

FIG. 5-3 TRANSMITTER TEST CONNECTION

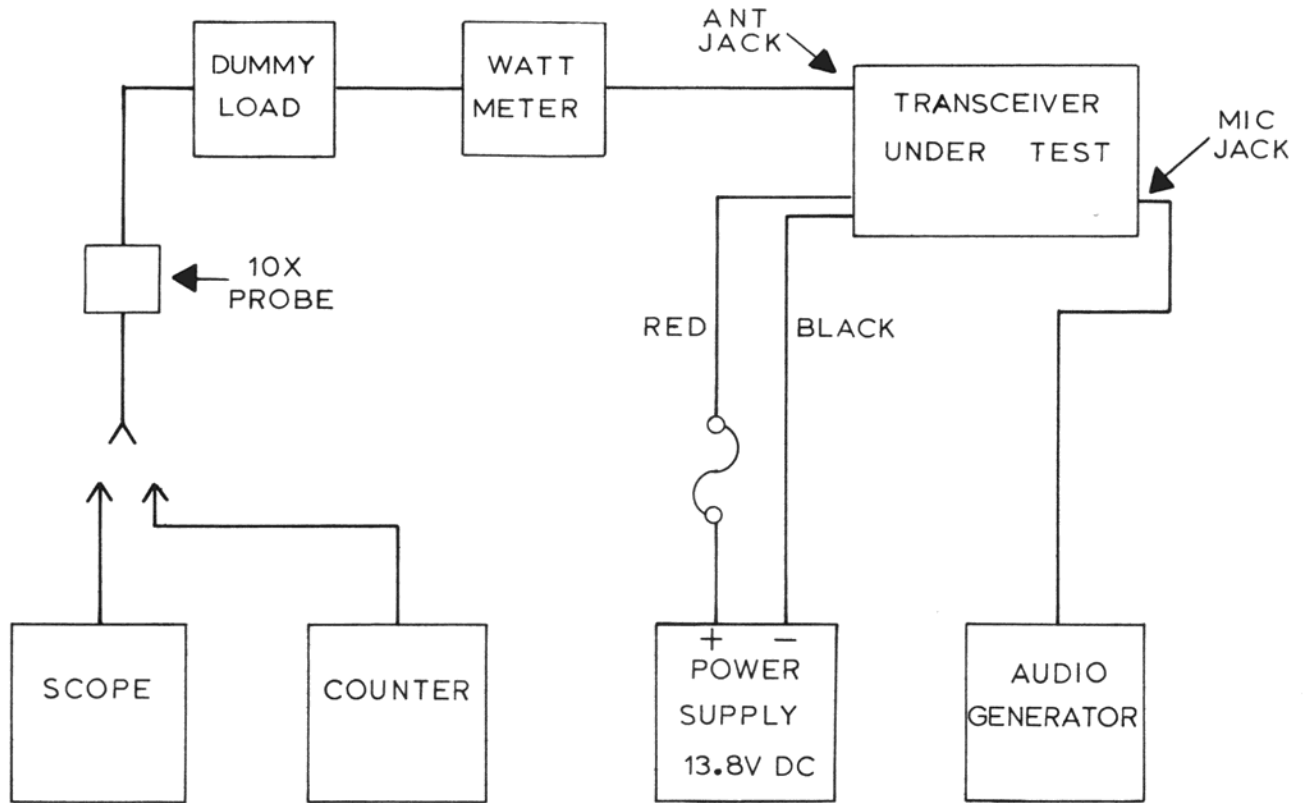


FIG. 5-4 RECEIVER TEST CONNECTION

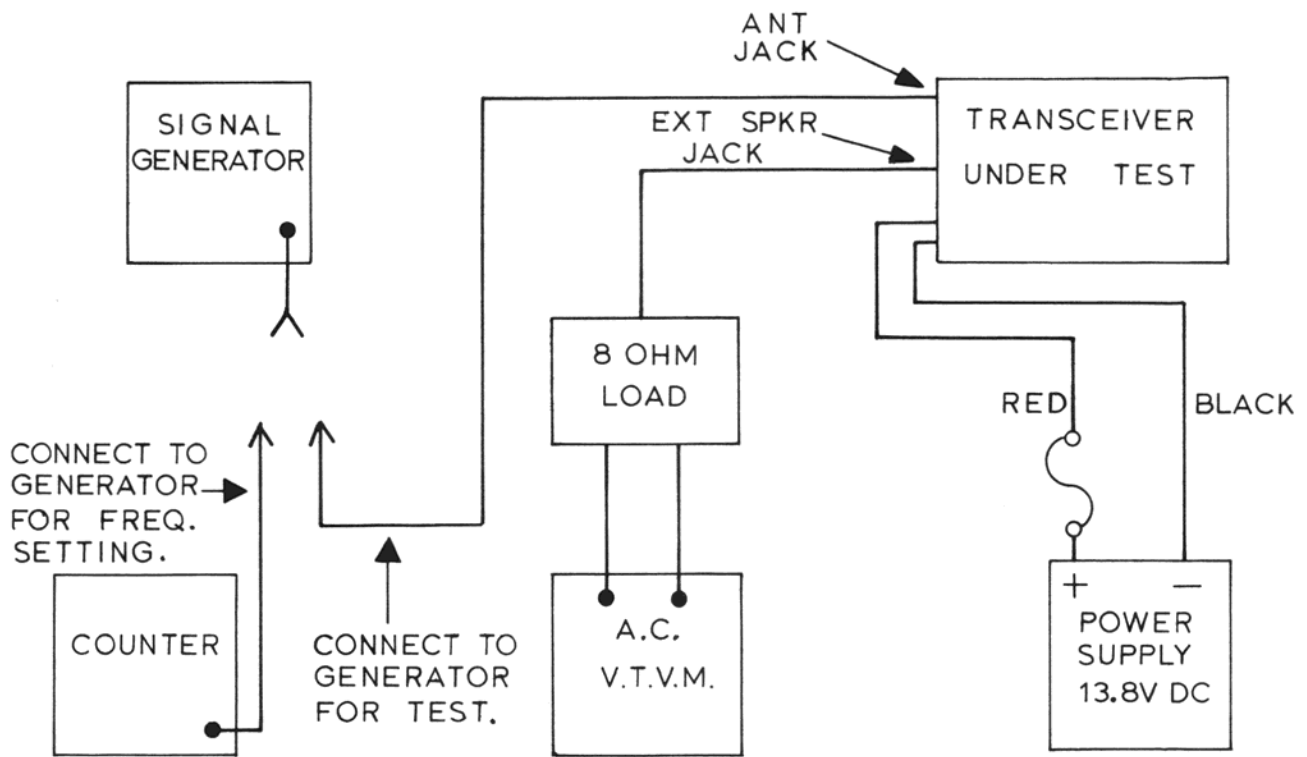


TABLE 5-5 DIGITAL SYNTHESIZER FREQUENCY SCHEME

VCO Frequency		CHANNEL SELECT CODE					Channel	
		IC-2	IC-1					
Transmit MHz	Receive MHz	Pin 3	Pin 6	Pin 5	Pin 4	Pin 3	No.	Frequency
16.727	16.270	1	1	1	1	0	1	26.965
16.737	16.280	1	1	1	0	1	2	26.975
16.747	16.290	1	1	1	0	0	3	26.985
16.767	16.310	1	1	0	1	0	4	27.005
16.777	16.320	1	1	0	0	1	5	27.015
16.787	16.330	1	1	0	0	0	6	27.025
16.797	16.340	1	0	1	1	1	7	27.035
16.817	16.360	1	0	1	0	1	8	27.055
16.827	16.370	1	0	1	0	0	9	27.065
16.837	16.380	1	0	0	1	1	10	27.075
16.847	16.390	1	0	0	1	0	11	27.085
16.867	16.410	1	0	0	0	0	12	27.105
16.877	16.420	0	1	1	1	1	13	27.115
16.887	16.430	0	1	1	1	0	14	27.125
16.897	16.440	0	1	1	0	1	15	27.135
16.917	16.460	0	1	0	1	1	16	27.155
16.927	16.470	0	1	0	1	0	17	27.165
16.937	16.480	0	1	0	0	1	18	27.175
16.947	16.490	0	1	0	0	0	19	27.185
16.967	16.510	0	0	1	1	0	20	27.205
16.977	16.520	0	0	1	0	1	21	27.215
16.987	16.530	0	0	1	0	0	22	27.225
17.017	16.560	0	0	0	0	1	23	27.255

REFERENCE OSCILLATOR Q10

TX = 10.238 MHz

RX = 10.240 MHz

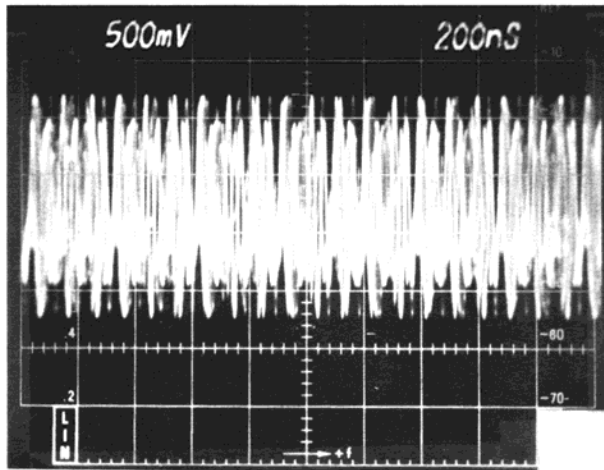
TX: VCO + 10.238 MHz = (CHAN. FREQ.)

RX: (CHAN. FREQ.) – VCO – 10.240 = 455 KHz IF

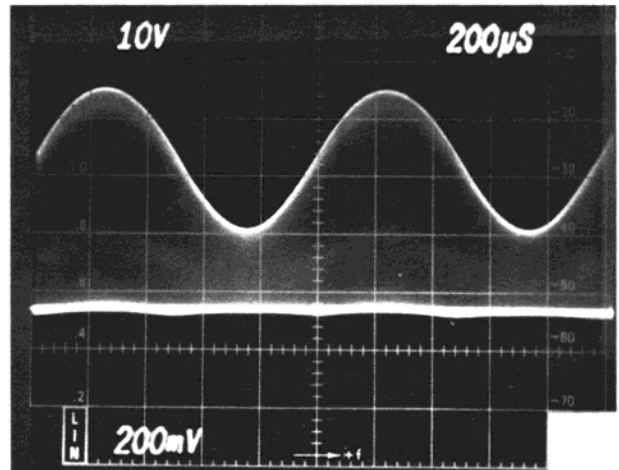
FIG. 5-6 TRANSMITTER ALIGNMENT PROCEDURE

<b>INITIAL SET-UP</b>
Connect the test equipment to the unit as shown in Figure 5-3. Set the delta tune control to the center position. Set the CB/PA switch in the CB position. Set the channel selector to channel 13.
<b><u>STEP 1</u></b> With no modulation, key the transmitter and adjust coils and transformers L3, L4, T7, L6, L8, L9 and L13 for maximum power output.
<b><u>STEP 2</u></b> With the transmitter keyed, observe the output envelope on the oscilloscope. Turn on the audio oscillator and set its output frequency to 1 KHz. Increase oscillator output while observing the modulation envelope on the oscilloscope. Set the audio oscillator output to a level that results in slight distortion of the positive peaks of the modulation.
<b><u>STEP 3</u></b> Adjust L6 counterclockwise until approximately 100% negative modulation is seen on the oscilloscope waveform. (See Fig. 5-8).
<b><u>STEP 4</u></b> Adjust the audio oscillator's level for 50% modulation. Read level on AC VTVM and increase level until the AC VTVM reads 8 times as great (about 18db). Adjust VR9 for 100% modulation.
<b><u>STEP 5</u></b> Remove audio oscillator. Adjust VR6 until RFO METER reads the same as wattmeter.
<b><u>STEP 6</u></b> Connect the frequency counter to the output of the transceiver. Key the transmitter with no modulation and note the frequency. If the frequency is more than 100 Hz from the channel frequency, adjust L11 for the correct channel frequency.

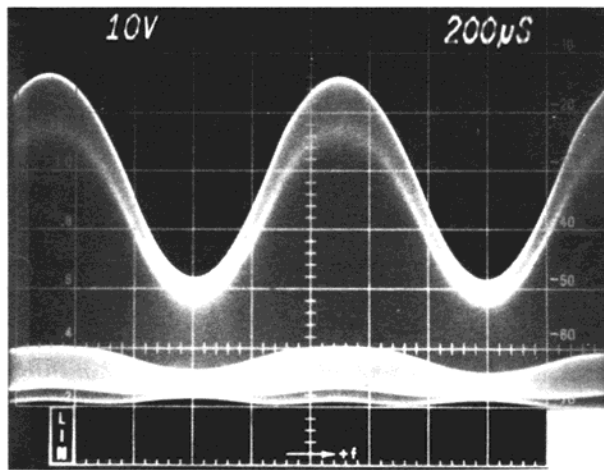
FIG. 5-7 TRANSMITTER ALIGNMENT WAVEFORMS



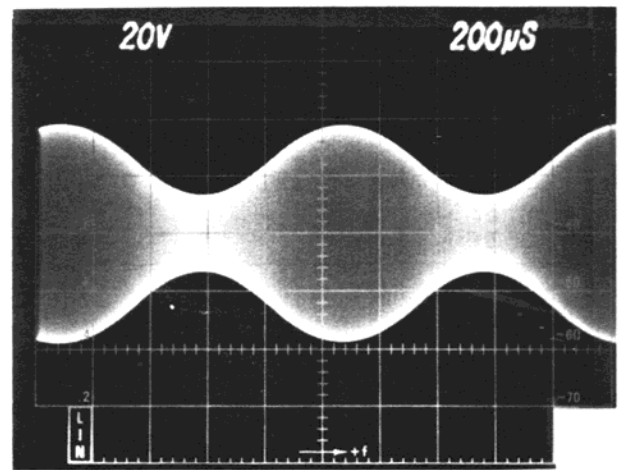
(a) TX MIXER DRAIN



(b) DRIVER COLLECTOR

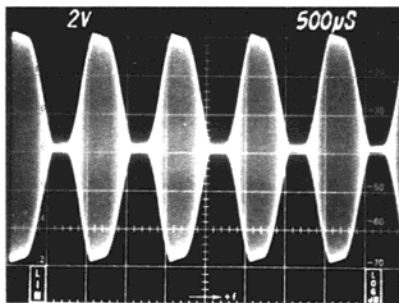


(c) FINAL COLLECTOR

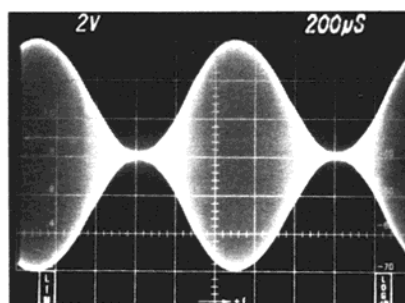


(d) RF OUTPUT

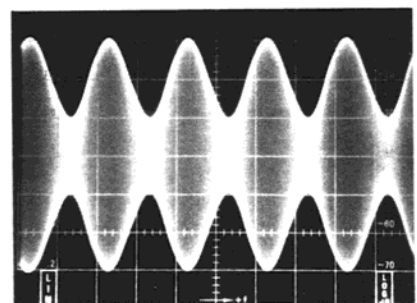
FIG. 5-8 MODULATION WAVEFORMS



OVERMODULATION



100% MODULATION



50% MODULATION

**FIG. 5-9 RECEIVER ALIGNMENT PROCEDURE**

**INITIAL SET-UP**

Connect the test equipment to the unit as shown in Figure 5-4. Set the local-distance switch on the front panel to the distance position. Adjust the volume control to maximum, clock-wise. Set the delta tune control to the center position. Set the CB/PA switch in the CB position. Set the noise limiter switch in the off position. Turn the squelch control fully counter clock-wise. Set the channel selector on channel 13.

**STEP 1**

Set the output level of the signal generator to a level sufficient to provide 3 volts of audio as measured on the audio voltmeter. Adjust in turn the following: T1, L1, T2-1, T2-2, T3, T4, T5, and T6 for maximum indication on the voltmeter. If at any time during the alignment procedure the audio level increases to more than 5 volts, reduce the generator output level to result in an audio output level of 3 volts.

**STEP 2**

Repeat the above procedure until a nominal 5 volts or more is available at the audio output with an input of 1 microvolt.

**STEP 3**

Adjust the audio output level with the volume control to result in a reading of 0db on the voltmeter. Adjust the slug of T1 counter-clockwise for a reduction of 1db in audio output. Remove the generator input from J1. Adjust the volume control to obtain a useable reading of the background noise level. On the voltmeter, switch the channel selector to channel 1 and note the noise level. Switch to channel 23. The noise level should be within 2db of the channel 1 reading. If the difference between 1 and 23 is greater than 2db, adjust L2.

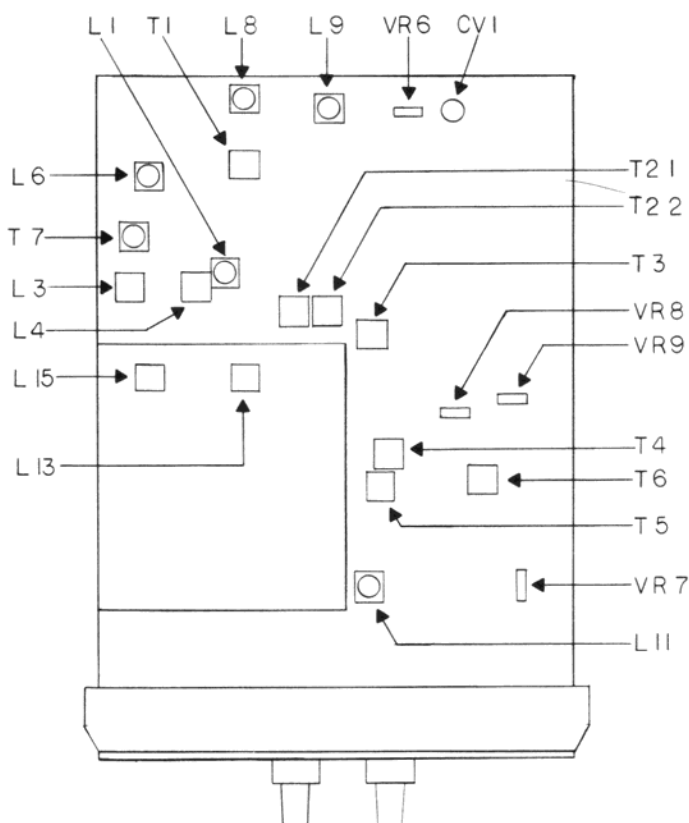
**STEP 4**

Set the generator output to 100 microvolts. Adjust VR7 for a reading of "9".

**STEP 5**

Rotate squelch control fully clockwise. Increase generator output to 300 microvolts. Squelch should break. If squelch fails to break, adjust VR8 to break squelch at 300 microvolts.

**FIG. 5-10 ALIGNMENT LAYOUT**



**TABLE 5-11 RECEIVER INJECTION VOLTAGES**

All injection voltages are at 30% – 1 KHz modulation at the specified frequency fed through a .01 MFD capacitor, and should produce at least 2 VAC audio output measured across the speaker or across an 8Ω load connected at EXT SP J2. N.L. – OFF. Delta tune – centered. DIS/LOC – DIS. Typical audio output voltages are given.

INJECTION POINT	INPUT LEVEL	AUDIO VOLTAGE	FREQUENCY
ANT JACK J1	1μV	4.6V	27.085 MHz
Q1 gate 2 – CP1*	3μV	4.1V	27.085 MHz
Q2 gate 2 – CP2	30μV	5.2V	27.085 MHz
TP-2	100μV	3.6V	10.695 MHz
Q3 base – CP3	30μV	4.9V	455 KHz
Q4 base – CP4	1000μV	3.6V	455 KHz

\*CHECK POINT numbers correspond to numbers in boxes on the schematic diagrams.

FIG. 5-12 SYNTHESIZER TROUBLESHOOTING PROCEDURE

**STEP 1**

Check emitter of Q26. If not 4.8-5.4 volts, check D27 and Q26.

**STEP 2**

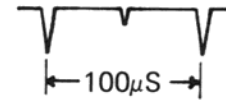
Set to channel 13. Check TP3. If not 2.7 volts, adjust L14 and try to bring to 2.7 VDC.

**STEP 3**

Check collectors of Q24 for 10.24 MHz and Q25 for 16.42 MHz.

**STEP 4**

Check IC-5 pin 11 for 640 KHz, IC-6 pin 11 for 40 KHz, IC-7 pins 8 & 9 for 10 KHz and IC-9 pins 1 & 3 with scope for 100 $\mu$ S pulses.



**STEP 5**

Check IC-1 pin 2 for 16.420 MHz, pin 14 for 8.22 MHz, pin 13 for 4.11 MHz, pin 12 for 2.06 MHz, pin 11 for 1.03 MHz, IC-2 pin 15 for 70 KHz and pin 11 for 10.03 KHz.

**STEP 6**

Check IC-9 pin 5 for 1.7 VDC, pins 2 & 3 for DC level (pulses indicate out-of-lock). Pulses on pin 5 indicate defective IC.

**STEP 7**

Check emitter of Q20 for ~1.4 volts and collector of Q23 with scope for 1.5 volt PP pulses on 5 VDC. (16.42 MHz)

**TABLE 5-13 AGC VOLTAGES versus RF INPUT LEVEL**

Measured with 10M $\Omega$ input at Anode of D6.  N.L. OFF DIS/LOC – DIS CB/PA – CB Delta tune – centered  (1) Channel Frequency at Antenna Jack.	<b>INPUT LEVEL (1)</b>	<b>AGC VOLTAGES</b>
	OPEN ANT	+0.72
	1 $\mu$ V	+0.48
	10 $\mu$ V	0.00
	100 $\mu$ V	-0.34
	1000 $\mu$ V	-0.51
	10,000 $\mu$ V	-0.59

**TABLE 5-14 DEFECT IN CHANNEL SELECT CODE**

<b>SELECT CODE</b>	<b>CHANNELS AFFECTED</b>	<b>TX RF OUTPUT FREQUENCIES</b>
IC-1 pin 3 stays L	2, 5, 7, 8, 10, 13, 15, 16, 18, 21, 23	10 KHz High
stays H	1, 3, 4, 6, 9, 11, 12, 14, 17, 19, 20, 22	10 KHz Low
IC-1 pin 4 stays L	1, 4, 7, 10, 11, 13, 14, 16, 17, 20	20 KHz High
stays H	2, 3, 5, 6, 8, 9, 12, 15, 18, 19, 21, 22, 23	20 KHz Low
IC-1 pin 5 stays L	1, 2, 3, 7, 8, 9, 13, 14, 15, 20, 21, 22	40 KHz High
stays H	4, 5, 6, 10, 11, 12, 16, 17, 18, 19, 23	40 KHz Low
IC-1 pin 6 stays L	1, 2, 3, 4, 5, 6, 13, 14, 15, 16, 17, 18, 19	80 KHz High
stays H	7, 8, 9, 10, 11, 12, 20, 21, 22, 23	80 KHz Low
IC-2 pin 3 stays L	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	160 KHz High
stays H	13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23	160 KHz Low



TABLE 5-15 CHANNEL SELECT CODE PCB-2

Channel #s	PIN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	WIRE	
IC-1	3	L	H	L	L	H	L	H	H	L	L	L	L	H	L	H	H	L	H	L	L	H	L	H	A	
	4	H	L	L	H	L	L	H	L	L	H	H	L	H	H	L	H	L	L	L	H	L	L	L	B	
	5	H	H	H	L	L	L	H	H	L	L	L	L	H	H	H	L	L	L	L	H	H	L	L	C	
	6	H	H	H	H	H	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L	L	L	D	
	IC-2	3	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	E

TABLE 5-16 IC-10 PCB-3

PIN #	Condition
1	H EXCEPT WHEN UP BUTTON DEPRESSED
2	H EXCEPT WHEN UP BUTTON DEPRESSED
3	L EXCEPT WHEN UP BUTTON DEPRESSED
4	L EXCEPT WHEN UP BUTTON DEPRESSED
5	L EXCEPT WHEN UP BUTTON DEPRESSED
6	H EXCEPT WHEN UP BUTTON DEPRESSED
7	L
8	H EXCEPT WHEN DOWN BUTTON DEPRESSED
9	L EXCEPT WHEN DOWN BUTTON DEPRESSED
10	L EXCEPT WHEN DOWN BUTTON DEPRESSED
11	L EXCEPT WHEN DOWN BUTTON DEPRESSED
12	H EXCEPT WHEN DOWN BUTTON DEPRESSED
13	H EXCEPT WHEN DOWN BUTTON DEPRESSED
14	H

TABLE 5-17 COUNTER IC-12 PCB-3

Channel #'s	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
PIN #																								
1	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	
2	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H	L	L	H	H	
3	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	L	H	L	H
4	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
5	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
6	L	L	L	H	H	H	H	L	L	L	L	H	H	H	H	L	L	L	L	H	H	H	H	H
7	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L
8	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
9	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
10	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	L
11	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
12	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
13	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
14	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
15	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
16	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

