

## ***Realistic Comp 100 (20-110)***

### **ALIGNMENT PREPARATION**

Test equipment required

1. Oscilloscope (0 ~ 500 kHz, 0 ~ 50 MHz)
2. AC VTVM
3. DC VTVM
4. Frequency counter (60 MHz)
5. 8 ohm dummy load
6. Slow sweep generator with variable marker (10.7 MHz)
7. VHF sweep generator with variable marker (30 ~ 52 MHz, 148 ~ 174 MHz)
8. UHF sweep generator with variable marker (450 ~ 512 MHz)
9. FM signal generator (30 ~ 50 MHz, 150 ~ 172 MHz, 450 ~ 512 MHz)

**NOTE 1:** *Use non-metallic tuning tools.*

*The test equipment and receiver should be warmed up at least 10 minutes before proceeding with alignment. Input signal from the generator should be kept as low as possible and still obtain usable output.*

**NOTE 2:** *The 9-volt battery is required to hold the memory when AC is disconnected. Always be sure the unit is loaded with a fresh 9-volt battery or the pre-programmed channels will be lost (and will have to be re-programmed).*

**NOTE 3:** *The extension P.C.Boards are prepared to check and/or repair the PLL/PROGRAMMER and SCANNING/PROGRAMMER P.C.Boards.*

*For PLL/PROGRAMMER P.C.Board*

*MFR's Part No.*

*GE-22B-6321*

*For SCANNING/PROGRAMMER P.C.Board*

*MFR's Part No.*

*GE-22B-6322*

### **REFERENCE FREQUENCY OSC/DIVIDER ALIGNMENT**

**NOTE:** *The reference frequency OSC/Divider circuit is on the PLL PROGRAMMER P.C. Board.*

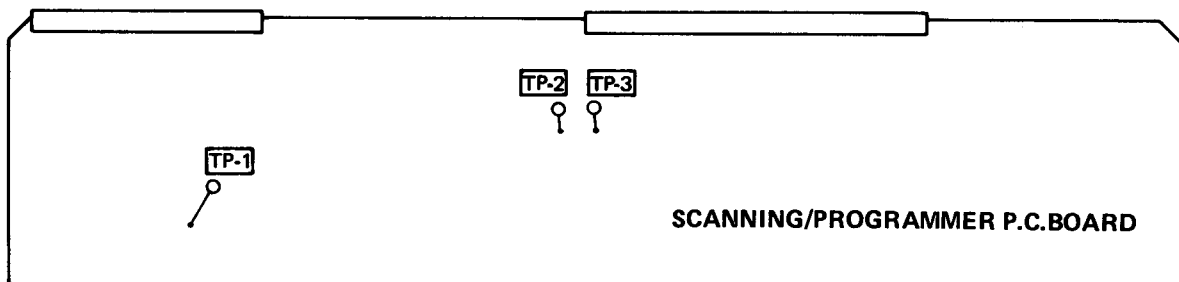
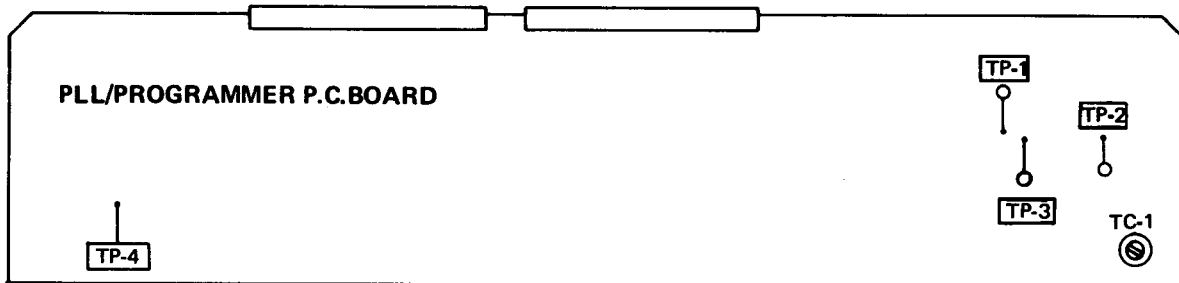
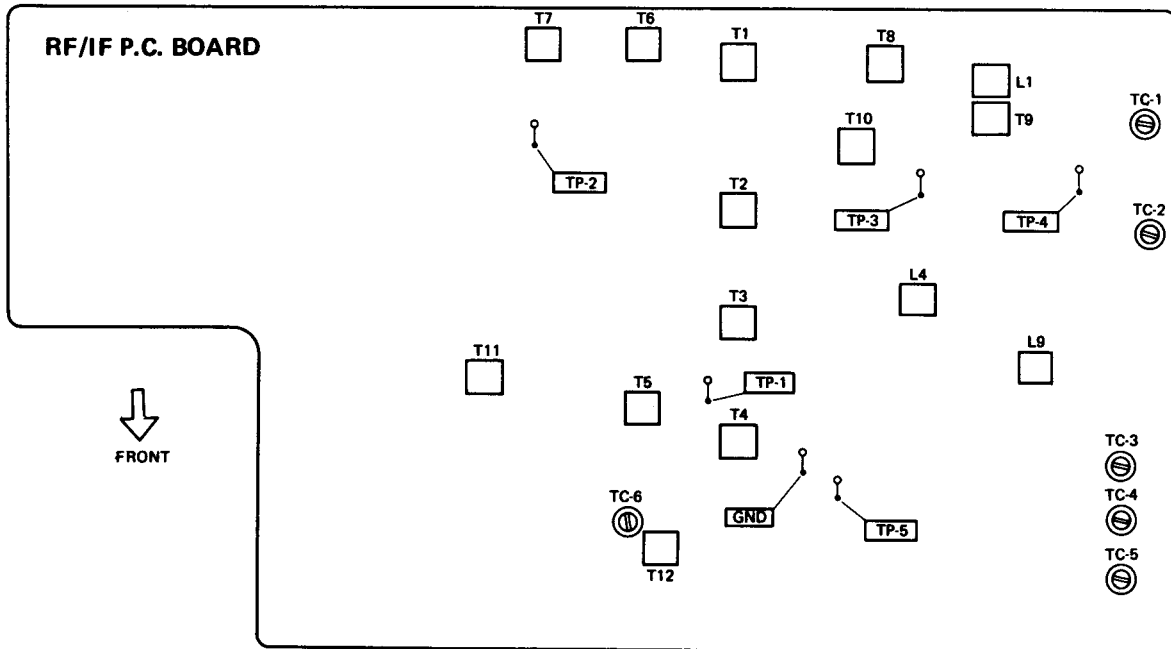
Step 1: Connect Frequency Counter to TP-2 and ground.

Step 2: Adjust TC-1 (On the PLL/PROGRAMMER PCB) so that the frequency is 5.120000 MHz  $\pm$ 30 Hz.

Step 3: Connect Frequency Counter to TP-1 and ground. Read frequency on the frequency counter.

Normal: 5.000 kHz.

# ALIGNMENT AND TEST POINT POSITIONS



## FREQUENCY CODE PROGRAMMING FOR ALIGNMENT PREPARATION

Before starting alignment, enter program code into channels 1 through 16 as follows:

Receiving Frequency	Channel/Digit Switches																VCO Frequency
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
<b>VHF low</b>																	
CH 1 30 MHz	*	*	*	4	*	*	7	*	9	10	11	*	*	*	*	*	40.700 MHz
CH 2 40 MHz	*	*	*	4	5	6	7	8	*	10	11	*	*	*	*	*	50.700 MHz
CH 3 50 MHz	*	*	*	*	5	*	7	8	9	10	11	*	*	*	*	*	60.700 MHz
CH 4 52 MHz	*	*	*	*	5	6	7	*	*	10	11	*	*	*	*	*	62.700 MHz
<b>VHF high</b>																	
CH 5 150 MHz	*	*	3	4	*	*	7	*	9	10	11	*	*	*	*	*	40.700 MHz
CH 6 160 MHz	*	*	3	4	5	6	7	8	*	10	11	*	*	*	*	*	50.700 MHz
CH 7 172 MHz	*	*	3	*	5	6	7	*	*	10	11	*	*	*	*	*	62.700 MHz
<b>UHF low</b>																	
CH 8 450 MHz	*	2	*	4	*	*	7	*	9	10	11	*	*	*	*	*	40.700 MHz
CH 9 460 MHz	*	2	*	4	5	6	7	8	*	10	11	*	*	*	*	*	50.700 MHz
CH10 470 MHz	*	2	*	*	5	*	7	8	9	10	11	*	*	*	*	*	60.700 MHz
<b>UHF mid</b>																	
CH11 470 MHz	*	2	3	4	*	*	7	*	9	10	11	*	*	*	*	*	40.700 MHz
CH12 480 MHz	*	2	3	4	5	6	7	8	*	10	11	*	*	*	*	*	50.700 MHz
CH13 490 MHz	*	2	3	*	5	*	7	8	9	10	11	*	*	*	*	*	60.700 MHz
<b>UHF high</b>																	
CH14 490 MHz	1	*	*	4	*	*	7	*	9	10	11	*	*	*	*	*	40.700 MHz
CH15 500 MHz	1	*	*	4	5	6	7	8	*	10	11	*	*	*	*	*	50.700 MHz
CH16 512 MHz	1	*	*	*	5	6	7	*	*	10	11	*	*	*	*	*	62.700 MHz

NOTE: Code \* = Button "in"  
Code Number = Button "out"

## VOLTAGE CONTROLLED OSCILLATOR (VCO) ALIGNMENT

NOTE: For this test you will MANUALLY select either channel 1, 2, 3 or 4.

Step 1: Connect a DC VTVM and a Frequency Counter as shown in Figure 4.

Step 2: Select Channel 1 and adjust T12 for 0.4 V on the DC VTVM. The Frequency Counter should read 40.700000 MHz  $\pm$  600 Hz.

Step 3: Next, select Channel 3 and adjust TC-6 for 4 V on the DC VTVM. The Frequency Counter should read 60.700000 MHz  $\pm$  600 Hz.

Step 4: Repeat steps 3 and 4 until no improvement is observed. Make sure that the Frequency Counter reads 40.700 MHz for CH 1, 50.700 MHz for CH 2, 60.700 MHz for CH 3 and 62.700 MHz for CH 4.

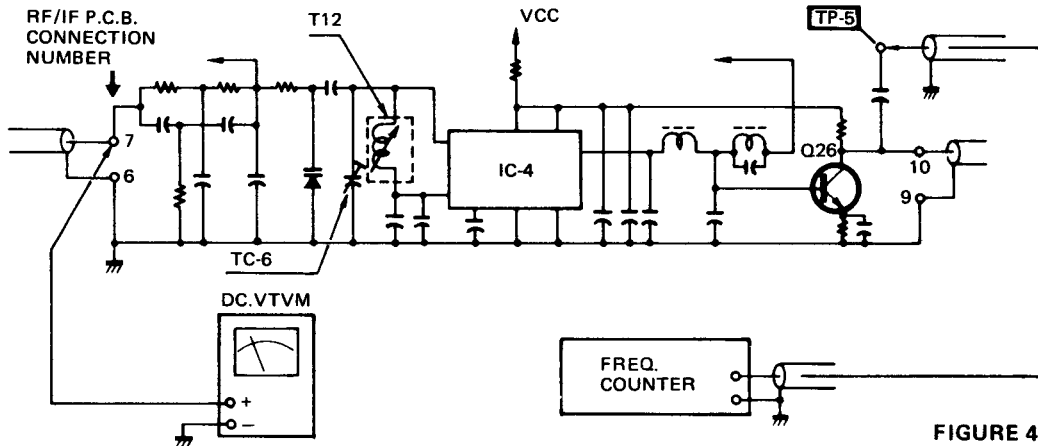


FIGURE 4.

## VHF, UHF LOCAL OSCILLATOR FREQUENCY CHECK

**NOTE:** For this test you will MANUALLY select either channel 1, 5, 8, 11 or 14.

Step 1: Couple the frequency Counter through a pickup coil to oscillator coil L9.

Refer to Figure 5.

Step 2: If necessary, adjust L9 as follows:

As you adjust this coil, you will note output increasing up to a certain point; further adjustment will cause output to drop off slightly and still further adjustment will cause the oscillator to drop out. Proper adjustment is at a point just before you get to maximum (on the side away from oscillator drop out).

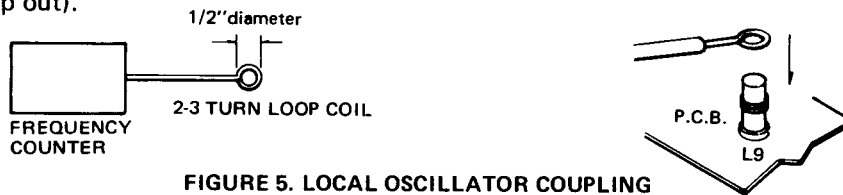


FIGURE 5. LOCAL OSCILLATOR COUPLING

Step 3: Adjust TC3, 4 and 5 for the following frequencies:

Channel	Adjust	Freq.
1	None	0
5	TC5	60.000000 MHz $\pm$ 200 Hz
8	—	60.000000 MHz $\pm$ 200 Hz
11	TC4	62.857500 MHz $\pm$ 200 Hz
14	TC3	65.714642 MHz $\pm$ 200 Hz

## LOCAL OSCILLATOR FREQUENCY CHECK (10.245 MHz)

Step 1: Connect Frequency Counter through a 10 pF capacitor to Q6 Emitter circuit. Refer to Figure 6.

Step 2: Read frequency on the Frequency Counter.  
Normal: 10.245 MHz  $\pm$ 1 kHz.

**NOTE:** Frequency Counter coupling capacitor should be as small a value as possible. Frequency Counter should be high impedance type.

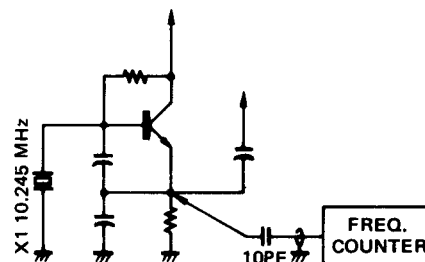


FIGURE 6.

## IF SECTION ALIGNMENT

Step 1: Connect instruments as shown in Figure 7.

Step 2: Maintain Sweep Generator output at the lowest level possible to prevent overloading.

**NOTE:** To perform the next adjustments, it is necessary to remove the Battery Compartment.

Step 3: Adjust T4 and T5 for maximum output and adjust T6 and T7 so that the 455 kHz marker is in the center of the discriminator curve and for best linearity as shown in Figure 8.

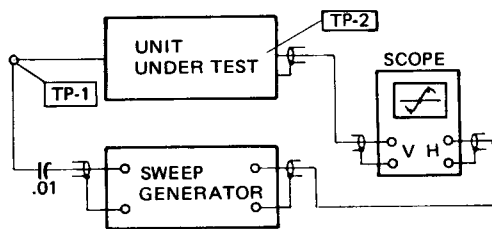


FIGURE 7. IF SECTION ALIGNMENT TEST EQPT. HOOK UP

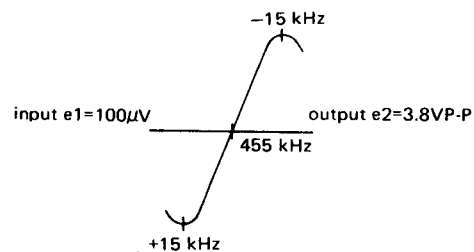


FIGURE 8. IF DISCRIMINATOR CURVE

## VHF LOW BAND RF AMP ALIGNMENT

**NOTE:** For this test you will MANUALLY select either channel 1, 2, 3 or 4.

Step 1: Connect instruments as shown in Figure 9.

Step 2: Select Channel 1 with the MANUAL button.

Step 3: Adjust T1, T2 and T3 so that the 30 MHz marker is in the center of the curve and for maximum output.

Step 4: Select Channel 3. The Sweep Generator output should appear with the 50 MHz marker in the center of the curve. If necessary, readjust TC-6 by rechecking step 3 of the VCO alignment.

Step 5: Make sure that the output curves are similar to Figure 10 (for channels 1 thru 4).

**NOTE:** It is difficult to track these 4 different frequencies, but differences of up to -6 dB are acceptable.

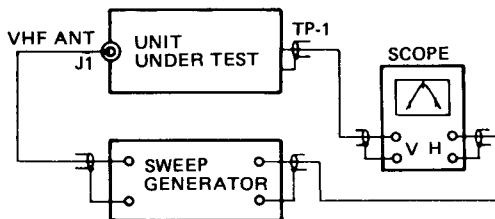


FIGURE 9. VHF LOW BAND RF TEST EQPT. HOOK UP

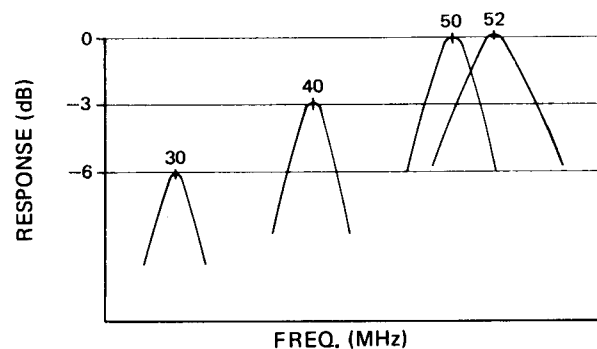


FIGURE 10.

## VHF HI BAND RF AMP ALIGNMENT

**NOTE:** For this test you will MANUALLY select either Channel 5, 6 or 7.

Step 1: Connect instruments as shown in Figure 11.

Step 2: Adjust T8, 9, 10 and L1 for maximum output similar to the Figure 12 curve. This curve should be dropping down by about  $-3$  dB for CH 5 to 7.

**NOTE:** If you change the connection from TP-3 to TP-1, you should see a display similar to Figure 10 curve.

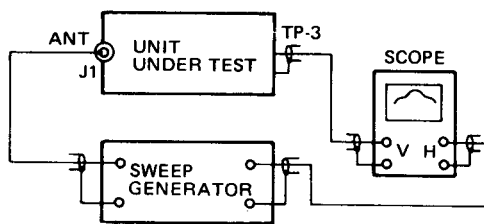


FIGURE 11. VHF HIGH BAND RF TEST EQPT. HOOK UP

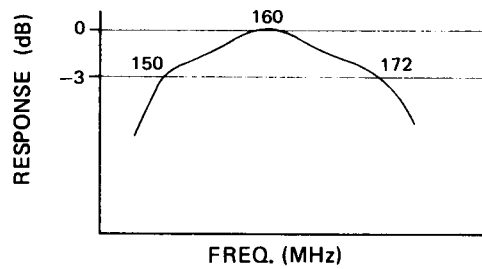


FIGURE 12.

## UHF BAND RF AMP ALIGNMENT

**NOTE:** For this test you will MANUALLY select either Channel 9, 12 or 15.

Step 1: Connect instruments as shown in Figure 13.

Step 2: Set TC-2 to minimum capacitance.

Step 3: Adjust TC-1 for maximum output and best curve symmetry as shown in Figure 14.

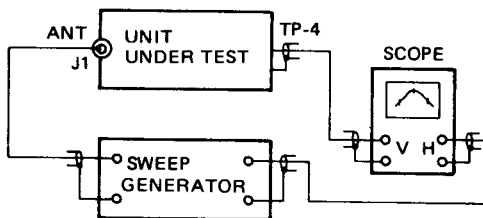


FIGURE 13. UHF BAND RF TEST EQPT. HOOK UP

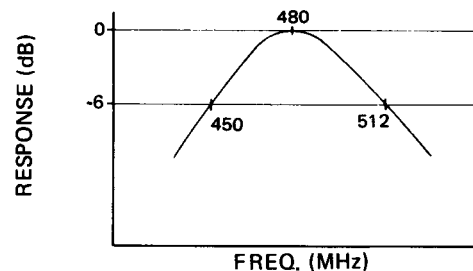


FIGURE 14.

## VHF LOW/HIGH, UHF OVERALL ALIGNMENT AND SENSITIVITY MEASUREMENT

Step 1: Connect Signal Generator to ANTenna jack and AC VTVM with 8-ohm dummy load to EXT. SPeaker jack.

Step 2: Turn SQUELCH fully counterclockwise. Set for reception of the channels noted in the following chart. Set the SSG to the center of each band.

CH	BAND	FREQ.
2	VHF LO	40 MHz
6	VHF HI	160 MHz
9	UHF LO	460 MHz
12	UHF MID	480 MHz
15	UHF HI	500 MHz

Step 3: Set the Signal Generator frequency to 40 MHz (channel 2) and readjust T4 and T5 for maximum output.

Step 4: Set the Signal Generator frequency to 160 MHz (channel 6) and adjust L4 for maximum output.

Step 5: Set the Signal Generator frequency to 480 MHz (channel 12) and adjust L9 and TC-2 for maximum output.

Step 6: For each frequency/channel set the signal generator to each frequency, no modulation and minimum output, and set VOLUME control to 0 dB (0.775 V) reading on the VTVM.

Step 7: Increase output of the generator to obtain reading -20dB on the AC VTVM. The generator output now equals the 20 dB noise quieting sensitivity.

**NOTE:** Alignment of T11 on the RF/IF P.C. Board is not required. It happens to be adjustable only because of ease of parts procurement and does not need any adjustment.

## OPERATION OF PLL/PROGRAMMER CIRCUIT

1. To program the National Weather Service station frequency 162.40 MHz, for example, select channel 1 with the MANUAL selector button. Slide the Program Door open and press in the PROGRAM button, then set the Digit switches in or out as shown below.

Indicator	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
The code	*	*	3	*	*	*	7	*	*	10	11	*	*	*	*	*

Press to release Digit switches at 3, 7, 10 and 11.

All other switches are to remain pushed in.

2. After setting the Digit switches, press the ENTER button. The code is then memorized and displayed by the channel/program code indicators instantly. See Figure 15 for the timing diagram. The displays shown in the timing diagram can be seen whenever the ENTER button is pressed.
3. The memorized code controls the programmable counter (IC 9 ~ 14) thru shift register (IC 7, 8). The programmable counter divides VCO frequency by the given code.
4. The phase of the divided frequency and 5 kHz reference frequency are detected by phase detector IC-5. This phase difference controls VCO frequency.
5. TP-3 is a PROGRAMMABLE COUNTER output terminal, when in locked condition 5 kHz pulse signals appear.

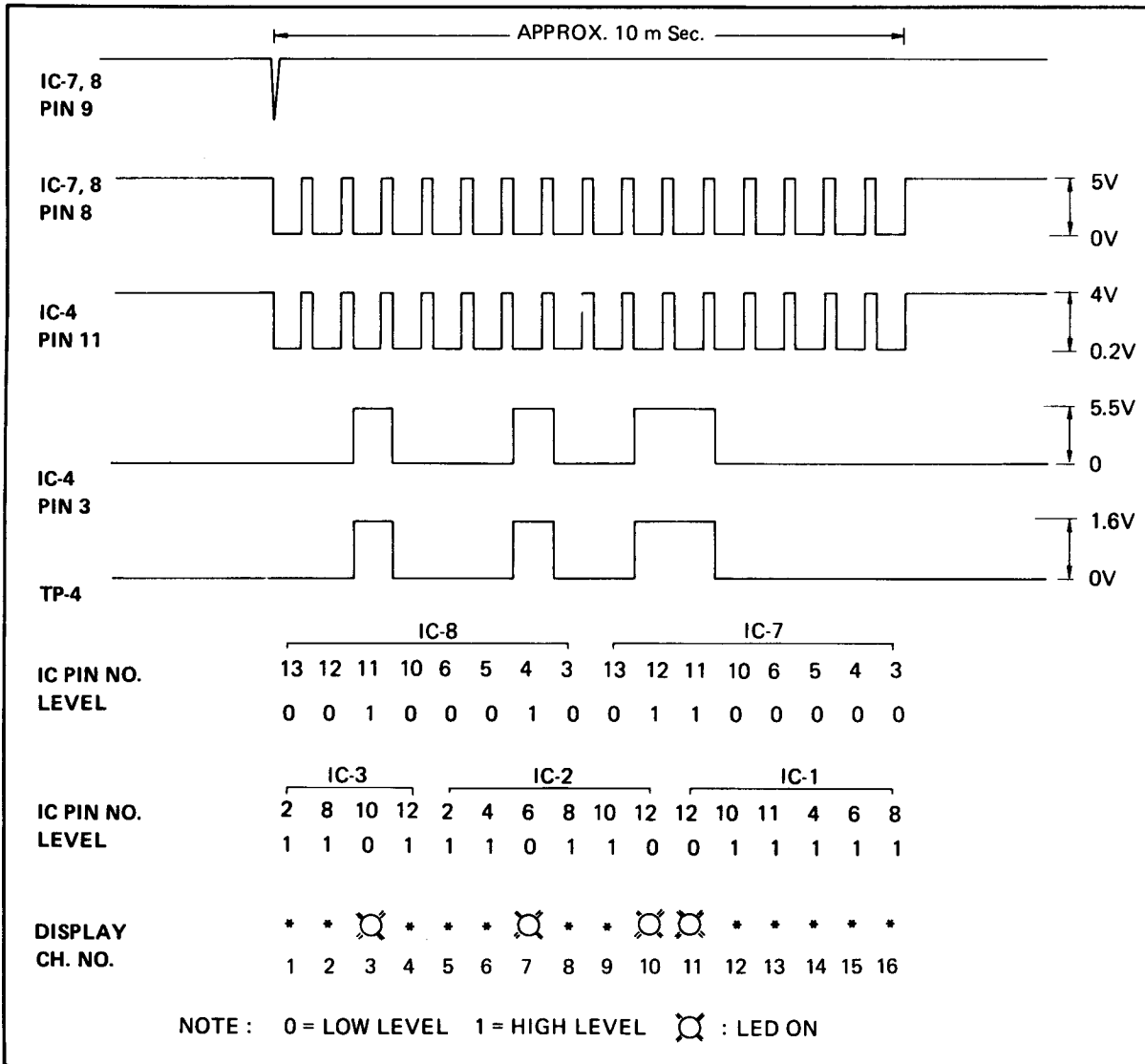


FIGURE 15.



# OPERATION OF SCANNING/PROGRAMMER CIRCUIT

1. Data read-out and write-on Clock OSC (IC7 2/6, TA-3, D21) generates sixteen pulses.
2. After address counter IC-6 counts sixteen pulses, word sensor (IC-5 1/4, D17 ~ 20) operate. Then channel counter counts the next pulse and LED display will read out the next channel.
3. Then word sensor becomes H level and scanning control is driven from this signal. Scanning rate is decided by C5 (33  $\mu$ F) on the Scanning/Programmer P.C. Board.
4. Channel counter and channel display-driver operation are the same as PRO-16A (20-165).
5. See Figure 16, for timing diagrams at each point.

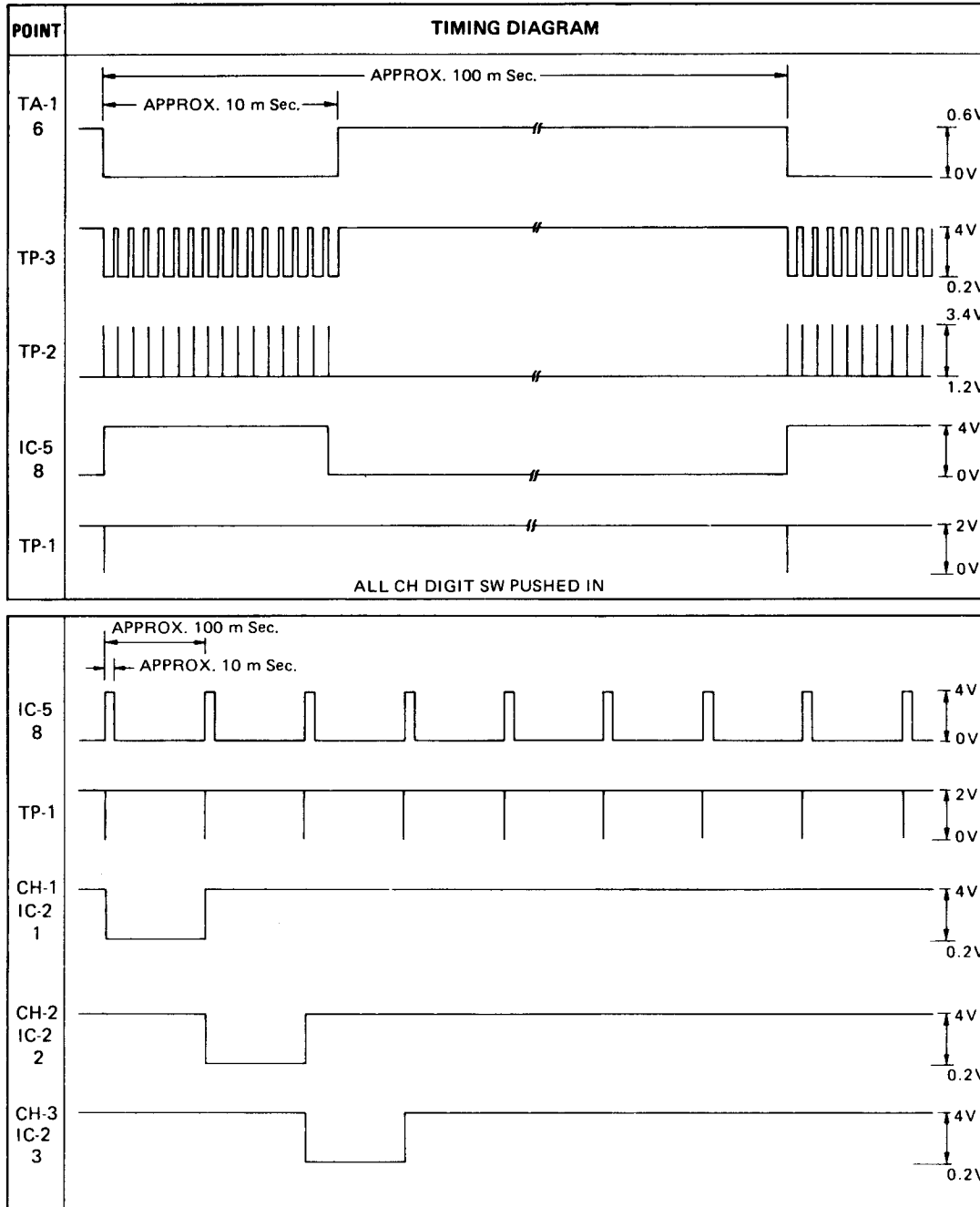
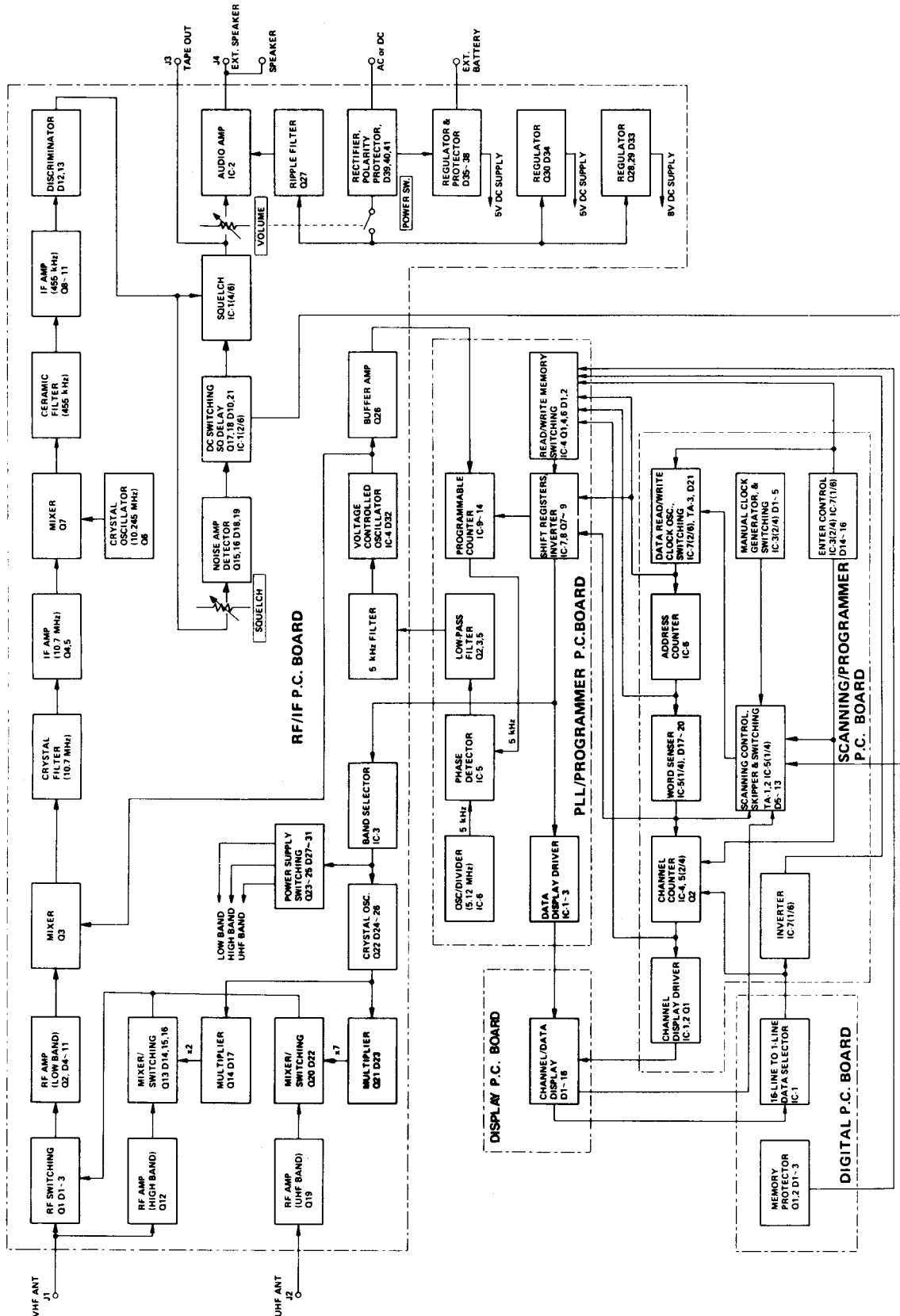


FIGURE 16.



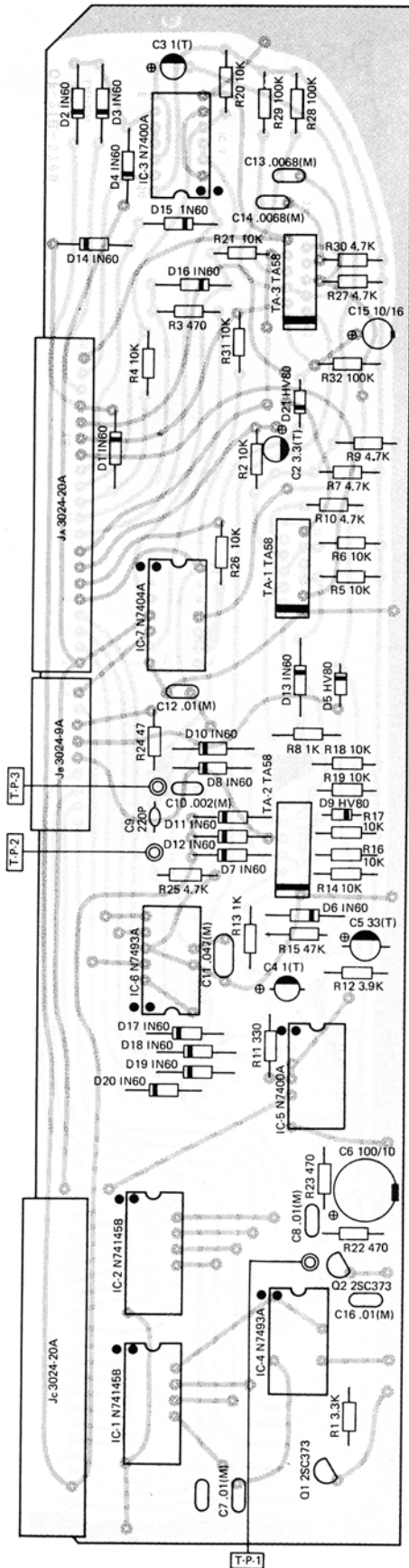
# BLOCK DIAGRAM





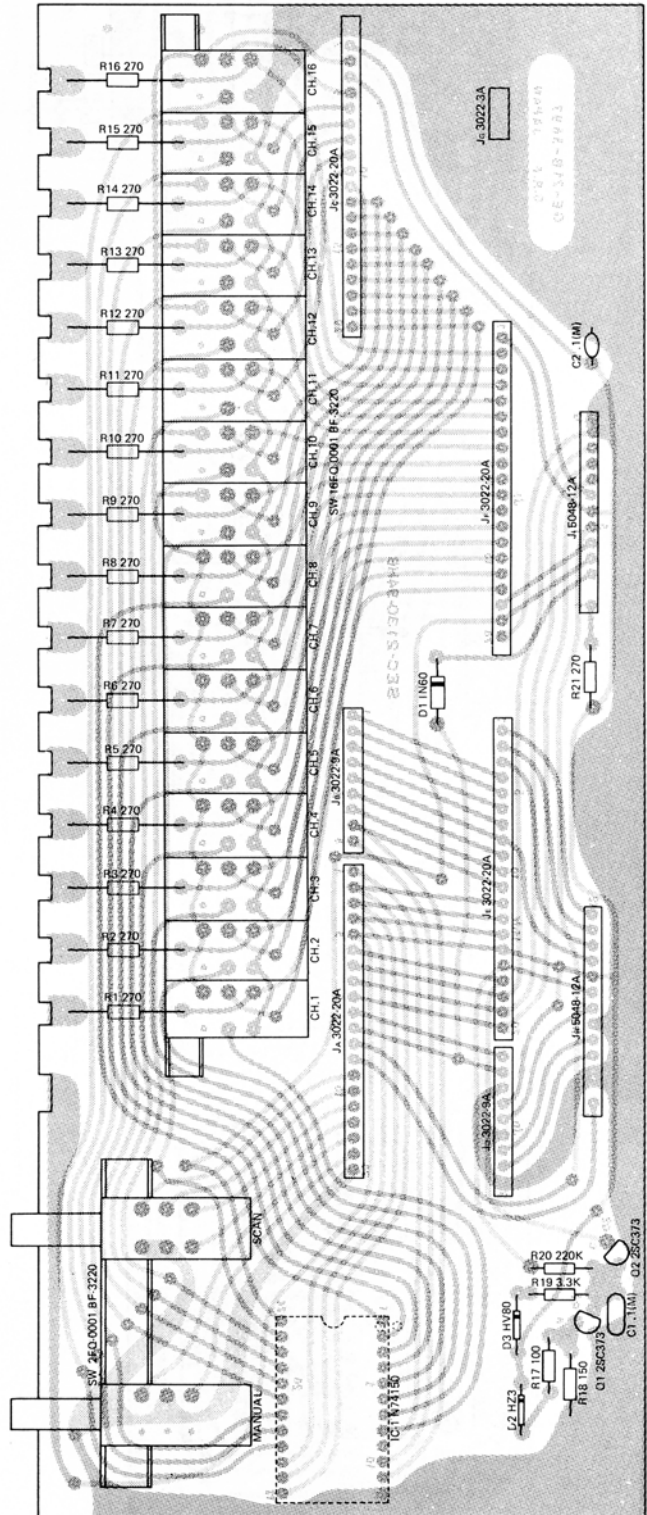
# SCANNING/PROGRAMMER P.C. BOARD

(TOP VIEW)

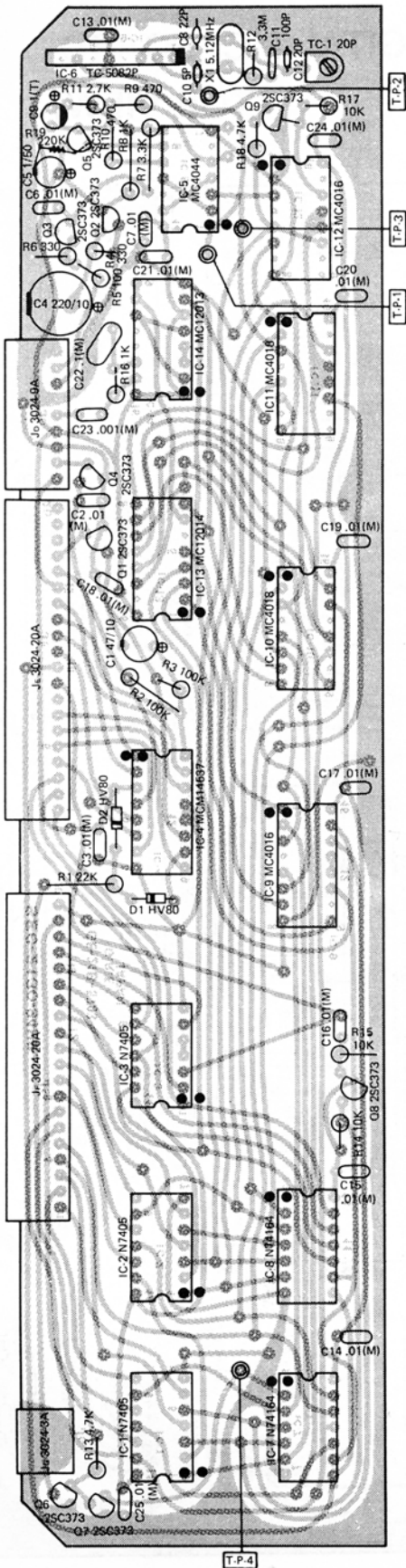


# DIGITAL P.C. BOARD

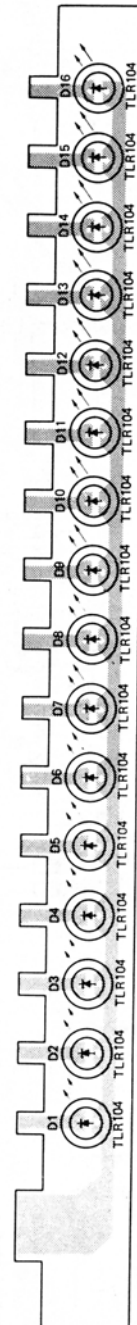
(TOP VIEW)



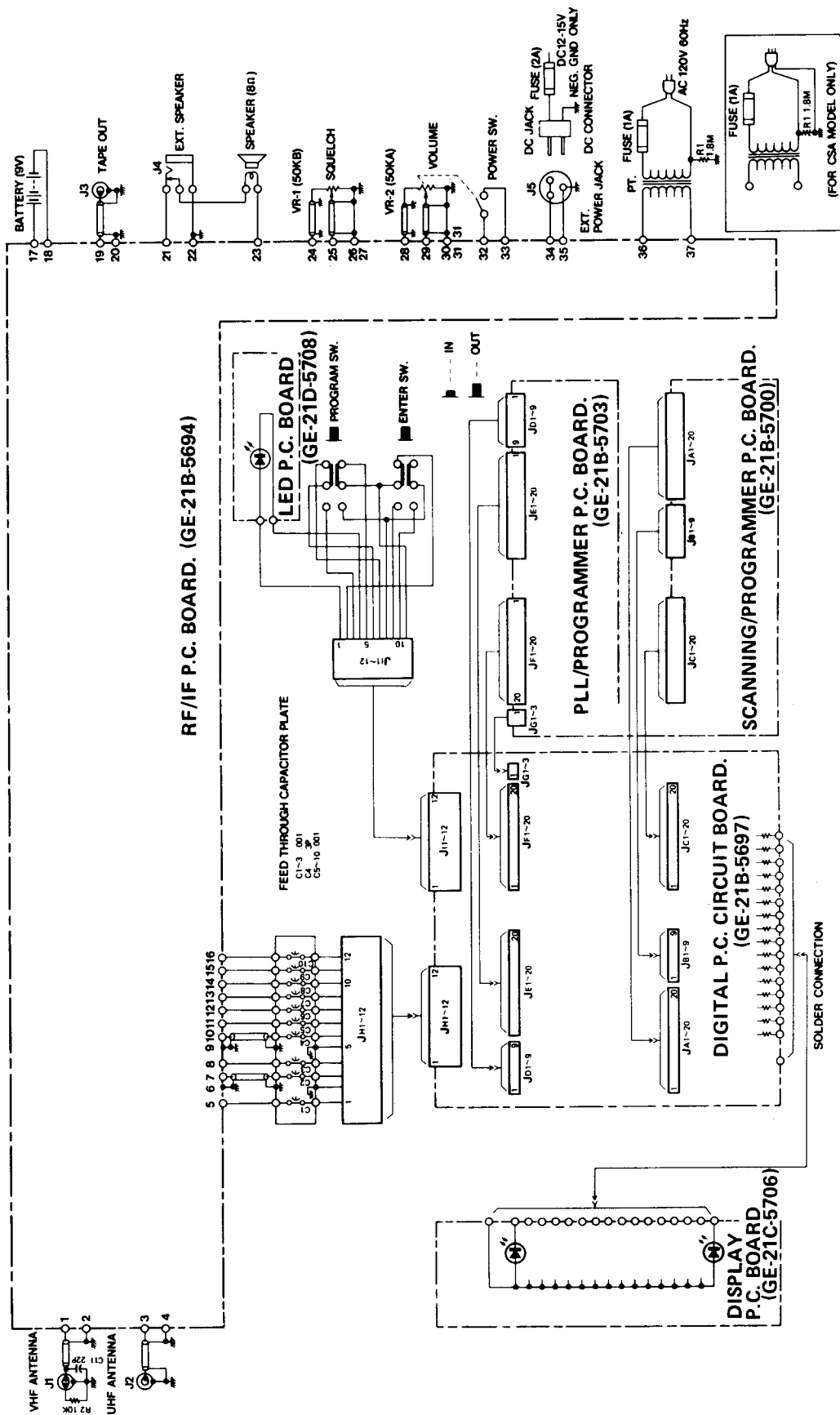
# PLL/PROGRAMMER P.C. BOARD (TOP VIEW)



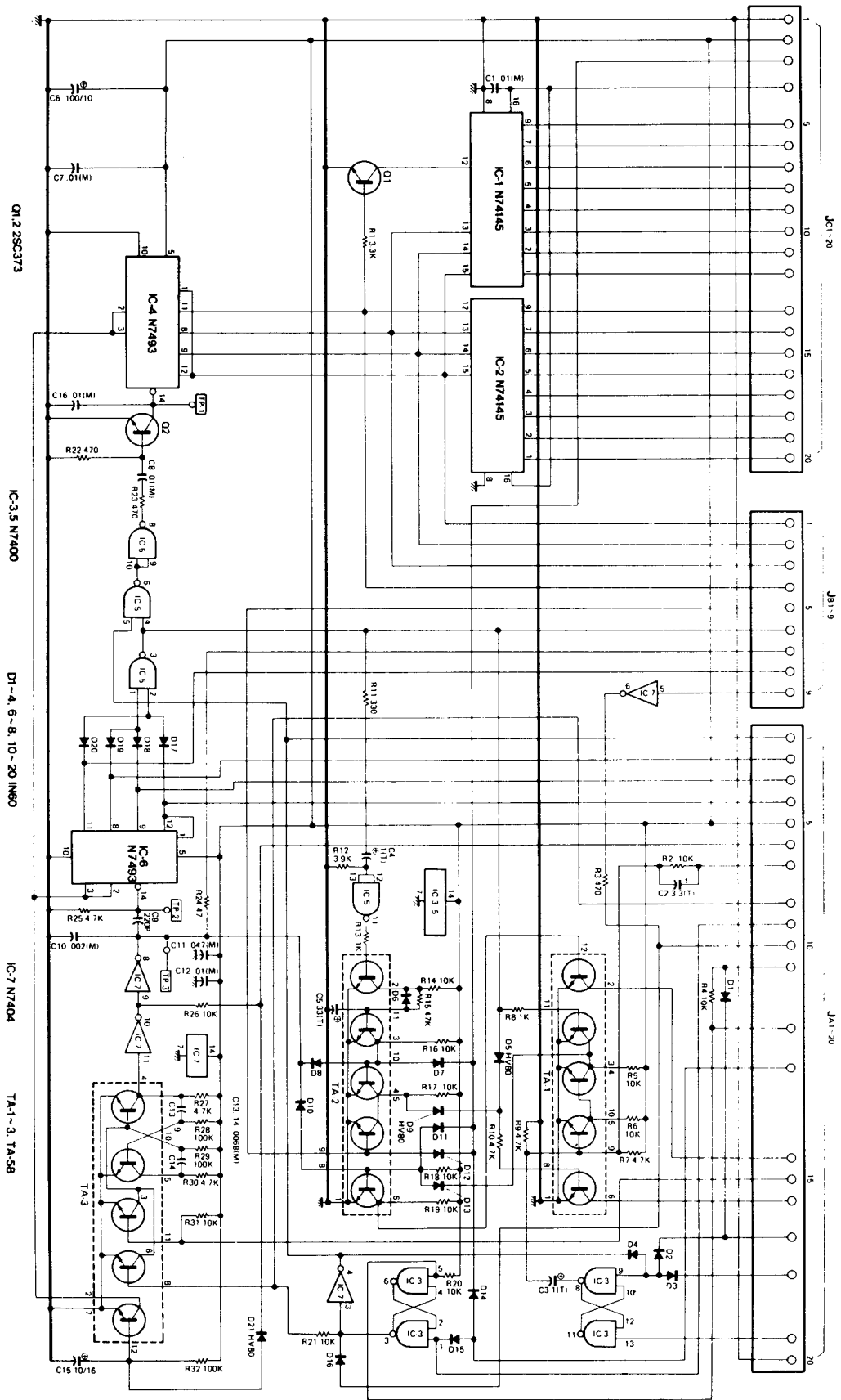
# DISPLAY P.C. BOARD (TOP VIEW)



# MASTER INTER-CONNECT DIAGRAM

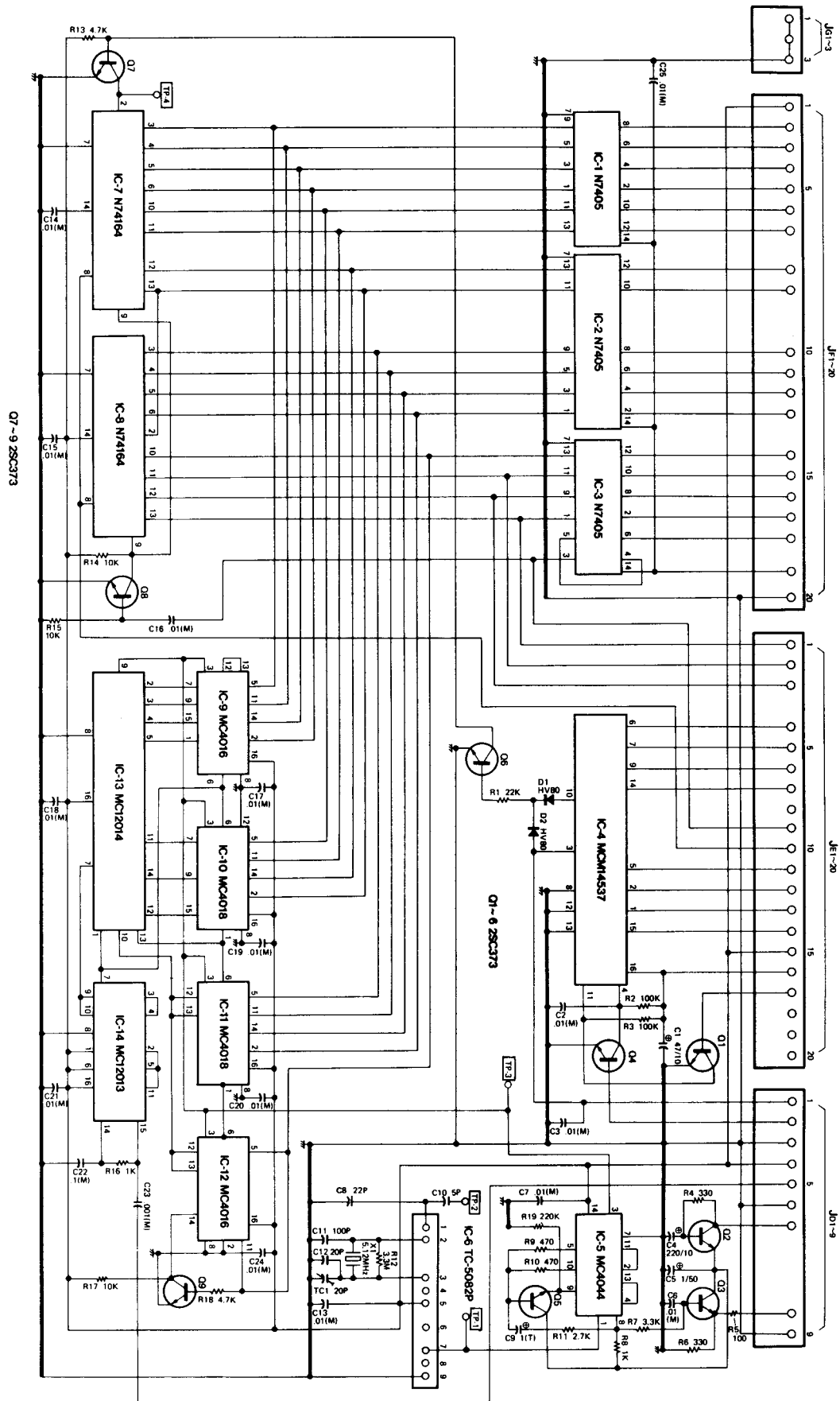


# SCANNING/PROGRAMMER P.C. BOARD SCHEMATIC DIAGRAM

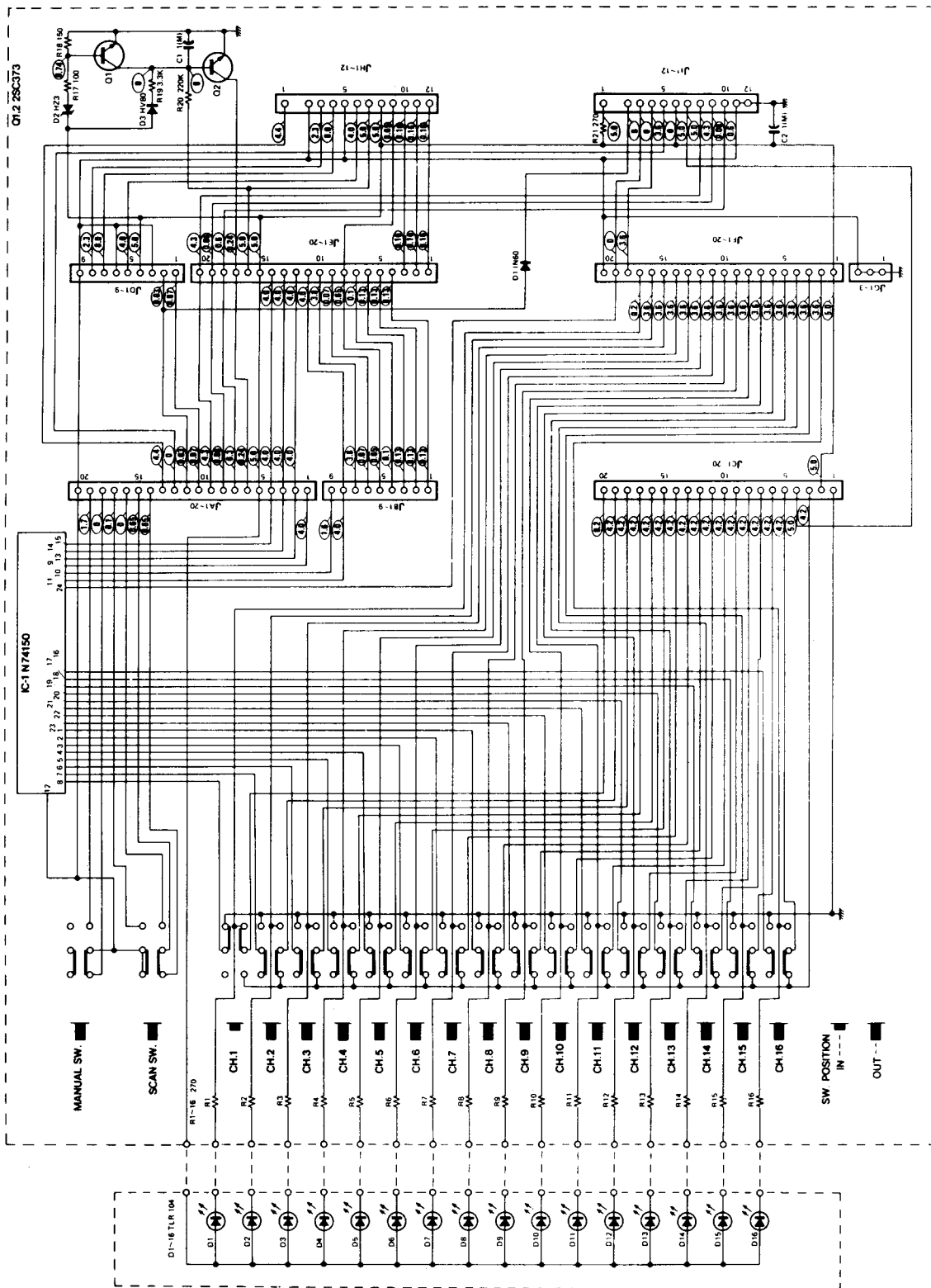




# PLL/PROGRAMMER P.C. BOARD



# DIGITAL/DISPLAY P.C. BOARDS SCHEMATIC DIAGRAM

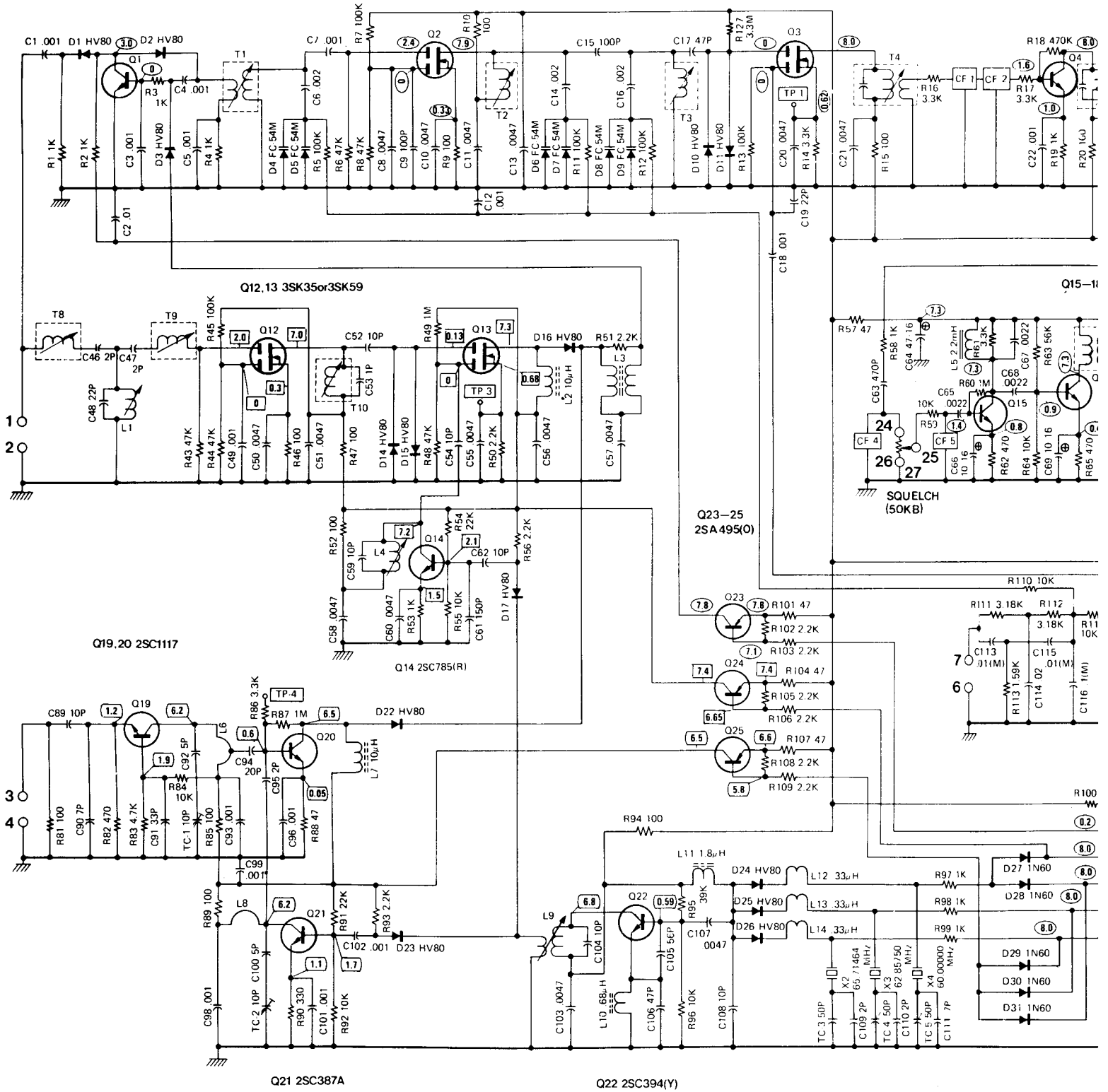


# RF/IF P.C. BOARD SCHEMATIC DIAGRAM

Q1 2SC373

Q2,3 3SK35 or 3SK59

Q4 2SC535(B)



## REMARKS

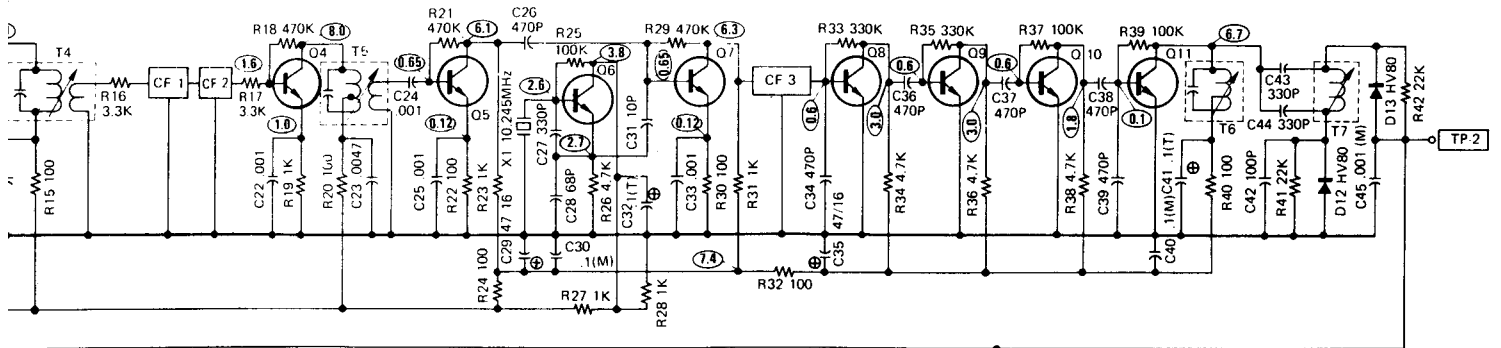
1. RESISTANCE VALUES IN OHMS (K=1,000), (M=1,000,000)
2. CAPACITANCE VALUES IN  $\mu\text{F}$  (P= $\mu\mu\text{F}$ )
3. (T) TANTALUM CAPACITOR
4. (M) MYLAR CAPACITOR

5. THIS SYMBOL INDIC. (100K $\Omega$ /V) UNDER FOLLOV VOLUME AT MINIMUM ANI
- THIS SYMBOL INDIC.
- THIS SYMBOL INDIC.

Q4 2SC535(B)

Q5-7 2SC372(O)

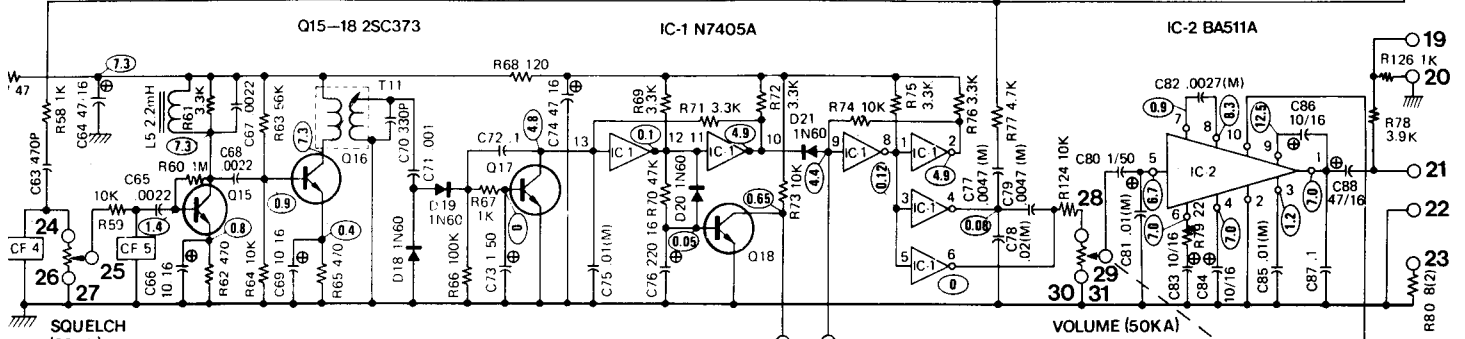
Q8-11 2SC372(O)



Q15-18 2SC373

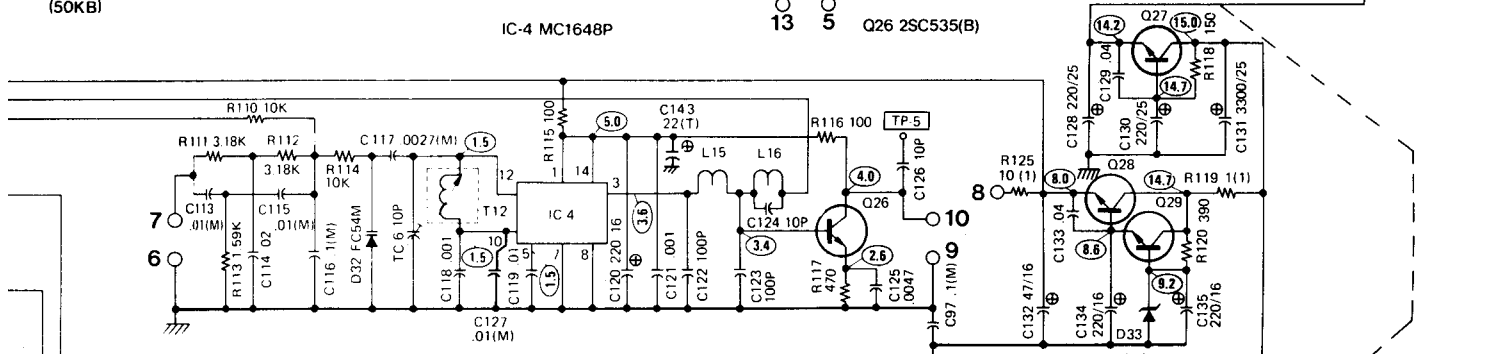
IC-1 N7405A

IC-2 BA511A



IC-4 MC1648P

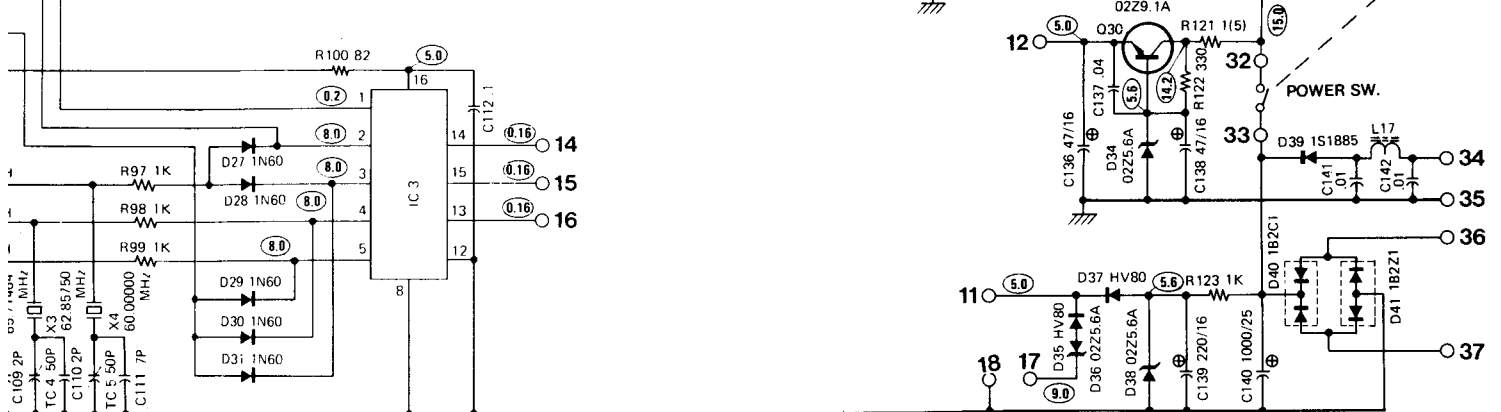
Q26 2SC535(B)




IC-3 N74145B

Q27.28.30 2SD526 or 2SC789

Q29 2SC735(Y)



5.  THIS SYMBOL INDICATES DC VOLTAGE MEASURED WITH DC VOLTMETER (100KΩ/V) UNDER FOLLOWING CONDITIONS: CH-1 LO BAND, MANUAL OPERATION, VOLUME AT MINIMUM AND SQUELCH "OUT".

 THIS SYMBOL INDICATES VOLTAGES FOR HIGH BAND OPERATION.

 THIS SYMBOL INDICATES VOLTAGES FOR UHF BAND OPERATION.

## TROUBLESHOOTING

Symptom	Possible cause
1) Channel Indicator LED does not light and no sound output. Volume Control : MAX. Channel/Digit Switches : Pushed-in Squelch Control : Extreme CCW	1) Faulty line power cord. 2) Defective power transformer. 3) Defective power switch. 4) DC or AC line fuse blown. 5) Defective diodes D39 ~ D41 on RF/IF P.C. Board. 6) Defective voltage regulator circuit component on RF/IF P.C. Board.
2) Channel Indicator LED lights but no sound. Volume Control : MAX. Squelch Control : Extreme CCW Channel/Digit Switches : Pushed-in	1) Defective speaker or speaker jack. 2) Faulty AF amplifier circuit component on RF/IF P.C. Board. 3) Faulty IF amplifier circuit component on RF/IF P.C. Board.
3) Sound but channel lamp does not light. Volume Control : MAX. Squelch Control : Extreme CCW Channel/Digit Switches : Pushed-in	1) Defective Channel/Digit switch or defective display circuit component. 2) Defective 5 V Regulator circuit component on RF/IF P.C. Board.
4) Does not scan and Squelch does not operate.	1) Defective Squelch control. 2) Defective IF amplifier circuit on RF/IF P.C. Board. 3) Defective noise amplifier, noise detector and/or integrated circuit IC-1 on RF/IF P.C. Board.
5) Does not scan but Squelch operates.	1) Defective SCANNING/PROGRAMMER P.C. Board. 2) Defective SCAN or MANUAL switch or faulty associated circuit component.
6) MANUAL selector does not operate but auto SCAN operates.	1) Defective MANUAL switch or associated circuit component. 2) Defective D3 and integrated circuit IC-3 or transistor array TA-1 on SCANNING/PROGRAMMER P.C. Board.
7) Auto SCAN does not operate but MANUAL selector operates.	1) Defective SCAN switch or associated circuit component.
8) Skipper does not operate.	1) Defective Channel/Digit switch. 2) Faulty diodes D7, D11 and D12 or skipper circuit component on SCANNING/PROGRAMMER P.C. Board.
9) Delay does not operate.	1) Faulty diode D-20 or Electrolytic capacitor C76 on RF/IF P.C. Board.

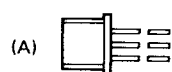
Symptom	Possible cause
<p>10) PROGRAM does not operate or makes mistakes in read out and/or write on.</p>	<ol style="list-style-type: none"> <li>1) Defective PROGRAM switch, ENTER switch and/or associated circuit component.</li> <li>2) Defective Channel/Digit switch.</li> <li>3) Defective integrated circuit IC-1 on DIGITAL P.C. Board.</li> <li>4) Defective SCANNING/PROGRAMMER P.C. Board component parts.</li> <li>5) Defective PLL/PROGRAMMER P.C. Board component parts.</li> <li>6) Faulty memory integrated circuit IC-4 and/or associated circuit component parts on the PLL/PROGRAMMER P.C. Board.</li> <li>7) Faulty integrated circuit IC-1, 2, 3, 7, 8, and/or associated circuit components parts on the PLL/PROGRAMMER P.C. Board.</li> <li>8) Faulty DISPLAY P.C. Board.</li> </ol>
<p>11) Memory operates but after a certain period the read out memory becomes faulty.</p>	<ol style="list-style-type: none"> <li>1) Weak battery (9 volt)</li> <li>2) Defective diode D35 ~ 38 and/or associated circuit component on RF/IF P.C. Board.</li> <li>3) Faulty memory IC, IC-4 or associated circuit component on PLL/PROGRAMMER P.C. Board.</li> </ol>
<p>12) Program memory operates but in case of repeated moving of power switch to ON and OFF the memory read out becomes faulty.</p>	<ol style="list-style-type: none"> <li>1) Weak battery (9 volt)</li> <li>2) Faulty memory protector Q1, 2 and/or associated circuit component on DIGITAL P.C. Board.</li> <li>3) Faulty power supply and regulator circuit component parts on RF/IF P.C. Board.</li> </ol>
<p>13) Program memory operates in read out and write on but unit does not operate on any bands.</p>	<ol style="list-style-type: none"> <li>1) Defective integrated circuit IC-5, 6, 9 ~ 14 and transistor Q2, 3, 5 or PLL circuit component parts of PLL/PROGRAMMER P.C. Board.</li> <li>2) Defective VCO circuit component parts on RF/IF P.C. Board.</li> <li>3) Defective band selector (IC-3) and power supply switching circuit component parts on RF/IF P.C. Board.</li> <li>4) Defective Low band RF amp and/or mixer circuit component on RF/IF P.C. Board.</li> </ol>
<p>14) VHF Hi band does not operate but VHF Lo and program are OK.</p>	<ol style="list-style-type: none"> <li>1) Defective band selector (IC-3) and/or power supply switching circuit component parts on RF/IF P.C. Board.</li> <li>2) Faulty crystal X-4 (60.000 MHz) and OSC circuit component parts on RF/IF P.C. Board.</li> <li>3) Faulty RF switching circuit component on RF/IF P.C. Board.</li> <li>4) Defective high band RF amp, mixer and buffer amp circuit component on RF/IF P.C. Board.</li> </ol>

Symptom	Possible cause
15) UHF Lo, Mid Hi does not operate but VHF Lo and Hi are OK.	<ol style="list-style-type: none"> <li>1) Defective band selector (IC-3) and/or power supply switching circuit component parts on RF/IF P.C. Board.</li> <li>2) Faulty diode D22, 23 and/or tripler (Q21) circuit component on RF/IF P.C. Board.</li> <li>3) Defective UHF RF amp and/or mixer circuit component on RF/IF P.C. Board.</li> </ol>
16) UHF Mid band does not operate but VHF Lo and UHF Lo are OK.	<ol style="list-style-type: none"> <li>1) Defective band selector (IC-3) or diode D25, D31 on RF/IF P.C. Board.</li> <li>2) Defective crystal X-3 (62.85750 MHz) and/or associated circuit component parts on RF/IF P.C. Board.</li> </ol>
17) UHF Hi does not operate but VHF Lo, Hi and UHF Lo, Mid are OK.	<ol style="list-style-type: none"> <li>1) Defective band selector (IC-3) or diode D26, D29 on RF/IF P.C. Board.</li> <li>2) Defective crystal X-2 (65.71464 MHz) and/or associated circuit component parts on RF/IF P.C. Board.</li> </ol>
18) VCO does not oscillate correct frequency.	<ol style="list-style-type: none"> <li>1) Faulty crystal X-1 and/or integrated circuit IC-6 of PLL/PROGRAMMER CIRCUIT.</li> <li>2) Defective programmable counter circuit, phase detector circuit and/or associated circuit component of PLL/PROGRAMMER P.C. Board.</li> <li>3) Faulty 5 kHz filter and/or buffer amp (Q26) circuit component parts on RF/IF P.C. Board.</li> <li>4) Defective VCO IC-4 and/or varicap D32 or associated circuit component on RF/IF P.C. Board.</li> </ol>

**NOTE:** Recheck to see that each connector is connected firmly.

## SEMICONDUCTOR LEAD IDENTIFICATIONS

(A) : 2SA495(O), 2SC372(O), 2SC373, 2SC387(A), 2SC394(Y), 2SC785(R), 2SC735(Y)  
 (B) : 2SC535(B)  
 (C) : 2SC789, 2SD526  
 (D) : 2SC1117  
 (E) : 3SK35, 3SK59



(A)  
 1. Emitter  
 2. Collector  
 3. Base



(B)  
 1. Emitter  
 2. Collector  
 3. Base



(C)  
 1. Base  
 2. Collector (Heat Sink)  
 3. Emitter



(D) (E)  
 1. Emitter  
 2. Base  
 3. Collector  
 4. Case

RF/IF P.C. BOARD PARTS LIST

Ref. No.	Description			RS Part Number	MFR's Part Number
<b>CAPACITORS</b>					
C1	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C2	Ceramic	0.01 $\mu$ F		+80 ~ -20%	MC-70
C3	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C4	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C5	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C6	Ceramic	0.002 $\mu$ F		$\pm 20\%$	SCP-80
C7	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C8	Ceramic	0.0047 $\mu$ F		+80 ~ -20%	SCP-100
C9	Ceramic	100pF		$\pm 10\%$	FC-70
C10	Ceramic	0.0047 $\mu$ F		+80 ~ -20%	SCP-80
C11	Ceramic	0.0047 $\mu$ F		+80 ~ -20%	SCP-80
C12	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C13	Ceramic	0.0047 $\mu$ F		+80 ~ -20%	SCP-80
C14	Ceramic	0.002 $\mu$ F		$\pm 20\%$	SCP-60
C15	Ceramic	100pF		$\pm 10\%$	FC-70
C16	Ceramic	0.002 $\mu$ F		$\pm 20\%$	SCP-80
C17	Ceramic	47pF		$\pm 10\%$	FCC-100
C18	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C19	Ceramic	22pF		$\pm 5\%$	FC-50
C20	Ceramic	0.0047 $\mu$ F		+80 ~ -20%	SCP-100
C21	Ceramic	0.0047 $\mu$ F		+80 ~ -20%	SCP-100
C22	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C23	Ceramic	0.0047 $\mu$ F		+80 ~ -20%	SCP-100
C24	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C25	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C26	Ceramic	470pF		$\pm 10\%$	SCP-50
C27	Ceramic	330pF		$\pm 10\%$	SCP-50
C28	Ceramic	68pF		$\pm 10\%$	FC-70
C29	Electrolytic	47 $\mu$ F	16WV	+50 ~ -10%	CE04W1C470B
C30	Mylar	0.1 $\mu$ F		$\pm 10\%$	
C31	Ceramic	10pF		$\pm 0.5\text{pF}$	FC-50
C32	Tantalum	0.1 $\mu$ F	35WV	$\pm 20\%$	CS15E1V0R1M
C33	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C34	Ceramic	470pF		$\pm 10\%$	SCP-50
C35	Electrolytic	47 $\mu$ F	16WV	+50 ~ -10%	CE04W1C470B
C36	Ceramic	470pF		$\pm 10\%$	SCP-50
C37	Ceramic	470pF		$\pm 10\%$	SCP-50
C38	Ceramic	470pF		$\pm 10\%$	SCP-50
C39	Ceramic	470pF		$\pm 10\%$	SCP-50
C40	Mylar	0.1 $\mu$ F		$\pm 10\%$	
C41	Tantalum	0.1 $\mu$ F	35WV	$\pm 20\%$	CS15E1V0R1M
C42	Ceramic	100pF		$\pm 10\%$	FC-70
C43	Ceramic	330pF		$\pm 5\%$	SCU-100
C44	Ceramic	330pF		$\pm 5\%$	SCU-100
C45	Mylar	0.001 $\mu$ F		$\pm 10\%$	
C46	Ceramic	2pF		$\pm 0.5\text{pF}$	FC-50
C47	Ceramic	2pF		$\pm 0.5\text{pF}$	FC-50
C48	Ceramic	22pF		$\pm 5\%$	FC-50
C49	Ceramic	0.001 $\mu$ F		$\pm 20\%$	SCP-60
C50	Ceramic	0.0047 $\mu$ F		+80 ~ -20%	SCP-100



Ref. No.	Description			RS Part Number	MFR's Part Number
C51	Ceramic	0.0047 $\mu$ F	+80 ~ -20%		SCP-100
C52	Ceramic	10pF	$\pm$ 0.5pF		PC-50
C53	Ceramic	1pF	$\pm$ 0.5pF		FC-50
C54	Ceramic	10pF	$\pm$ 0.5pF		FC-50
C55	Ceramic	0.0047 $\mu$ F	+80 ~ -20%		SCP-100
C56	Ceramic	0.0047 $\mu$ F	+80 ~ -20%		SCP-100
C57	Ceramic	0.0047 $\mu$ F	+80 ~ -20%		SCP-100
C58	Ceramic	0.0047 $\mu$ F	+80 ~ -20%		SCP-100
C59	Ceramic	10pF	+0.5pF		FC-50
C60	Ceramic	0.0047 $\mu$ F	+80 ~ -20%		SCP-100
C61	Ceramic	150pF	+10%		PC-80
C62	Ceramic	10pF	$\pm$ 0.5pF		FC-50
C63	Ceramic	470pF	$\pm$ 10%		SCP-50
C64	Electrolytic	47 $\mu$ F	16WV	+50 ~ -10%	CE04W1C470B
C65	Ceramic	0.002 $\mu$ F	$\pm$ 20%		SCP-80
C66	Electrolytic	10 $\mu$ F	16WV	+50 ~ -10%	CE04W1C100F
C67	Ceramic	0.0022 $\mu$ F	$\pm$ 20%		SCP-80
C68	Ceramic	0.0022 $\mu$ F	$\pm$ 20%		SCP-80
C69	Electrolytic	10 $\mu$ F	16WV	+50 ~ -10%	CE04W1C100F
C70	Ceramic	330pF	$\pm$ 10%		SCP-50
C71	Ceramic	0.001 $\mu$ F	$\pm$ 20%		SCP-60
C72	Ceramic	0.1 $\mu$ F	+80 ~ -20%		MC-135
C73	Electrolytic	1 $\mu$ F	50WV	+75 ~ -10%	CE04W1H010
C74	Electrolytic	47 $\mu$ F	16WV	+50 ~ -10%	CE04W1C470B
C75	Mylar	0.01 $\mu$ F	$\pm$ 10%		
C76	Electrolytic	220 $\mu$ F	16WV	+50 ~ -10%	CE04W1E221C
C77	Mylar	0.0047 $\mu$ F	$\pm$ 10%		
C78	Mylar	0.02 $\mu$ F	$\pm$ 10%		
C79	Mylar	0.0047 $\mu$ F	$\pm$ 10%		
C80	Electrolytic	1 $\mu$ F	50WV	+75 ~ -10%	CE04W1H010
C81	Mylar	0.01 $\mu$ F	$\pm$ 10%		
C82	Mylar	0.0027 $\mu$ F	$\pm$ 10%		
C83	Electrolytic	10 $\mu$ F	16WV	+50 ~ -10%	CE04W1C100F
C84	Electrolytic	10 $\mu$ F	16WV	+50 ~ -10%	CE04W1C100F
C85	Mylar	0.01 $\mu$ F	$\pm$ 10%		
C86	Electrolytic	10 $\mu$ F	16WV	+50 ~ -10%	CD04W1C100F
C87	Ceramic	0.1 $\mu$ F	+80 ~ -20%		MC-135
C88	Electrolytic	47 $\mu$ F	16WV	+50 ~ -10%	CE04W1C470B
C89	Ceramic	10pF	$\pm$ 0.5pF		FC-50
C90	Ceramic	7pF	$\pm$ 0.5pF		FC-50
C91	Ceramic	33pF	$\pm$ 5%		FC-50
C92	Ceramic	5pF	$\pm$ 5%		FC-50
C93	Ceramic	0.001 $\mu$ F	$\pm$ 20%		SCP-60
C94	Ceramic	20pF	$\pm$ 5%		FC-50
C95	Ceramic	2pF	$\pm$ 0.5pF		FC-50
C96	Ceramic	0.001 $\mu$ F	$\pm$ 20%		SCP-60
C97	Mylar	0.1 $\mu$ F	$\pm$ 10%		
C98	Ceramic	0.001 $\mu$ F	$\pm$ 10%		SCP-60
C99	Ceramic	0.001 $\mu$ F	$\pm$ 10%		SCP-60
C100	Ceramic	5pF	$\pm$ 0.5pF		FC-50
C101	Ceramic	0.001 $\mu$ F	$\pm$ 20%		SCP-60
C102	Ceramic	0.001 $\mu$ F	$\pm$ 20%		SCP-60

Ref. No.	Description			RS Part Number	MFR's Part Number
C103	Ceramic	0.0047 $\mu$ F	+80 ~ -20%		SCP-100
C104	Ceramic	10pF	$\pm$ 0.5pF		FC-50
C105	Ceramic	56pF	$\pm$ 10%		FCC-100
C106	Ceramic	47pF	$\pm$ 10%		FCC-100
C107	Ceramic	0.0047 $\mu$ F	+80 ~ -20%		SCP-100
C108	Ceramic	10pF	$\pm$ 0.5pF		FC-50
C109	Ceramic	2pF	$\pm$ 0.5pF		FC-50
C110	Ceramic	2pF	$\pm$ 0.5pF		FC-50
C111	Ceramic	7pF	$\pm$ 0.5pF		FC-50
C112	Ceramic	0.1 $\mu$ F	+80 ~ -20%		MC-135
C113	Mylar	0.01 $\mu$ F	$\pm$ 10%		
C114	Mylar	0.02 $\mu$ F	$\pm$ 10%		
C115	Mylar	0.01 $\mu$ F	$\pm$ 10%		
C116	Mylar	0.1 $\mu$ F	$\pm$ 10%		
C117	Mylar	0.0027 $\mu$ F	$\pm$ 10%		
C118	Ceramic	0.001 $\mu$ F	$\pm$ 20%		SCP-100
C119	Ceramic	0.01 $\mu$ F	+80 ~ -20%		MC-70
C120	Electrolytic	220 $\mu$ F 16WV	+50 ~ -10%		CE04W1C221E
C121	Ceramic	0.001 $\mu$ F	$\pm$ 20%		SCP-60
C122	Ceramic	100pF	$\pm$ 10%		FC-70
C123	Ceramic	100pF	$\pm$ 10%		FC-70
C124	Ceramic	10pF	$\pm$ 0.5pF		FC-50
C125	Ceramic	0.0047 $\mu$ F	+80 ~ -20%		SCP-100
C126	Ceramic	10pF	$\pm$ 0.5pF		FC-50
C127	Mylar	0.01 $\mu$ F	$\pm$ 10%		
C128	Electrolytic	220 $\mu$ F 25WV	+50 ~ -10%		CE04W1E221C
C129	Ceramic	0.04 $\mu$ F	+80 ~ -20%		MC-100
C130	Electrolytic	220 $\mu$ F 25WV	+50 ~ -10%		CE04W1E221C
C131	Electrolytic	3300 $\mu$ F 25WV	+50 ~ -10%		1E332
C132	Electrolytic	47 $\mu$ F 16WV	+50 ~ -10%		CE04W1C470B
C133	Ceramic	0.04 $\mu$ F	+80 ~ -20%		MC-100
C134	Electrolytic	220 $\mu$ F 16WV	+50 ~ -10%		CE04W1C221E
C135	Electrolytic	220 $\mu$ F 16WV	+50 ~ -10%		CE04W1C221E
C136	Electrolytic	47 $\mu$ F 16WV	+50 ~ -10%		CE04W1C470B
C137	Ceramic	0.04 $\mu$ F	+80 ~ -20%		MC-100
C138	Electrolytic	47 $\mu$ F 16WV	+50 ~ -10%		CE04W1C470B
C139	Electrolytic	220 $\mu$ F 16WV	+50 ~ -10%		CE04W1C221E
C140	Electrolytic	1000 $\mu$ F 25WV	+50 ~ -10%		CE04W1E102C
C141	Ceramic	0.01 $\mu$ F	+80 ~ -20%		MC-70
C142	Ceramic	0.01 $\mu$ F	+80 ~ -20%		MC-70
C143	Tantalum	22 $\mu$ F 6.3WV	$\pm$ 20%		CS15EOJ220MIS
TC-1	Trimmer	10pF		C-0729	ECV-1ZW10X52
TC-2	Trimmer	10pF		C-0729	ECV-1ZW10X52
TC-3	Trimmer	50pF		C-0561	ECV-1ZW50X32
TC-4	Trimmer	50pF		C-0561	ECV-1ZW50X32
TC-5	Trimmer	50pF		C-0561	ECV-1ZW50X32
TC-6	Trimmer	10pF		C-0561	ECV-1ZW10X52

Ref. No.	Description	RS Part Number	MFR's Part Number
<b>COIL/TRANSFORMERS/FILTERS/CRYSTALS</b>			
T1	VHF Lo RF coil	CA-4549	113KN-4427
T2	VHF Lo RF coil	CA-3482	113KN-5344Z
T3	VHF Lo RF coil	CA-3482	113KN-5344Z
T4	IFT 10.7 MHz	CA-4653	119LC-470033N3
T5	IFT 10.7 MHz	CA-4653	119LC-470033N3
T6	IFT coil	CA-3484	7MC-452503N
T7	Discriminator coil	CA-2997	7MC-2091N
T8	VHF Hi RF coil	CA-3481	113KN-5127Z
T9	VHF Hi RF coil	CA-3481	113KN-5127Z
T10	VHF Hi RF coil	CA-4547	113SN-4580X
T11	Coil	CA-3483	126LN-5730A
T12	VCO coil	CA-3482	113KN-5344Z
L1	VHF RF coil	CA-3486	6.5SN0-097
L2	RFC 10 $\mu$ H	C-0728	LF4-100K
L3	Balun coil	CA-3487	6.5SN0-099
L4	VHF OSC coil	CA-4546	6.5SN0-087
L5	RFC 2.2mH	C-727	FL-7H
L6	UHF Tank coil	CA-4654	8LNR-093
L7	RFC 10 $\mu$ H	C-0728	LF4-100K
L8	UHF Tank coil	CA-4654	8LNR-093
L9	VHF OSC coil	CA-3485	6.5SN0-104
L10	RFC .68 $\mu$ H	CB-2190	EL0606-R68M
L11	RFC 1.8 $\mu$ H	CA-2909	LF4-1R8K
L12	RFC .33 $\mu$ H	C-0726	FL-3H
L13	RFC .33 $\mu$ H	C-0726	FL-3H
L14	RFC .33 $\mu$ H	C-0726	FL-3H
L15	RFC .2 $\mu$ H	CA-3488	4LNC-092
L16	RFC .2 $\mu$ H	CA-3488	4LNC-092
L17	Choke coil 18 $\mu$ H	CA-3182	3B-037
CF-1	Crystal filter 10.7 MHz	C-0725	CMF-10.7 or 10M15B
CF-2	Crystal filter 10.7 MHz	C-0725	CMF-10.7 or 10M15B
CF-3	Ceramic filter 455 kHz		LF-C18
CF-4	Ceramic filter 455 kHz	C-0578	BFB455L or EF-A8
CF-5	Ceramic filter 455 kHz	C-0578	BFB455L or EF-A8
X1	Crystal 10.245 MHz		
X2	Crystal 65.71464 MHz		
X3	Crystal 62.85750 MHz		
X4	Crystal 60.00000 MHz		
<b>MISCELLANEOUS</b>			
②	Test pin IC socket Shield plate Ceramic stand off L = 10 mm. Ceramic stand off L = 20 mm. P.C. Board VCO shief plate with insulator	J-6461	CTP C831402 CE-21D-5910  GE-21B-5694 GE-21D-6070/6071

Ref. No.	Description		RS Part Number	MFR's Part Number
<b>SEMICONDUCTORS</b>				
D1	Diode	Silicon	HV80	HV80
D2	Diode	Silicon	HV80	HV80
D3	Diode	Silicon	HV80	HV80
D4	Diode	Variable capacitor	FC-54M	FC-54M
D5	Diode	Variable capacitor	FC-54M	FC-54M
D6	Diode	Variable capacitor	FC-54M	FC-54M
D7	Diode	Variable capacitor	FC-54M	FC-54M
D8	Diode	Variable capacitor	FC-54M	FC-54M
D9	Diode	Variable capacitor	FC-54M	FC-54M
D10	Diode	Silicon	HV80	HV80
D11	Diode	Silicon	HV80	HV80
D12	Diode	Silicon	HV80	HV80
D13	Diode	Silicon	HV80	HV80
D14	Diode	Silicon	HV80	HV80
D15	Diode	Silicon	HV80	HV80
D16	Diode	Silicon	HV80	HV80
D17	Diode	Silicon	HV80	HV80
D18	Diode	Germanium	1N60	1N60
D19	Diode	Germanium	1N60	1N60
D20	Diode	Germanium	1N60	1N60
D21	Diode	Germanium	1N60	1N60
D22	Diode	Silicon	HV80	HV80
D23	Diode	Silicon	HV80	HV80
D24	Diode	Silicon	HV80	HV80
D25	Diode	Silicon	HV80	HV80
D26	Diode	Silicon	HV80	HV80
D27	Diode	Germanium	1N60	1N60
D28	Diode	Germanium	1N60	1N60
D29	Diode	Germanium	1N60	1N60
D30	Diode	Germanium	1N60	1N60
D31	Diode	Germanium	1N60	1N60
D32	Diode	Variable capacitor	FC-54M	FC-54M
D33	Diode	Zener (9.1V)	02Z9.1A	02Z9.1A
D34	Diode	Zener (5.6V)	02Z5.6A	02Z5.6A
D35	Diode	Silicon	HV80	HV80
D36	Diode	Zener (5.6V)	02Z5.6A	02Z5.6A
D37	Diode	Silicon	HV80	HV80
D38	Diode	Zener (5.6V)	02Z5.6A	02Z5.6A
D39	Diode	Silicon	1S1885	1S1885
D40	Diode	Silicon	1B2C1	1B2C1
D41	Diode	Silicon	1B2Z1	1B2Z1
Q1	Transistor	Silicon	Toshiba	2SC373
Q2	FET	Silicon	Toshiba	3SK35 or 3SK59
Q3	FET	Silicon	Toshiba	3SK35 or 3SK59
Q4	Transistor	Silicon	Hitachi	2SC535(B)
Q5	Transistor	Silicon	Toshiba	2SC372(0)
Q6	Transistor	Silicon	Toshiba	2SC372(0)
Q7	Transistor	Silicon	Toshiba	2SC372(0)
Q8	Transistor	Silicon	Toshiba	2SC372(0)

Ref. No.	Description				RS Part Number	MFR's Part Number
Q9	Transistor	Silicon	Toshiba	2SC272(0)	2SC372(0)	
Q10	Transistor	Silicon	Toshiba	2SC372(0)	2SC372(0)	
Q11	Transistor	Silicon	Toshiba	2SC372(0)	2SC372(0)	
Q12	FET	Silicon	Toshiba	3SK35 or 3SK59	3SK35 or 3SK59	
Q13	FET	Silicon	Toshiba	3SK35 or 3SK59	3SK35 or 3SK59	
Q14	Transistor	Silicon	Toshiba	2SC785(R)	2SC785(R)	
Q15	Transistor	Silicon	Toshiba	2SC373	2SC373	
Q16	Transistor	Silicon	Toshiba	2SC373	2SC373	
Q17	Transistor	Silicon	Toshiba	2SC373	2SC373	
Q18	Transistor	Silicon	Toshiba	2SC373	2SC373	
Q19	Transistor	Silicon	Hitachi	2SC1117	2SC1117	
Q20	Transistor	Silicon	Hitachi	2SC1117	2SC1117	
Q21	Transistor	Silicon	Toshiba	2SC387A	2SC387A	
Q22	Transistor	Silicon	Toshiba	2SC394(Y)	2SC394(Y)	
Q23	Transistor	Silicon	Toshiba	2SA495(0)	2SA495(0)	
Q24	Transistor	Silicon	Toshiba	2SA495(0)	2SA495(0)	
Q25	Transistor	Silicon	Toshiba	2SA495(0)	2SA495(0)	
Q26	Transistor	Silicon	Hitachi	2SC535(B)	2SC535(B)	
Q27	Transistor	Silicon	Toshiba	2SD526 or 2SC789	2SD526 or 2SC789	
Q28	Transistor	Silicon	Toshiba	2SD526 or 2SC789	2SD526 or 2SC789	
Q29	Transistor	Silicon	Toshiba	2SC735(Y)	2SC735(Y)	
Q30	Transistor	Silicon	Toshiba	2SD526 or 2SC789	2SD526 or 2SC789	
IC-1	Integrated circuit				N7405A	N7405A
IC-2	Integrated circuit				BA-511A	BA-511A
IC-3	Integrated circuit				N74145B	N74145B
IC-4	Integrated circuit				MC1648P	MC1648P
<b>RESISTORS</b>						
R1	Carbon film	1K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-102
R2	Carbon film	1K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-102
R3	Carbon film	1K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-102
R4	Carbon film	1K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-102
R5	Carbon film	100K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-104
R6	Carbon film	47K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-473
R7	Carbon film	100K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-104
R8	Carbon film	47K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-473
R9	Carbon film	100 $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-101
R10	Carbon film	100 $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-101
R11	Carbon film	100K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-104
R12	Carbon film	100K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-104
R13	Carbon film	100K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-104
R14	Carbon film	3.3K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-332
R15	Carbon film	100 $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-101
R16	Carbon film	3.3K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-332
R17	Carbon film	3.3K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-332
R18	Carbon film	470K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-474
R19	Carbon film	1K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-102
R20	Carbon film	100 $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-101
R21	Carbon film	470K $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-474
R22	Carbon film	100 $\Omega$	1/8W	$\pm 5\%$		ERD-18VJ-101

**DISPLAY P.C. BOARD PARTS LIST**

Ref. No.	Description	RS Part Number	MFR's Part Number
<b>SEMICONDUCTORS</b>			
D1	Light emitting diode	L-0740	TLR-104 (C or D)
D2	Light emitting diode	L-0740	TLR-104 (C or D)
D3	Light emitting diode	L-0740	TLR-104 (C or D)
D4	Light emitting diode	L-0740	TLR-104 (C or D)
D5	Light emitting diode	L-0740	TLR-104 (C or D)
D6	Light emitting diode	L-0740	TLR-104 (C or D)
D7	Light emitting diode	L-0740	TLR-104 (C or D)
D8	Light emitting diode	L-0740	TLR-104 (C or D)
D9	Light emitting diode	L-0740	TLR-104 (C or D)
D10	Light emitting diode	L-0740	TLR-104 (C or D)
D11	Light emitting diode	L-0740	TLR-104 (C or D)
D12	Light emitting diode	L-0740	TLR-104 (C or D)
D13	Light emitting diode	L-0740	TLR-104 (C or D)
D14	Light emitting diode	L-0740	TLR-104 (C or D)
D15	Light emitting diode	L-0740	TLR-104 (C or D)
D16	Light emitting diode	L-0740	TLR-104 (C or D)
<b>MISCELLANEOUS</b>			
⑳	P.C. Board holder P.C. Board		GE-11D-593 GE-21C-5706

**LED P.C. BOARD PARTS LIST**

Ref. No.	Description	RS Part Number	MFR's Part Number
D1	Light emitting diode	L-0740	TLR-104 (C or D)
㉓	P.C. Board		GE-21D-5708

**MISCELLANEOUS**

	Push switch	S-7293	2FQ-0001DF-3220
	Push switch	S-7294	16FQ-0001BF-3220
JA	P.C. Board connector	HB-5490	3022-20A
JB	P.C. Board connector	HB-5491	3022-9A
JC	P.C. Board connector	HB-5490	3022-20A
JD	P.C. Board connector	HB-5491	3022-9A
JE	P.C. Board connector	HB-5490	3022-20A
JF	P.C. Board connector	HB-5490	3022-20A
JG	P.C. Board connector	HB-5492	3022-3A
JH	P.C. Board connector	HB-5493	5048-12A
Ji	P.C. Board connector	HB-5493	5048-12A
㉔	P.C. Board		GE-21B-5697

**SEMICONDUCTORS**

D1	Diode	Germanium		1N60	1N60
D2	Diode	Zener		HZ3-C	HZ3-C
D3	Diode	Silicon		HV80	HV80
1C-1	Integrated circuit			N74150	N74150
Q1	Transistor	Silicon	Toshiba	2SC373	2SC373
Q2	Transistor	Silicon	Toshiba	2SC373	2SC373

PLL/PROGRAMMER P.C. BOARD PARTS LIST

Ref. No.	Description	RS Part Number	MFR's Part Number
<b>CAPACITORS</b>			
C1	Electrolytic 47 $\mu$ F 10WV +50 ~ -10%		CE04W1A470B
C2	Mylar 0.01 $\mu$ F $\pm$ 10%		
C3	Mylar 0.01 $\mu$ F $\pm$ 10%		
C4	Electrolytic 220 $\mu$ F 10WV +50 ~ -10%		CE04W1A221E
C5	Electrolytic 1 $\mu$ F 50WV +75 ~ -10%		CE04W1H010
C6	Mylar 0.01 $\mu$ F $\pm$ 10%		
C7	Mylar 0.01 $\mu$ F $\pm$ 10%		
C8	Ceramic 22pF $\pm$ 5%		FC-50
C9	Tantalum 1 $\mu$ F 35WV $\pm$ 20%		CS15E1E010M1S
C10	Ceramic 5pF $\pm$ 0.5pF		FC-50
C11	Ceramic 100pF $\pm$ 10%		FC-70
C12	Ceramic 20pF $\pm$ 5%		FC-50
C13	Mylar 0.01 $\mu$ F $\pm$ 10%		
C14	Mylar 0.01 $\mu$ F $\pm$ 10%		
C15	Mylar 0.01 $\mu$ F $\pm$ 10%		
C16	Mylar 0.01 $\mu$ F $\pm$ 10%		
C17	Mylar 0.01 $\mu$ F $\pm$ 10%		
C18	Mylar 0.01 $\mu$ F $\pm$ 10%		
C19	Mylar 0.01 $\mu$ F $\pm$ 10%		
C20	Mylar 0.01 $\mu$ F $\pm$ 10%		
C21	Mylar 0.01 $\mu$ F $\pm$ 10%		
C22	Mylar 0.1 $\mu$ F $\pm$ 10%		
C23	Mylar 0.001 $\mu$ F $\pm$ 10%		
C24	Mylar 0.01 $\mu$ F $\pm$ 10%		
C25	Mylar 0.01 $\mu$ F $\pm$ 10%		
TC-1	Trimmer 20pF	C-0730	ECV-1ZW20X53
<b>MISCELLANEOUS</b>			
JD	P.C. Board connector	HB-5489	3024-9A
JE	P.C. Board connector	HB-5488	3024-20A
JF	P.C. Board connector	HB-5488	3024-20A
JG	P.C. Board connector		3024-3A
(25)	P.C. Board		GE-21B-5703
X1	Crystal 5.12 MHz IC socket IC socket Test pin	J-6462 HB-3996	C831402 C831602 CTP
<b>RESISTORS</b>			
R1	Carbon film 22K $\Omega$ 1/8W $\pm$ 5%		ERD-18VJ-223
R2	Carbon film 100K $\Omega$ 1/8W $\pm$ 5%		ERD-18VJ-104
R3	Carbon film 100K $\Omega$ 1/8W $\pm$ 5%		ERD-18VJ-104
R4	Carbon film 330 $\Omega$ 1/8W $\pm$ 5%		ERD-18VJ-331
R5	Carbon film 100 $\Omega$ 1/8W $\pm$ 5%		ERD-18VJ-101
R6	Carbon film 330 $\Omega$ 1/8W $\pm$ 5%		ERD-18VJ-331

Ref. No.	Description			RS Part Number	MFR's Part Number
R7	Carbon film	3.3K $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-332
R8	Carbon film	1K $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-102
R9	Carbon film	470 $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-471
R10	Carbon film	470 $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-471
R11	Carbon film	2.7K $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-272
R12	Carbon film	3.3M $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-335
R13	Carbon film	4.7K $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-472
R14	Carbon film	10K $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-103
R15	Carbon film	10K $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-103
R16	Carbon film	1K $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-102
R17	Carbon film	10K $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-103
R18	Carbon film	4.7K $\Omega$	1/8W $\pm$ 5%		ERD-18VJ-472
R19	Carbon film	220K $\Omega$	1/8W $\pm$ 5%		ERD-18TJ-224
<b>SEMICONDUCTORS</b>					
IC-1	Integrated circuit			N7405	N7405
IC-2	Integrated circuit			N7405	N7405
IC-3	Integrated circuit			N7405	N7405
IC-4	Integrated circuit			MCM14537	MCM14537
IC-5	Integrated circuit			MC4044	MC4044
IC-6	Integrated circuit			TC-5082P	TC-5082P
IC-7	Integrated circuit			N74164	N74164
IC-8	Integrated circuit			N74164	N74164
IC-9	Integrated circuit			MC4016P	MC4016P
IC-10	Integrated circuit			MC4018P	MC4018P
IC-11	Integrated circuit			MC4018P	MC4018P
IC-12	Integrated circuit			MC4016P	MC4016P
IC-13	Integrated circuit			MC12014	MC12014
IC-14	Integrated circuit			MC12013	MC12013
D1	Diode	Silicon		HV80	HV80
D2	Diode	Silicon		HV80	HV80
Q1	Transistor	Silicon	Toshiba	2SC373	2SC373
Q2	Transistor	Silicon	Toshiba	2SC373	2SC373
Q3	Transistor	Silicon	Toshiba	2SC373	2SC373
Q4	Transistor	Silicon	Toshiba	2SC373	2SC373
Q5	Transistor	Silicon	Toshiba	2SC373	2SC373
Q6	Transistor	Silicon	Toshiba	2SC373	2SC373
Q7	Transistor	Silicon	Toshiba	2SC373	2SC373
Q8	Transistor	Silicon	Toshiba	2SC373	2SC373
Q9	Transistor	Silicon	Toshiba	2SC373	2SC373



**SCANNING/PROGRAMMER P.C. BOARD PARTS LIST**

Ref. No.	Description				RS Part Number	MFR's Part Number
<b>CAPACITORS</b>						
C1	Mylar	0.01 $\mu$ F		$\pm 10\%$		
C2	Tantalum	3.3 $\mu$ F	10WV	$\pm 20\%$		CS15E1A3R3M1S
C3	Tantalum	1 $\mu$ F	35WV	$\pm 20\%$		CS15E1E010M1S
C4	Tantalum	1 $\mu$ F	35WV	$\pm 20\%$		CS15E1E010M1S
C5	Tantalum	33 $\mu$ F	6.3WV	$\pm 20\%$		CS15E0J330M1S
C6	Electrolytic	100 $\mu$ F	10WV	+50 ~ -10%		CE04W1A101A
C7	Mylar	0.01 $\mu$ F		$\pm 10\%$		
C8	Mylar	0.01 $\mu$ F		$\pm 10\%$		
C9	Ceramic	220pF		$\pm 10\%$		FC-80
C10	Mylar	0.002 $\mu$ F		$\pm 10\%$		
C11	Mylar	0.047 $\mu$ F		$\pm 10\%$		
C12	Mylar	0.01 $\mu$ F		$\pm 10\%$		
C13	Mylar	0.0068 $\mu$ F		$\pm 10\%$		
C14	Mylar	0.0068 $\mu$ F		$\pm 10\%$		
C15	Electrolytic	10 $\mu$ F	16WV	+50 ~ -10%		CE04W1C100F
C16	Mylar	0.01 $\mu$ F		$\pm 10\%$		
<b>RESISTORS</b>						
R1	Carbon film	3.3K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-332
R2	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R3	Carbon film	470 $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-471
R4	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R5	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R6	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R7	Carbon film	4.7K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-472
R8	Carbon film	1K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-102
R9	Carbon film	4.7K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-472
R10	Carbon film	4.7K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-472
R11	Carbon film	330 $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-331
R12	Carbon film	3.9K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-392
R13	Carbon film	1K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-102
R14	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R15	Carbon film	47K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-473
R16	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R17	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R18	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R19	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R20	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R21	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R22	Carbon film	470 $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-471
R23	Carbon film	470 $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-471
R24	Carbon film	47 $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-470
R25	Carbon film	4.7K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-472
R26	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R27	Carbon film	4.7K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-472
R28	Carbon film	100K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-104
R29	Carbon film	100K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-104
R30	Carbon film	4.7K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-472
R31	Carbon film	10K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-103
R32	Carbon film	100K $\Omega$	1/8W	$\pm 5\%$		ERD-18TJ-104

Ref. No.	Description	RS Part Number	MFR's Part Number
<b>SEMICONDUCTORS</b>			
D1	Diode Germanium	1N60	1N60
D2	Diode Germanium	1N60	1N60
D3	Diode Germanium	1N60	1N60
D4	Diode Germanium	1N60	1N60
D5	Diode Silicon	HV80	HV80
D6	Diode Germanium	1N60	1N60
D7	Diode Germanium	1N60	1N60
D8	Diode Germanium	1N60	1N60
D9	Diode Silicon	HV80	HV80
D10	Diode Germanium	1N60	1N60
D11	Diode Germanium	1N60	1N60
D12	Diode Germanium	1N60	1N60
D13	Diode Germanium	1N60	1N60
D14	Diode Germanium	2N60	1N60
D15	Diode Germanium	1N60	1N60
D16	Diode Germanium	1N60	1N60
D17	Diode Germanium	1N60	1N60
D18	Diode Germanium	1N60	1N60
D19	Diode Germanium	1N60	1N60
D20	Diode Germanium	1N60	1N60
D21	Diode Silicon	HV80	HV80
IC-1	Integrated circuit	N74145	N74145
IC-2	Integrated circuit	N74145	N74145
IC-3	Integrated circuit	N7400	N7400
IC-4	Integrated circuit	N7493	N7493
IC-5	Integrated circuit	N7400	N7400
IC-6	Integrated circuit	N7493	N7493
IC-7	Integrated circuit	N7404	N7404
Q1	Transistor Silicon Toshiba	2SC373	2SC373
Q2	Transistor Silicon Toshiba	2SC373	2SC373
TA-1	Transistor Array	TA-58	TA-58
TA-2	Transistor Array	TA-58	TA-58
TA-3	Transistor Array	TA-58	TA-58
<b>MISCELLANEOUS</b>			
	IC socket IC socket Test pin	J-6462 HB-3996	C831402 C831602 CTP
JA JB JC	P.C. Board connector P.C. Board connector P.C. Board connector		3024-20A 3024-9A 3024-20A
②	P.C. Board		GE-21B-5700