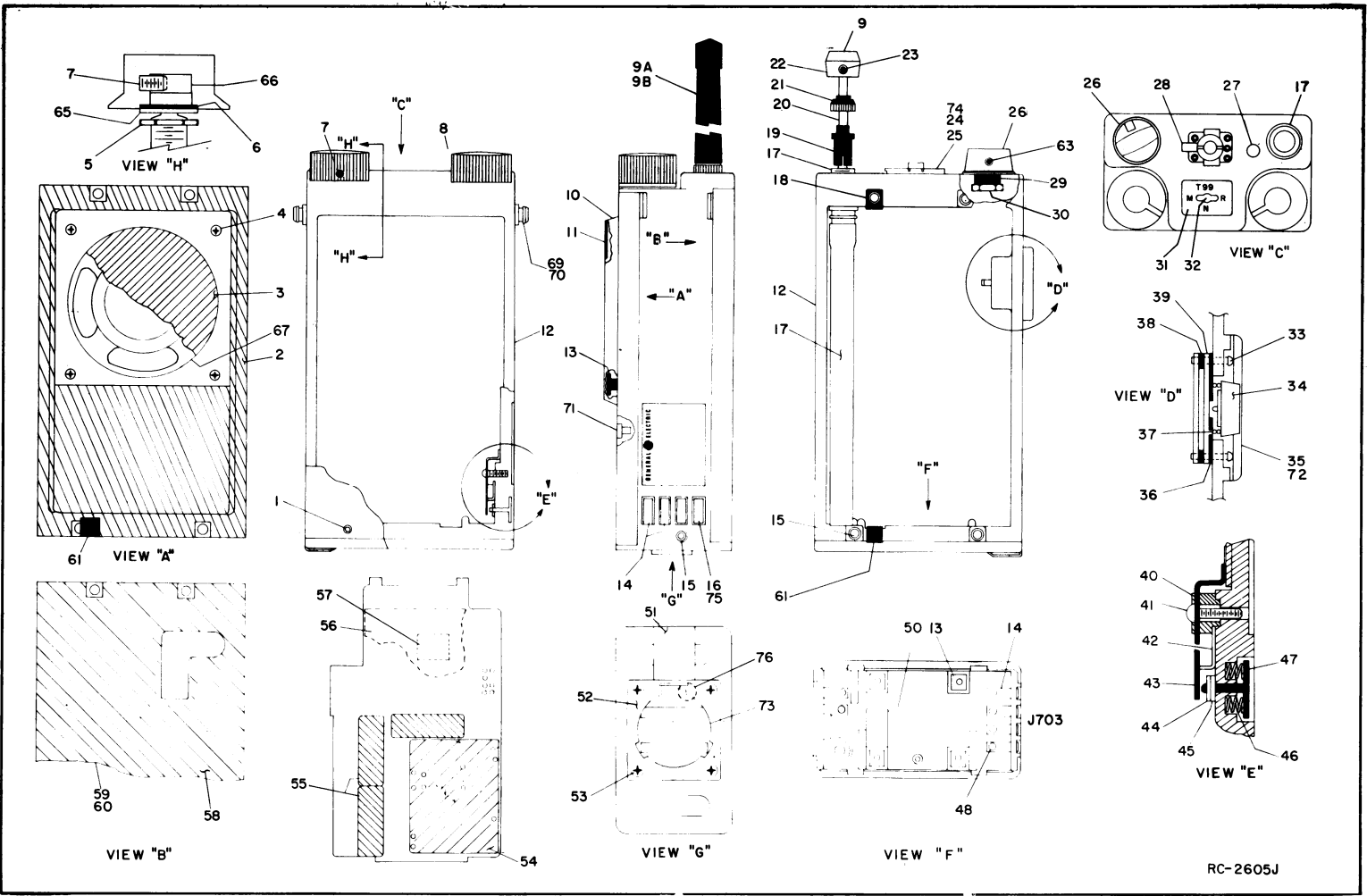
ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K-1000 OHMS OR MEG-1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF-MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH-MILLIHENRYS OR H-HENRYS.

(19B232959, Rev. 4)





PARTS LIST		
LBI4701D		
SYSTEM BOARD/CASE ASSEMBLY 19D417100G1 AND ASSOCIATED ASSEMBLIES		
SYMBOL	GE PART NO.	DESCRIPTION
A701		SYSTEM BOARD 19D417100G1
A1	19C320062G1	Transmitter Audio Module.
A2*	19C328070G1	Regulator Module. In REV D & earlier: Regulator Module.
A3	19C320060G1	Oscillator Compensator Module.
A4	19C320084G1	Modulator Module.
C1	5491674P30	Capacitors: 39 pf ±20%, 10 VDCW; sim to Sprague Type 162D.
C2	5491674P42	Tantalum: 47 pf ±20%, 6 VDCW; sim to Sprague Type 162D.
C3*	5491674P51	Tantalum: 0.023 pf ±10%, 35 VDCW; sim to Kemet T376P3K03AS. In REV C: Tantalum: 0.068 pf ±10%, 20 VDCW; sim to Sprague Type 162D.
C4	5491674P1	Tantalum: 1.0 pf ±40-20%, 10 VDCW; sim to Sprague Type 162D.
C5*	5491674P52	Tantalum: 0.33 pf ±10%, 20 VDCW; sim to Kemet T376B3K03AS. In REV C: Tantalum: 0.068 pf ±10%, 10 VDCW; sim to Sprague Type 162D.
C7	5491674P42	Tantalum: 47 pf ±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	5491601P120	Phenolic: 1.0 pf ±5%, 500 VDCW.
C14	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C15	5496218P36	Ceramic disc: 5.0 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C16 and C17	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C18	19B209351P2	Variable: 2.5 to 20 pf, 200 VDCW; sim to Matsushita ECV-1C-W20P32.
C19	19C307102P19	Tantalum: 68 ±20%, 4 VDCW.
C20	19A116114P8065	Ceramic: 100 pf ±5%, 100 VDCW; temp coef -1500 PPM.
C21*	5491674P1	Tantalum: 1.0 pf ±40-20%, 10 VDCW; sim to Sprague Type 162D. Added by REV E.
SYMBOL	GE PART NO.	DESCRIPTION
CR1	19A115250P1	Diodes and Rectifiers: Silicon, fast recovery, 225 mA, 50 PIV.
CR2	5494922P1	Silicon; sim to Type 1N456.
CR5	5494922P1	Silicon; sim to Type 1N456.
CR6	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
CV1	5495769P9	Silicon, capacitive.
J1* thru J5*	19A116366P4	Connectors: Electrical: sim to Concord 10-891-1. Earlier than REV A: Contact, electrical: sim to Cambion 3232-1.
J6 thru J8	19A116366P1	Contact, electrical: sim to Cambion 3232-1.
J9* and J10*	19A116366P4	Contact, electrical: sim to Concord 10-891-1. Earlier than REV A: Contact, electrical: sim to Concord 10-891-1.
J15* thru J21*	19A116366P4	Contact, electrical: sim to Concord 10-891-1. Earlier than REV A: Contact, electrical: sim to Cambion 3232-1.
J24* thru J26*	19A116366P4	Contact, electrical: sim to Concord 10-891-1. Earlier than REV A: Contact, electrical: sim to Cambion 3232-1.
J30* and J31*	19A116366P4	Contact, electrical: sim to Concord 10-891-1. Earlier than REV A: Contact, electrical: sim to Cambion 3232-1.
J32*	19A116366P2	Contact, electrical: sim to Cambion 3233-1. Deleted by REV A.
J33 and J34	19A116366P2	Contact, electrical: sim to Cambion 3233-1.
K1*	19B209562P2	Relay, hermetic sealed: (between 45 to 100 ohms), ±10%, 2 form C contacts, 3.0 VDC nominal, 1.0 w max operating; sim to GE 3SC31002A2. In REV A: Relay, hermetic sealed: 98 ohms ±10%, 2 form C contacts, 6.0 VDC nominal, 1.0 w max operating; sim to GE 3SC31001A2.
L1	19B209420P114	Coil, RF: 1.20 pf ±10%, 0.18 ohms DC res max; sim to Jeffers 4430-1K.
L2	19A127798G1	Coil: 6.05-6.9 pf. Includes: Tuning slug.
L3	19B218910G1	Coil. Includes: Tuning slug.
L4 and L5	19B216320P3	Coil.
R1*	3R151P181J	Composition: 180 ohms ±5%, 1/8 w. In REV A: Composition: 1K ohms ±5%, 1/8 w.
R8	3R151P102J	Composition: 220 ohms ±5%, 1/8 w.
R9	3R151P154J	Composition: 150K ohms ±5%, 1/8 w.
R2*	3R151P391J	Composition: 390 ohms ±5%, 1/8 w.
	3R151P983J	Composition: 68K ohms ±5%, 1/8 w.
	3R151P913J	Composition: 91K ohms ±5%, 1/8 w.
SYMBOL	GE PART NO.	DESCRIPTION
R5*	3R151P241J	Composition: 240 ohms ±5%, 1/8 w. In REV B and earlier: Composition: 10K ohms ±5%, 1/8 w.
R6*	3R151P222J	Composition: 2.2K ohms ±5%, 1/8 w. Deleted by REV C.
R7	3R151P103J	Composition: 10K ohms ±5%, 1/8 w.
R8	19A116412P4	Variable, cermet: 250K ohms ±10%, 1/2 w; sim to Helipot Model 62 PF.
R9 and R10	3R151P101K	Composition: 100 ohms ±10%, 1/8 w.
XX1*	19A115834P5	Push to Talk Switch Board 19B232886G1 (Added by REV E) (Deleted by REV F)
A705*		Push to Talk Switch Board 19B232886G1 (Added by REV E) (Deleted by REV F)
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.
Q1	19A129187P1	Silicon, PNP.
Q2	19A116201P3	Silicon, NPN.
R1	3R151P103J	Composition: 10K ohms ±5%, 1/8 w.
R2	3R151P372J	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.
A705*		Push to Talk Switch Board 19B232886G2 (Added by REV F)
C1*	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM. Deleted by REV A.
C3	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C5*	19A116114P2044	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM. Added by REV B.
Q1	19A129187P1	Silicon, PNP.
Q2	19A116201P3	Silicon, NPN.
R5	3R151P982J	Composition: 6.8K ohms ±5%, 1/8 w.
R6	3R151P182J	Composition: 1.8K ohms ±5%, 1/8 w.
R7*	3R151P751J	Composition: 750 ohms ±5%, 1/8 w. Earlier than REV A: 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.
P701	19A127884G1	Fuse Kit.
SYMBOL	GE PART NO.	DESCRIPTION
J701	19B216594G2	Connectors: Electrical: 6 contacts. See Mechanical Parts RC2605 items 14, 16.
J702		See Mechanical Parts RC2605 items 14, 48.
J703		See Mechanical Parts RC2605 items 51-53.
K1*	19A127836G1	Relays: Sensitive: 95 ohms ±10%, 2 form C contacts, 5.5 to 9.0 VDC (over the temp range indicated); sim to C.P. Clare MF1401G01. Deleted by REV B.
L701	19A127815P1	Inductors: Coil.
P701	19A115834P4	Plugs: Contact, electrical: sim to AMP 2-332070-9.
P704 and P705	19A127569G1	Plug: 8 contacts.
P706*	19A127569G1	Plug: 8 contacts. Deleted by REV B.
R707	19A116227P1	Resistor/Switch: variable, carbon film, 25K ohms ±20%, 1/8 w. (Includes S703), SPST, 3 amp at 125 VAC.
R708	19A116227P2	Variable, carbon film: 25K ohms ±20%, 1/8 w.
R709	3R151P152K	Composition: 1.5K ohms ±10%, 1/8 w.
R710*	3R151P103K	Composition: 10K ohms ±10%, 1/8 w. Deleted by REV B.
S701		Switches: See Mechanical Parts RC2605, items 33-39.
S702		See Mechanical Parts RC2605, items 40-47. (Part of R707).
S703		Toggle: SPDT, sim to C x K Component 71075DG. Deleted by REV B.
S704*	19A116648P5	Associated Assemblies
A5 and A6	48G27A10	Transmitter Oscillator.
A10 thru A12	48G27A10	Transmitter Oscillator.
A13 thru A15	48G28A15 48G28A11	Receiver Oscillator. (132-150.8 MHz) = $\frac{F_0 - 20}{8}$ Receiver Oscillator. (150.8-174 MHz).
SYMBOL	GE PART NO.	DESCRIPTION
J11* thru J14*	19A116366P4	Connectors: Electrical: sim to Concord 10-891-1. Earlier than REV A: Contact, electrical: sim to Cambion 3232-1.
L81	19A116090P1	Loudspeakers: Permanent magnet: 2.00 inch, 8 ohms ±10% voice coil imp, 450 Hz ±12 Hz resonant; freq range 400 to 3000 Hz.
P1 and P2	19A115834P4	Plugs: Contact, electrical: sim to AMP 2-332070-9.
C11	19A116114P2047	Ceramic: 33 pf ±5%, 100 VDCW; temp coef -80 PPM.
C12	19A116114P2051	Ceramic: 43 pf ±5%, 100 VDCW; temp coef -80 PPM.
S1	19B219976G1	Switch Assembly.
1	19A134425P1	Machine screw, hex head: No. 2-56 x 3/16.
2	19C317394P4	Gasket.
3	19B204527P2	Diaphragm: No. 2 inches dia.
4	98A195002C6	Screw, Phillips head: No. 2-56 x 1/8.
5	19A127319P1	Nut: No. 1/4-32.
6	4035630P1	Washer: teflon.
7	N70B7030C6	Set screw: No. 3-48 x 3/16.
8	19B212784G1	Knob, includes items 7, 66. (SQUELCH, ON-OFF, VOLUME).
9	19B219953G3	Antenna Assembly. (Includes items 19-23).
10	19B414531P2	Grille. (Standard).
11	19B226502G2	Grille. (Hi-Power).
12	NP270290P2	Nameplate. (GE monogram - standard).
13	19D41542G12	Case assembly. (Includes items 14, 15, 18, 27, 33-39, 48, 49).
14	19A127753P1	Insert. Contact. (Part of J702 and J703).
SYMBOL	GE PART NO.	DESCRIPTION
15	19A116719P1	Insert, screw thread: No. 2-56.
16	19B216862P2	Contact. (Part of J702).
17	19A127798G8	Antenna tube.
18	19B216875P1	Support.
19	19C320352P1	Bushing. (Part of item 9).
20	19C320383P2	Antenna rod. (Part of item 9).
21	19A129652P1	Nut, knurled: thd size 7/16-40. (Part of item 9).
22	19A129649P1	Antenna Cap. (Part of item 9).
23	N70P7030C6	Set screw: No. 3-48 x 3/16. (Part of item 9).
24	19C317050P1	Protective Cover.
25	19A129390P1	Disc.
26	19A130426G2	Knob. (Includes items 63, 64).
27	19A129723P1	Rivet.
28	19B219540P1	Catch.
29	19B216520P4	Washer, nylon: 1/4 inch.
30	19A127319P2	Nut: No. 1/4-28.
31	19B216926P8	Decorative cap. (TYPE 99).
32	19C320721P1	Seal. (Used with TYPE 99 Switch).
33	N55P1006	Machine screw: No. 0-80 x 3/8. (Part of S701).
34	19C328416G1	Button assembly. (Part of S701).
35	19C328407P1	Collar. (Part of S701).
36	19A137621P1	Plate. (Part of S701).
37	19A137620P1	Spring. (Part of S701).
38	N207P1C6	Nut, hex: No. 10-32. (Part of S701).
39	19B209643P2	Switch. (Part of S701).
40	19B216865P1	Insulator. (Part of S702).
41	N64795004C	Cap screw: 2-56 x 1/4. (Part of S702).
42	19B216864P1	Contact. (Part of S702).
43	19B216863P1	Spring contact. (Part of S702).
44	N910P6C6	Retaining ring. (Part of S702).
45	19A127754P1	Gasket. (Part of S702).
46	9A127755P1	Spring. (Part of S702).
47	19B216862P1	Contact. (Part of S702).
48	N330P605F22	Eyelet, brass: 1/16 x 5/32.
49	N330P602F22	Eyelet, brass: 1/16 x 1/16. (Not Used).
50	19A127762P1	Strap.
51	19B216891G1	Spring assembly. (Part of J704).
52	19B413467P1	Fastener. (Part of J704).
53	19A115794P3	Flat head screw: brass, 2-56 x 5/16. (Part of J704).
54	19B216847P1	Insulator, pressure sensitive. (Not Used).
55	19C311491P3	Can. (Used with Regulator, Oscillator Compensator, and Compressor Circuits).
56	19B219510P1	Insulator. (Located between System & Receiver Boards).
57	19A116270P1	Tape, pressure sensitive. (Specify length).
58	19C317394P6	Gasket.
59	19B216897G3	Rear Cover Assembly (without clip).
60	19B216897G4	Rear Cover Assembly (with clip).
61	19A110397P1	Strap.
62	N404P8P	Lockwasher, internal tooth: No. 2. (Not Used).



\*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 - Case Assembly 19D417103G1  
Incorporated into initial shipment.

REV. B - Case Assembly 19D417103G1  
To make compatible with more options.  
Deleted K1.

REV. C - To improve design. Added insulator.

REV. D - To improve design. Changed screws  
in PTT switch S701.

REV. A - System Board 19D417100G1  
To make compatible with more options.  
Added K1 and increased the size of runs  
on printed wire board.

REV. B - To improve PTT relay pick-up performance at  
low voltage. Changed K1 and R1.

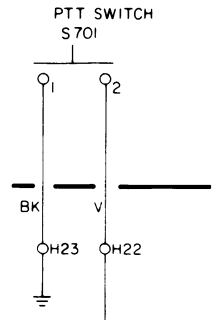
REV. C - To increase modulation level and improve  
frequency response. Changed C3, C5, R2,  
and R5. Deleted R6.

REV. D - To improve frequency response.  
Changed C3 and C5.

REV. E - To incorporate a new 5.4 V Regulator module. Changed A2 and  
added C21.

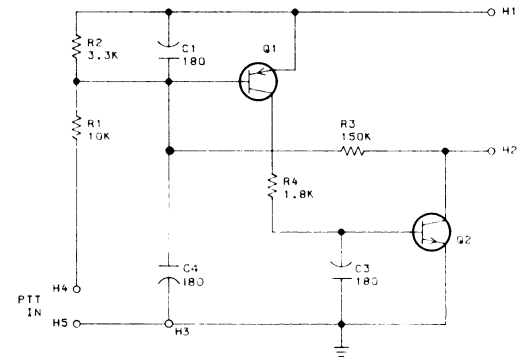
REV. E - Case Assembly 19D417103G1  
To improve reliability changed S701 and added A705. Also, changed  
knobs.

Schematic Diagram was:

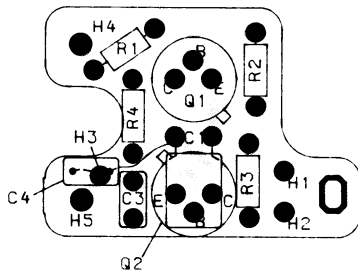


REV. F - To make new PTT Switch compatible with GE-STAR. Changed A705.

Schematic Diagram was:



Outline Diagram was:



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

REV. A - PTT Circuit 19B232586G2  
To improve performance deleted C1 and changed R7.

REV. B - To improve RF filtering. Added C5.

REV. C - To make compatible with GE-STAR changed circuit or printed wire  
board and added C2.



MULTI-FREQUENCY MODIFICATIONS

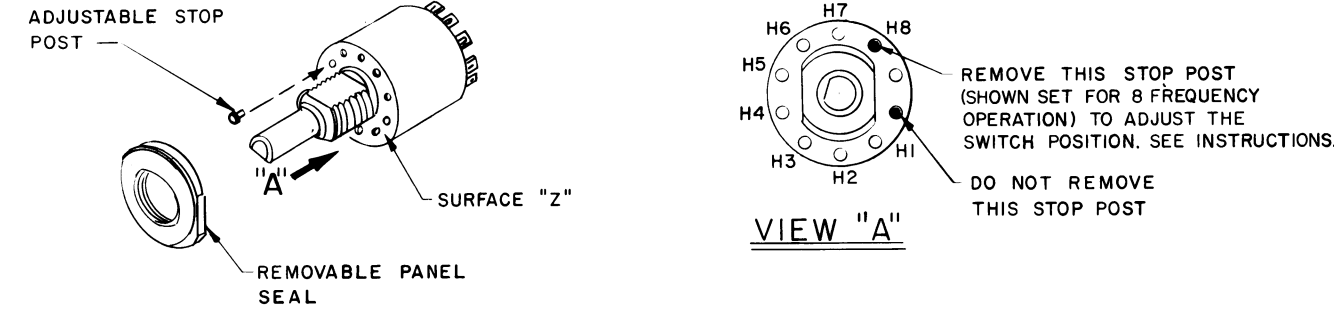


Figure 1 - Stop Post Adjustment

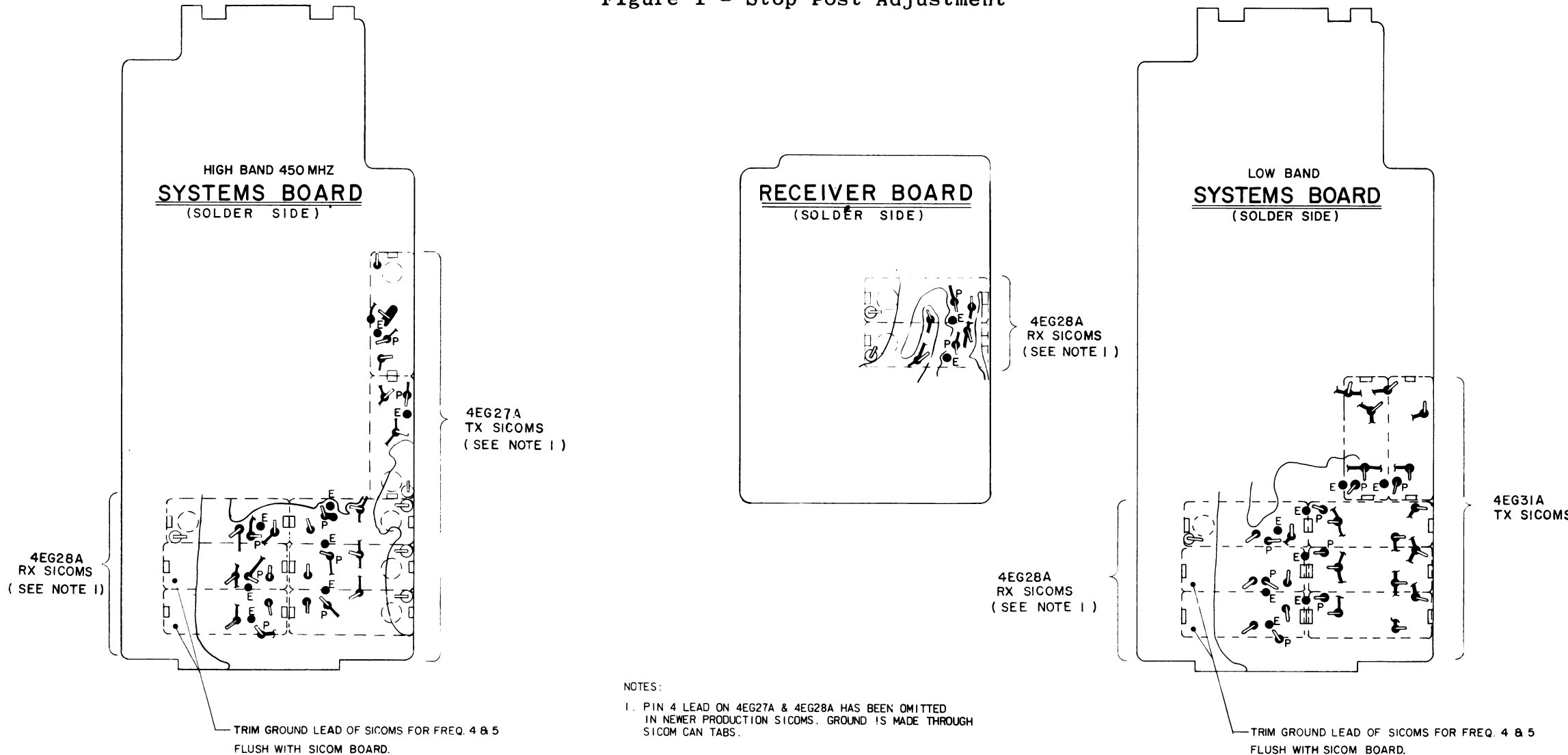


Figure 2 - Oscillator Module and Diode Installation

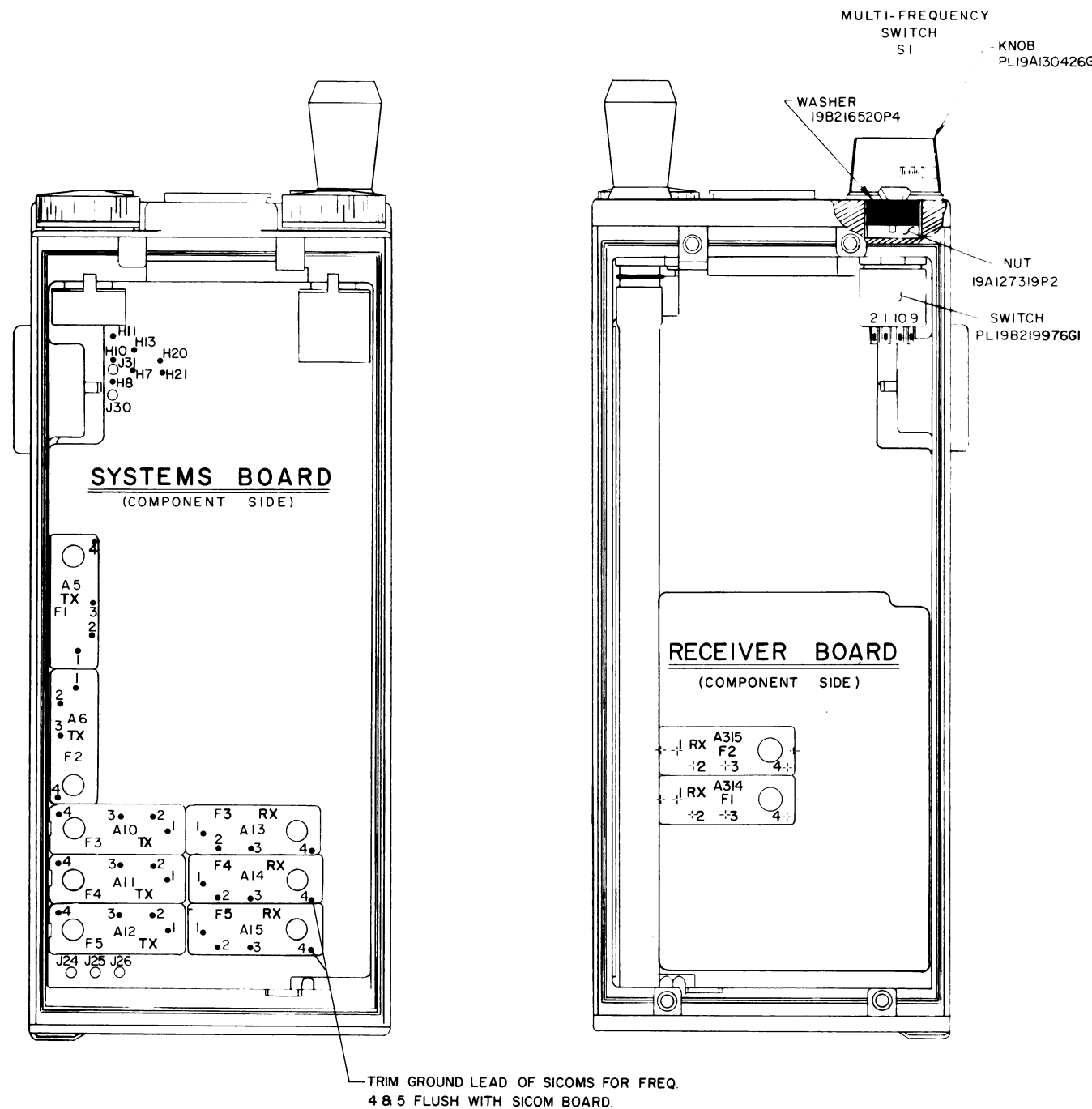


Figure 3 - Oscillator Mounting Positions & S1 Connection Points

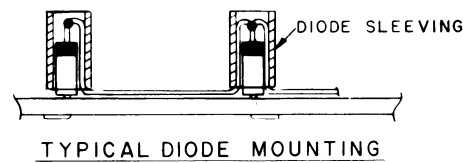


Figure 4 - Typical Diode Mounting

MULTI-FREQUENCY MODIFICATIONS

(19D417138, Sh. 1, Rev. 5 & 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 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 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.