

# PARTS LIST

70-050/055

REF. NO.	USE	DESCRIPTION	PART NO.	REF. NO.	USE	DESCRIPTION	PART NO.
<u>CONTROL PCB</u>				<u>DISPLAY DRIVER PCB</u>			
CX - 04 CONTINUED				CX - 06			
<u>INTEGRATED CIRCUITS</u>				<u>RESISTORS</u>			
IC303	UD	uPC 78084	70-076088	R312,313, 314,315	TM	470 ohm 1/8 W	70-145004
<u>CONNECTORS</u>				R307,308	TM	22K ohm 1/8 W	70-145002
J382	UD	Jack, 7 Pin	70-159095	R301,302, 309	TM	220K ohm 1/8 W	70-145001
<u>PCB</u>				<u>INTEGRATED CIRCUITS</u>			
CX - 04A	UD	PCB	70-070082	IC301,302	TM	HD14511BP	70-076082
<u>CONTROL/INTERFACE PCB</u>				<u>PC BOARD</u>			
CX - 05				CX-06A	TM	PCB	70-070074
<u>SWITCHES</u>				<u>DISPLAY PCB</u>			
S304	TM	SW, Rotary	70-180014	CX - 07			
<u>CONTROLS</u>				<u>SWITCHES</u>			
RV 301	TM	Squelch Control	70-164030	S301,302, 303	TM	Scan,Pri,Mon.	70-180012
RV 302	TM	Volume Control	70-164027	<u>RESISTORS</u>			
<u>RESISTORS</u>				R311,316- 324	TM	470 ohm 1/8 W	70-145004
R332	TM	270 ohm 1/8 W	70-144047	R310,325, 328-330	TM	560 ohm 1/8 W	70-145003
R303-306	TM	22K ohm 1/8 W	70-145002	R331	TM	1.2K ohm 1/8 W	70-145007
<u>CAPACITORS</u>				R326	TM	3.3K ohm 1/8 W	70-145005
C301,302	TM	10uf 50V	70-135059	R327	TM	12K ohm 1/8 W	70-145006
<u>INTEGRATED CIRCUITS</u>				<u>TRANSISTORS</u>			
IC303	TM	uPC7808H	70-076088	Q301	TM	2SC458C	70-080082
<u>CONNECTORS</u>				Q302	TM	2SB649C	70-080080
J396	TM	Jack 34 Pin	70-159107	<u>DIODES</u>			
<u>PCB</u>				D301	TM	GL-6N202	70-085051
CX-5A	TM	PCB	70-070073	D302,303 304	TM	SLP436B	70-085052
				D305	TM	SLP530D	70-085053

REF. NO.	USE	DESCRIPTION	PART NO.
<u>DISPLAY PCB</u>			
CX - 07 CONTINUED			
J301	TM	<u>CONNECTORS</u> Jack, 16 Pin	70-159105
CX-07A	TM	<u>PC BOARD</u> PCB	70-070075
		<u>MISCELLANEOUS</u> LED HOLDER	70-159113
<u>CONTROL CABLE INTERFACE PCB</u>			
CX - 08			
R351	TM	<u>RESISTORS</u> 4.7 ohm 1/2 W	70-145052
C351	TM	<u>CAPACITORS</u> 220uf 25V	70-131224
T301	TM	<u>TRANSFORMER</u> 8392159	70-090144
J325	TM	<u>CONNECTORS</u> Jack, 34 Pin	70-159106
CX-08A	TM	<u>PC BOARD</u> PCB	70-070076
CA357	TM	<u>CABLE ASSEMBLY</u> Cable W/J323	70-034069

HOW TO ORDER REPLACEMENT PARTS

NOTE: To eliminate error and speed delivery of replacement parts, always include the following information on your order:

1. Complete identification of model which requires the part.
  - A. Model Number
  - B. Serial Number
  
2. Best possible identification of the part itself.
  - A. Part Number
  - B. Schematic Reference Number
  - C. Part Description
  - D. Quantity Requested
  - E. If necessary, return old part as sample



# 70-2102A CTCSS KIT INSTALLATION INSTRUCTIONS

## UNDER-DASH AND TRUNK-MOUNT MODELS

1. Remove the 4 screws securing the radio top and bottom covers and remove the covers.
2. Turn the radio upside-down on the bench. Screw the threaded standoff supplied with the CTCSS board into the right hand hole located in the option area in front of the receiver board.
3. If the 70-2195 microphone hangup box is to be installed, the jumper JP2 must be removed from the CTCSS board for proper monitor operation.
4. As supplied, the CTCSS board can be programmed to encode and decode on any of the standard EIA Group A and B tones from 71.9 to 241.8 Hz. If Group C tones are desired, remove JP1 from the CTCSS board. Refer to the appendix of the unit service manual if simultaneous A/C, B/C or A/B/C groups programming is required.
5. Remove the jumper plug from J358 (right side of receiver board) and connect the 8 pin connector and cable running from P358 on the CTCSS board.
6. Connect the 8 pin plug with the single wire, P357, to J357 on the receiver board.
7. Remove the clear sleeve and jumper plug from the floating option connector P1. Connect P1 to J1 on the CTCSS board.
8. Feed the remaining 8 pin connector and cable connected to P903 (CTCSS Board) to the top of the radio through the opening just behind the front panel assembly. Remove the E/Prom module and connect P903 to the J903 jack on the E/Prom module. Reinstall the E/Prom module.
9. Carefully position the CTCSS board over the option area, connector side down and install the 3 screws supplied (left side and center) to secure the board in place.
10. CTCSS modulation adjustment is made by RV1, marked "MOD" on the CTCSS Board. Refer to the radio service manual for complete alignment instructions.

## 70-2102A KIT COMPONENTS

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>
CTCSS PCB Assembly	1	- - -
Threaded Standoff	1	70-156072
3 x 6 mm Panhead Screw	3	70-151355

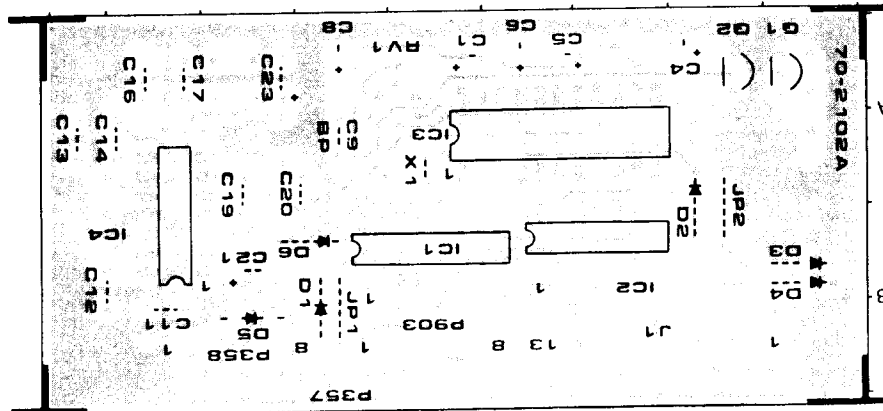
# 70-2102A CTCSS PC BOARD PARTS LIST

70-2102 PARTS LIST 9/19/83

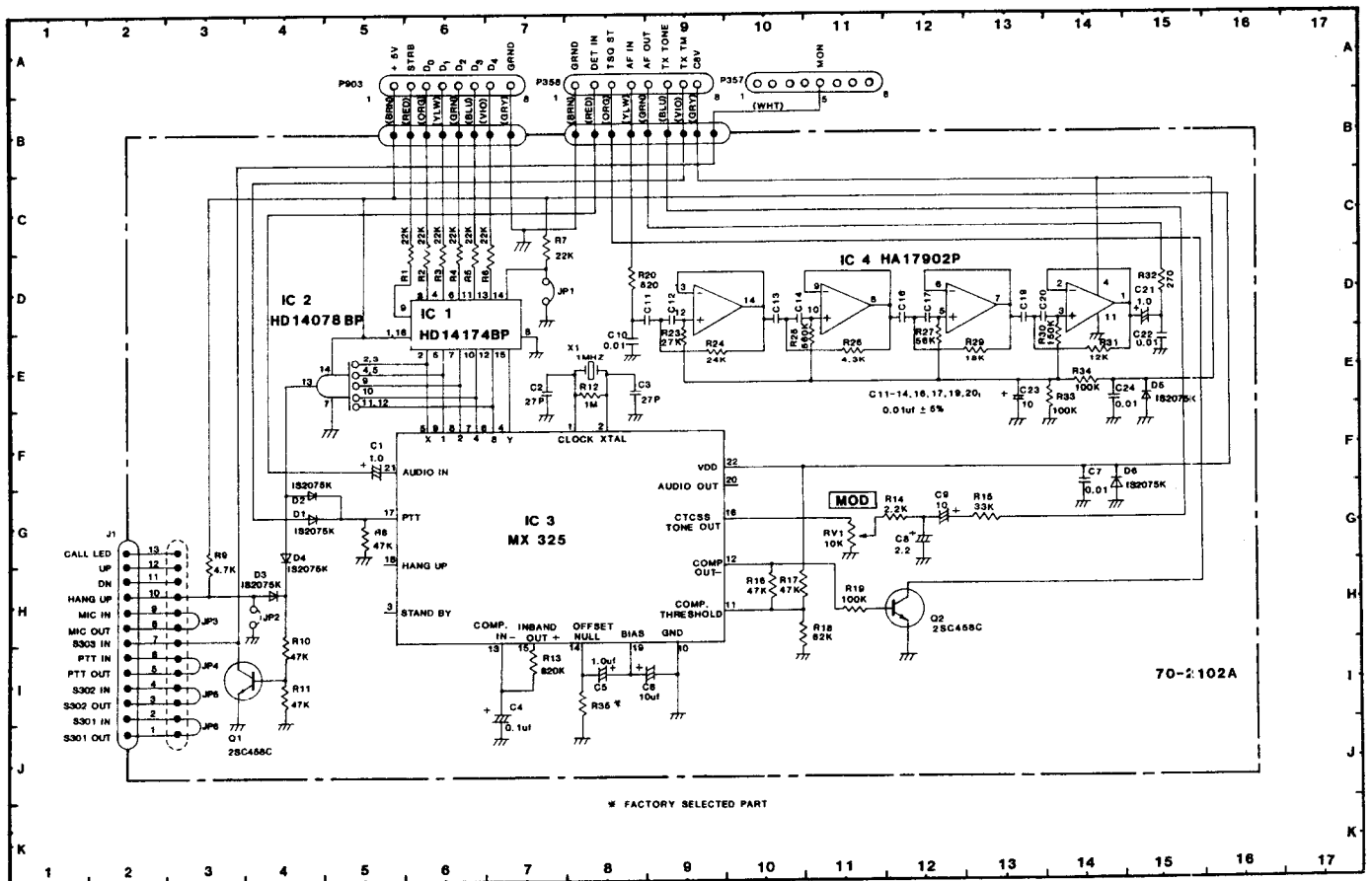
REF#	LOC	SCH DESCRIPTION	PART#	REF#	LOC	SCH DESCRIPTION	PART#
1		BRASS MOUNTING STUD	70-156072	R1	B B3	D6 22K 1/8W CHIP RES.	70-144032
2		3x6mm SCREW	70-151355	R2	B B3	D6 22K 1/8W CHIP RES.	70-144032
3		3x6mm SCREW	70-151355	R3	B B3	D6 22K 1/8W CHIP RES.	70-144032
4		3x6mm SCREW	70-151355	R5	B B2	D6 22K 1/8W CHIP RES.	70-144032
C1	T A3	F5 1UF 35WVDC TANT.	70-138087	R6	B B3	D6 22K 1/8W CHIP RES.	70-144032
C2	B A3	E7 27PF 50WVDC CER. CAP.	70-131190	R7	B B3	C7 22K 1/8W CHIP RES.	70-144032
C3	B A2	E8 27PF 50WVDC CER. CAP.	70-131190	R8	B A2	G5 47K 1/8W CHIP RES.	70-144034
C4	T A1	I7 .1UF 35WVDC TANT.	70-138086	R9	B B2	G3 4.7K 1/8W CHIP RES.	70-144025
C5	T A2	I8 1UF 35WVDC TANT.	70-138087	R10	B A1	I4 47K 1/8W CHIP RES.	70-144034
C6	T A2	I9 10UF 50WVDC AL.	70-135059	R11	B A1	I4 47K 1/8W CHIP RES.	70-144034
C7	B A2	F1 .01UF 50WVDC CER. CAP.	70-132032	R12	B A2	E8 1M 1/8W CHIP RES.	70-144042
C8	T A3	G1 2.2UF 35WVDC TANT.	70-138103	R12	B A2	E8 1M 1/8W CHIP RES.	70-144042
C9	T A3	G12 10UF 16WVDC AL.	70-135083	R13	B A2	I7 820K 1/8W CHIP RES.	70-144069
C10	B B4	E8 .01UF 50WVDC CER. CAP.	70-132032	R14	B A3	G12 2.2K 1/8W CHIP RES.	70-144067
C11	T B4	D9 .01UF 50WVDC PLYSTER CAP. 5%	70-137048	R15	B A3	G13 33K 1/8W CHIP RES.	70-144033
C12	T B4	D9 .01UF 50WVDC PLYSTER CAP. 5%	70-137048	R16	B A1	H10 47K 1/8W CHIP RES.	70-144034
C13	T A4	D10 .01UF 50WVDC PLYSTER CAP. 5%	70-137048	R17	B A2	H10 47K 1/8W CHIP RES.	70-144034
C14	T A5	D10 .01UF 50WVDC PLYSTER CAP. 5%	70-137048	R18	B A1	H11 62K 1/8W CHIP RES.	70-144083
C16	T A4	D12 .01UF 50WVDC PLYSTER CAP. 5%	70-137048	R19	B A1	H11 100K 1/8W CHIP RES.	70-144037
C17	T A4	D12 .01UF 50WVDC PLYSTER CAP. 5%	70-137048	R20	B B4	D8 8200HM 1/8W CHIP RES.	70-144018
C19	T A4	D13 .01UF 50WVDC PLYSTER CAP. 5%	70-137048	R23	B B4	E9 27K 1/8W CHIP RES.	70-145062
C20	T A4	D13 .01UF 50WVDC PLYSTER CAP. 5%	70-137048	R24	B B4	E9 24K 1/8W CHIP RES.	70-145063
C21	T B4	D15 1UF 35WVDC TANT.	70-138087	R25	B A4	E11 560K 1/8W CHIP RES.	70-145064
C22	B A4	E21 .01UF 50WVDC CER. CAP.	70-132032	R26	B A4	E11 4.3K 1/8W CHIP RES.	70-145065
C23	T A4	E13 10UF 50WVDC AL.	70-135059	R27	B A4	E12 56K 1/8W CHIP RES.	70-145066
C24	B B4	E14 .01UF 50WVDC CER. CAP.	70-132032	R29	B A4	E13 18K 1/8W CHIP RES.	70-144073
D1	T B3	G4 1S2075(K)	70-085001	R30	B A4	E14 150K 1/8W CHIP RES.	70-144038
D2	T A1	G4 1S2075(K)	70-085001	R31	B A4	E14 12K 1/8W CHIP RES.	70-144030
D3	T B1	H4 1S2075(K)	70-085001	R32	B B4	D15 2700HM 1/8W CHIP RES.	70-144014
D4	T B1	G4 1S2075(K)	70-085001	R33	B A4	E14 100K 1/8W CHIP RES.	70-144037
D5	T B4	E15 1S2075(K)	70-085001	R34	B A4	E14 100K 1/8W CHIP RES.	70-144037
D6	T B3	G14 1S2075(K)	70-085001	RV1	T A3	G11 TRIMMER 10K	70-144045
IC1	T B3	D6 HD14174BP	70-076091	X1	T A3	E8 CRYSTAL, 1MHz.	70-128024
IC2	T B2	E5 HD14078BP	70-076142				
IC3	T A2	G7 MX-325	70-076092				
IC4	T A4	D11 HA17902P	70-076143				
J1	T B2	H2 JACK, 13 PIN	70-159098				
JP3	B B2	H3 ZERO OHM CHIP JUMPER	70-144001				
JP4	B B2	I3 ZERO OHM CHIP JUMPER	70-144001				
JP5	B B1	I3 ZERO OHM CHIP JUMPER	70-144001				
JP6	B B1	I3 ZERO OHM CHIP JUMPER	70-144001				
P358	T B4	A8 9 WIRE CABLE W TWO PLUGS	70-034065				
P903	T B3	A6 8 WIRE CABLE W ONE PLUG	70-034066				
Q1	T A1	I4 TRANSISTOR 2SC458C	70-080082				
Q2	T A1	H12 TRANSISTOR 2SC458C	70-080082				

# 70-2102A CTCSS PC BOARD AND SCHEMATIC

## CTCSS PCB (TOP VIEW)

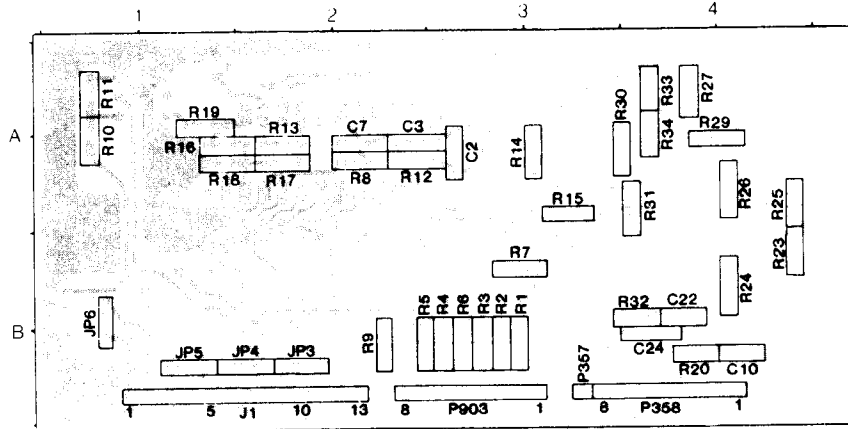


## CTCSS SCHEMATIC DIAGRAM



# 70-2102A CTCSS PC BOARD

## CTCSS PCB (BOTTOM VIEW)



## CTCSS VOLTAGE CHARTS

### TRANSISTORS

REF. NO.	DESCRIPTION	BASE	COLLECTOR	EMITTER	FUNCTION
Q1	2SC458C W/Tone	Mon. ON	0.0	0.0	Squelch Control
		Mon. OFF	0.0	.050	
	W/"0" Code		.650	.050	
	W/O Tone		0.0	0.0	
Q2	2SC458C	Mon. ON	0.0	0.0	Tone Squelch Switch
		Mon. OFF	0.0	4.44	
Q2	2SC458C	Decode	0.0	5.85	Tone Squelch Switch
		No Decode	.639	0.0	

### INTEGRATED CIRCUITS

REF. NO.	DESCRIPTION	PIN NO.	+ V VOLTAGE	GND. PIN NO.	FUNCTION
IC 1	HD14174BP	16	5V	8	Data Latch
IC 2	HD14078BP	14	5V	7	Encode/Decode Inhibiter
IC 3	MX 325	22	5V	10	Encoder/Decoder
IC 4	HA17902P	4	8V	11	High Pass Filter

### ENCODE/DECODE IC 3 FREQUENCY (HZ) PINS

	4	5	6	7	8	9
67.0	1	1	1	1	1	1
71.9	0	1	1	1	1	1
74.4	1	1	1	1	1	0
77.0	0	0	1	1	1	1
79.7	1	1	1	1	0	1
82.5	0	1	1	1	1	0
85.4	1	1	1	1	0	0
88.5	0	0	1	1	1	0
91.5	1	1	1	0	1	1
94.8	0	1	1	1	0	1
97.4	1	1	1	0	1	0
100.0	0	0	1	1	0	1
103.5	0	1	1	1	0	0
107.2	0	0	1	1	0	0

### ENCODE/DECODE IC 3 FREQUENCY (HZ) PINS

	4	5	6	7	8	9
110.9	0	1	1	0	1	1
114.8	0	0	1	0	1	1
118.8	0	1	1	0	1	0
123.0	0	0	1	0	1	0
127.3	0	1	1	0	0	1
131.8	0	0	1	0	0	1
136.5	0	1	1	0	0	0
141.3	0	0	1	0	0	0
146.2	0	1	0	1	1	1
151.4	0	0	0	1	1	1
156.7	0	1	0	1	1	0
162.2	0	0	0	1	1	0

### ENCODE/DECODE IC 3 FREQUENCY (HZ) PINS

	4	5	6	7	8	9
167.9	0	1	0	1	0	1
173.8	0	0	0	1	0	1
179.9	0	1	0	1	0	0
186.2	0	0	0	1	0	0
192.8	0	1	0	0	1	1
203.5	0	0	0	0	1	1
210.7	0	1	0	0	1	0
218.1	0	0	0	0	0	0
225.7	0	1	0	0	0	1
233.6	0	0	0	0	0	1
241.8	0	1	0	0	0	0
250.3	0	0	0	0	0	0

"1" = 5V  
"0" = 0V



# 70-2102A CTCSS MODIFIED TONE PROGRAMMING

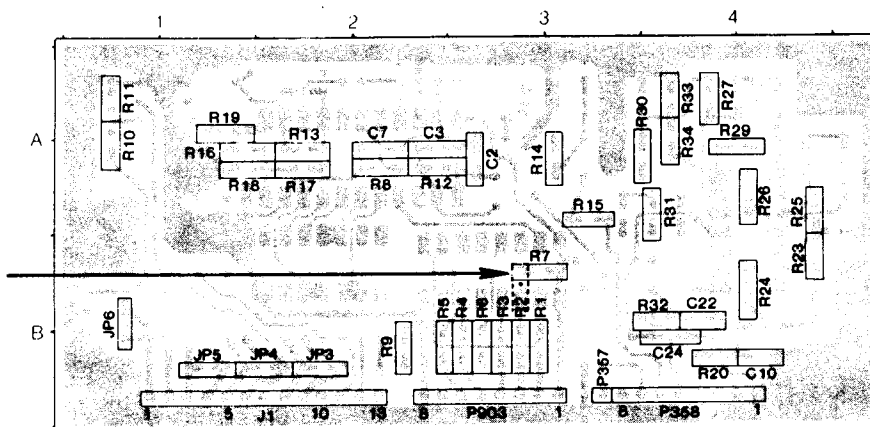
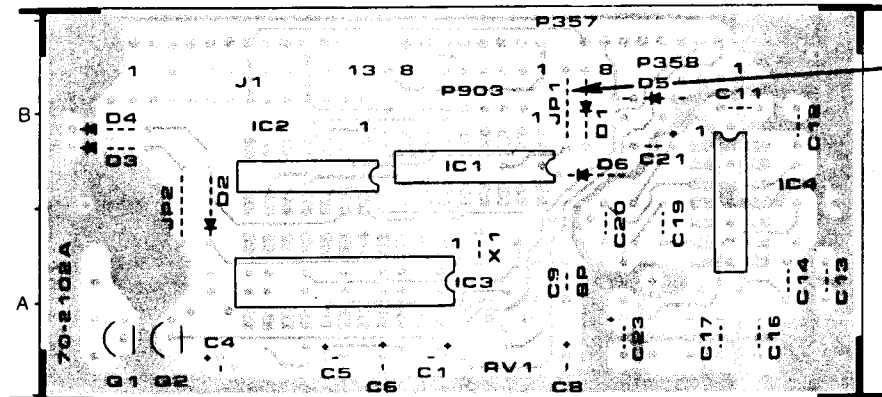
The 70-2102A CTCSS board can be programmed for 31 EIA tones in Group A and B. If JP1 is removed, 5 Group C tones can be programmed, but Group A and B tones are not programmable. To allow simultaneous programming of Groups A and C, Groups B and C or Groups A, B and C tones, follow the instructions given below. If the 97.4 Hz Group C tone is desired, a direct replacement IC 3 is available (P/N 70-076153). Code number 21 should then be used for 97.4 Hz programming.

## 1. Simultaneous Group A and C Programming

Remove JP1 and reposition R7 as shown. Programming should then be as follows:

CODE NUMBER	FREQUENCY	GROUP	CODE NUMBER	FREQUENCY	GROUP
0	Tone Disable		*21	97.4 Hz	C
2	233.6 Hz	A	22	114.8 Hz	A
4	218.1 Hz	A	23	91.5 Hz	C
6	203.5 Hz	A	24	107.2 Hz	A
8	186.2 Hz	A	25	85.4 Hz	C
10	173.8 Hz	A	26	100.0 Hz	A
12	162.2 Hz	A	27	79.7 Hz	C
14	151.4 Hz	A	28	88.5 Hz	A
16	141.3 Hz	A	29	74.4 Hz	C
18	131.8 Hz	A	30	77.0 Hz	A
20	123.0 Hz	A	31	67.0 Hz	C

\*With replacement IC 3 only  
Codes 1,3,5,....,17, 19 are not used.



NEW R7  
LOCATION  
(DASHED  
LINE)

# 70-2102A CTCSS MODIFIED TONE PROGRAMMING

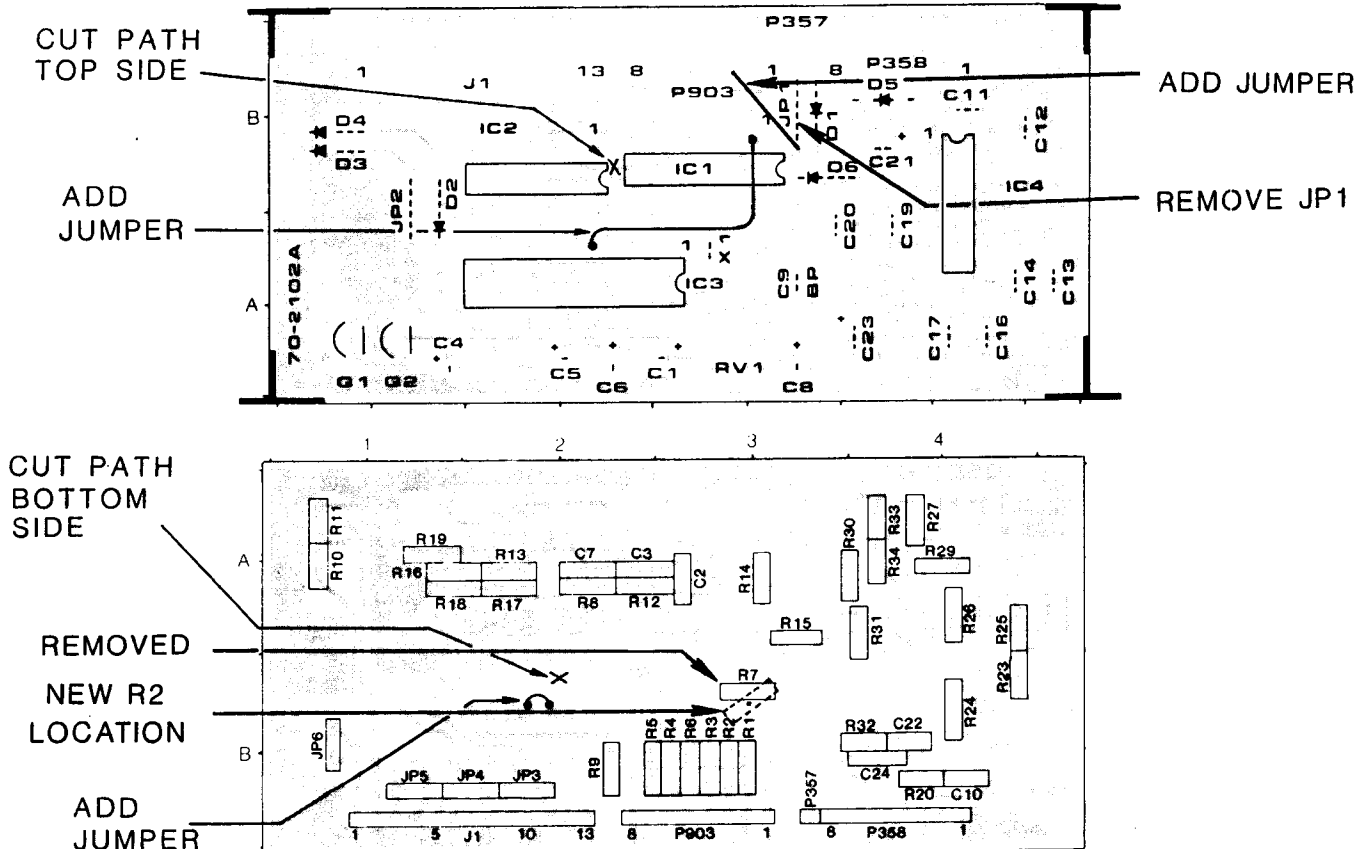
## 2. Simultaneous Group B and C Programming

Remove JP1. Add both jumper wires and cut path top side as shown.  
 Remove R7. Reposition R2. Add jumper and cut path bottom side as shown. Programming should then be as follows:

CODE NUMBER	FREQUENCY	GROUP	CODE NUMBER	FREQUENCY	GROUP
0	Tone Disable		*21	97.4 Hz	C
2	225.7 Hz	B	22	110.9 Hz	B
4	210.7 Hz	B	23	91.5 Hz	C
6	192.8 Hz	B	24	103.5 Hz	B
8	179.9 Hz	B	25	85.4 Hz	C
10	167.9 Hz	B	26	94.8 Hz	B
12	156.7 Hz	B	27	79.7 Hz	C
14	146.2 Hz	B	28	82.5 Hz	B
16	136.5 Hz	B	29	74.4 Hz	C
18	127.3 Hz	B	30	71.9 Hz	B
20	118.8 Hz	B	31	67.0 Hz	C

\*With replacement IC 3 only.

Codes 1,3,5,.....17,19 are not used.  
 The Group B tone 241.8Hz is not programmable.

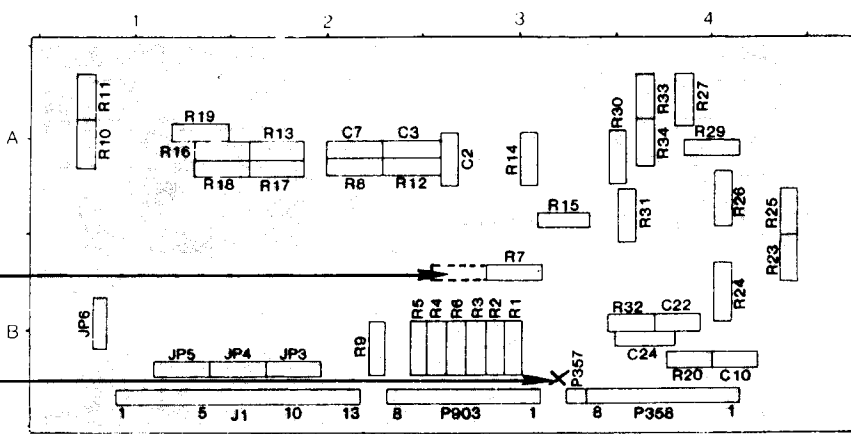
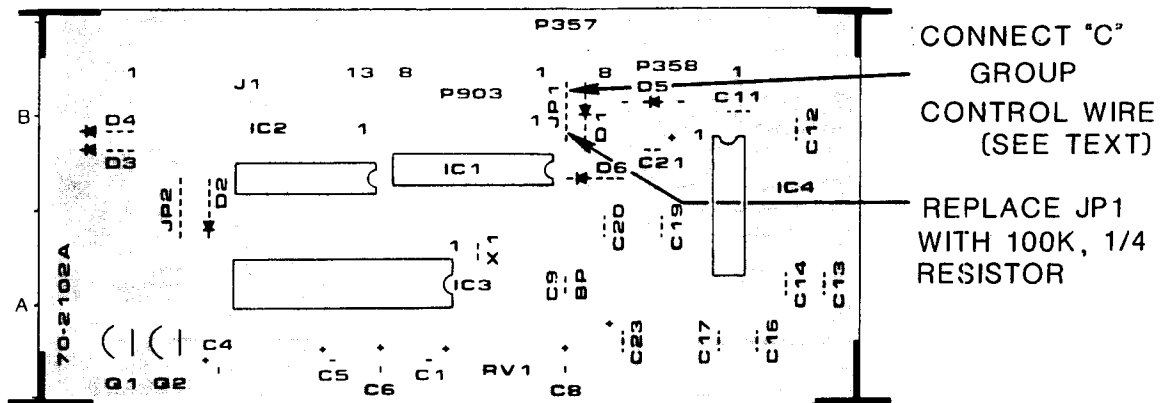


# 70-2102A CTCSS MODIFIED TONE PROGRAMMING

## 3. Simultaneous Group A, B and C Programming

CTCSS tones in Groups A, B and C can be simultaneously programmed on a limited channel number basis by utilizing an appropriate LED channel display segment driver output as a C Group control line. To utilize this input the 70-2102A CTCSS tone board must be modified as follows:

- Remove JP 1 and replace it with a 100K ohm 1/4 watt resistor. Connect a 6 inch length of wire to the end of the resistor closest to the board edge. If complete connectorization is desirable, a single pin receptacle (P/N 70-159118) can be connected to the resistor in place of the wire by bending the connector end at a right angle, slipping it over the resistor lead and soldering it in place. The mating male pin (P/N 70-034080) can then be connected to the C Group control wire which will be connected as described below.
- On the bottom of the CTCSS board, cut the ground path connected to the resistor replacing JP-1.
- Remove chip resistor R7.



# 70-2102A CTCSS MODIFIED TONE PROGRAMMING

The C Group control wire added in step a, on preceding page, must be connected to the appropriate output of one of the channel display segment drivers IC301 and IC302. On underdash models this connection can be made directly to the IC pin on the back of the CX-03, Display PCB according to the channel number/tone group chart below. On trunk mount models the appropriate IC 301 or IC 302 pin must be connected to either the AUX 1 or AUX 2 on the connector J396 (pin 20 or 21) located on the CX-05 control interface PCB in the control head. The C Group control wire from the CTCSS board can then be terminated in a male pin (P/N 70-034080), which will connect directly with P2, the floating connector carrying AUX 1 and AUX 2.

The C Group control wire should be connected per the following chart. DO NOT attempt to connect to more than one point on IC 301 or IC302.

<u>Connection Point IC302 Pin</u>	<u>C Tone Only Channels</u>	<u>A and/or B Tone Only Channels</u>
Pin 13	00-09, 20-39, 50-59, 70-79	10-19, 40-49, 60-69
Pin 12	00-49, 70-79	50-69
Pin 11	00-19, 30-79	20-29
Pin 10	00-09, 20-39, 50-69	10-19, 40-49, 70-79
Pin 9	00-09, 20-29, 60-69	10-19, 30-59, 70-79
Pin 15	00-09, 40-69	10-39, 70-79
Pin 14	20-69	00-19, 70-79

<u>Connection Point IC301 Pin</u>	<u>C Tone Only All Channels Ending With:</u>	<u>A and/or B Tone Only All Channels Ending With:</u>
Pin 13	0, 2, 3, 5, 7, 8, 9	1, 4, 6
Pin 12	0, 1, 2, 3, 4, 7, 8, 9	5, 6
Pin 11	0, 1, 3, 4, 5, 6, 7, 8, 9	2
Pin 10	0, 2, 3, 5, 6, 8	1, 4, 7, 9
Pin 9	0, 2, 6, 8	1, 3, 4, 5, 7, 9
Pin 15	0, 4, 5, 6, 8, 9	1, 2, 3, 7
Pin 14	2, 3, 4, 5, 6, 8, 9	0, 1, 7

The Tone programming codes given in the 70-1000 E/PROM Programmer Users Manual are still applicable, but are subject to the IC301/IC302 connection point chosen and the channel number selected. For example if the C Group control wire is connected to IC 302, pin 14, an auxiliary code of 23 will result in a tone frequency of 110.9 Hz (B Group) if programmed on channels 00-19 or 70-79. However, the same code 23 will result in a tone frequency of 91.5 Hz (C Group) if programmed on channels 20-69.

# 70-2124 2.0 PPM/70-2125 2.5 PPM OSCILLATOR KIT INSTALLATION INSTRUCTIONS

## 70-2124 2.0 PPM OSCILLATOR KIT INSTALLATION INSTRUCTIONS

1. Remove the 8 screws securing the Transmit/Synthesizer board. Disconnect P361-366. Remove the oscillator shield cover (marked CV701).
2. Remove the crystal X701 and Oven 701 (crystal heater).
3. Install the two pieces of sleeving provided in the kit on the leads of the replacement 2.0 PPM crystal. Slide the crystal into the replacement Oven 701 and install the assembly in the printed circuit board. Replace the oscillator shield cover.
4. Remove the chip capacitor C704 470pf located at Grid C/D 5 on the bottom of the board. Refer to the service manual transmitter PC Board (Bottom View). Install the 330 pf chip capacitor supplied with the kit.
5. Reinstall the circuit board in the unit.
6. Adjust CV701 for the correct oscillator frequency, following the service manual alignment instructions.

## 70-2124 KIT COMPONENTS

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>
5.12 MHz Crystal	1	70-128026
330 pf (CH) Chip Capacitor	1	70-131233
40°C Crystal Heater	1	70-086010
0.5 X 3mm Sleeving	2	---

## 70-2125 2.5 PPM OSCILLATOR KIT INSTALLATION INSTRUCTIONS

1. Remove the 8 screws securing the Transmit/Synthesizer board. Disconnect P361-366. Remove the oscillator shield cover (marked CV701).
2. Remove the crystal X701 and Oven 701 (crystal heater).
3. Install the two pieces of sleeving provided in the kit on the leads of the replacement 2.5 PPM crystal. Slide the crystal into the Oven 701 and install the assembly in the printed circuit board. Replace the oscillator shield cover.
4. Remove the chip capacitor C704 470pf located at Grid C/D 5 on the bottom of the board. Refer to the service manual transmitter PC Board (Bottom View). Install the 330 pf chip capacitor supplied with the kit.
5. Reinstall the circuit board in the unit.
6. Adjust CV701 for the correct oscillator frequency, following the service manual alignment instructions.

## 70-2125 KIT COMPONENTS

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>
5.12 MHz Crystal	1	70-128027
330 pf (CH) Chip Capacitor	1	70-131233
0.5 x 3mm Sleeving	2	---

## 70-2132 12.5KHz CHANNEL SPACING KIT

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Remove the 8 screws securing the Transmit/Synthesizer board. Disconnect P361-366 and remove the board. Referring to the accompanying diagram for locations, change the top and bottom side components as follows:

### 1. Top Side Components (Pull off the oscillator and TX PLL covers)

Remove IC106 74LS93 IC  
Remove X701 Crystal and Oven 701  
Cut the PC trace between IC702 pin 1 and Q703 collector.

Install IC106 74LS92 IC  
Install X701 12.8MHz Crystal and Oven 701

### 2. Bottom Side Components

Remove C703 27pf Chip Capacitor (Grid C6)  
Remove C704 470pf Chip Capacitor (Grid C5)  
Remove C705 330pf Chip Capacitor (Grid C5)  
Remove R114 22K ohm Chip Resistor (Grid E1)  
Remove R167 0 ohm Chip Resistor (Grid D2)  
On 70-050A/052A/055A/056A ONLY, remove R713 5.6K Chip Resistor  
(Grid B6)

Install C703 56pf Capacitor (Grid C6)  
Install C704 150pf Capacitor (Grid C5)  
Install C705 100pf Chip Capacitor (Grid C5)  
Install R194 0 ohm Chip Resistor (Grid D2)  
Install a jumper wire from IC702 pin 14 to Q703 collector  
Install a jumper wire from IC702 pin 12 to IC702 pin 1  
On 70-050A/052A/055A/056A ONLY, install R713 3.3K ohm Chip Resistor (Grid B6)

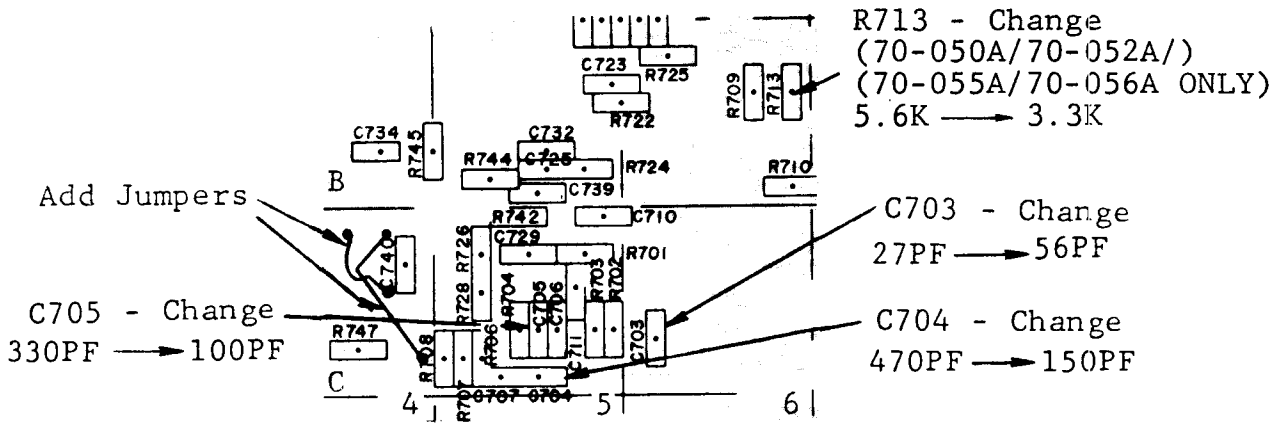
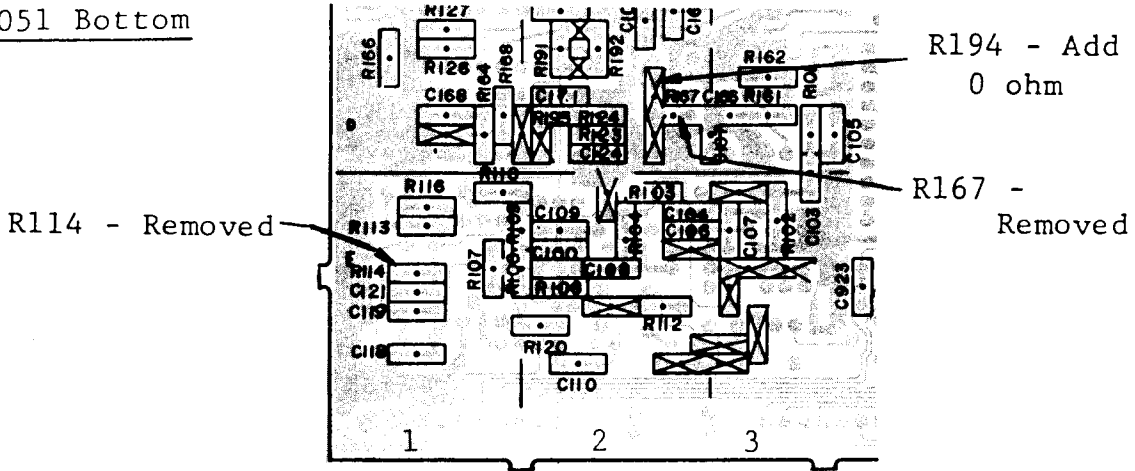
### 3. Reinstall the printed circuit board.

4. If the radio is of standard configuration (high side injection) Band Code OB must be used when programming the E/PROM. If the 70-2175, 70-2176 or 70-2177 Low Side Injection Kit has been installed, Band Code OC must be used for programming. It is recommended that a label be attached inside the unit top cover to indicate any kits installed.

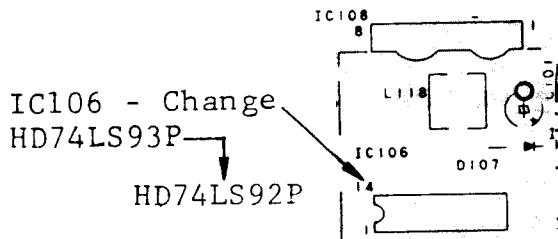
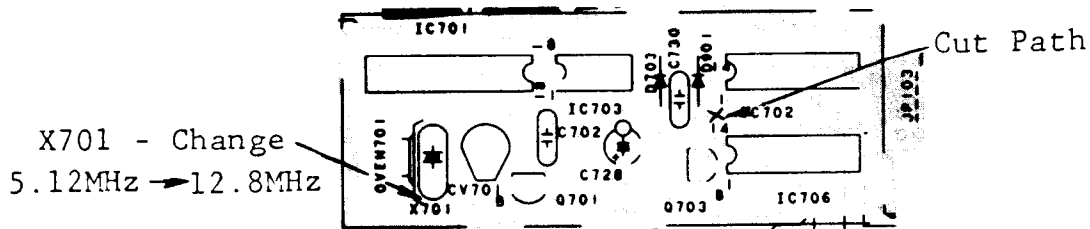
5. Follow the standard transmitter and receiver alignment instructions in the unit service manual.

# 70-2132 12.5KHz CHANNEL SPACING KIT

## TX-051 Bottom



## TX-051 Top



# 70-2141 SCAN KIT INSTALLATION INSTRUCTIONS

UNDER DASH MODELS ONLY

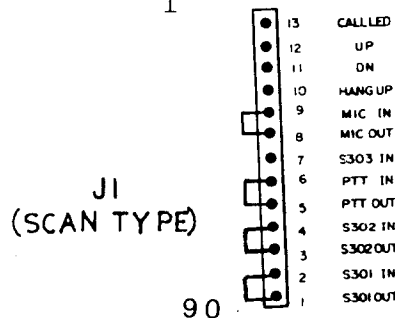
## NOTE

When programming the E/PROM for scan operation, it is recommended that channels be programmed in both scan groups (primary and secondary). If one scan group is left unprogrammed, engaging the corresponding scan button on the radio may result in a lockup condition preventing manual channel change. This condition is removed when unit power is cycled off and on, but can be eliminated by programming at least one channel in each group.

1. Remove the 4 screws securing the radio top and bottom covers and remove the covers.
2. Remove the 4 screws securing the front panel assembly to the radio. Carefully slide the front panel assembly forward and away from the radio.
3. Remove the 2 screws securing the display/switch PCB (CX-03) and carefully separate the PCB from the front panel.
4. Note the mounting locations for the switches S301 and S302 and LEDs D302 and D303. Using a solder-sipper or solderwick, carefully remove solder from the switch and diode mounting holes.
5. Install S301 and S302 in the same manner as the monitor switch S303 already installed. Make sure the switches fit completely against the PCB before soldering.
6. Install the yellow LEDs D302 and D303 with the flat side toward the TX/Busy LED (LED's will not seat completely unless oriented correctly).
7. Push the blue switch covers on S301 and S302.
8. Remove the face plate by pushing from the rear of the front panel through the two available holes.
9. Remove the protective backing from the new face plate and carefully press it in place.
10. Carefully re-install the CX-03 PCB in place on the front panel, checking for proper switch operation.
11. Reinstall the front panel assembly on the radio.
12. Remove the clear sleeving and the jumper plug from P1, the floating option connector. Install the jumper plug from the kit (see below) and re-install the sleeving. If the CTCSS option board is installed, this jumper plug is not used.
13. Install an E/PROM module programmed for scan operation and confirm correct operation. Reinstall the unit covers.

## 70-2141 KIT COMPONENTS

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>
Yellow LED	2	70-085052
Pushbutton Switch	2	70-180012
Switch Cover	2	70-110013
Scan Faceplate	1	70-020066
Jumper Plug	1	70-159109





# 70-2142 SCAN KIT INSTALLATION INSTRUCTIONS

TRUNK MOUNT MODELS ONLY

## NOTE

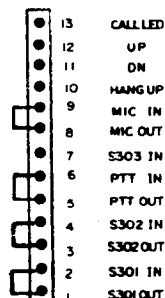
When programming the E/PROM for scan operation, it is recommended that channels be programmed in both scan groups (primary and secondary). If one scan group is left unprogrammed, engaging the corresponding scan button on the radio may result in a lockup condition preventing manual channel change. This condition is removed when unit power is cycled off and on, but can be eliminated by programming at least one channel in each group.

1. Remove the 2 thumb screws securing the mounting bracket to the control head. Remove the 2 screws securing the rear cover and remove the cover.
2. Remove the 2 screws securing the front panel assembly. Carefully remove the front panel assembly.
3. Remove the 3 control knobs.
4. Note the mounting locations for the switches S301 and S302 and LEDs D302 and D303. Using a solder-sipper or solderwick, carefully remove solder from the switch and diode mounting holes.
5. Install S301 and S302 in the same manner as the monitor switch S303 already installed. Make sure the switches fit completely against the PCB before soldering.
6. Install the yellow LEDs D302 and D303 with the flat side toward the TX/Busy LED (LEDs will not seat completely unless oriented correctly).
7. Push the blue switch covers on S301 and S302.
8. Remove the face plate by pushing from the rear of the front panel through the two available holes.
9. Remove the protective backing from the new face plate and carefully press it in place.
10. Carefully re-install the control knobs, checking for proper orientation.
11. Reinstall the front panel assembly, rear cover and mounting bracket.
12. Remove the radio bottom cover for access to the option area. Remove the clear sleeving and the jumper plug from P1, the floating option connector. Install the jumper plug from the kit and re-install the sleeving. If the CTCSS option board is installed, this jumper plug is not used.
13. Install an E/Prom module programmed for scan operation and confirm correct operation. Reinstall the unit covers.

## 70-2142 KIT COMPONENTS

DESCRIPTION	QUANTITY	PART NUMBER
Yellow LED	2	70-085052
Pushbutton Switch	2	70-180012
Switch Cover	2	70-110013
Scan Faceplate	1	70-020067
Jumper plug	1	70-159109

J1  
(SCAN TYPE)



# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

70-2151/2152  
SYN-TECH UNDER-DASH/TRUNK-MOUNT  
TWO TONE SEQUENTIAL  
SELECTIVE SIGNALLING SYSTEM

The 70-2151/2152 is a universal Two Tone Sequential decoding system for the SYN-TECH line of MIDLAND LAND MOBILE radios, featuring compatibility with fast or slow format systems, tones ranging from 280 through 3500Hz, Group Call and a variety of output functions.

## Specifications

Operational Temperature Range: -30 to +60 degrees celsius.

Tone Frequency Range: 280Hz to 3500Hz in two continuously tunable bands, jumper selected. Band 1 is from 280Hz to 1200Hz. Band 2 is from 900Hz to 3500Hz. Tones 1 and 2 are totally independent and may be in either band.

Decode Bandwidth: +/- 1.5% nominal, +/- 2.5% maximum, +/- 1% minimum.

Center Frequency Drift: less than +/- .5% over operational temperature range.

Decode Modulation Threshold: less than 1.5kHz deviation.

Signaling Formats (jumper selectable):

- Slow - Tone 1 duration more than 600mS, Intertone delay less than 600mS, Tone 2 duration more than 600mS.
- Fast - Tone 1 duration more than 70mS, Intertone delay less than 120mS, Tone 2 duration more than 70mS.

Group Call Format (jumper selectable on Tone 1, Tone 2 or disabled):  
Tone duration more than 4 seconds.

Output Modes:

1. Latched - continuously active when triggered, resets when decoder is disabled.
2. Latched Interrupted - continuously active and pulsing at 1Hz when triggered, resets when decoder is disabled.
3. Momentary - active for approximately 8 seconds after last triggering and is retriggerable. Output is aborted when decoder is disabled.
4. Momentary Interrupted - active and pulsing at 1Hz for approximately 8 seconds after last triggering and is retriggerable. Output is aborted when decoder is disabled.

# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

Output Types (all jumper programmable to any output mode):

1. Receiver Muting - receiver remains muted until output mode (usually Latched or Momentary) is triggered or decoder is disabled.  
Note: Noise squelch and CTCSS, if installed, also control muting.
2. Alarm Tone - a 500Hz tone, approximately 10V peak to peak amplitude generated at the receiver audio output terminals. Level and pitch can be varied by changing resistor values.
3. CALL Light - bright yellow LED located on front panel of radio.
4. Relay #1 - SPDT contacts, MAXIMUM CURRENT - 1 AMP! Can be enabled by panel switch (HORN). May be jumper connected to AUX 1, AUX 2 and/or chassis ground for controlling external devices such as a vehicle horn. An external power relay is required if more current handling capacity than 1 amp is needed. NOTE: AUX 1 connects to pin 1 and AUX 2 connects to pin 8 of the radio power/accessory jack.
5. Relay #2 - SPDT contacts, MAXIMUM CURRENT - 1 AMP! May be jumper connected to AUX 1, AUX 2 and/or chassis ground for controlling external devices such as a signalling lamp. An external power relay is required if more current handling capacity than 1 amp is needed. NOTE: AUX 1 connects to pin 1 and AUX 2 connects to pin 8 of the radio power/accessory jack.

The standard configuration of the 70-2151/2152 is as follows:

1. Format - Slow.
2. Tone Range - Band 1 (280 to 1200Hz).
3. Tone 1 - 1092.4Hz.
4. Tone 2 - 288.5Hz.
5. Group Call - Disabled.
6. Receiver Muting - Disabled.
7. Alarm Tone - Momentary Interrupted mode.
8. Call LED - Latched Interrupted mode.
9. Relay #1 - Momentary Interrupted mode, HORN button enabled, normally open contact pair across AUX 2 and chassis ground.
10. Relay #2 - Latched Interrupted mode, normally open contact pair across AUX 1 and chassis ground.

# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

## Decoder Board Preparation

### Format Selection:

1. Fast Format - install jumpers JP3, JP4 and JP7.
2. Slow Format - remove jumpers JP3, JP4 and JP7.

### Tone Band Selection:

1. Tone 1, Band 1 (280 to 1200Hz) - remove jumpers JP1 and JP2.
2. Tone 1, Band 2 (900 to 3500Hz) - install jumpers JP1 and JP2.
3. Tone 2, Band 1 (280 to 1200Hz) - remove jumpers JP5 and JP6.
4. Tone 2, Band 2 (900 to 3500Hz) - install jumpers JP5 and JP6.

### Group Call Selection:

1. Tone 1 - Remove all connections to points 46 and 21, then jumper points 19 and 20.
2. Tone 2 - Remove all connections to points 46 and 19, then jumper points 20 and 21.
3. Disable Group Call - remove all connections to points 19 and 21, then jumper points 20 and 46.

### Output Function Selection:

1. Receiver Muting - connect point 23 or 24 to desired mode point. Receiver Muting will be disabled if points 23 and 24 are open circuited.
2. Alarm Tone - connect point 26 or 27 to desired mode point. Alarm Tone will be disabled if points 26 and 27 are open circuited.
3. Call Light - connect point 29 or 30 to desired mode point. Call Light will be disabled if points 29 and 30 are open circuited.
4. Relay #1 - connect point 32 or 33 to desired mode point. Relay #1 will be disabled if points 32 and 33 are open circuited. Contacts are available at points 36, 37 and 38 for connection to AUX 1, AUX 2 or chassis ground. The Horn switch may be freed for other use by installing JP8 and removing JP9.
5. Relay #2 - connect point 34 or 35 to desired mode point. Relay #2 will be disabled if points 34 and 35 are open circuited. Contacts are available at points 39, 40 and 41 for connection to AUX 1, AUX 2 or chassis ground.

### Output Mode Selection Points:

1. Latched - point 25.
2. Latched Interrupted - point 31.
3. Momentary - point 22.
4. Momentary Interrupted - point 28.

### Call/Hangup Box use:

1. To use a Call/Hangup Box with the 70-2151/2152, remove JP20. The decoder will be disabled when the microphone goes off hook, allowing channel monitoring before transmitting. The decoder will be reset if the SET button is in and the microphone is placed back on hook.

# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

## Under-Dash Installation: 70-2151

1. Remove top and bottom covers from radio.
2. Remove Front Panel entirely from chassis, CX-03 PCB and Volume holder.
3. Push Face Plate out of Front Panel. Clean the newly exposed surface and remove any adhesive left behind.
4. Remove protective film from front and back of the replacement Selective Signaling Face Plate. Do not touch revealed adhesive surface on the back of the plate.
5. Carefully align plate with the Front Panel and press into place.
6. Solder S301 and D303 into place on the CX-03 PCB and push Switch Button onto S301 shaft . Remove D302, D304 and S302 if present.
7. Reassemble Volume Holder, CX-03 and the Front Panel then reattach to the radio chassis.
8. Plug the P357 and P358 cables into J357 and J358 on the receiver board.
9. Plug P1 and P3 into J1 and J3 on the decoder board.
10. Screw Brass Standoff into center hole in the option area, between the receiver board and front panel.
11. Carefully position the decoder board so that it does not short to anything and access to RV1, RV2, TP1, TP2 and TP3 is possible.

## Trunk-Mount Installation: 70-2152

1. Remove case covers from Remote Unit and the Control Head.
2. Remove Front Panel entirely from the CX-07 PCB and Control Head chassis.
3. Push Face Plate out of Front Panel. Clean the newly exposed surface and remove any adhesive left behind.
4. Remove protective film from front and back of the replacement Selective Signaling Face Plate. Do not touch revealed adhesive surface on the back of the plate.
5. Carefully align plate with the Front Panel and press into place.
6. Solder S301 and D303 into place on the CX-07 PCB and push Switch Button onto S301 shaft . Remove D302, D304 and S302 if present.
7. Re-assemble Control Head chassis, CX-07 and the Front Panel then re-attach to the Control Head Cover.
8. Plug the P357 and P358 cables into J357 and J358 on the receiver board.
9. Plug P1 and P3 into J1 and J3 on the decoder board.
10. Screw Brass Standoff into center hole in the option area, between the receiver board and front panel.
11. Carefully position the decoder board so that it does not short to anything and access to RV1, RV2, TP1, TP2 and TP3 is possible.

# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

## Alignment

1. Necessary Test Equipment.
  - a. FM Signal Generator.
  - b. Two Tone Sequential Encoder.
  - c. Variable Frequency Audio Generator, 280 to 3500Hz range.
  - d. AC Voltmeter.
  - e. AF frequency counter (optional).
  - f. Power Supply.
2. Connect radio to power supply and RF generator.
3. Turn on radio and set to desired channel.
4. Tone tuning method using tone generator:
  - a. Tune generator to radio channel frequency, set RF level to 100uV and modulate at 3kHz deviation and Tone 1 frequency.
  - b. Measure AC voltage at TP1 and adjust RV1 for maximum indication.
  - c. Set modulation frequency to Tone 2 and adjust RV2 for maximum AC voltage at TP2.
4. Tone tuning method using AF frequency counter:
  - a. Set counter for .1Hz resolution and attach input to TP3.
  - b. Temporarily connect TP1 to TP3. (causes Tone 1 filter to oscillate at its' resonant frequency)
  - c. Adjust RV1 for Tone 1 frequency.
  - d. Disconnect TP1 and TP3 then connect TP2 and TP3.
  - e. Adjust RV2 for Tone 2 frequency.
  - f. Disconnect TP2, TP3 and frequency counter.
5. Performance Test:
  - a. Tune generator to channel frequency, set RF level to .25uV and connect Two Tone Sequential Encoder to external modulation input of signal generator. Set encoder level for 3kHz deviation.
  - b. Put SET button in OUT position and then in again. (resets decoder)
  - c. Generate the Two Tone Sequential code and verify proper decode output function(s).
  - d. Turn off radio and disconnect power supply.

## Assembly

1. Position decoder board so that center hole is aligned with the top of the Brass Standoff and start a 3x6mm screw into the Standoff— but do not tighten! Check for mis-positioned wires that might get pinched and move as needed.
2. Start 4 more 3x6mm screws, one at each corner of the decoder board, and tighten all five screws.
3. Replace radio covers and repeat the performance test.
4. The radio is now ready for installation.

# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

## Operation

To enable the decoder:

1. Turn on the radio and push in the SET button.
2. If a Call/Hangup Box is used, the microphone must be in place.

To disable the decoder:

1. Turn off the radio or push out the SET button.
2. If a Call/Hangup Box is used, the decoder can be disabled by taking the microphone off hook.

To reset the decoder:

1. Turn the radio off then on or push the SET button out then in.
2. If a Call/Hangup Box is used, the decoder can be reset by taking the microphone off hook, then putting it back.

To enable the external HORN circuit:

1. Push in the HORN button.

To disable the external HORN circuit:

1. Push out the HORN button.



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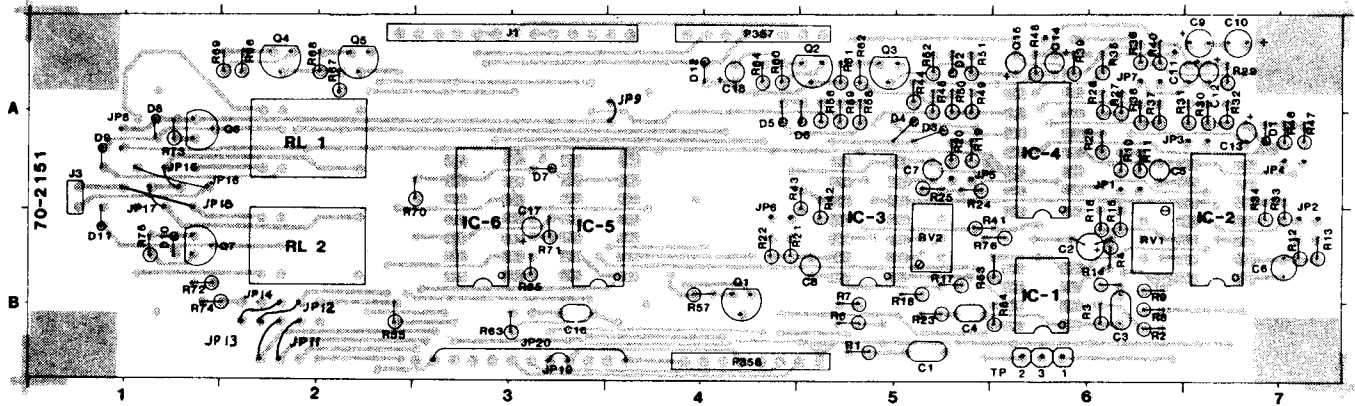
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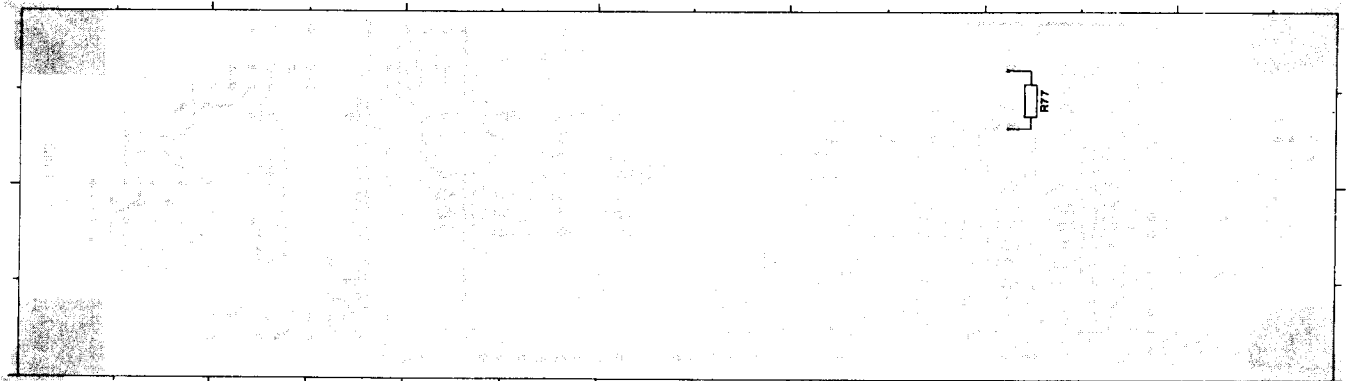


# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

## PC BOARD (TOP VIEW)

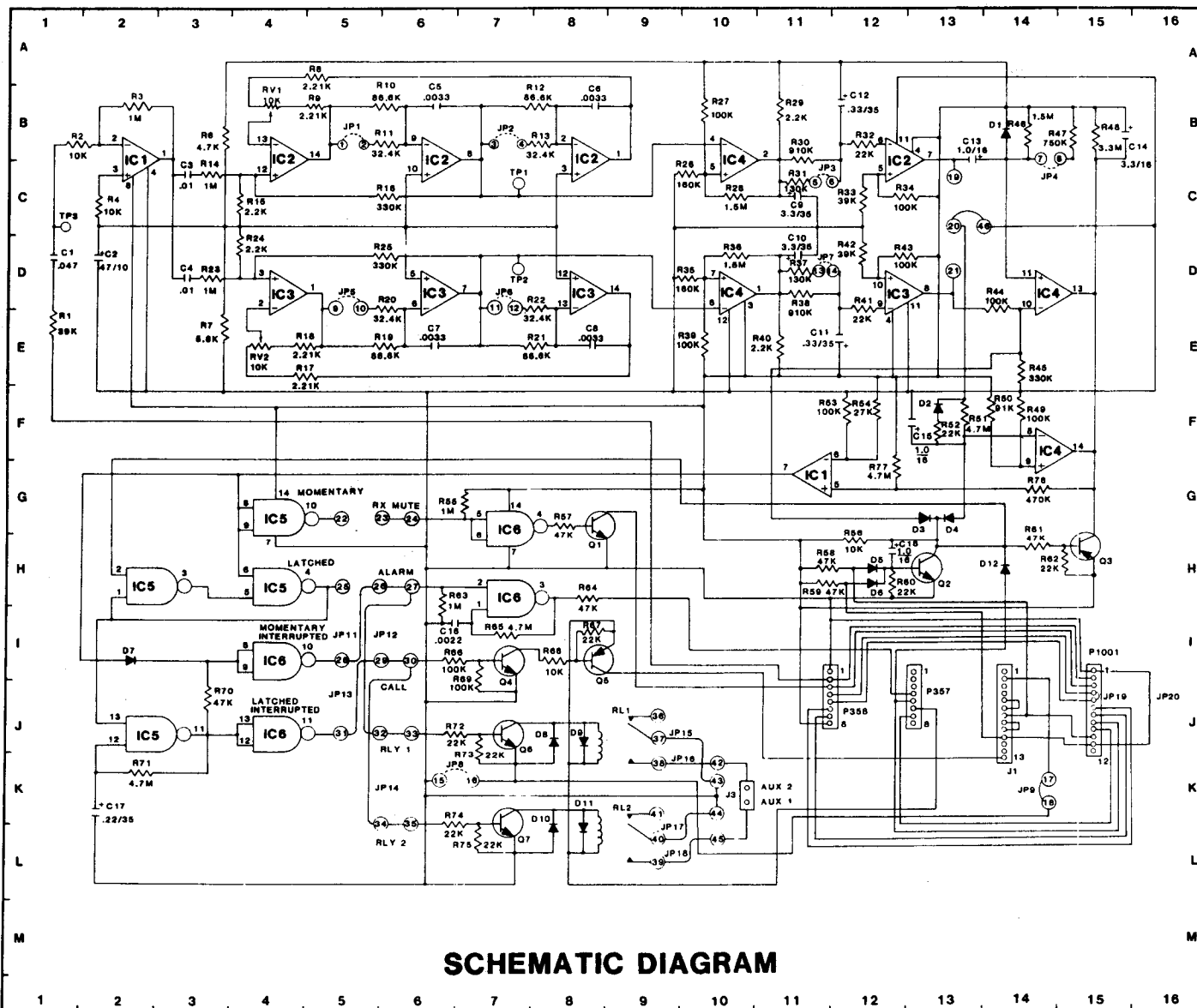
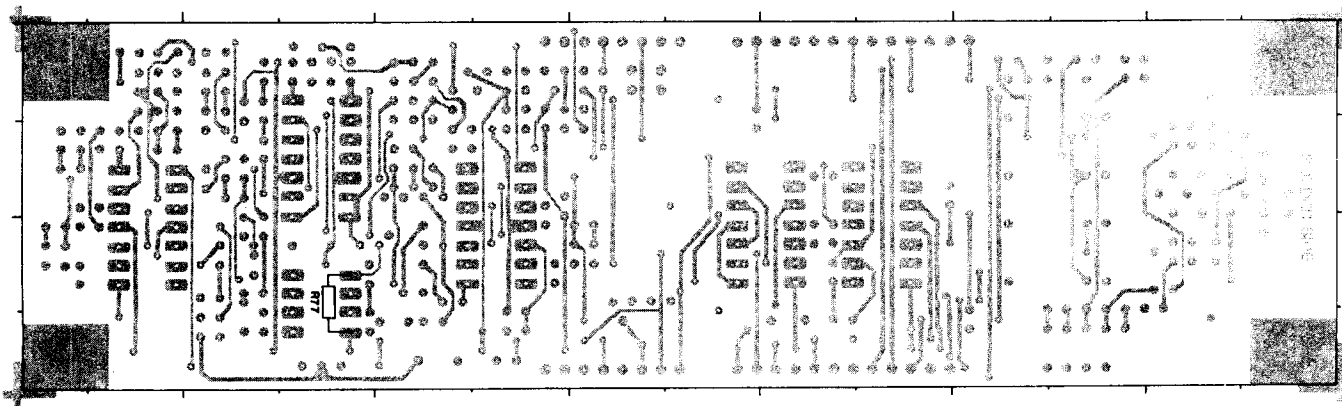


## PC BOARD (BOTTOM VIEW)



# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

## PC BOARD (BOTTOM VIEW)



# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

## PC BOARD PARTS LIST

REF#	LOC	SCH DESCRIPTION	PART#	REF#	LOC	SCH DESCRIPTION	PART#
C1	T B5	D1 .047UF MYLAR 20% 50V CAP.	70-137038	R1	T B5	E1 39K 1/4W 5% RES. CF	70-140034
C2	T B6	D2 47UF 10V AE CAP.	70-135009	R2	T B6	B1 10K 1/4W 5% RES. CF	70-140021
C3	T B6	C3 .01UF MYLAR 20% 50V CAP.	70-137053	R3	T B6	B2 1M 1/4W 5% RES. CF	70-140032
C4	T B5	D3 .01UF MYLAR 20% 50V CAP.	70-137053	R4	T B6	C2 10K 1/4W 5% RES. CF	70-140021
C5	T A6	B6 .0033UF C06 5% 50V CAP.	70-137054	R6	T B5	B3 4.7K 1/4W 5% RES. CF	70-140018
C6	T B6	B8 .0033UF C06 5% 50V CAP.	70-137054	R7	T B5	E3 5.6K 1/4W 5% RES. CF	70-140019
C7	T A5	E6 .0033UF C06 5% 50V CAP.	70-137054	R8	T B6	A5 2.21K 1/4W 1% RES. MF	70-140160
C8	T B5	E8 .0033UF C06 5% 50V CAP.	70-137054	R9	T B6	B5 2.21K 1/4W 1% RES. MF	70-140160
C9	T A7	C11 3.3UF 35V AE CAP.	70-138136	R10	T A6	B6 86.6K 1/4W 1% RES. MF	70-142025
C10	T A7	D11 3.3UF 35V AE CAP.	70-138136	R11	T A6	B6 32.4K 1/4W 1% RES. MF	70-140161
C11	T A7	E12 .33UF 35V TE 10% CAP.	70-138137	R12	T B7	B8 86.6K 1/4W 1% RES. MF	70-142025
C12	T A7	B12 .33UF 35V TE 10% CAP.	70-138137	R13	T B7	B8 32.4K 1/4W 1% RES. MF	70-140161
C13	T A7	B13 1UF 16V TE 20% CAP.	70-138022	R14	T B6	C3 1M 1/4W 5% RES. CF	70-140032
C14	T A6	B15 3.3UF 16V AE CAP.	70-138138	R15	T B6	C4 2.2K 1/4W 5% RES. CF	70-140024
C15	T A6	F13 1UF 16V TE 20% CAP.	70-138022	R16	T B6	C6 330K 1/4W 5% RES. CF	70-140043
C16	T B3	I7 .0022UF 50V MYLAR 20% CAP.	70-137001	R17	T B5	E5 2.21K 1/4W 1% RES. MF	70-140160
C17	T B3	K2 .22UF 35V TA 20% CAP.	70-138028	R18	T B5	E5 2.21K 1/4W 1% RES. MF	70-140160
C18	T A4	H12 1UF 16V TA 20% CAP.	70-138022	R19	T A5	E6 86.6K 1/4W 1% RES. MF	70-142025
D1	T A7	B14 1S2075K DIODE	70-085001	R20	T A5	D6 32.4K 1/4W 1% RES. MF	70-140161
D2	T A5	F13 1S2075K DIODE	70-085001	R21	T B5	E8 86.6K 1/4W 1% RES. MF	70-142025
D3	T A5	G13 1S2075K DIODE	70-085001	R22	T B4	D8 32.4K 1/4W 1% RES. MF	70-140161
D4	T A5	G13 1S2075K DIODE	70-085001	R23	T B5	D3 1M 1/4W 5% RES. CF	70-140032
D5	T A4	H12 1S2075K DIODE	70-085001	R24	T A5	D4 2.2K 1/4W 5% RES. CF	70-140015
D6	T A5	H12 1S2075K DIODE	70-085001	R25	T A5	D6 330K 1/4W 5% RES. CF	70-140043
D7	T A3	I2 1S2075K DIODE	70-085001	R26	T A6	C10 160K 1/4W 5% RES. CF	70-140149
D8	T A1	J8 1S2075K DIODE	70-085001	R27	T A6	B10 100K 1/4W 5% RES. CF	70-140042
D9	T A1	J8 1S2075K DIODE	70-085001	R28	T A6	C10 1.5M 1/4W 5% RES. CF	70-140148
D10	T B1	L8 1S2075K DIODE	70-085001	R29	T A7	B11 2.2K 1/4W 5% RES. CF	70-140015
D11	T B1	L8 1S2075K DIODE	70-085001	R30	T A7	B11 910K 1/4W 5% RES. CF	70-140154
D12	T A4	H14 1S2075K DIODE	70-085001	R31	T A7	C11 130K 1/4W 5% RES. CF	70-140126
IC1	T B6	B2 TA7558P DUAL OP-AMP	70-076169	R32	T A7	B12 22K 1/4W 5% RES. CF	70-140024
IC2	T B7	B8 TL0841N QUAD FET OP-AMP	70-076170	R33	T A7	C12 39K 1/4W 5% RES. CF	70-140034
IC3	T B5	D4 TL0841N QUAD FET OP-AMP	70-076170	R34	T A7	C12 100K 1/4W 5% RES. CF	70-140042
IC4	T A6	D10 LM2901N QUAD COMPARATOR	70-076171	R35	T A6	D10 160K 1/4W 5% RES. CF	70-140149
IC5	T B3	H2 MC14093P QUAD 2 INPUT NAND 6	70-076172	R36	T A6	D10 1.5M 1/4W 5% RES. CF	70-140148
IC6	T B3	H7 MC14093P QUAD 2 INPUT NAND 6	70-076172	R37	T A6	D11 130K 1/4W 5% RES. CF	70-140126
J1	T A3	J14 13 PIN JACK	70-159098	R38	T A6	D11 910K 1/4W 5% RES. CF	70-140154
J3	T A1	K10 2 PIN JACK	70-159138	R39	T A6	E10 100K 1/4W 5% RES. CF	70-140042
P357	T A4	J13 8 WIRE CABLE 100MM LEN	70-034101	R40	T A6	E11 2.2K 1/4W 5% RES. CF	70-140015
P358	T B4	J12 8 WIRE CABLE 150MM LEN	70-034100	R41	T B5	D12 22K 1/4W 5% RES. CF	70-140024
PCB	-- --	PRINTED CIRCUIT BOARD BARE	70-070114	R42	T A5	D12 39K 1/4W 5% RES. CF	70-140034
Q1	T B4	G8 2SC945 NPN SS B=150	70-080005	R43	T A5	D13 100K 1/4W 5% RES. CF	70-140042
Q2	T A5	H13 2SC945 NPN SS B=150	70-080005	R44	T A5	D14 100K 1/4W 5% RES. CF	70-140042
Q3	T A5	H15 2SA952 PNP SS B=150	70-080136	R45	T A5	E14 330K 1/4W 5% RES. CF	70-140043
Q4	T A2	I7 2SC945 NPN SS B=150	70-080005	R46	T A7	B14 1.5M 1/4W 5% RES. CF	70-140148
Q5	T A2	I8 2SA952 PNP SS B=150	70-080136	R47	T A7	B15 750K 1/4W 5% RES. CF	70-140152
Q6	T A1	J7 2SC945 NPN SS B=150	70-080005	R48	T A6	B15 3.3M 1/4W 5% RES. CF	70-140150
Q7	T B1	L7 2SC945 NPN SS B=150	70-080005	R49	T A5	F14 100K 1/4W 5% RES. CF	70-140042
				R50	T A5	F14 91K 1/4W 5% RES. CF	70-140153
				R51	T A5	F13 4.7M 1/4W 5% RES. CF	70-141108
				R52	T A5	F13 22K 1/4W 5% RES. CF	70-140015
				R53	T B6	F12 100K 1/4W 5% RES. CF	70-140042
				R54	T B6	F12 27K 1/4W 5% RES. CF	70-140025
				R55	T B2	G7 1M 1/4W 5% RES. CF	70-140032
				R56	T A5	H12 10K 1/4W 5% RES. CF	70-140021
				R57	T B4	G8 47K 1/4W 5% RES. CF	70-140027
				R58	T A5	H11 47K 1/4W 5% RES. CF	70-140027
				R59	T A5	H11 47K 1/4W 5% RES. CF	70-140027
				R60	T A4	H12 22K 1/4W 5% RES. CF	70-140024
				R61	T A5	H14 47K 1/4W 5% RES. CF	70-140027

# 70-2151/2152 TWO TONE SEQUENTIAL DECODER

## PC BOARD PARTS LIST

REF#	LOC	SCH DESCRIPTION	PART#
R62	T A5	H15 22K 1/4W 5% RES. CF	70-140024
R63	T B3	H6 1M 1/4W 5% RES. CF	70-140032
R64	T A4	H8 47K 1/4W 5% RES. CF	70-140027
R65	T B3	I7 4.7M 1/4W 5% RES. CF	70-141108
R66	T A2	I6 100K 1/4W 5% RES. CF	70-140042
R67	T A2	I8 22K 1/4W 5% RES. CF	70-140024
R68	T A2	I8 10K 1/4W 5% RES. CF	70-140021
R69	T A2	I7 100K 1/4W 5% RES. CF	70-140042
R70	T A3	J3 47K 1/4W 5% RES. CF	70-140027
R71	T B3	K2 4.7M 1/4W 5% RES. CF	70-141108
R72	T B1	J7 22K 1/4W 5% RES. CF	70-140024
R73	T A1	J7 22K 1/4W 5% RES. CF	70-140024
R74	T B1	L7 22K 1/4W 5% RES. CF	70-140024
R75	T B1	L7 22K 1/4W 5% RES. CF	70-140024
R76	T B6	G14 470K 1/4W 5% RES. CF	70-140031
R77	B B6	G12 4.7M 1/4W 5% CF AX RESISTOR	70-141112
RL1	T A2	J9 RELAY 1AMP SPDT 12VDC	70-105013
RL2	T B2	K9 RELAY 1AMP SPDT 12VDC	70-105013
RV1	T B6	B4 10K POT. 25T	70-123039
RV2	T B5	E4 10K POT. 25T	70-123039
TP123	T B6	C7 3 PIN TEST POINT	70-159140

## 70-2151 KIT PARTS LIST

REF#	LOC	SCH DESCRIPTION	PART#
		2 TONE DECODER PCB ASSEMBLED	70-075032
		BUTTON-BLUE	70-110013
		UD TRIM PLATE	70-020073
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		26.5mm BRASS STANDOFF	70-156072
D303		LED-YELLOW	70-085052
S301		PUSH-PUSH SWITCH	70-180012

## 70-2152 KIT PARTS LIST

REF#	LOC	SCH DESCRIPTION	PART#
		2 TONE DECODER PCB ASSEMBLED	70-075032
		BUTTON-BLUE	70-110013
		TM TRIM PLATE	70-020074
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		3x6mm B.H. NI. PLTD. SCREW	70-151355
		26.5mm BRASS STANDOFF	70-156072
D303		LED-YELLOW	70-085052
S301		PUSH-PUSH SWITCH	70-180012

# 70-2191 NOISE BLANKER KIT

1. Install the band selection capacitors C621 and C622 (included with kit) as necessary per the following chart.

<u>Frequency Band</u>	<u>C621, C622 Required</u>
A (29-37 MHz)	22 pf
B (35-44 MHz)	8 pf
C (40-54 MHz)	NONE

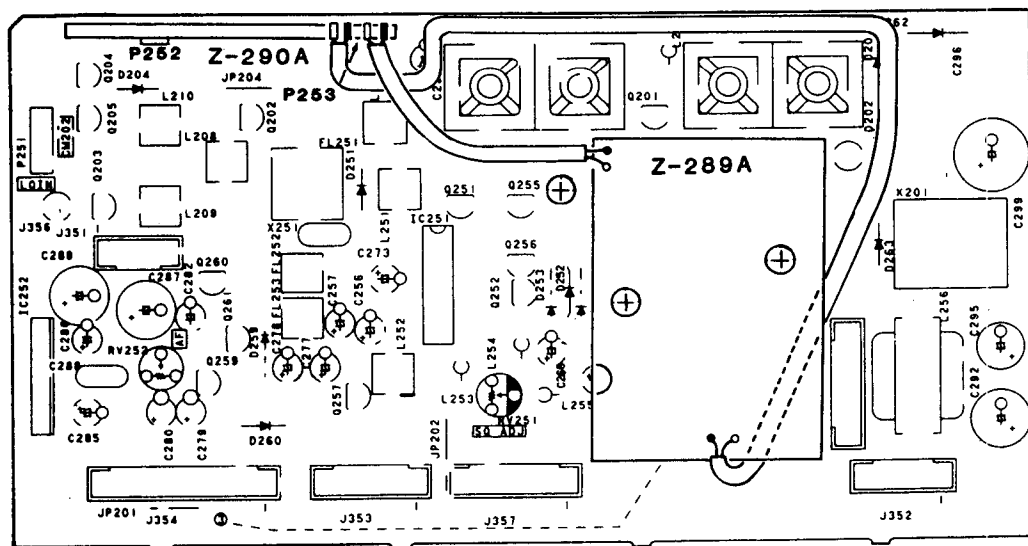
C621/622 mounting locations are on the Z-289A Amplifier board, next to L601 and L602 respectively.

2. Remove the 4 screws securing the radio bottom cover and remove the cover.
3. Carefully install the Z-289A Amplifier board in the location shown below, mating the pins of P250 into J250 on the receiver board.
4. Routing the shielded cable as illustrated, install the Delay Line board Z-290A, mating J252 to P252 and J253 to P253. Cut jumper JP204, located on the receiver board directly in front of the Z-289A Delay Line board.
5. With the Noise Blanker switch "off" (Z-289A Amplifier board), align the radio receiver in the normal manner. Switch the Noise Blanker "ON" and input to the antenna connector an unmodulated 50 millivolt signal at a frequency 2 MHz below the lowest receive frequency. Connect a 50 micro-amp meter between the cathode of D602 and ground. Align L601 and L602 for a maximum meter indication.

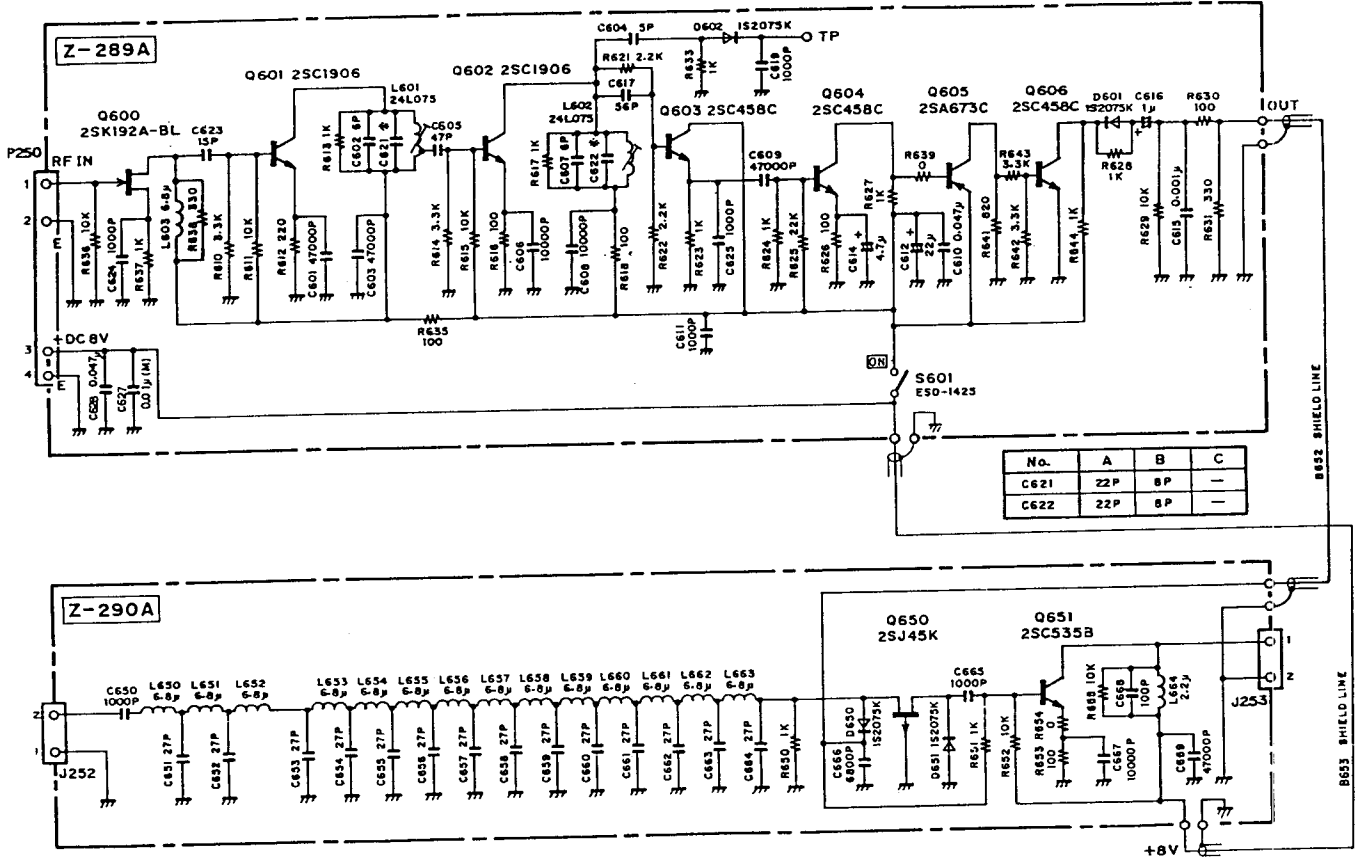
## 70-2191 Kit Components

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>
Z-289A/Z-290A PCB Assembly	1	- - - - -
8pf 50V Ceramic Capacitor	2	70-131143
22pf 50V Ceramic Capacitor	2	70-131227

## INSTALLATION DIAGRAM



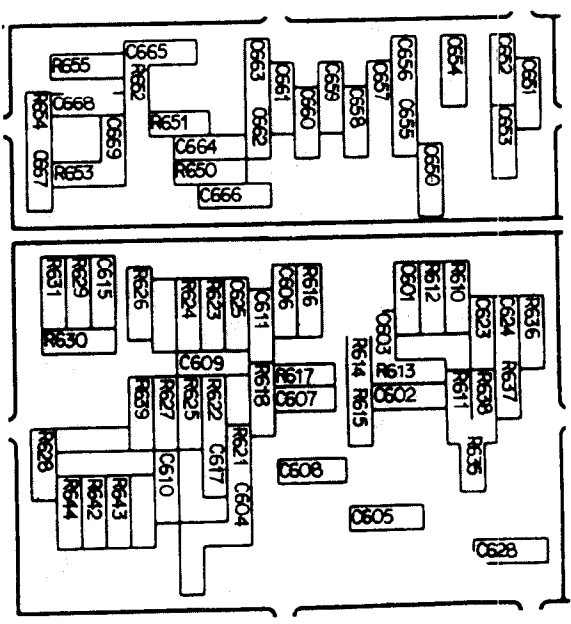
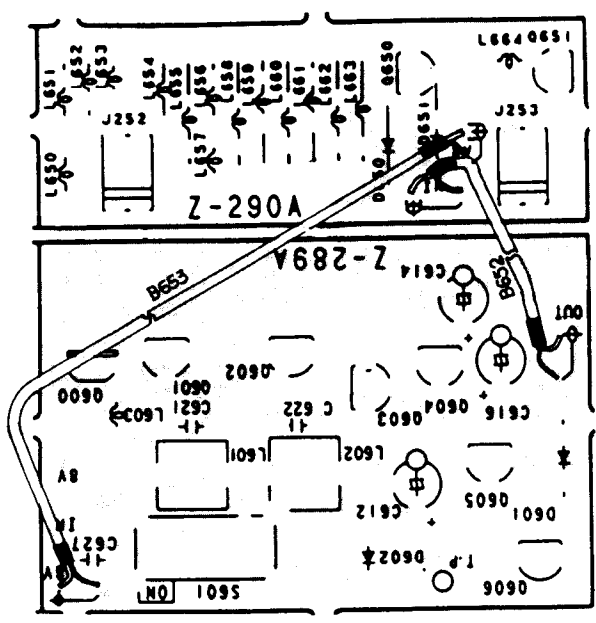
# 70-2191 NOISE BLANKER KIT SCHEMATIC DIAGRAM



## PC BOARDS

TOP VIEW

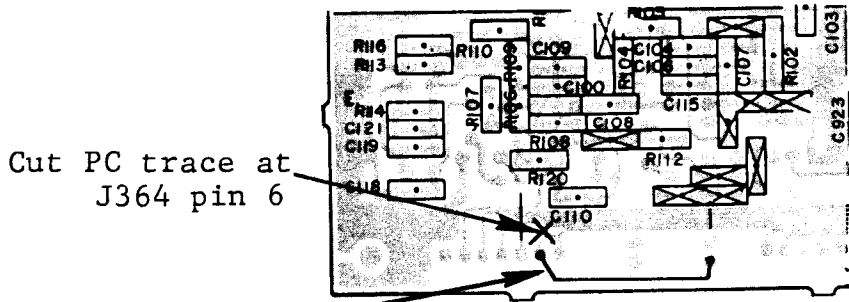
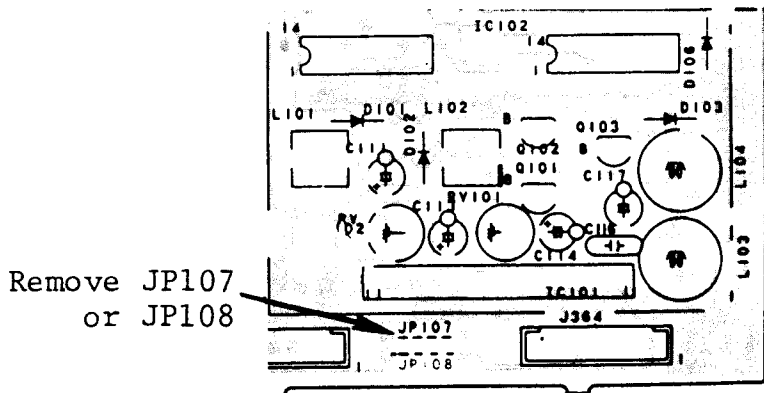
BOTTOM VIEW



# -tone-enabled TRANSMIT/RECEIVE

The referenced SYNTECH transceivers can be configured to allow tone-enabled receive and transmit operation. In this mode only correctly coded signals are received and transmitter activation can occur only while the correct tone is being received.

1. Remove the transmit/synthesizer board from the unit. Remove the jumper installed in the JP107 or JP108 position. Both jumper positions must be empty.
2. On the bottom of the transmit/synthesizer board, cut the PC trace at J364 pin 6. Install an insulated jumper wire from J364 pin 6 to the JP107 or JP108 hole closest to J362.
3. Remove the wire (S303, monitor switch) from P1 pin 7.
4. Install JP2 on the CTCSS board.
5. Program the E/PROM for the desired channel and tone frequencies. The BCLO function should be programmed Code 2 to give the user an audible indication that transmit is not occurring.



# 70-K33 DESK MIC ADAPTOR KIT INSTALLATION INSTRUCTIONS

The 70-2305 microphone is a dynamic type with an integral amplifier, automatic sensitivity control circuit and an output converter for driving carbon type transceiver inputs. The push-to-talk switch is a normally-open type that contacts to ground on transmit and the monitor switch is a normally-closed type also contacting to the same ground. Operating power for the electronics is obtained from the transceiver through a connection to a source of filtered +13.8 volts D.C. The 70-2305 pinouts are as follows.

<u>PIN</u>	<u>COLOR</u>	<u>FUNCTION</u>
1	RED (shielded)	Filtered +13.8 VDC
2	SHIELD (SH 2)	Shield for 1 and switch ground
3	BLUE	Monitor switch (NC to ground)
4	WHITE (shielded)	Microphone audio output
5	SHIELD (SH 1)	Microphone audio shield
6	BLACK	Push-to-talk switch (NO)

To allow connection of the 70-2305 to the referenced mobile transceivers, the 4 pin microphone jack on the mobile unit can be replaced by a 6 pin jack. This replacement jack and sufficient wire to complete the modification are contained in kit number 70-K33, available from Midland. Replacement should be made as follows.

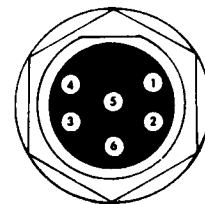
1. Remove the transceiver top and bottom covers. Remove the 4 screws securing the front panel to the unit and slide the front panel forward, separating it from the unit. Remove the 2 screws securing the CX-07 Display PCB assembly and separate it from the front panel.
2. Remove the 4 pin microphone jack J393 (the 70-156018 microphone jack removal tool is available for this purpose). Install the replacement jack in the front panel and reconnect the wires and capacitors according to the following chart.

### ORIGINAL J393 (4 PIN)

1 (BROWN), C391  
2 (RED), C391, C392  
4 (ORANGE), C392

### 6 PIN REPLACEMENT JACK

4 C391  
2 and 5 C391, C392  
6 C392  
1  
3



REAR VIEW

Pins 1 and 3 of the replacement jack must be connected to the transceiver to supply microphone power and allow control of the sub-audible tone squelch for monitoring. Using the wire supplied in the kit, connect mic jack pin 1 to J381 pin 3 and mic jack pin 3 to J381 pin 1. J381 is located at the rear of the front panel control PCB CX-04. Connections can most easily be made on the bottom of the PCB.

3. Carefully reinstall the CX-03 PCB, positioning C391 and C392 to fit through the hole directly behind the microphone jack. Reinstall the CS-03 retaining screws and reconnect the front panel to the radio. Remove JP-2 from 70-2102 CTCSS PC Board if installed.

### 70-K33 Kit Components

<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>PART NUMBER</u>
6 pin microphone jack	1	70-159058
24AWG wire, 15"	2	-----
	106	

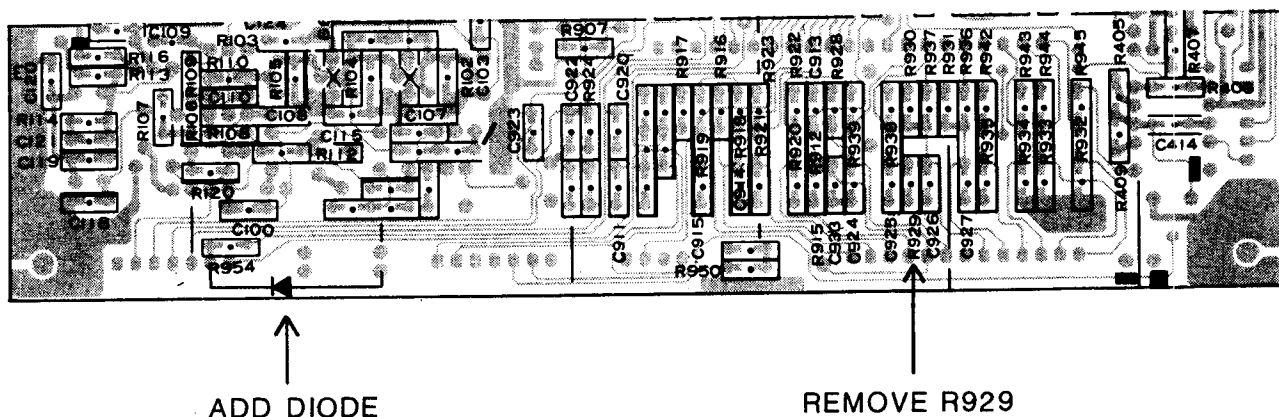


# SPECIAL BUSY CHANNEL LOCKOUT

All SYN-TECH transceivers can be configured to have a Special Busy Channel Lock Out (BCLO) function which may be useful in community repeater applications. When configured as described below, transmit is inhibited in the presence of carrier with no tone or incorrect tone. Transmit is enabled if no carrier is being received or if the carrier is modulated by the correct CTCSS tone (as programmed for that receive channel). This allows the repeater to be accessed when the channel is clear but also allows a reply to be initiated before the tone-modulated carrier drops out.

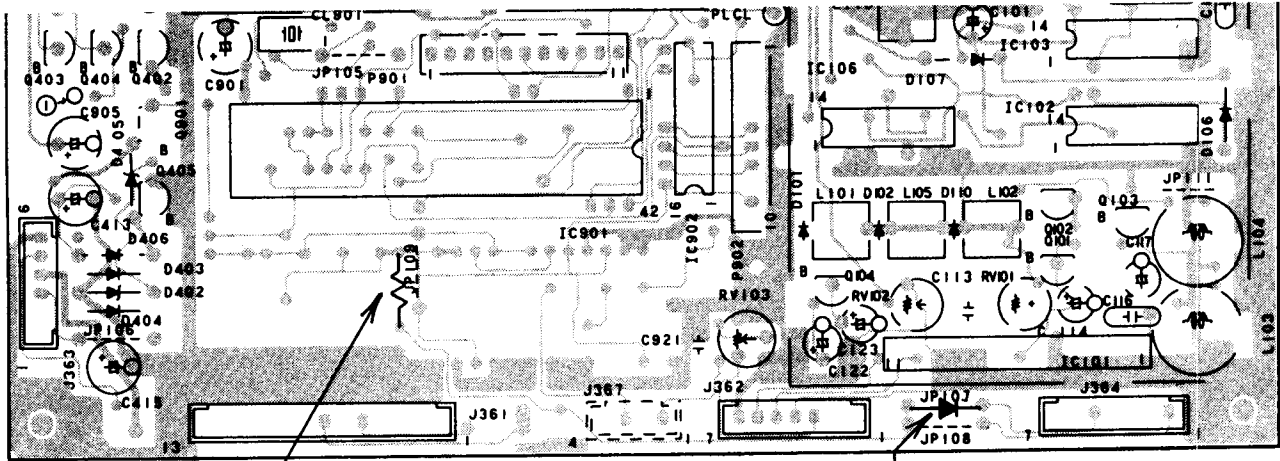
1. Remove the transmitter/synthesizer board from the unit. Remove jumpers which are installed in either the JP107 or JP108 position. Both jumper positions must be empty.
2. On the bottom of the PCB, remove chip resistor R929. Add a 1S2075 or similar diode between the JP108 right-hand hole (anode) and J364-6 (cathode).
3. On the top of the PCB, add a 1S2075 diode in the JP107 position (cathode to the right). Install a 22K 1/8 or 1/4 watt resistor in the location shown (beside JP109). Reinstall the transmitter/synthesizer board.
4. Program the E/PROM for the desired channel and tone frequencies and BCLO operation (BCLO with alert is recommended).

## TRANSMITTER/SYNTHESIZER PC BOARD (BOTTOM)



# SPECIAL BUSY CHANNEL LOCKOUT

## TRANSMITTER/SYNTHESIZER PC BOARD (TOP)



ADD 22K RESISTOR

ADD DIODE