

This Information Is Provided By  
***CBTricks.com***

**Realistic TRC-448 Service Manual**

**Liability of damages to any equipment is the sole responsibility of the user! Downloading, viewing, or using any information provided on these pages automatically accepts the user to the terms of this agreement!**

**Modifications are provided for information purposes only!**

Supporters of CBTricks.com paid for the hosting so you would have this file.

CBTricks.com is a non-commercial personal website was created to help promote the exchange of service, modification, technically oriented information, and historical information aimed at the Citizens Band, GMRS (CB "A" Band), MURS, Amateur Radios and RF Amps.

CBTricks.com is not sponsored by or connected to any Retailer, Radio, Antenna Manufacturer or Amp Manufacturer, or affiliated with any site links shown in the links database. The use of product or company names on my web site is not endorsement of that product or company.

The site is supported with donations from users, friends and selling of the Site Supporters DVD's to cover some of the costs of having this website on the Internet instead of relying on banner ads, pop-up ads, commercial links, etc. Thus I do not accept advertising banners or pop-up/pop-under advertising or other marketing/sales links or gimmicks on my website.

ALL the money from donations is used for CBTricks.com I didn't do all the work to make money (I have a day job). This work was not done for someone else to make money also, for example the ebay CD sellers.

All Trademarks, Logos, and Brand Names are the property of their respective owners.

This information is not provided by, or affiliated in any way with any radio or antenna Manufacturers.

**Thank you for any support you can give.**

For information on how to Support CBTricks.com

<http://www.cbtricks.com/support/>



**REALISTIC<sup>®</sup>**

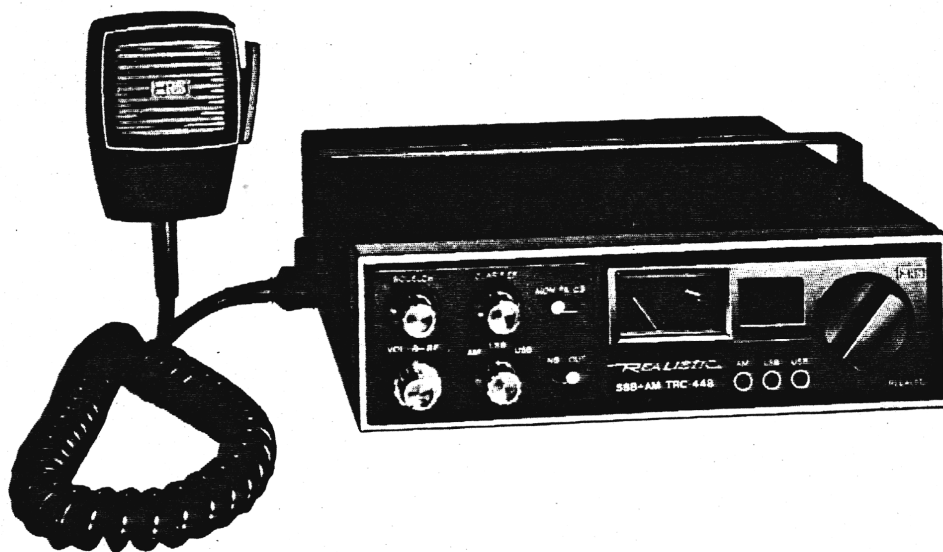
21-1561

# Service Manual

**TRC-448**

## **40-CHANNEL MOBILE TRANSCEIVER**

Catalog Number: 21-1561



CUSTOM MANUFACTURED FOR RADIO SHACK  A DIVISION OF TANDY CORPORATION

# CONTENTS

SPECIFICATIONS .....	3, 4
BLOCK DIAGRAM .....	5
PRINCIPLES OF OPERATION .....	6 ~ 8
DISASSEMBLY .....	9
ALIGNMENT PREPARATION .....	9
ALIGNMENT POSITIONS AND POINTS .....	10
PLL SECTION ALIGNMENT CHART .....	11
VCO OUTPUT FREQUENCY, IC-2 INPUT FREQUENCY AND CODE TABLE .....	12
TRANSMITTER SECTION ALIGNMENT CHART .....	13
RECEIVER SECTION ALIGNMENT CHART .....	14
ALIGNMENT CONNECTIONS .....	15, 16
NOISE BLANKER ALIGNMENT CHART .....	17
PLL P.C. BOARD TOP VIEW .....	18
PLL P.C. BOARD BOTTOM VIEW .....	19
MAIN P.C. BOARD TOP VIEW .....	20
MAIN P.C. BOARD BOTTOM VIEW .....	21
WIRING DIAGRAM (1) .....	22
WIRING DIAGRAM (2) .....	23
LED P.C.BOARD (TOP VIEW) .....	24
LED P.C.BOARD (BOTTOM VIEW) .....	24
LED P.C.BOARD/ CHANNEL SWITCH P.C.BOARD WIRING DIAGRAM.....	24
TROUBLESHOOTING .....	25 ~ 27
SEMICONDUCTOR VOLTAGE READINGS .....	28 ~ 33
PLL P.C.BOARD ASSEMBLY PARTS LIST .....	34 ~ 39
MAIN P.C.BOARD ASSEMBLY PARTS LIST.....	40 ~ 49
LED P.C.BOARD ASSEMBLY PARTS LIST.....	49
CHASSIS ASSEMBLY PARTS LIST .....	50
EXPLODED VIEW .....	51
SCHEMATIC DIAGRAM.....	52, 53
SEMICONDUCTOR LEAD IDENTIFICATION.....	54
IC PIN CONFIGURATION .....	54, 55

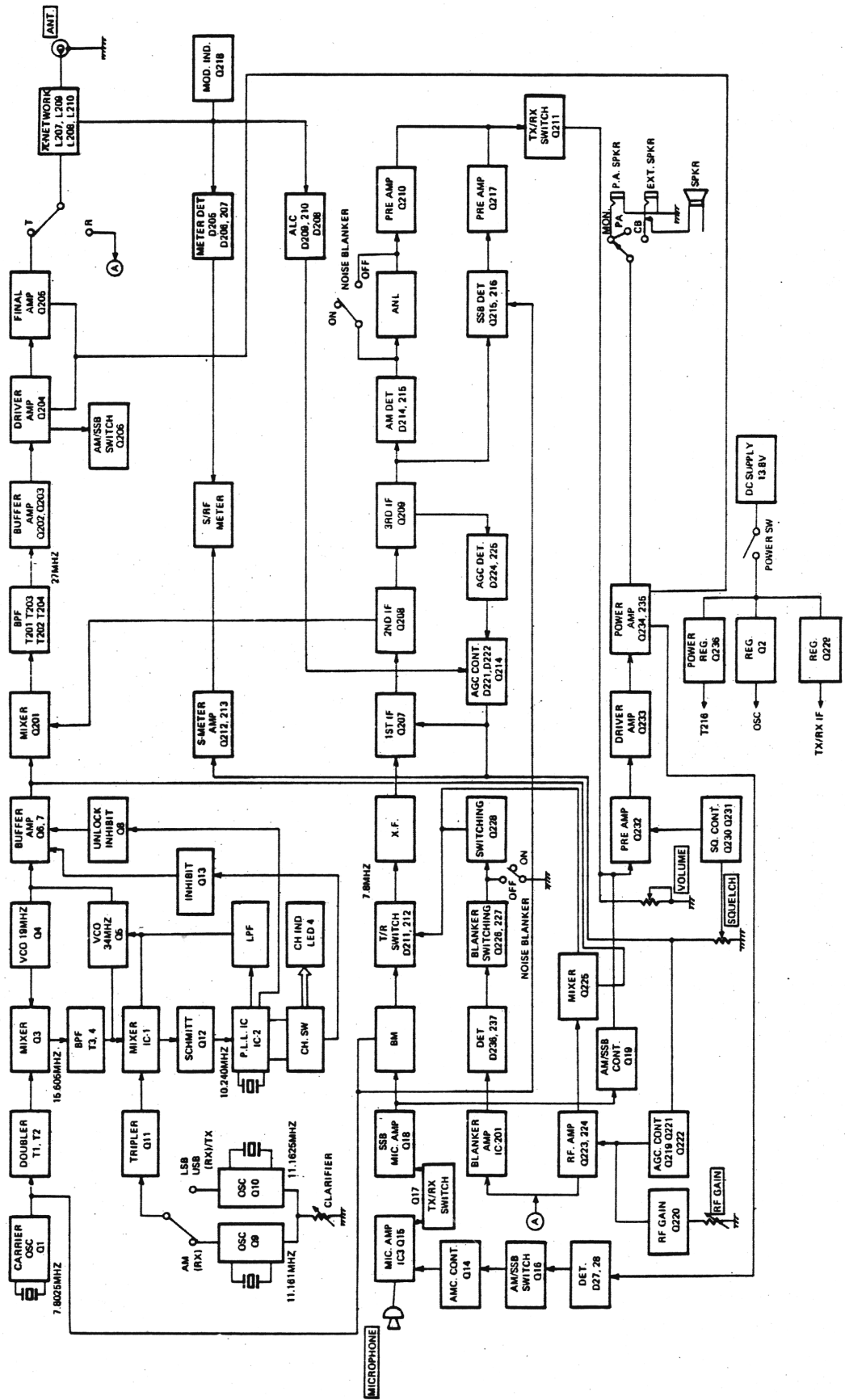
# SPECIFICATIONS

DESCRIPTION		CONDITION	NOMINAL	LIMIT
<b>TRANSMITTER</b>				
Frequency Tolerance	AM		±0.0003%	±0.005%
	SSB		±0.0003%	±0.005%
RF Output	AM	13.8 V DC	3.8 W (4 watts max.)	3.5 ~ 4.0 W
	SSB	13.8 V DC	12 W PEP	10 ~ 12 W
Modulation Distortion		80% MOD 1 kHz	3%	10%
Spurious Harmonic Emission	AM		-65 dB	-60 dB
	SSB		-65 dB	-60 dB
Carrier Suppression	SSB		-50 dB	-40 dB
Unwanted Sideband Suppression		2.5 kHz (SSB)	-50 dB	-40 dB
Current Drain		No Modulation (AM)	1500 mA	2000 mA
		(SSB)	1000 mA	1500 mA
		80% MOD (AM)	2000 mA	2600 mA
		10 W PEP Two-Tone (SSB)	2500 mA	3000 mA
Modulation Frequency Response		1 kHz 0 dB		
		Lower 450 Hz	AM SSB -6 dB	AM -10 dB SSB -14 dB
		Upper 2.5 kHz	AM SSB -6 dB	AM SSB -10 dB
Carrier Power Uniformity		Ch-to-Ch with No MOD	AM 0.3 W	0.5 W
MIC Input Level Uniformity		Ch-to-Ch for 4 W Output,	SSB 2 dB	3 dB
		1000Hz Single-Tone		
Intermodulation Distortion		500 and 2500 Hz Two-Tone	30 dB	25 dB
MIC Input Level Uniformity		LSB/USB 4 W Output		
		1.5 kHz Single Tone	1 dB	3 dB
Microphone Sensitivity		AM 50% MOD	0.7 mV	1.5 mV
		SSB 4 W PEP	0.7 mV	1.5 mV
AMC Range		AM 50 ~ 100% MOD	50 dB	30 dB
		SSB 10 ~ 12 W PEP	20 dB	10 dB
<b>RECEIVER</b>				
Max. Sensitivity		AM	0.5 μV	1 μV
		SSB	0.25 μV	0.5 μV
Sensitivity		10 dB S/N	AM	0.5 μV
			SSB	0.25 μV
AGC Figure of Merit		50 mV 10 dB	AM	90 dB
			SSB	90 dB
Overload AGC Characteristics		10 mV to 100 mV	AM	±2 dB
			SSB	±2 dB
Overall Audio Fidelity		at 6 dB Down		
		Upper Frequency	AM	2100 Hz
			SSB	3500 Hz
		Lower Frequency	AM	300 Hz
			SSB	300 Hz
Cross Modulation RS Standard		AM	60 dB	50 dB
Adjacent Channel Selectivity		10 kHz	AM	80 dB
			SSB	90 dB
Maximum Audio Output Power		AM	5 W	4 W
		SSB	5 W	4 W
Audio Output Power		10% THD	SSB	3.5 W
			AM	3.5 W
THD AM		500 mW Output 1 mV		
		Input 30% (MOD)	3%	6%
		80% (MQD)	5%	12%
THD SSB		1 mV Input 1 kHz		
		Single Tone	3%	6%

DESCRIPTION	CONDITION	NOMINAL	LIMIT
RF Gain Control Range at Max. Sensitivity Level	AM	40 dB	30 ~ 50 dB
	SSB	40 dB	30 ~ 50 dB
S/N Ratio	AM Input 1 mV	40 dB	35 dB
	SSB	40 dB	35 dB
Squelch Sensitivity at Threshold	AM	0.5 $\mu$ V	1 $\mu$ V
	SSB	0.5 $\mu$ V	1 $\mu$ V
Squelch Sensitivity at Tight	AM	1000 $\mu$ V	500 ~ 2000 $\mu$ V
	SSB	1000 $\mu$ V	500 ~ 2000 $\mu$ V
Skirt Rejection ( $\pm$ 20 kHz)	AM	80 dB	70 dB
S Meter Sensitivity at "S-9" (No Modulation AM)	AM	100 $\mu$ V	50 ~ 200 $\mu$ V
	SSB	100 $\mu$ V	50 ~ 200 $\mu$ V
Image Rejection Ratio fo + (2 x 7.8 MHz)	AM	80 dB	65 dB
	SSB	80 dB	65 dB
1/2 IF Rejection Ratio fo + 7.8 MHz/2	AM	90 dB	80 dB
	SSB	90 dB	80 dB
IF Rejection Ratio 7.8 MHz	AM	90 dB	75 dB
	SSB	90 dB	75 dB
Oscillator Drop-out Voltage	AM	7 V	10 V
	SSB	7 V	10 V
Current Drain at No Signal	AM	550 mA	1000 mA
	SSB	550 mA	1000 mA
Current Drain at Maximum	AM	1000 mA	1500 mA
	SSB	1000 mA	1500 mA
Clarifier Range	AM	$\pm$ 1 kHz	$\pm$ 0.6 ~ $\pm$ 2.5 kHz
	SSB	$\pm$ 1 kHz	$\pm$ 0.6 ~ $\pm$ 2.5 kHz
Spurious Rejection Ratio Within Band	AM	65 dB	56 dB
	SSB	65 dB	56 dB
Outside of Band	AM	60 dB	50 dB
	SSB	60 dB	50 dB
<b>PUBLIC ADDRESS</b>			
Microphone Sensitivity	3 W-Output 1 kHz	1 mV	2 mV
Output Power	10% Distortion	3.5 W	3 W
Current Drain	No Signal	500 mA	1000 mA
	Max. Output Power	1000 mA	1500 mA
<b>GENERAL</b>			
Frequency Range	29.965 to 27.405 MHz		
Channel	40 Channels		
Frequency Control	Crystal Control (PLL System)		
Operating Temperature	-10°C to 50°C		
Humidity	10 to 95%		
Microphone	Dynamic Type with PTT Switch		
Operating Voltage	13.8 V DC Nominal (12.0 ~ 15.0 Volt DC)		
Power Consumption	Pos./Neg. Ground 40 Watts		
Meter	TX Power and Signal Strength		
Size	205(W) x 60(H) x 260(D) mm (8-1/4" x 2-1/2" x 10-1/2")		

**NOTE:** Nominal Specs represent the design specs: all units should be able to approximate these – some will exceed and some may drop slightly below these specs. Limit Specs represent the absolute worst condition which still might be considered acceptable; in no case should a unit perform to less than within any Limit Spec.

# BLOCK DIAGRAM



# PRINCIPLES OF OPERATION

This section of the Service Manual will give you a brief technical description of unique or special circuits which you might otherwise not understand, notice or be able to troubleshoot.

## PLL CIRCUIT

The TRC-448 uses a Digital Phase Lock Loop circuit to synthesize each of the channel frequencies. The PLL Circuit consists of a reference crystal oscillator (10.24 MHz), reference divider, programable divider, crystal oscillator, Phase Detector, Low Pass Filter (LPF) and a Voltage Controlled Oscillator (VCO, which uses a varicap diode as the frequency control source).

Refer to the AM and USB Block Diagram as you go through the following description. A 10.24 MHz Crystal is used as a reference frequency. The crystal is connected between Pin 4 and 5 of the PLL IC IC-2.

Crystal oscillator Q10 produces a 33.4875/3 MHz frequency signal. This signal is processed through Q11 tripler and mixed by IC-1 mixer with the Q5 VCO frequency (34.7675 to 35.2075 MHz). The resulting down-mix produces signals of 1.28 through 1.72 MHz, which pass through LPF, and Q12 amplifier and then applied to Pin 3 of PLL IC IC-2. These frequencies are divided by "N" (128 through 172) as determined by the Channel Selector switch. Thus the output is 10 kHz (divided internally by IC-2).

Also, the reference oscillator frequency, 10.24 MHz, is divided by 1024 (again, internally by IC-2) resulting in another 10 kHz frequency.

These two 10 kHz signals are fed to the Phase Detector and AFC. An error voltage is generated by the Phase Detector which is in proportion to the phase difference between these two 10 kHz signals. This error voltage appears at Pin 7. The AFC circuit brings the VCO to within the lock range of the Phase Detector. The AFC output is a tri-state output that is open when the circuit is in phase lock, provides positive going pulses when the VCO frequency is lower than the reference frequency and provides negative going pulses when the VCO frequency is higher than the reference frequency. This error voltage appears at Pin 1. The error voltage which appears at Pin 7 and 1 are the result of the phase difference, plus effects of harmonics and extraneous noise. These error voltages pass through the LPF, where the error voltage is integrated and harmonics and noises are filtered out. The resulting DC voltage is applied to the VCO (a varicap diode) whose capacity varies with applied DC voltage. With proper circuit design and precise adjustments, the VCO frequency is accurate and precise. When the Phase Detector senses no frequency or phase difference between the two 10 kHz signals, the system is "locked" and the VCO generates a frequency which is as accurate and stable as the reference crystal oscillator.

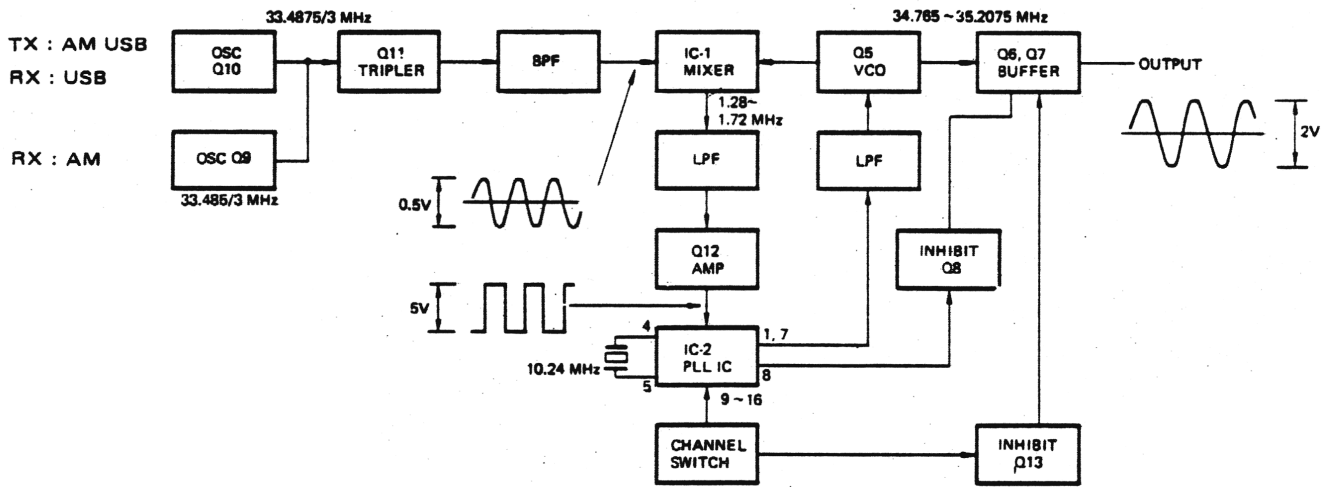
The Channel Selector switch provides a Binary Code output which is connected to Pins 9 through 16. The resulting code determines "N", the divisor which produces the required output frequency for each channel (precisely spaced 10 kHz apart).

For AM Receive Mode, crystal oscillator Q9 generates a frequency of 33.485/3 MHz. This signal is also processed through Q11 tripler and mixed in IC-1 mixer with the Q5 VCO frequency (34.765 to 35.205 MHz). The resulting down-mix produces 1.28 through 1.72 MHz frequencies which are supplied to Pin 3 of IC-2. Thus, the circuit functions in the same way, except for the method of deriving the required 1.28 through 1.72 MHz stepped frequencies.

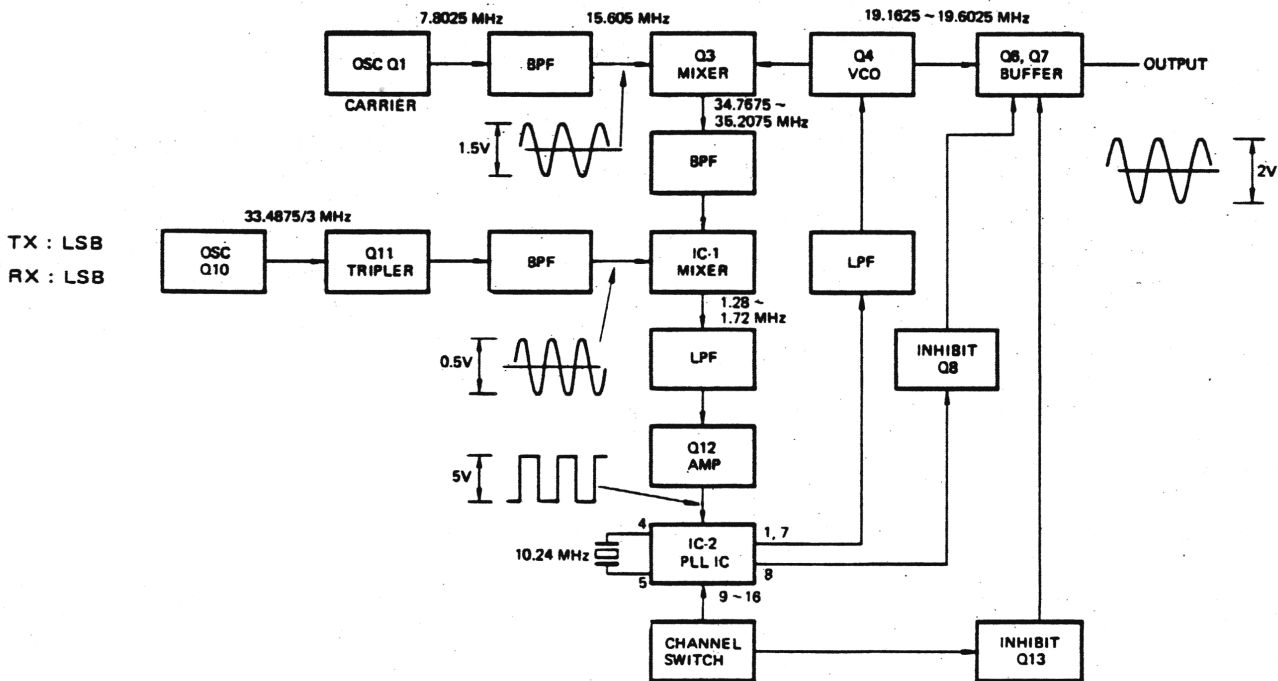
For LSB, crystal oscillator Q10 generates a frequency of 33.4875/3 MHz. This signal is processed through Q11 tripler. Carrier oscillator Q1 produces a 7.8025 MHz signal. This signal is processed through T1 and T2 Band Pass Filter, tuned to the 2nd harmonic (15.605 MHz) and mixed in Q3 mixer with the Q4 VCO frequency (19.1625 to 19.6025 MHz). The resulting up-mix produces 34.7675 through 35.2075 MHz which pass through BPF and mixed in IC-1 mixer with the 33.4875 MHz. The resulting down-mix produces the 1.28 through 1.72 MHz frequencies which are supplied to Pin 3 of IC-2. Thus, the circuit functions in the same way, except for the method of deriving the required 1.28 through 1.72 MHz stepped frequencies.



At Pin 8 of IC-2 a Transmit Inhibit signal is available. It provides a high output (supply voltage to IC-2) when the synthesizer attains a lock condition, or a low (0 volt) when not in lock. When the output is either high or low, no phase error pulses are outputted that require detection. This circuit is used to inhibit transmitter operation if the programmed frequency cannot be properly acquired. The lock detector output will go low if a frequency error exists for more than 0.5 milliseconds. This signal is applied to the base of Q8, turning it on or off. Thus the Transmitter can not operate in an unlocked condition of the PLL. The channel selector switch also has an inhibit function, when the selector switch is set in between two channel positions, Q13 is turned on to kill Q6.



**AM and USB**  
(Receive and Transmit)

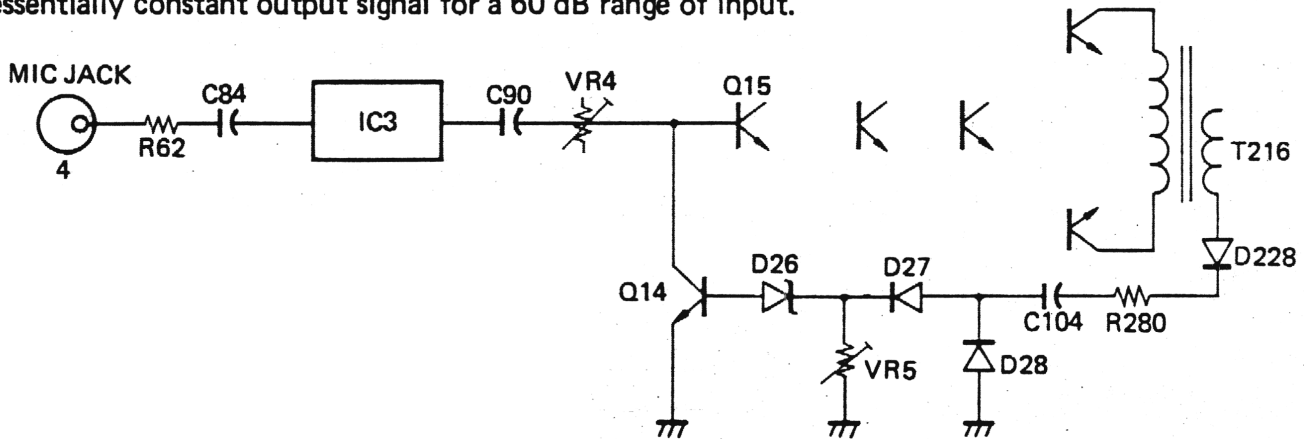


**LSB**  
(Receive and Transmit)

## AUTOMATIC MODULATION CONTROL CIRCUIT

The Automatic Modulation Control (AMC) circuit consists of Q14, D26, D27 and D28. The Mic input signal is fed to pin 4 of the microphone jack and then through R62, C84 to the input terminal (pin 5) of IC-3 where it is amplified and delivered through C90 and VR4 for further amplification by Q15, Q232, Q233, Q234 and Q235. The Audio amplifier/Modulation amplifier drives T216, whose secondary incorporates C104, through D228 and R280, which couples a portion of the signal to AMC detector diodes D27 and D28. D26 (an 8-volt zener) is connected to the output of D27/28; when the detected DC voltage from D27/28 exceeds 8 volts, D26 conducts. This applies a DC voltage to the base of Q14, thus decreasing its collector impedance. Notice that the combination of Q14 and VR4 automatically sets the desired audio signal level processed by the audio amplifier circuitry. VR5 is adjusted to set a modulation level of less than 100%.

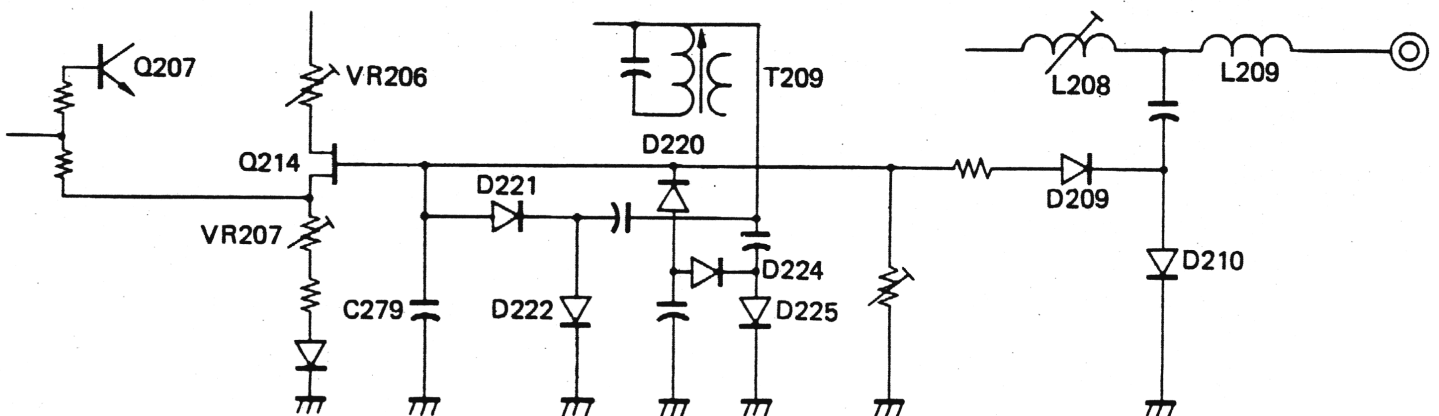
VR4 is adjusted to set a modulation level in the SSB mode. IC-3 is a silicon integrated circuit which functions as a audio amplifier with built-in automatic voice-operated gain adjustment. It is designed to provide an essentially constant output signal for a 60 dB range of input.



## AUTOMATIC LIMITER CONTROL (TRANSMITTER)/AUTOMATIC GAIN CONTROL (RECEIVER)

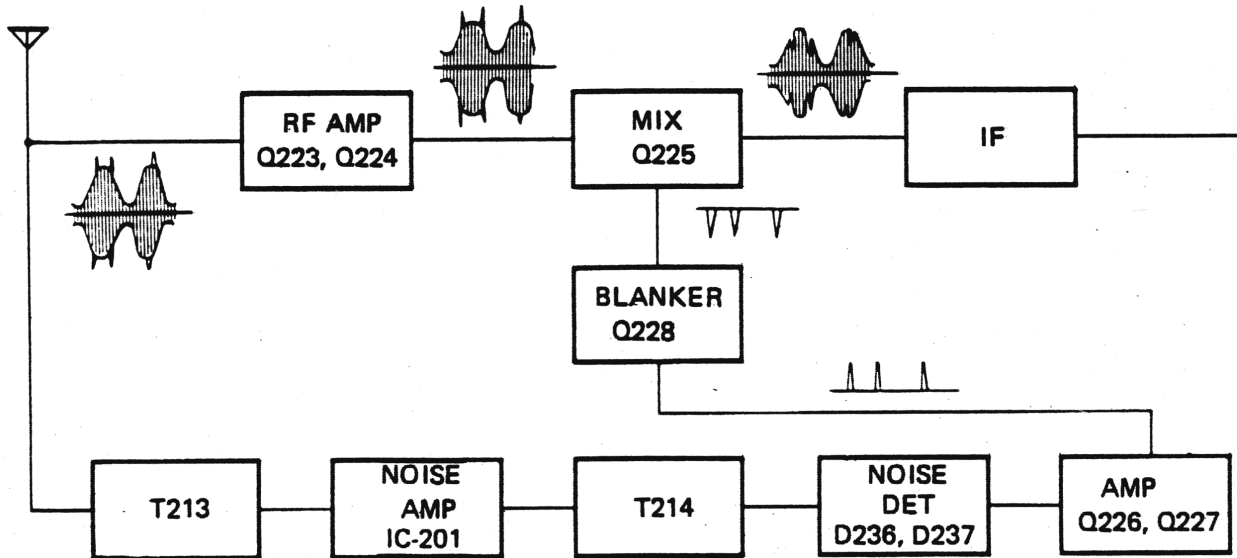
The Automatic Limiter Control (ALC) circuit consists of D209, D210 and Q214. The RF output signal is detected by D209 and D210. This applies a negative DC voltage to the gate of Q214, thus decreasing its source voltage. This source voltage controls Q207's (7.8 MHz amplifier) base bias voltage, thus decreasing its base voltage. This automatically sets the desired RF output level processed by the RF amplifier circuitry. VR207 is adjusted to set a RF power level of less than 12 watts PEP.

Q214 is also used as an automatic gain control (AGC). AGC circuit consists of Q214, D221 and D222. The amplified IF signal is detected by D221, D222, D224, and D225. This voltage is used for fast-attack AGC. D221, D222 and C279 are used for slow-release AGC. Thus, the circuit functions in the same way, except for the delivering of source voltage. VR206 is adjusted to set a "0" reading on the S-meter.



## NOISE BLANKER

Noise pulses are amplified by IC-201 and detected by D236 and D237. The detected pulses are then amplified by Q226 and Q227. This applies a positive pulse to the base of Q228, thus decreasing its collector impedance to shunt the Q225 gate impedance during the duration of the noise pulses. The most objectionable noise pulse frequencies are distributed around 40 MHz, thus T213 and T214 are tuned to this frequency.



## DISASSEMBLY

Refer to Figure 1.

Step 1: Remove two bracket screws (A) and the Bracket.

Step 2: Remove 4 cabinet mounting screws (B) (two from each side).

Step 3: Remove Cabinet Top and Bottom.

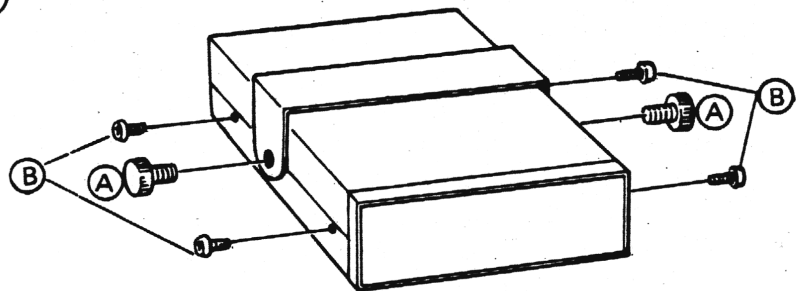


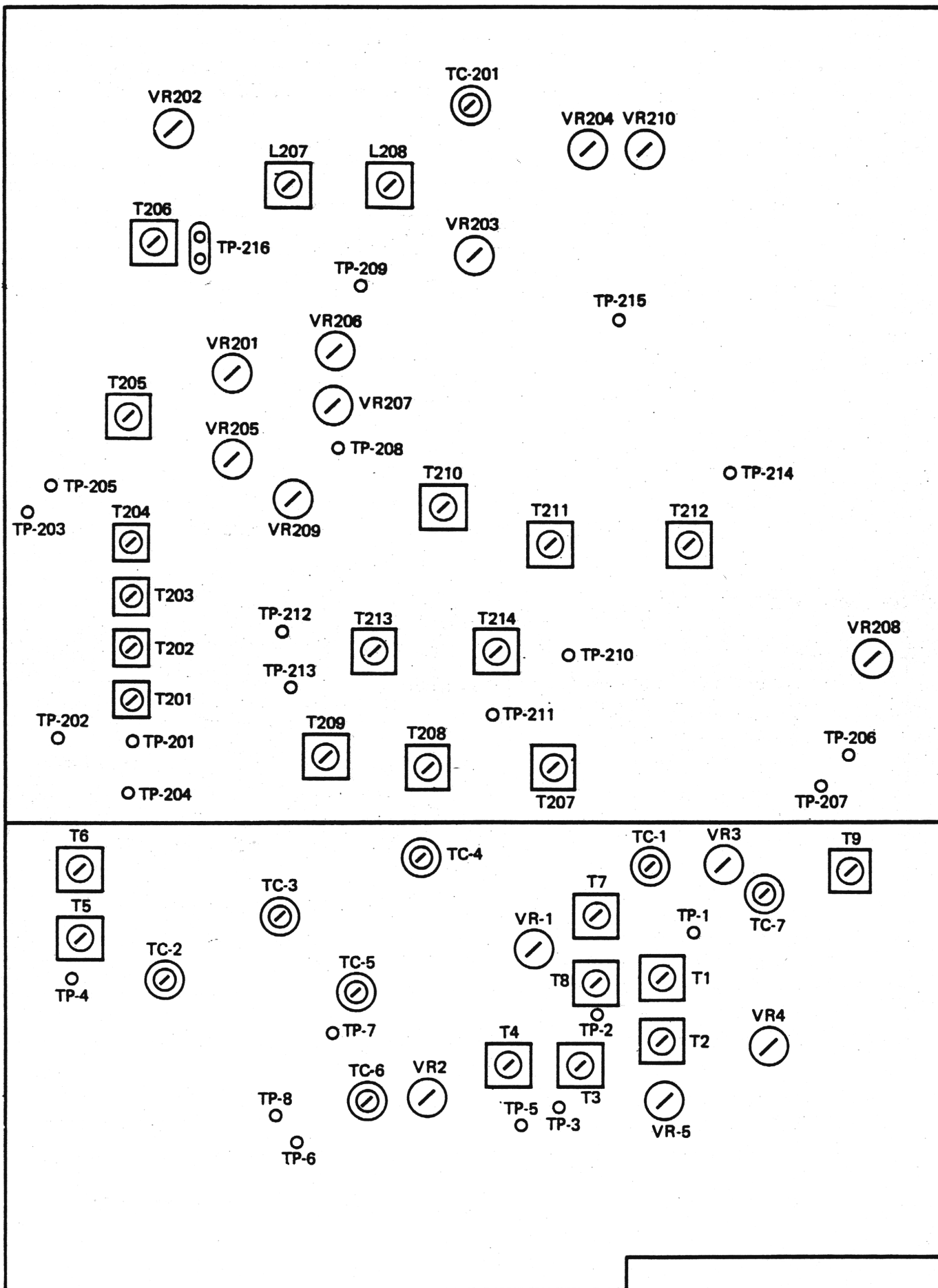
FIGURE 1

## ALIGNMENT PREPARATION

### TEST EQUIPMENT REQUIRED

1. Oscilloscope
2. AC VTVM
3. DC VTVM
4. Frequency Counter with level meter
5. AUDIO Signal Generator
6. Sweep Generator (0 ~ 50 MHz)
7. Power meter (50  $\Omega$ )
8. 50  $\Omega$ , 10 W dummy load
9. 2-tone generator (500 Hz ~ 2.5 kHz)
10. RF Signal Generator (0 ~ 30 MHz)
11. Pulse Generator
12. Monitor Receiver (54 MHz)  
(or Spectrum Analyzer)

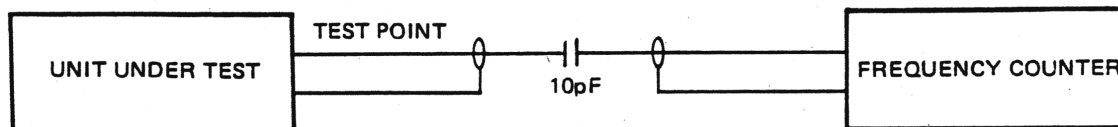
# ALIGNMENT POSITIONS AND POINTS



# PLL SECTION ALIGNMENT CHART

Step	Control Setting	Test Equipment	Test Point or Connection	Adjust
1	MODE – RX CH-19 CLARIFIER – Center	DC VTVM	Both ends of VR-304 CLARIFIER Control	VR-2 for 4V DC
2	MODE – RX CH-19	Freq. Counter with with level meter See NOTE 1 below	TP-8	TC-6 for 10.24 MHz ±10Hz
3	MODE – RX (AM)	Freq. Counter with level meter	TP-5	TC-4 for 33.485 MHz T7, 8 for max. output
4	MODE – RX (LSB or USB)	Freq. Counter with level meter	TP-5	TC-5 for 33.4875 MHz
5	MODE – RX (LSB)	Freq. Counter with level metre	TP-1	Check the frequency : 7.8025 MHz
6	MODE – RX (LSB)	Freq. Counter with level meter	TP-2	TC-1 for 7.8025 MHz ±10 Hz T1, T2 for max. output
7	MODE – RX (USB) CH-1	DC VTVM See NOTE 2 below	TP-7	TC-3 for 2.5 V DC ±0.1 V
8	MODE – RX (LSB) CH-19	Freq. Counter with Level Meter	TP-3	T3, T4 34.9875 MHz for max. output
9	MODE – RX (LSB) CH-1	DC VTVM See NOTE 2 below	TP-7	TC-2 for 2.5 V DC
10	MODE – RX (AM) CH-19	Freq. Counter with level meter	TP-4	T6 for max. output at 34.985 MHz
11	MODE – RX (LSB) CH-19	Freq. Counter with level meter	TP-4	T5 for max. output at 19.3825 MHz
12	MODE – TX (AM or USB)	Freq. Counter	TP-5	VR-1 for 33.4875 MHz

NOTE 1 : Steps 2 through 12, connect Frequency Counter through a 10 pF Capacitor to the test point noted.



NOTE 2 : Steps 7 and 9, DC output should change from  $2.5 \pm 0.1$  volts on CH-1 to approx. 3.5 volts on CH-40.

NOTE 3 : You can check the input frequency to IC-2 at TP-6, use TP-7 for ground.

# VCO OUTPUT FREQUENCY, IC-2 INPUT FREQUENCY AND CODE TABLE

CH	Frequency (MHz)	VCO			fin (MHz)	N	INPUT CODE PIN NO.									
		RX (AM) $\pm 1.5$ kHz	TX (AM USB)				9	10	11	12	13	14	15	16		
			RX (LSB) $\pm 1.5$ kHz	RX (USB) $\pm 1.5$ kHz											RX (USB) $\pm 1.5$ kHz	
1	26.965	34.765	19.1625	34.7675	1.28	128	1	0	0	0	0	0	0	0	0	0
2	26.975	34.775	19.1725	34.7775	1.29	129	1	0	0	0	0	0	0	0	0	1
3	26.985	34.785	19.1825	34.7875	1.30	130	1	0	0	0	0	0	0	0	1	0
4	27.005	34.805	19.2025	34.8075	1.32	132	1	0	0	0	0	0	1	0	0	0
5	27.015	34.815	19.2125	34.8175	1.33	133	1	0	0	0	0	0	1	0	1	0
6	27.025	34.825	19.2225	34.8275	1.34	134	1	0	0	0	0	0	1	1	0	0
7	27.035	34.835	19.2325	34.8375	1.35	135	1	0	0	0	0	0	1	1	1	0
8	27.055	34.855	19.2525	34.8575	1.37	137	1	0	0	0	0	0	1	0	0	1
9	27.065	34.865	19.2625	34.8675	1.38	138	1	0	0	0	0	1	0	1	0	0
10	27.075	34.875	19.2725	34.8775	1.39	139	1	0	0	0	0	1	0	1	1	0
11	27.085	34.885	19.2825	34.8875	1.40	140	1	0	0	0	0	1	1	0	0	0
12	27.105	34.905	19.3025	34.9075	1.42	142	1	0	0	0	0	1	1	1	1	0
13	27.115	34.915	19.3125	34.9175	1.43	143	1	0	0	0	0	1	1	1	1	1
14	27.125	34.925	19.3225	34.9275	1.44	144	1	0	0	0	1	0	0	0	0	0
15	27.135	34.935	19.3325	34.9375	1.45	145	1	0	0	0	1	0	0	0	0	1
16	27.155	34.955	19.3525	34.9575	1.47	147	1	0	0	0	1	0	0	0	1	1
17	27.165	34.965	19.3625	34.9675	1.48	148	1	0	0	0	1	0	1	0	0	0
18	27.175	34.975	19.3725	34.9775	1.49	149	1	0	0	0	1	0	1	0	0	1
19	27.185	34.985	19.3825	34.9875	1.50	150	1	0	0	0	1	0	1	0	0	0
20	27.205	35.005	19.4025	35.0075	1.52	152	1	0	0	0	1	1	0	0	0	0
21	27.215	35.015	19.4135	35.0175	1.53	153	1	0	0	0	1	1	0	0	0	1
22	27.225	35.025	19.4225	35.0275	1.54	154	1	0	0	0	1	1	0	0	1	0
23	27.255	35.055	19.4525	35.0575	1.57	157	1	0	0	0	1	1	1	0	0	1
24	27.235	35.035	19.4325	35.0375	1.55	155	1	0	0	0	1	1	0	0	1	1
25	27.245	35.045	19.4425	35.0475	1.56	156	1	0	0	0	1	1	1	0	0	0
26	27.265	35.065	19.4625	35.0675	1.58	158	1	0	0	0	1	1	1	1	0	0
27	27.275	35.075	19.4725	35.0775	1.59	159	1	0	0	0	1	1	1	1	1	1
28	27.285	35.085	19.4825	35.0875	1.60	160	1	0	1	0	0	0	0	0	0	0
29	27.295	35.095	19.4925	35.0975	1.61	161	1	0	1	0	0	0	0	0	0	1
30	27.305	35.105	19.5025	35.1075	1.62	162	1	0	1	0	0	0	0	0	1	0
31	27.315	35.115	19.5125	35.1175	1.63	163	1	0	1	0	0	0	0	0	1	1
32	27.325	35.125	19.5225	35.1275	1.64	164	1	0	1	0	0	0	0	1	0	0
33	27.335	35.135	19.5325	35.1375	1.65	165	1	0	1	0	0	0	0	1	0	1
34	27.345	35.145	19.5425	35.1475	1.66	166	1	0	1	0	0	0	0	1	1	0
35	27.355	35.155	19.5525	35.1575	1.67	167	1	0	1	0	0	0	0	1	1	1
36	27.365	35.165	19.5625	19.1675	1.68	168	1	0	1	0	0	1	0	0	0	0
37	27.375	35.175	19.5725	35.1775	1.69	169	1	0	1	0	0	1	0	0	0	1
38	27.385	35.185	19.5825	35.1875	1.70	170	1	0	1	0	0	1	0	0	1	0
39	27.395	35.195	19.5925	35.1975	1.71	171	1	0	1	0	0	1	0	0	1	1
40	27.405	35.205	19.6025	35.2075	1.72	172	1	0	1	0	0	1	0	0	1	0

# TRANSMITTER SECTION ALIGNMENT CHART

STEP	CONTROL SETTING	TEST EQUIPMENT	TEST EQUIPMENT SETTING	ADJUST	REFER TO
1 BPF	MODE — AM CH-19	Sweep Generator	Freq. : 27 MHz	T201 — 204 for max. out- put best wave form	Fig. 2
2	MODE — AM CH-19	RF Power Meter 50Ω dummy load DC current meter	Connect in series at TP-216	VR202 for 15 mA on the DC current meter	
3 AM POWER	MODE — AM CH-19	RF-Power Meter 50Ω dummy load		T205 — 208, L207, 208 for max. output	Fig. 3
4 AM POWER	MODE — AM CH-19	RF Power Meter 50Ω dummy load		VR-210 for 3.8 W output	Fig. 3
5 BM	MODE — LSB or USB CH-19	RF Power Meter 50Ω dummy load AF Generator Monitor Scope	AF Generator Freq. : 1 kHz Set the AF Generator out- put to get approx. 10 W.	VR-3, TC-7, T9 for mfn. carrier	Fig. 4
6 SSB MOD	MODE — LSB or USB CH-19	RF Power Meter 50Ω dummy load AF Generators Monitor Scope	2 AF Generators Freq. : 500/2400 Hz Output : approx. 30 mV	Set VR-204 to 0 ohm. (fully counterclockwise) VR-4 for 11 W PEP output	Fig. 5
7 AM AMC	MODE — AM CH-19	RF Power Meter 50Ω dummy load AF Generator Monitor Scope	AF Generator Freq. : 1 kHz Set the output to 50% Mod. + 16 dB	VR-5 for clean wave form with no over modu- lation ( should be 85~ 90% mod).	Fig. 3
8 ALC	MODE — LSB, USB or AM RECEIVE	DC VTVM	Connect DC VTVM to TP-208 (use TP-209 for ground connec- tion)	VR-207 for 1.2~1.8V	
9 ALC	MODE — LSB or USB CH-19	RF Power Meter 50Ω dummy load AF Generator Monitor Scope	AF Generator Freq. : 1 kHz Output: 15 mV + 6 db	VR-204 for 11 W PEP	Fig. 5
10 TWO TONE	MODE — LSB or USB CH-19	RF Power Meter 50Ω dummy load AF Generators Monitor Scope	2 AF Generators Freq. : 500/2400 Hz Output: Approx. 30 mV	VR-201 for clean wave form	Fig. 5

NOTE : You can check 7.8025 MHz in AM transmit mode at TP-204.

STEP	CONTROL SETTING	TEST EQUIPMENT	TEST EQUIPMENT SETTING	ADJUST	REFER TO
11 RF METER	MODE – AM CH-19	RF Power Meter 50Ω dummy load		VR-203 for same reading on built-in meter as power meter indication	Fig. 3
12 MOD IND	MODE – AM CH-19	RF Power Meter 50Ω dummy load AF Generator Monitor Scope	AF Generator Freq. : 1 kHz Set the AF Generator out- put to get 30% mod.	VR-208 for modulation lamp just comes on	Fig. 3
13 HAR- MONICS	MODE – AM CH-19	RF Power Meter 50Ω dummy load 54 MHz Monitor Receiver (or Spectrum Ana- lyzer if available)		TC-201 for min. reading on the receiver	Fig. 3

## RECEIVER SECTION ALIGNMENT CHART

STEP	CONTROL SETTING	TEST EQUIPMENT	TEST EQUIPMENT SETTING	ADJUST	REFER TO
1	SQ Minimum MODE – LSB or USB	Sweep Generator Oscilloscope	Frequency: 7.8 MHz	T209 for max. output and best wave form	Fig. 2
2 RF	SQ Minimum MODE – AM CH-19	RF Signal Generator Oscilloscope AC VTVM 8 Ω load	Frequency : 27.185 MHz MOD 30% at 1 kHz	T210, T211, T212 for max. output	Fig. 6
3 S-Meter	MODE – AM RF GAIN Maximum	RF Signal Generator	No signal	VR-206 for zero on the S-meter	Fig. 6
4 S-Meter	MODE – AM RF GAIN Maximum	RF Signal Generator	Output : 100 μV	VR-205 for S9 on the S-meter	Fig. 6
5 SQ	SQ Maximum MODE – AM	RF Signal Generator Oscilloscope AC VTVM 8 Ω Load	Channel 19 Output : 1 mV MOD. : 30% at 1 kHz	VR-209 to the point where wave form just shows	Fig. 6



# ALIGNMENT CONNECTIONS

## BAND PASS FILTER ALIGNMENT

Connect the instruments as shown in Figure 2.

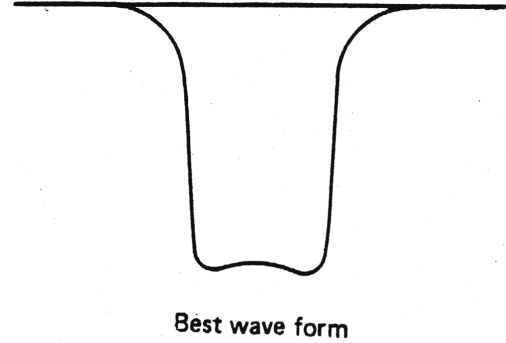
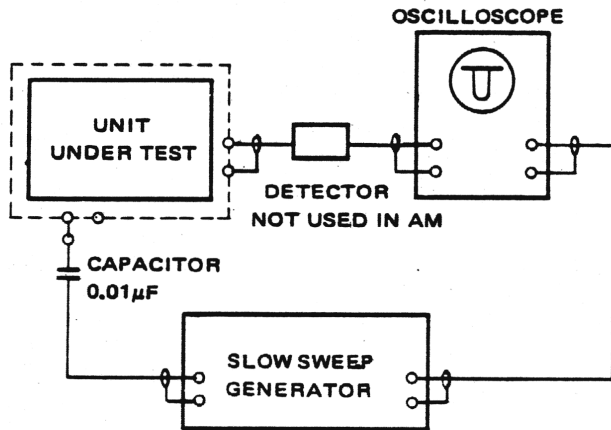
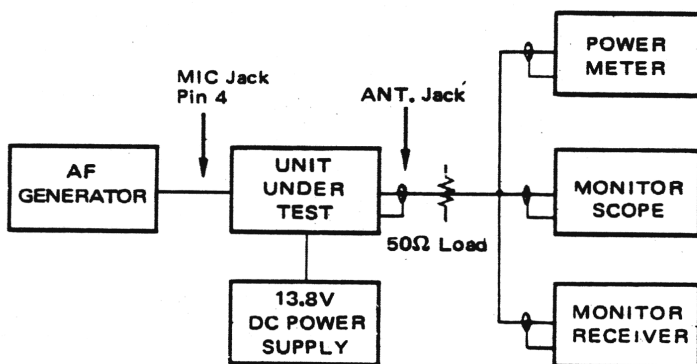


FIGURE 2

Mode Switch	Input Test Point		Output Test Point		Sweep Generator
	hot	ground	hot	ground	
AM	TP-201	TP-202	TP-205	TP-203	27 MHz
USB or LSB	TP-206 or TP-214	TP-207 or TP-215	TP-212	TP-213	7.8 MHz

## TRANSMITTING SECTION ALIGNMENT

Connect the instruments as shown in Figure 3.



MONITOR SCOPE WAVE FORM

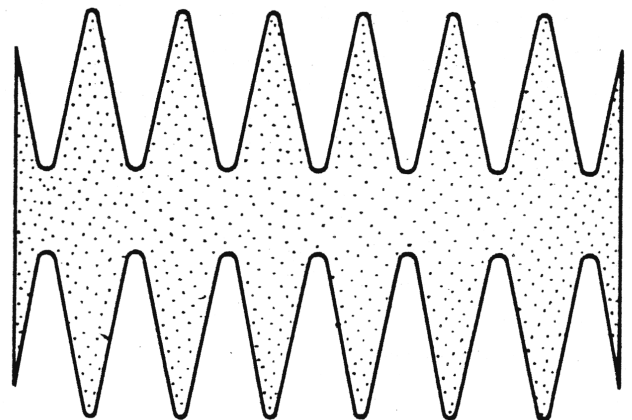


FIGURE 3

## BALANCED MODULATOR ALIGNMENT

Connect the instruments as shown in Figure 4.

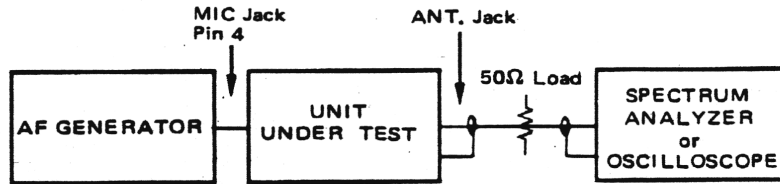


FIGURE 4

Step	Control Setting	Adjust	Remarks
1	SSB TX	AF Generator	To get 10W output power Note the carrier level at 10W output power
2	SSB TX	VR-3 T-9	Remove AF Generator Minimum carrier level
3	SSB TX	TC-7	Minimum carrier level
4	SSB TX		Repeat steps 2 and 3

## TRANSMITTING SECTION ALIGNMENT (SSB)

Connect the instrument as shown is Figure 5.

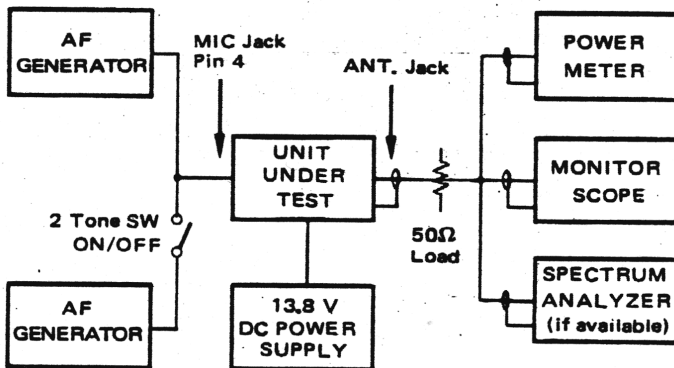


FIGURE 5

\* AF input frequency  
2500 Hz

\* AF Two-tone input frequency  
Select frequencies not related harmonically.  
The test tones of 500 Hz and 2400 Hz are suggested.

\* Idling current of Final Transistor : Approx. 50 mA

## RECEIVER SECTION ALIGNMENT

Connect the instruments as shown in Figure 6.

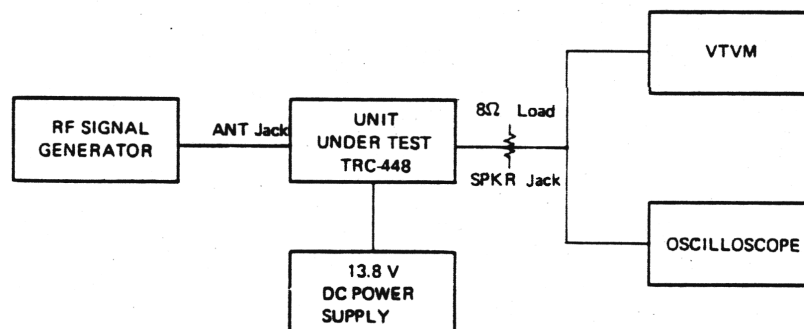
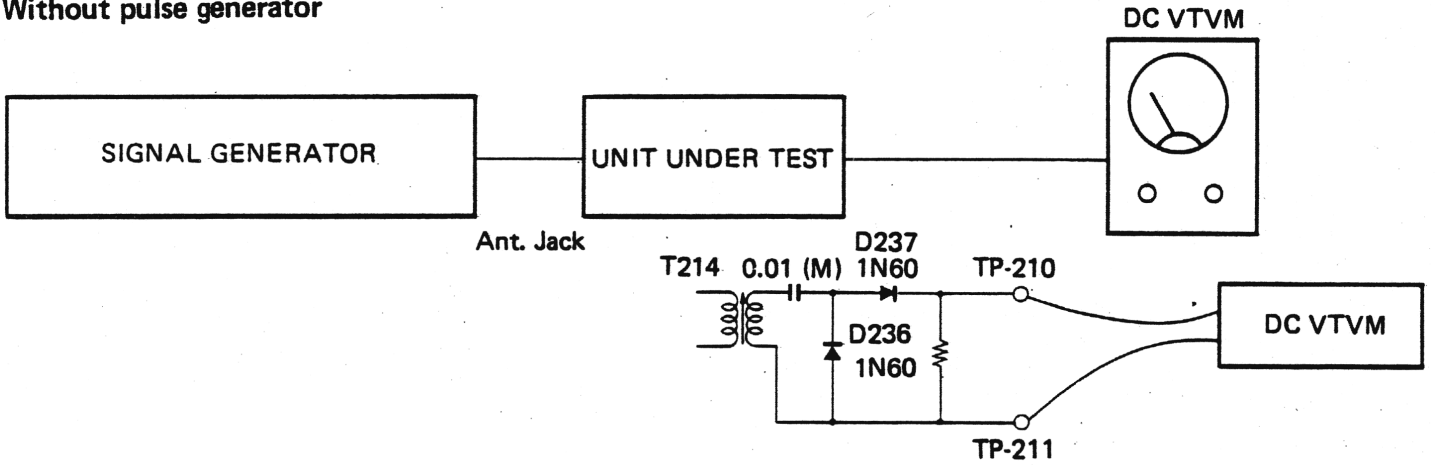


FIGURE 6

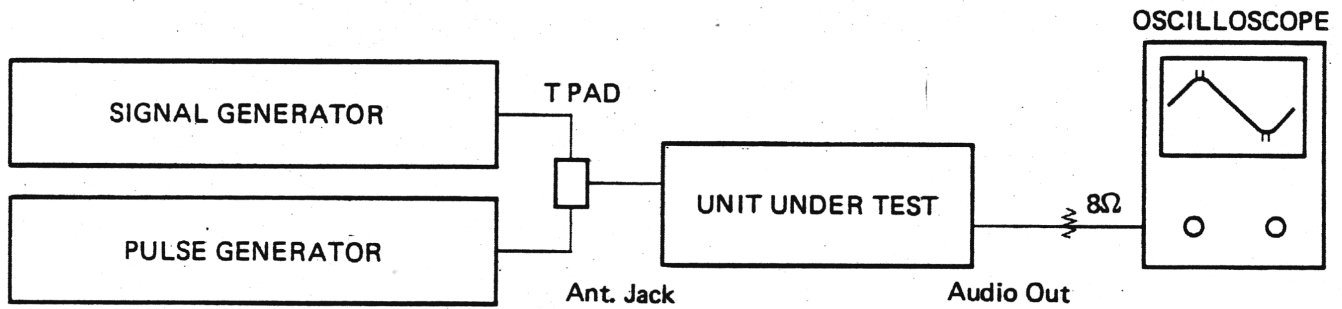
# NOISE BLANKER ALIGNMENT CHART

## Without pulse generator



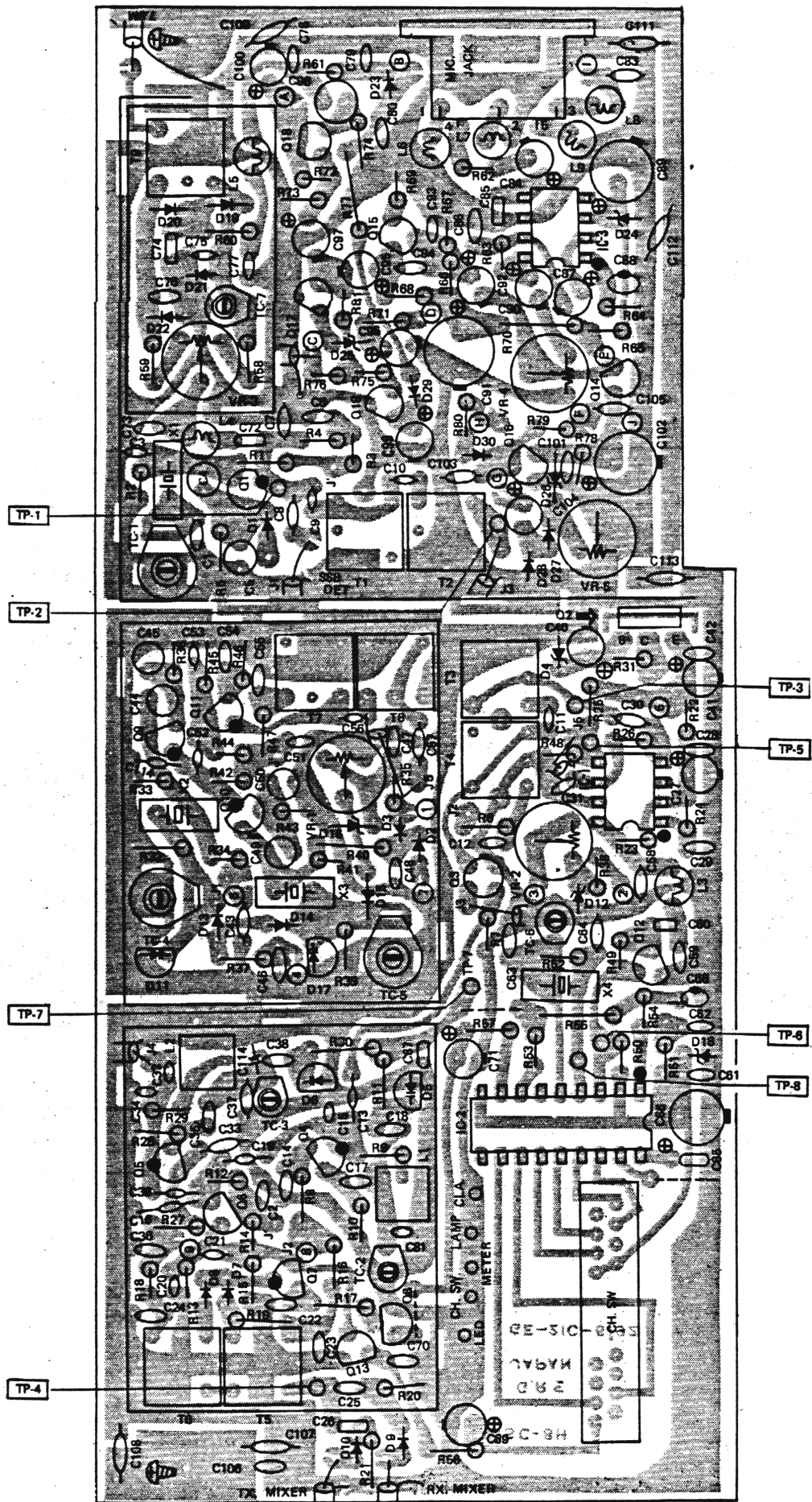
Control Setting	Test Equipment	Adjust	Procedure
Channel -19	Signal Generator 40MHz (Output : 10 $\mu$ V)	T213 T214	Tune T213 and T214 for maximum reading on the DC VTVM
	Connect Oscilloscope		

## With pulse generator

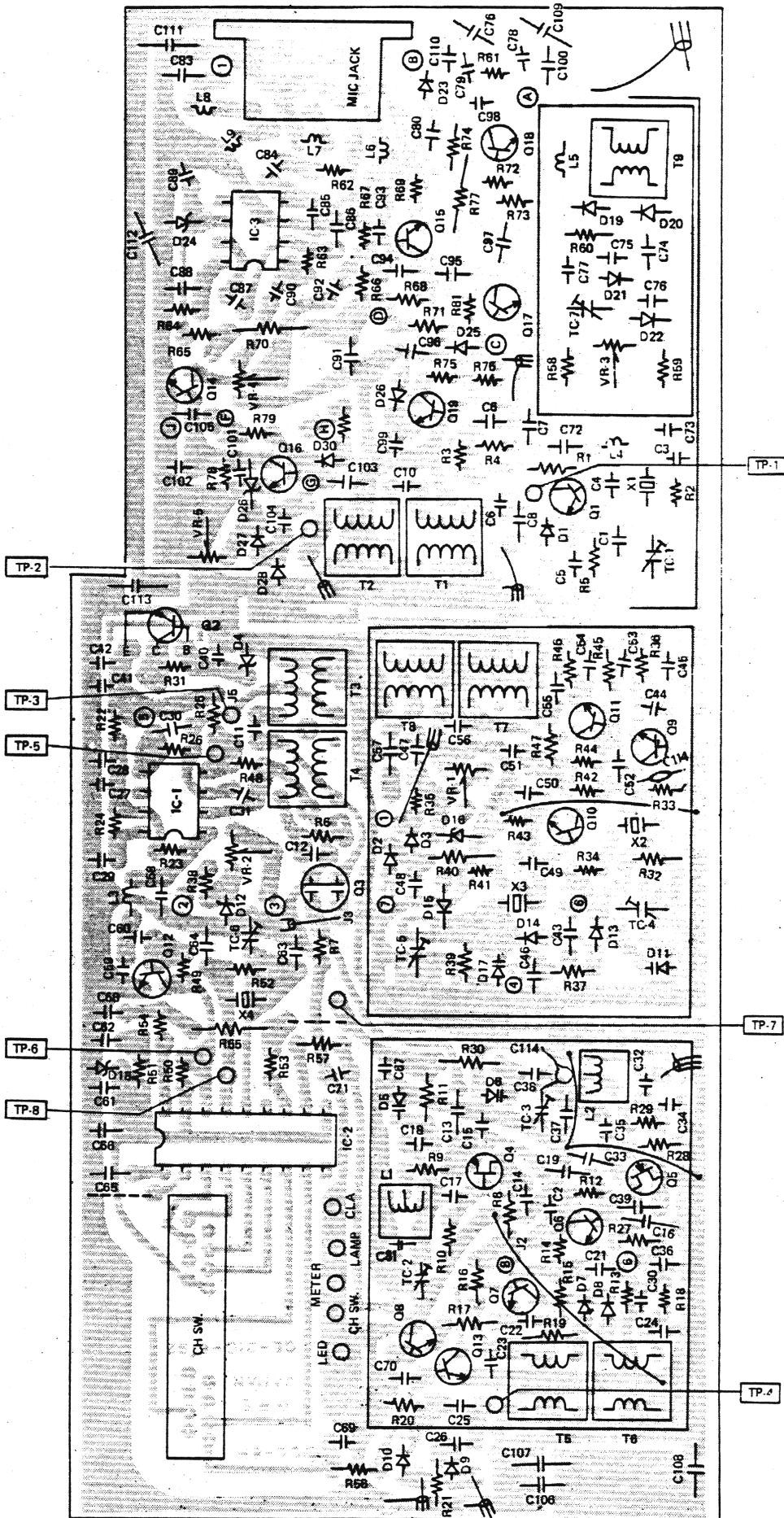


Control Setting	Test Equipment	Adjust	Procedure
CH : 19 (27.185 MHz)	Signal Generator (Output : 1 $\mu$ V)	T214	Tune T214 for Max. S/N ratio on the oscilloscope
	Pulse Generator (Pulse width : 1 $\mu$ Sec.) (Cycle : 10 mSec.) (Output : 1V P.P.)		
	Connect Oscilloscope		

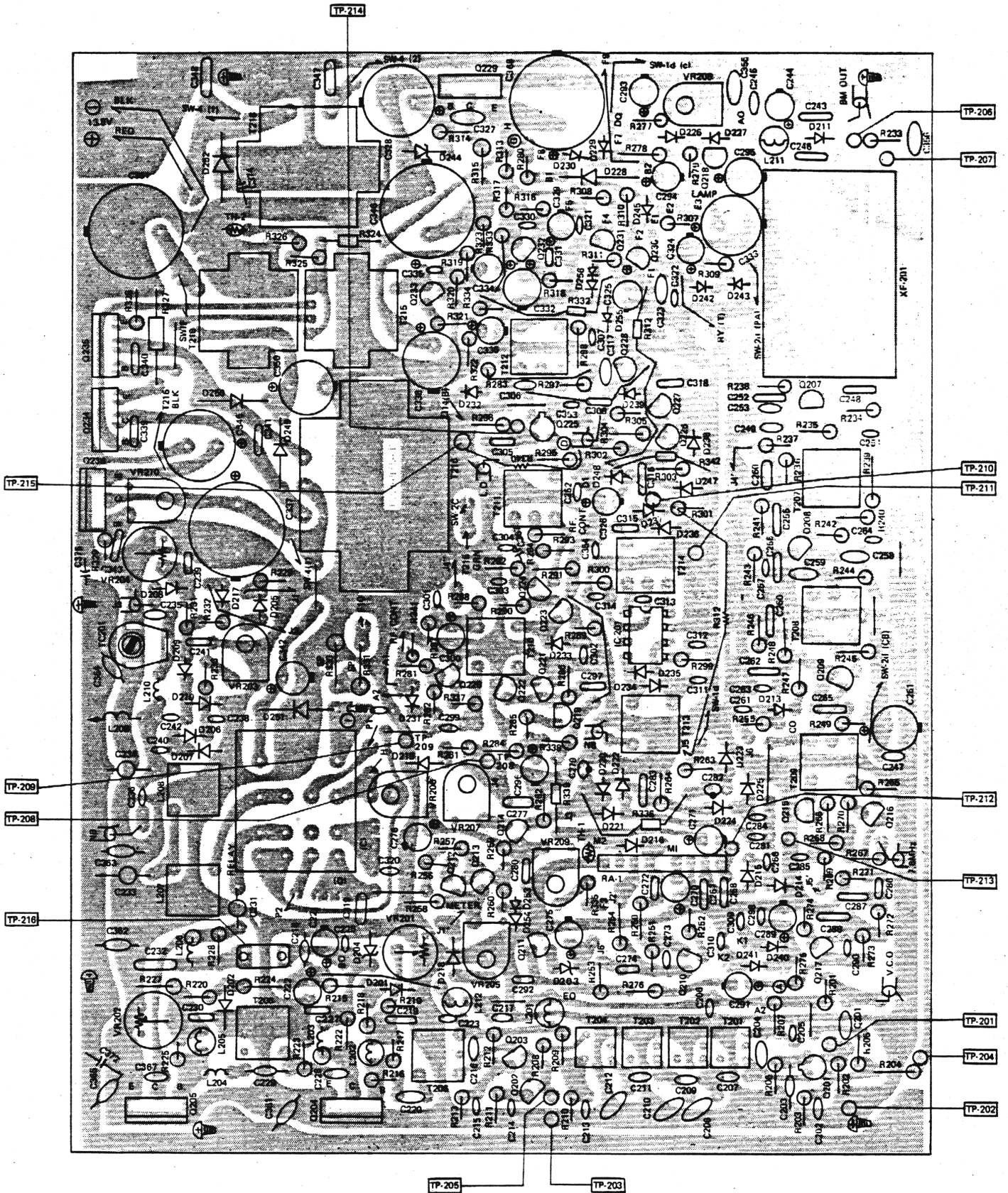
# PLL P.C.BOARD (TOP VIEW)



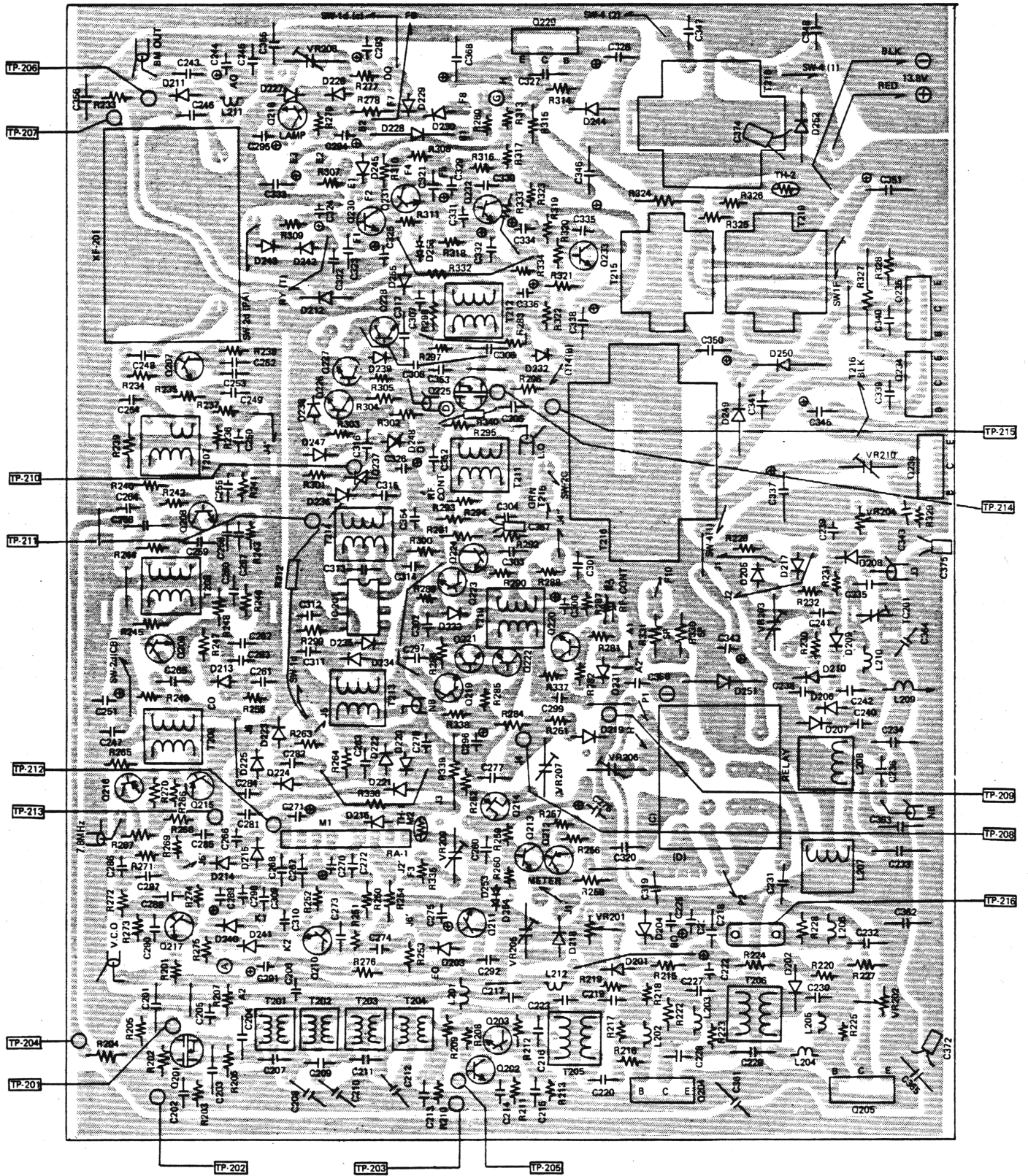
# PLL P.C.BOARD (BOTTOM VIEW)



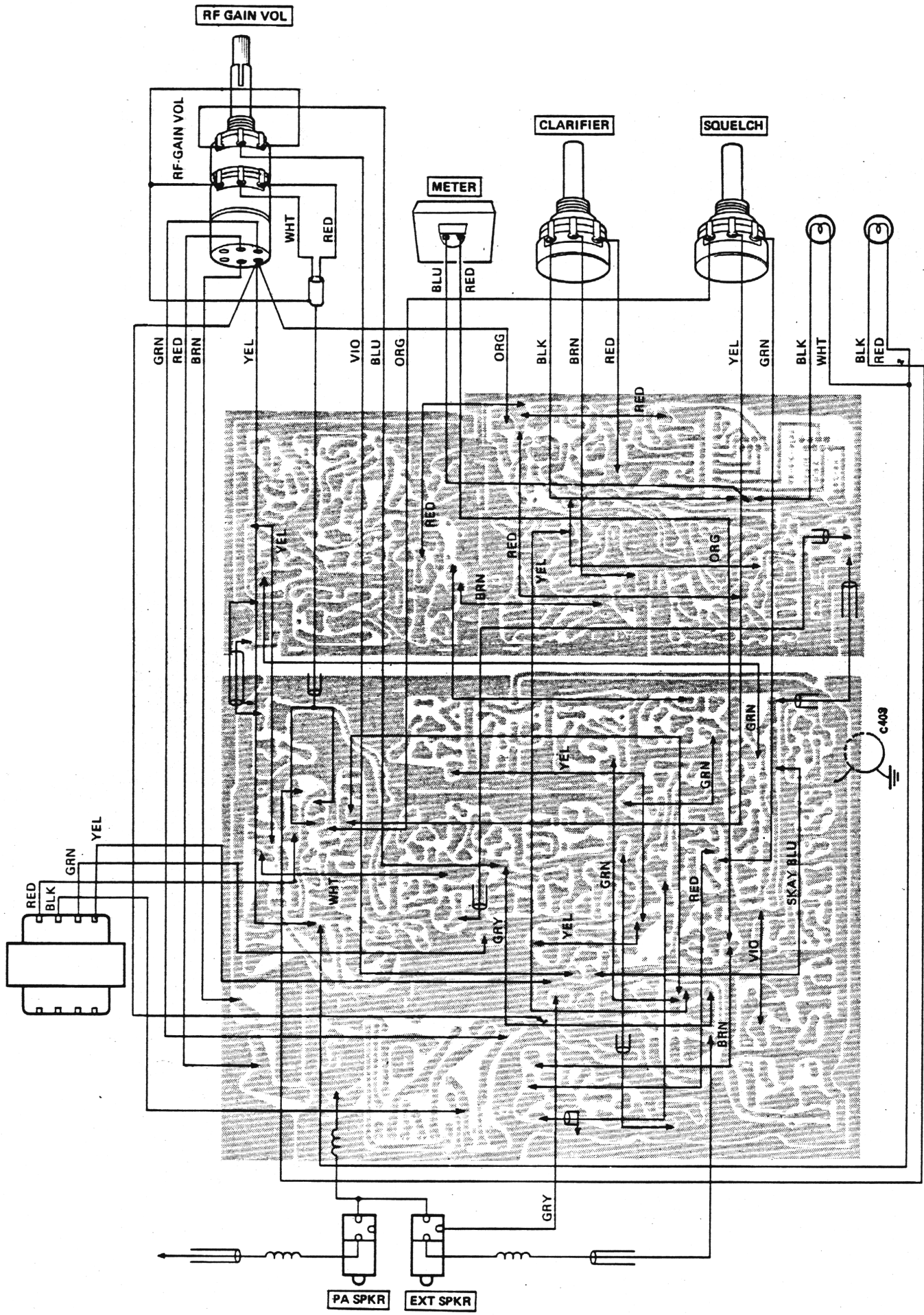
# MAIN P.C.BOARD (TOP VIEW)



# MAIN P.C.BOARD (BOTTOM VIEW)

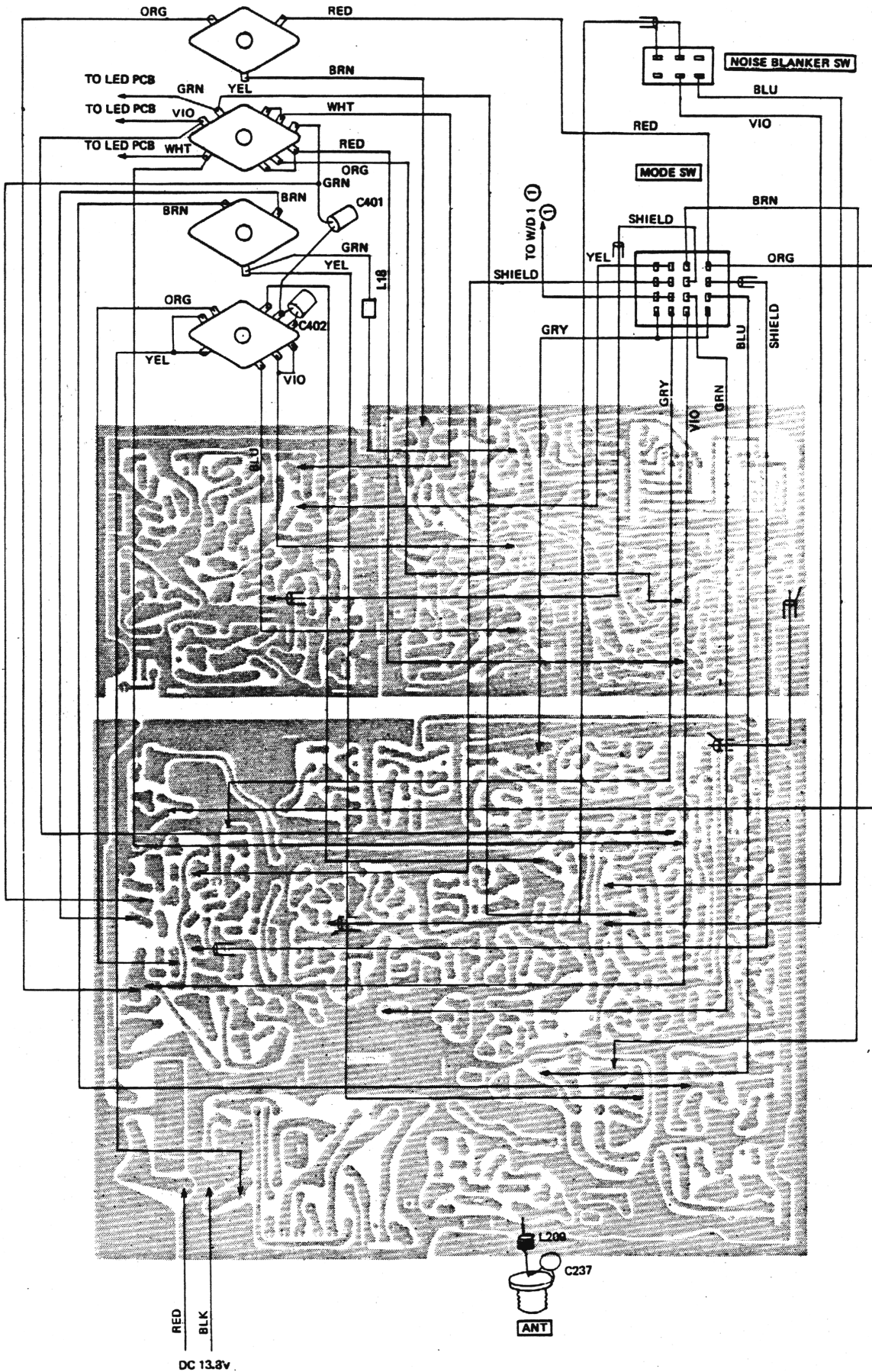


# WIRING DIAGRAM (1)



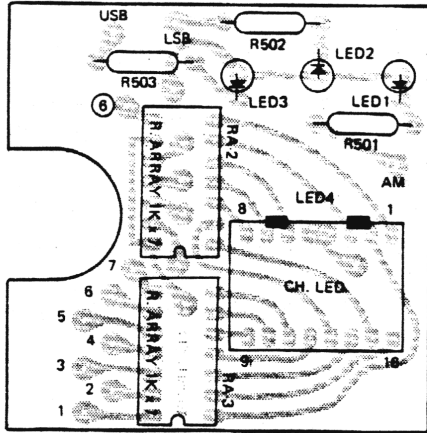


# WIRING DIAGRAM (2)

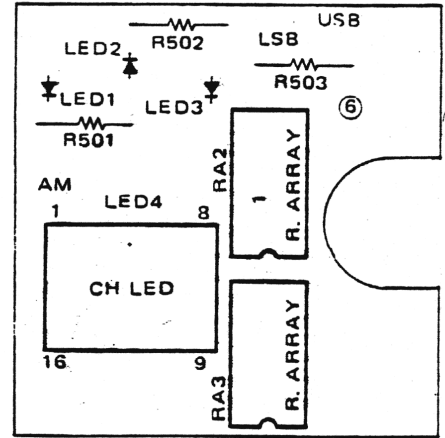


# LED P.C.BOARD

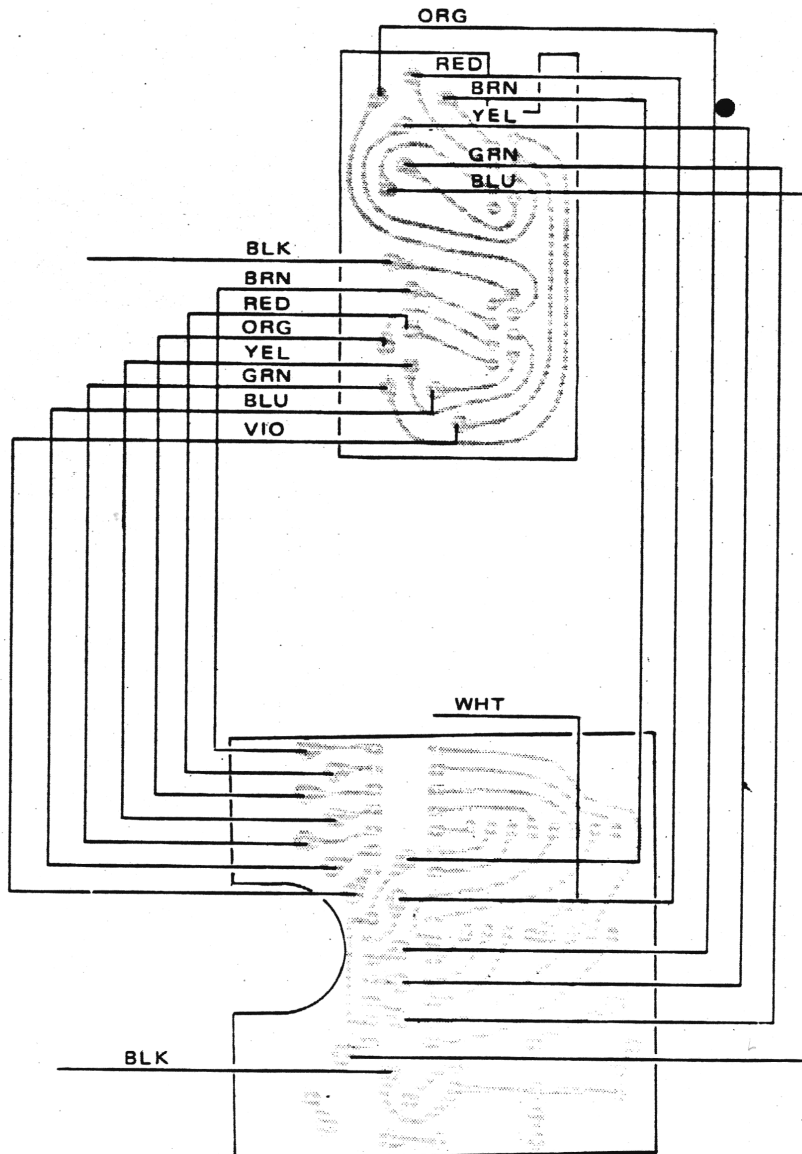
(TOP VIEW)



(BOTTOM VIEW)



## LED P.C.BOARD/ CHANNEL SWITCH P.C.BOARD WIRING DIAGRAM



# TROUBLE SHOOTING

Before starting trouble shooting, first check the PLL section with the channel selector set at CH-19.

STEP	CONTROL SETTING	TEST POINT	TEST EQUIPMENT	OUTPUT	REMARKS
1	RX (AM)	TP-4	Freq. Counter	34.985 MHz	VCO freq.
2	RX (LSB) or TX (LSB)	TP-4	Freq. Counter	19.3825 MHz	VCO freq.

If above 2 steps are OK, the PLL section is OK.

## PLL SECTION

Symptom	Possible Cause
1) Wrong frequency in step 1 above	Defective Q5, D6, L2, Q9, X2, Q11, IC-1 and/or associated circuit components
2) Wrong frequency in step 2 above	Defective Q4, D5, L1, Q1, T1, T2, Q10, X3, Q11 and/or associated circuit components
3) Wrong frequency in both steps 1 and 2 above	Defective IC-2, X4, Q3, Q4, Q6, Q7, Q8, Q13 and/or channel selector switch

## OTHER SECTIONS

Symptom	Possible Cause
1) Meter lamp does not light and/or set fails to operate when power is on	A) Faulty DC power cord B) Defective Q229 and/or associated circuit components C) Defective power cord D) Defective meter lamp E) Fuse blown
2) Fuse blows	A) Collector of the Q204, Q205, Q234 and/or Q235 are shorted to chassis. B) Reverse polarity C) Defective Q204, Q205, Q234, Q235 and/or D204 D) Defective Q299 and/or D244
3) Does not receive AM RX SSB : OK TX AM SSB : OK	A) Defective D214, D215 and/or associated circuit components B) Defective Q210 and/or associated circuit components C) Defective Q211, D255 and/or associated circuit components

Symptom	Possible Cause
4) Does not receive SSB RX AM : OK TX AM SSB : OK	A) Defective Q215, Q216 and/or associated circuit components B) Defective Q217 and/or associated circuit components
5) Does not receive or transmit SSB RX AM : OK TX AM : OK	A) Defective Q1 and/or associated circuit components
6) Does not receive AM/SSB or transmit SSB TX AM : OK	A) Defective XF201, Q207, Q208, T207, T208 and/or associated circuit components
7) Does not receive both AM and SSB	A) Defective Q223, Q224, Q235 and/or associated circuit components
8) No sound TX AM SSB : OK	A) Defective speaker or defective EXT. SPKR jack B) Faulty Squelch control circuit C) Defective Relay
9) Does not transmit AM and SSB	A) Defective Q201, Q202, Q203, Q204, Q205 and/or associated circuit components B) Defective Relay, D251 and/or Microphone PTT switch C) Defective MODE Switch
10) Does not transmit AM TX SSB : OK	A) Defective Q236, D228, MODE switch and/or associated circuit components
11) Does not transmit SSB TX AM : OK RX AM SSB : OK	A) Defective IC-3, Q15, Q17, Q18 and/or associated circuit components B) Defective D19, D20, D21, D22, T9, D211 and/or associated circuit components C) Defective D249, D250 and/or associated circuit components
12) SQUELCH Control does not function	A) Defective VR-209 and/or VR-303 B) Defective VR-206 C) Defective Q230, Q231 and/or associated circuit components
13) Receiver oscillates on AM RX SSB : OK	A) Defective D1 B) Defective MODE switch
14) Low sensitivity TX SSB : OK	A) Faulty AGC circuit Q219, Q220, Q221 and/or associated circuit components B) Defective Q228 and/or associated circuit components C) Defective Q223, Q224, Q225 and/or associated circuit components
15) No modulation on AM TX SSB : OK RX AM : OK	A) Defective IC-3, Q15, Q17, Q18 and/or associated circuit components B) Defective T216

Symptom	Possible Cause
16) Modulation indicator does not flash on AM. MOD : OK	A) Defective Q218, D226, D227 and/or associated circuit components B) Defective modulation indicator lamp
17) Meter lamp does not turn on in RX.	A) Defective D229
18) Meter lamp does not turn on in MON/PA	A) Defective D230
19) RX AGC and SSB TX ALC does not work	A) Defective Q214 and/or associated circuit components
20) Noise blanker and ANL does not work.	A) Defective IC-201, Q226, Q228, D236, D237, D238, D239 and/or associated circuit components B) Defective D216 and/or associated circuit components C) Defective NB switch
21) PA does not work. CB : OK	A) Defective PA—CB switch B) Defective PA jack
22) RF control does not work.	A) Defective Q220, D253 and/or associated circuit components
23) CLARIFIER does not work.	A) Defective D12, D13, D14 and/or associated circuit components B) Defective VR-304 and/or VR-2

# SEMICONDUCTOR VOLTAGE READINGS

SYMBOL NO.	RECEIVING			TRANSMITTING		
	VOLTAGE MAX. SQUELCH MIN. (V DC)			VOLTAGE MAX. SQUELCH MIN. (V DC)		
	AM	LSB	USB	AM	LSB	USB
Q1	B	2.2	2.15	2.15	2.15	2.15
	C	9.9	6.0	6.0	6.0	6.0
	E	8.6	1.85	1.85	1.85	1.85
Q2	B	10.6	10.6	10.6	10.6	10.6
	C	13.5	13.5	13.5	13.5	13.5
	E	10.0	10.0	10.0	10.0	10.0
Q3	G <sub>1</sub>	0	0	0	0	0
	G <sub>2</sub>	0	0	0	0	0
	D	0	9.2	0	0	9.2
	S	0	0	0	0	0
Q4	G	0	0	0	0	0
	D	0	5.9	0	0	5.9
	S	0	0.3	0	0	0.3
Q5	G	0	0	0	0	0
	D	6.0	0	6.0	6.0	6.0
	S	0.3	0	0.3	0.3	0.3
Q6	B	4.5	4.5	4.5	4.5	4.5
	C	10.0	10.0	10.0	10.0	10.0
	E	4.0	4.0	4.0	4.0	4.0
Q7	B	2.1	2.1	2.1	2.1	2.1
	C	8.8	7.6	8.8	8.8	8.8
	E	1.45	1.45	1.45	1.45	1.45
Q8	B	0.7	0.7	0.7	0.7	0.7
	C	0.06	0.06	0.06	0.06	0.06
	E	0	0	0	0	0
Q9	B	2.25	0	0	0	0
	C	6.0	6.3	6.3	6.3	6.3
	E	1.7	0	0	0	0
Q10	B	0	2.1	2.1	2.1	2.1
	C	6.0	6.3	6.3	6.3	6.3
	E	0	1.55	1.55	1.55	1.55
Q11	B	1.8	1.8	1.8	1.8	1.8
	C	9.6	9.6	9.6	9.6	9.6
	E	1.75	1.75	1.75	1.75	1.75
Q12	B	0.52	0.52	0.52	0.52	0.52
	C	2.6	2.6	2.6	2.6	2.6
	E	0	0	0	0	0

SYMBOL NO.	RECEIVING			TRANSMITTING		
	VOLTAGE MAX. SQUELCH MIN. (V DC)			VOLTAGE MAX SQUELCH MIN. (V DC)		
	AM	LSB	USB	AM	LSB	USB
Q13	B	0	0	0	0	0
	C	2.1	2.1	2.1	2.1	2.1
	E	0	0	0	0	0
Q14	B	0.67	0.67	0	0	0
	C	0	0	0	0	0
	E	0	0	0	0	0
Q15	B	1.36	1.36	1.36	1.36	1.36
	C	5.6	5.6	5.6	5.6	5.6
	E	0.75	0.75	0.75	0.75	0.75
Q16	B	0	0	0	0.7	0.7
	C	RX 0.67 PA 0	RX 0.67 PA 0	RX 0.67 PA 0	0	0
	E	0	0	0	0	0
Q17	B	0.7	0.7	0.7	0	0
	C	0	0	0	0	0
	E	0	0	0	0	0
Q18	B	0	0	0	0	4.7
	C	0	8.7	8.7	0	8.7
	E	0	4.2	4.2	0	4.2
Q19	B	0	0	0	0.7	0
	C	0	0	0	0	0
	E	0	0	0	0	0
Q201	G <sub>1</sub>	0	0	0	0	0
	G <sub>2</sub>	0	0	0	0.75	0.75
	D	0	0	0	8.7	8.7
	S	0	0	0	0.1	0.1
Q202	B	0	0	0	1.35	1.35
	C	0	0	0	4.5	4.5
	E	0	0	0	0.7	0.7
Q203	B	0	0	0	5.1	5.1
	C	0	0	0	9.3	9.3
	E	0	0	0	4.5	4.5
Q204	B	0	0	0	0.65	0.65
	C	0	0	0	9.5	9.5
	E	0	0	0	0	0
Q205	B	0	0	0	0.6	0.6
	C	0	0	0	9.4	9.4
	E	0	0	0	0	0

SYMBOL NO.	RECEIVING			TRANSMITTING		
	VOLTAGE MAX. SQUELCH MIN. (V DC)			VOLTAGE MAX. SQUELCH MIN. (V DC)		
	AM	LSB	USB	AM	LSB	USB
Q206	- Not used -					
Q207	B	1.1	1.1	1.1	1.1	1.1
	C	8.6	8.6	8.6	8.6	8.6
	E	0.5	0.5	0.5	0.5	0.5
Q208	B	1.55	1.55	1.55	1.55	1.55
	C	8.0	8.0	8.0	8.0	8.0
	E	0.9	0.9	0.9	0.9	0.9
Q209	B	0.96	0.96	0.96	1.15	1.15
	C	8.9	8.9	8.9	9.3	9.3
	E	0.3	0.3	0.3	2.7	2.7
Q210	B	0.83	0	0	0.83	0
	C	6.0	0	0	6.0	0
	E	0.33	0	0	0.33	0
Q211	B	0	0	0	0.7	0.7
	C	0.2	0.2	0.2	0	0
	E	0	0	0	0	0
Q212	B	9.2	9.2	9.2	0	0
	C	0.26	0.26	0.26	0	0
	E	9.4	9.4	9.4	0	0
Q213	B	0.75	0.75	0.75	0.5	0.5
	C	9.2	9.2	9.2	0	0
	E	0.25	0.25	0.25	0	0
Q214	G	0	0	0	0	0
	D	2.0	2.0	2.0	1.3	1.3
	S	1.65	1.65	1.65	1.2	1.2
Q215	B	0	7.4	7.4	0	0
	C	0	0	0	0	0
	E	0	8.0	8.0	0	0
Q216	B	0	7.4	7.4	0	0
	C	0	1.1	1.1	0	0
	E	0	8.0	8.0	0	0
Q217	B	0	0.85	0.85	0	0.85
	C	0	7.0	7.0	0	7.0
	E	0	0.3	0.3	0	0.3



SYMBOL NO.	RECEIVING						TRANSMITTING					
	VOLTAGE MAX. SQUELCH MIN. (V DC)						VOLTAGE MAX. SQUELCH MIN. (V DC)					
	AM		LSB		USB		AM		LSB		USB	
Q218	B	0.8	0.8	0.8	0.8	0.8	0	0	0	0	0	0
	C	0.15	0.15	0.15	0.15	0.15	W/MOD 0.15	NO MOD 13.5	W/MOD 0.15	NO MOD 13.5	W/MOD 0.15	NO MOD 13.5
	E	0	0	0	0	0	0	0	0	0	0	0
Q219	B	1.4	1.4	1.4	1.4	1.4	0	0	0	0	0	0
	C	9.4	9.4	9.4	9.4	9.4	0	0	0	0	0	0
	E	0.75	0.75	0.75	0.75	0.75	0	0	0	0	0	0
Q220	B	RF MAX 0	RF MIN 0.7	RF MAX 0	RF MIN 0.7	RF MAX 0	0.7	0.7	0.7	0.7	0.7	0.7
	C	0	0	0	0	0	0	0	0	0	0	0
	E	0	0	0	0	0	0	0	0	0	0	0
Q221	B	0.75	0.75	0.75	0.75	0.75	0	0	0	0	0	0
	C	0	0	0	0	0	0	0	0	0	0	0
	E	0	0	0	0	0	0	0	0	0	0	0
Q222	B	0.75	0.75	0.75	0.75	0.75	0	0	0	0	0	0
	C	0	0	0	0	0	0	0	0	0	0	0
	E	0	0	0	0	0	0	0	0	0	0	0
Q223	B	1.15	1.15	1.15	1.15	1.15	0	0	0	0	0	0
	C	4.2	4.2	4.2	4.2	4.2	0	0	0	0	0	0
	E	0.42	0.42	0.42	0.42	0.42	0	0	0	0	0	0
Q224	B	5.0	5.0	5.0	5.0	5.0	0	0	0	0	0	0
	C	8.4	8.4	8.4	8.4	8.4	0	0	0	0	0	0
	E	4.2	4.2	4.2	4.2	4.2	0	0	0	0	0	0
Q225	G1	0	0	0	0	0	0	0	0	0	0	0
	G2	0.7	0.7	0.7	0.7	0.7	0	0	0	0	0	0
	D	6.6	6.6	6.6	6.6	6.6	0	0	0	0	0	0
	S	0	0	0	0	0	0	0	0	0	0	0
Q226	B	0.46	0.46	0.46	0.46	0.46	0	0	0	0	0	0
	C	0.7	0.7	0.7	0.7	0.7	0	0	0	0	0	0
	E	0	0	0	0	0	0	0	0	0	0	0
Q227	B	NB OFF 0.7	NB ON 0.7	NB OFF 0.7	NB ON 0.7	NB OFF 0.7	0	0	0	0	0	0
	C	0	0.15	0	0.15	0	0	0	0	0	0	0
	E	0	0	0	0	0	0	0	0	0	0	0
Q228	B	0	0	0	0	0	0	0	0	0	0	0
	C	0	0	0	0	0	0	0	0	0	0	0
	E	0	0	0	0	0	0	0	0	0	0	0

SYMBOL NO.	RECEIVING						TRANSMITTING		
	VOLTAGE MAX. SQUELCH MIN. (V DC)						VOLTAGE MAX. SQUELCH MIN. (V DC)		
	AM	LSB	USB	AM	LSB	USB			
Q229	B	10	10	10	10	10	10	10	
	C	13.5	13.5	13.5	13.5	13.5	13.5	13.5	
	E	9.4	9.4	9.4	9.4	9.4	9.4	9.4	
Q230	B	SQ ON 8.1 SQ OFF 9.2	SQ ON 8.1 SQ OFF 9.2	SQ ON 8.1 SQ OFF 9.2	9.2	9.2	9.2		
	C	SQ ON 0.6 SQ OFF 0.2	SQ ON 0.6 SQ OFF 0.2	SQ ON 0.6 SQ OFF 0.2	0.2	0.2	0.2		
	E	SQ ON 9.0 SQ OFF 9.1	SQ ON 9.0 SQ OFF 9.1	SQ ON 9.0 SQ OFF 9.1	9.1	9.1	9.1		
Q231	B	SQ ON 0.6 SQ OFF 0.2	SQ ON 0.6 SQ OFF 0.2	SQ ON 0.6 SQ OFF 0.2	0.2	0.2	0.2		
	C	SQ ON 0 SQ OFF 0.7	SQ ON 0 SQ OFF 0.7	SQ ON 0 SQ OFF 0.7	0.7	0.7	0.7		
	E	SQ ON 0 SQ OFF 0	SQ ON 0 SQ OFF 0	SQ ON 0 SQ OFF 0	0	0	0		
Q232	B	SQ ON 0.7 SQ OFF 0	SQ ON 0.7 SQ OFF 0	SQ ON 0.7 SQ OFF 0	0.7	0.7	0.7		
	C	SQ ON 4.3 SQ OFF 8.9	SQ ON 4.3 SQ OFF 8.9	SQ ON 4.3 SQ OFF 8.9	4.3	4.3	4.3		
	E	SQ ON 0.15 SQ OFF 0	SQ ON 0.15 SQ OFF 0	SQ ON 0.15 SQ OFF 0	0.15	0.15	0.15		
Q233	B	2.7	2.7	2.7	2.7	2.7	2.7		
	C	11.5	11.5	11.5	11.5	11.5	11.5		
	E	2.1	2.1	2.1	2.1	2.1	2.1		
Q234	B	0.65	0.65	0.65	0.65	0.65	0.65		
	C	13.5	13.5	13.5	13.5	13.5	13.5		
	E	0	0	0	0	0	0		
Q235	B	0.65	0.65	0.65	0.65	0.65	0.65		
	C	13.5	13.5	13.5	13.5	13.5	13.5		
	E	0	0	0	0	0	0		
Q236	B	13.1	13.1	13.1	11.6	13.1	13.1		
	C	13.5	13.5	13.5	13.5	13.5	13.5		
	E	13.0	13.0	13.0	10.6	13.0	13.0		
IC-1	1	5.0	5.0	5.0	5.0	5.0	5.0		
	2	8.8	8.8	8.8	8.8	8.8	8.8		
	3	0	0	0	0	0	0		
	4	2.6	2.6	2.6	2.6	2.6	2.6		
	5	4.2	4.2	4.2	4.2	4.2	4.2		
	6	2.6	2.6	2.6	2.6	2.6	2.6		
	7	0	0	0	0	0	0		
	8	7.3	7.3	7.3	7.3	7.3	7.3		

SYMBOL NO.	RECEIVING			TRANSMITTING		
	VOLTAGE MAX. SQUELCH MIN. (V DC)			VOLTAGE MAX. SQUELCH MIN. (V DC)		
	AM	LSB	USB	AM	LSB	USB
IC-2	1	1.7	1.7	1.7	1.7	1.7
	2	5.0	5.0	5.0	5.0	5.0
	3	2.6	2.6	2.6	2.6	2.6
	4	2.2	2.2	2.2	2.2	2.2
	5	2.2	2.2	2.2	2.2	2.2
	6	0	0	0	0	0
	7	2.8	2.8	2.8	2.8	2.8
	8	4.9	4.9	4.9	4.9	4.9
	9	5.0	5.0	5.0	5.0	5.0
	10	0	0	0	0	0
	11	0	0	0	0	0
	12	5.0	5.0	5.0	5.0	5.0
	13	0	0	0	0	0
	14	5.0	5.0	5.0	5.0	5.0
	15	0	0	0	0	0
	16	5.0	5.0	5.0	5.0	5.0
	17	0	0	0	0	0
	18	3.2	3.2	3.2	3.2	3.2
IC-3	1	0	0	0	0	0
	2	2.2	2.2	2.2	2.2	2.2
	3	5.7	5.7	5.7	5.7	5.7
	4	0.9	0.9	0.9	0.9	0.9
	5	0.9	0.9	0.5	0.9	0.5
	6	0	0	0	0	0
	7	1.3	1.3	1.3	1.3	1.3
	8	1.3	1.3	1.3	1.3	1.3
IC-201	1	8.7	8.7	8.7	0	0
	2	8.7	8.7	8.7	0	0
	3	0	0	0	0	0
	4	2.06	2.06	2.06	0	0
	5	4.0	4.0	4.0	0	0
	6	2.05	2.05	2.05	0	0
	7	0	0	0	0	0
	8	8.7	8.7	8.7	0	0

**NOTE :** Voltages as PIN 9 to 16 of IC-2 are shown for channel 18; refer to page 12 – VCO OUTPUT FREQUENCY, IC-2 INPUT FREQUENCY AND CODE TABLE – for other channels.

# PLL P.C.BOARD ASSEMBLY PARTS LIST

Ref. No.	Description	RS Part Number	MFR's Part Number
<b>CAPACITORS</b>			
C1	Ceramic 10pF 50WV ±0.5pF		NPO
C2	Ceramic 0.01μF 25WV -20 ~ +80%		
C3	Ceramic 5pF 50WV ±0.25pF		NPO
C4	Polystyrene 330pF 50WV -20 ~ +80%		
C5	Polystyrene 470pF 50WV -20 ~ +80%		
C6	Ceramic 0.01μF 25WV -20 ~ +80%		
C7	Ceramic 470pF 50WV ±10%		
C8	Ceramic 470pF 50WV ±10%		
C9	Ceramic 10pF 50WV ±0.5pF		NPO
C10	Ceramic 3pF 50WV ±0.25pF		NPO
C11	Ceramic 10pF 50WV ±0.5pF		NPO
C12	Ceramic 0.01μF 25WV -20 ~ +80%		
C13	Ceramic 3pF 50WV ±0.25pF		NPO
C14	Ceramic 0.01μF 25WV -20 ~ +80%		
C15	Ceramic 5pF 50WV ±0.25pF		NPO
C16	Ceramic 3pF 50WV ±0.25pF		NPO
C17	Ceramic 47pF 50WV ±10%		NPO
C18	Ceramic 22pF 50WV ±10%		NPO
C19	Ceramic 3pF 50WV ±0.25pF		NPO
C20	Ceramic 7pF 50WV ±0.5pF		NPO
C21	Ceramic 10~33pF 50WV ±0.5pF		NPO
C22	Ceramic 0.01μF 25WV -20 ~ +80%		
C23	Ceramic 0.01μF 25WV -20 ~ +80%		
C24	Ceramic 0.01μF 25WV -20 ~ +80%		
C25	Ceramic 47pF 50WV ±10%		NPO
C26	Mylar 0.01μF 50WV ±10%		
C27	Electrolytic 1μF 50WV		
C28	Ceramic 0.01μF 25WV -20 ~ +80%		
C29	Ceramic 0.001μF 50WV -20 ~ +80%		
C30	Ceramic 47pF 50WV ±10%		NPO
C31	Ceramic 0.01μF 25WV -20 ~ +80%		
C32	Ceramic 3P 50WV ±0.25pF		NPO
C33	Ceramic 0.01μF 25WV -20 ~ +80%		
C34	Ceramic 5pF 50WV ±0.25pF		NPO
C35	Ceramic 47pF 50WV ±10%		NPO
C36	Ceramic 0.01μF 25WV -20 ~ +80%		
C37	Ceramic 47pF 50WV ±10%		NPO
C38	Ceramic 22pF 50WV ±10%		NPO
C39	Ceramic 3pF 50WV ±0.25pF		NPO
C40	Electrolytic 33μF 16WV		
C41	Electrolytic 10μF 16WV		
C42	Ceramic 0.01μF 25WV -20 ~ +80%		
C43	Ceramic 0.01μF 25WV -20 ~ +80%		
C44	Polystyrene 360pF 50WV ±20%		
C45	Polystyrene 360pF 50WV ±20%		
C46	Ceramic 0.01μF 25WV -20 ~ +80%		
C47	Ceramic 0.01μF 25WV -20 ~ +80%		
C48	Ceramic 0.01μF 25WV -20 ~ +80%		
C49	Polystyrene 360pF 50WV ±20%		
C50	Polystyrene 360pF 50WV ±20%		

Ref. No.	Description				RS Part Number	MFR's Part Number
C51	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C52	Ceramic	5pF	50WV	$\pm$ 0.25pF		NPO
C53	Ceramic	5pF	50WV	$\pm$ 0.25pF		NPO
C54	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C55	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C56	Ceramic	5pF	50WV	$\pm$ 0.25pF		NPO
C57	Ceramic	56pF	50WV	$\pm$ 10%		NPO
C58	Ceramic	33pF	50WV	$\pm$ 10%		NPO
C59	Ceramic	33pF	50WV	$\pm$ 10%		NPO
C60	Mylar	0.001 $\mu$ F	50WV	$\pm$ 10%		
C61	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C62	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C63	Ceramic	22pF	50WV	$\pm$ 10%		NPO
C64	Ceramic	56pF	50WV	$\pm$ 10%		NPO
C65	Mylar	0.001 $\mu$ F	50WV	$\pm$ 10%		
C66	Electrolytic	100 $\mu$ F	10WV			
C67	Mylar	0.01 $\mu$ F	25WV	$\pm$ 10%		
C68	Tantalum	0.1 $\mu$ F	35WV			
C69	Electrolytic	1 $\mu$ F	50WV			
C70	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C71	Electrolytic	1 $\mu$ F	50WV			
C72	Mylar	0.01 $\mu$ F	50WV	$\pm$ 10%		
C73	Ceramic	47pF	50WV	$\pm$ 10%		
C74	Mylar	0.039 $\mu$ F	50WV	$\pm$ 10%		
C75	Ceramic	10pF	50WV	$\pm$ 0.5pF		NPO
C76	Ceramic	22pF	50WV	$\pm$ 10%		NPO
C77	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C78	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C79	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C80	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C81	Ceramic	5pF	50WV	$\pm$ 0.25pF		
C82	Ceramic	0.001 $\mu$ F	50WV	$\pm$ 10%		
C83	Ceramic	0.04 $\mu$ F	25WV	$\pm$ 10%		
C84	Electrolytic	10 $\mu$ F	16WV			
C85	Mylar	0.039 $\mu$ F	50WV	-20 ~ +80%		
C86	Ceramic	100pF	50WV	-20 ~ +80%		
C87	Electrolytic	1 $\mu$ F	50WV			
C88	Tantalum	22 $\mu$ F	16WV			
C89	Electrolytic	47 $\mu$ F	16WV			
C90	Electrolytic	3.3 $\mu$ F	35WV			
C91	Electrolytic	220 $\mu$ F	16WV			
C92	Electrolytic	3.3 $\mu$ F	35WV			
C93	Ceramic	0.001 $\mu$ F	50WV	-20 ~ +80%		
C94	Ceramic	56pF	50WV	$\pm$ 10%		
C95	Electrolytic	1 $\mu$ F	50WV			
C96	Electrolytic	1 $\mu$ F	50WV			
C97	Electrolytic	1 $\mu$ F	50WV			
C98	Nonpola	1 $\mu$ F	50WV			
C99	Electrolytic	1 $\mu$ F	50WV			
C100	Electrolytic	10 $\mu$ F	16WV			
C101	Ceramic	0.01 $\mu$ F	50WV	-20 ~ +80%		
C102	Electrolytic	10 $\mu$ F	16WV			

Ref. No.	Description	RS Part Number	MFR's Part Number
C103	Ceramic 0.04 $\mu$ F 25WV -20 ~ +80%		
C104	Electrolytic 1 $\mu$ F 50WV		
C105	Ceramic 0.01 $\mu$ F 25WV -20 ~ +80%		
C106	Ceramic 0.01 $\mu$ F 25WV -20 ~ +80%		
C107	Ceramic 0.1 $\mu$ F 25WV -20 ~ +80%		
C108	Ceramic 0.1 $\mu$ F 25WV -20 ~ +80%		
C109	Ceramic 0.1 $\mu$ F 25WV -20 ~ +80%		
C110	Ceramic 500pF 50WV $\pm$ 20%		
C111	Ceramic 0.1 $\mu$ F 25WV -20 ~ +80%		
C112	Ceramic 0.1 $\mu$ F 25WV -20 ~ +80%		
C113	Ceramic 0.1 $\mu$ F 25WV -20 ~ +80%		
C114	Not used		
C115	Ceramic 5pF 50WV $\pm$ 0.25pF		FCU
TC1	Trimmer capacitor 30pF	C-0842	ECV1ZW30x32
TC2	Trimmer capacitor 10pF		ECV1ZW10x53
TC3	Trimmer capacitor 10pF		ECV1ZW10x53
TC4	Trimmer capacitor 50pF	C-0561	ECV1ZW50x32
TC5	Trimmer capacitor 50pF	C-0561	ECV1ZW50x32
TC6	Trimmer capacitor 20pF	C-0730	ECV1ZW20x53
TC7	Trimmer capacitor 20pF	C-0730	ECV1ZW20x53

#### RESISTORS

R1	Carbon film 7.5K $\Omega$ 1/4W $\pm$ 5%	FEE0266	ELR-25J-752
R2	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R3	Carbon film 120 $\Omega$ 1/4W $\pm$ 5%	FEE0136	ELR-25J-121
R4	Carbon film 620 $\Omega$ 1/4W $\pm$ 5%	FEE0181	ELR-25J-621
R5	Carbon film 390 $\Omega$ 1/4W $\pm$ 5%	FEE0162	ELR-25J-391
R6	Carbon film 100 $\Omega$ 1/4W $\pm$ 5%	FEE0132	ELR-25J-101
R7	Carbon film 47K $\Omega$ 1/4W $\pm$ 5%	FEE0340	ELR-25J-473
R8	Carbon film 1.5K $\Omega$ 1/4W $\pm$ 5%	FEE0206	ELR-25J-152
R9	Carbon film 100 $\Omega$ 1/4W $\pm$ 5%	FEE0132	ELR-25J-101
R10	Carbon film 100K $\Omega$ 1/4W $\pm$ 5%	FEE0371	ELR-25J-104
R11	Carbon film 100K $\Omega$ 1/4W $\pm$ 5%	FEE0371	ELR-25J-104
R12	Carbon film 220K $\Omega$ 1/4W $\pm$ 5%	FEE0396	ELR-25J-224
R13	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R14	Carbon film 12K $\Omega$ 1/4W $\pm$ 5%	FEE0288	ELR-25J-123
R15	Carbon film 3.3K $\Omega$ 1/4W $\pm$ 5%	FEE0230	ELR-25J-332
R16	Carbon film 330 $\Omega$ 1/4W $\pm$ 5%	FEE0159	ELR-25J-331
R17	Carbon film 270 $\Omega$ 1/4W $\pm$ 5%	FEE0155	ELR-25J-271
R18	Carbon film 100 $\Omega$ 1/4W $\pm$ 5%	FEE0132	ELR-25J-101
R19	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R20	Carbon film 220 $\Omega$ 1/4W $\pm$ 5%	FEE0149	ELR-25J-221
R21	Carbon film 220 $\Omega$ 1/4W $\pm$ 5%	FEE0149	ELR-25J-221
R22	Carbon film 100 $\Omega$ 1/4W $\pm$ 5%	FEE0132	ELR-25J-101
R23	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R24	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R25	Carbon film 6.8K $\Omega$ 1/4W $\pm$ 5%	FEE0262	ELR-25J-682
R26	Carbon film 330 $\Omega$ 1/4W $\pm$ 5%	FEE0159	ELR-25J-331
R27	Carbon film 1.5K $\Omega$ 1/4W $\pm$ 5%	FEE0206	ELR-25J-152
R28	Carbon film 100K $\Omega$ 1/4W $\pm$ 5%	FEE0371	ELR-25J-104
R29	Carbon film 100 $\Omega$ 1/4W $\pm$ 5%	FEE0132	ELR-25J-101
R30	Carbon film 100K $\Omega$ 1/4W $\pm$ 5%	FEE0371	ELR-25J-104
R31	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R32	Carbon film 47K $\Omega$ 1/4W $\pm$ 5%	FEE0340	ELR-25J-473
R33	Carbon film 3.3K $\Omega$ 1/4W $\pm$ 5%	FEE0230	ELR-25J-332
R34	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103

Ref. No.	Description	RS Part Number	MFR's Part Number
R35	Carbon film 220Ω 1/4W ±5%	FEE0149	ELR-25J-221
R36	Carbon film 470Ω 1/4W ±5%	FEE0169	ELR-25J-471
R37	Carbon film 1KΩ 1/4W ±5%	FEE0196	ELR-25J-102
R38	Carbon film 220Ω 1/4W ±5%	FEE0149	ELR-25J-221
R39	Carbon film 47KΩ 1/4W ±5%	FEE0340	ELR-25J-473
R40	Carbon film 10KΩ 1/4W ±5%	FEE0281	ELR-25J-103
R41	Carbon film 3.3KΩ 1/4W ±5%	FEE0230	ELR-25J-332
R42	Carbon film 1KΩ 1/4W ±5%	FEE0196	ELR-25J-102
R43	Carbon film 470Ω 1/4W ±5%	FEE0169	ELR-25J-471
R44	Carbon film 15KΩ 1/4W ±5%	FEE0297	ELR-25J-153
R45	Carbon film 3.3KΩ 1/4W ±5%	FEE0230	ELR-25J-332
R46	Carbon film 680Ω 1/4W ±5%	FEE0183	ELR-25J-681
R47	Carbon film 120Ω 1/4W ±5%	FEE0136	ELR-25J-121
R48	Carbon film 4.7KΩ 1/4W ±5%	FEE0247	ELR-25J-472
R49	Carbon film 150KΩ 1/4W ±5%	FEE0384	ELR-25J-154
R50	Carbon film 2.2KΩ 1/4W ±5%	FEE0216	ELR-25J-222
R51	Carbon film 220Ω 1/4W ±5%	FEE0149	ELR-25J-221
R52	Carbon film 1MΩ 1/4W ±5%	FEE0445	ELR-25J-105
R53	Carbon film 220KΩ 1/4W ±5%	FEE0396	ELR-25J-224
R54	Carbon film 1KΩ 1/4W ±5%	FEE0196	ELR-25J-102
R55	Carbon film 3.3KΩ 1/4W ±5%	FEE0230	ELR-25J-332
R56	Carbon film 10KΩ 1/4W ±5%	FEE0281	ELR-25J-103
R57	Carbon film 22KΩ 1/4W ±5%	FEE0311	ELR-25J-223
R58	Carbon film 470Ω 1/4W ±5%	FEE0169	ELR-25J-471
R59	Carbon film 470Ω 1/4W ±5%	FEE0169	ELR-25J-471
R60	Carbon film 4.7KΩ 1/4W ±5%	FEE0247	ELR-25J-472
R61	Carbon film 1KΩ 1/4W ±5%	FEE0196	ELR-25J-102
R62	Carbon film 220Ω 1/4W ±5%	FEE0149	ELR-25J-221
R63	Carbon film 4.7KΩ 1/4W ±5%	FEE0247	ELR-25J-472
R64	Carbon film 330KΩ 1/4W ±5%	FEE0410	ELR-25J-334
R65	Carbon film 330Ω 1/4W ±5%	FEE0159	ELR-25J-331
R66	Carbon film 39KΩ 1/4W ±5%	FEE0330	ELR-25J-393
R67	Carbon film 4.7KΩ 1/4W ±5%	FEE0247	ELR-25J-472
R68	Carbon film 4.7KΩ 1/4W ±5%	FEE0247	ELR-25J-472
R69	Carbon film 470Ω 1/4W ±5%	FEE0169	ELR-25J-471
R70	Carbon film 220Ω 1/4W ±5%	FEE0149	ELR-25J-221
R71	Carbon film 4.7KΩ 1/4W ±5%	FEE0247	ELR-25J-472
R72	Carbon film 47KΩ 1/4W ±5%	FEE0340	ELR-25J-473
R73	Carbon film 68KΩ 1/4W ±5%	FEE0354	ELR-25J-683
R74	Carbon film 1.5KΩ 1/4W ±5%	FEE0206	ELR-25J-152
R75	Carbon film 560Ω 1/4W ±5%	FEE0176	ELR-25J-561
R76	Carbon film 10KΩ 1/4W ±5%	FEE0281	ELR-25J-103
R77	Carbon film 22KΩ 1/4W ±5%	FEE0311	ELR-25J-223
R78	Carbon film 22KΩ 1/4W ±5%	FEE0311	ELR-25J-223
R79	Carbon film 22KΩ 1/4W ±5%	FEE0311	ELR-25J-223
R80	Carbon film 22KΩ 1/4W ±5%	FEE0311	ELR-25J-223
R81	Carbon film 10KΩ 1/4W ±5%	FEE0281	ELR-25J-103
<b>COILS/TRANSFORMERS</b>			
L1	VCO Coil (19 MHz)	CA-3818	10SFU-117
L2	VCO Coil (34 MHz)	CA-3817	10SFU-116
L3	RFC (220 μH)	C-0834	LF1-221K
L4	RFC (10 μH)	C-0832	LF1-100K
L5	RFC (22 μH)	C-0833	LF1-220K
L6	RFC (10 μH)	C-0832	LF1-100K
L7	RFC (10 μH)	C-0832	LF1-100K

Ref. No.	Description	RS Part Number	MFR's Part Number
L8	RFC (470 $\mu$ H)	C-0835	LF1-471K
L9	RFC (470 $\mu$ H)	C-0835	LF1-471K
L10	RFC (Beads core)		FBH-2.6/1.3/1.3/40L
L11	RFC (Beads core)		FBH-2.6/1.3/1.3/40L
L12	RFC (Beads core)		FBH-2.6/1.3/1.3/40L
L13	RFC (Beads core)		FBH-2.6/1.3/1.3/40L
L14	RFC (Beads core)		FBH-2.6/1.3/1.3/40L
L15	RFC (Beads core)		FBH-2.6/1.3/1.3/40L
L16	RFC (Beads core)		FBH-2.6/1.3/1.3/40L
L17	Not used		
T1	Transformer (15 MHz)	CA-3815	GR-K-531
T2	Transformer (15 MHz)	CA-3815	GR-K-531
T3	Transformer (34 MHz)	CA-3814	GR-K-530
T4	Transformer (34 MHz)	CA-3814	GR-K-530
T5	Transformer (19 MHz)	CA-3813	GR-K-529
T6	Transformer (34 MHz)	CA-3814	GR-K-530
T7	Transformer (34 MHz)	CA-3814	GR-K-530
T8	Transformer (34 MHz)	CA-3814	GR-K-530
T9	Transformer (7.8 MHz)	CA-3816	GR-H-40046
<b>SEMICONDUCTORS</b>			
Q1	Transistor silicon		2SC394(Y)
Q2	Transistor silicon		2SD526
Q3	F.E.T.		3SK45
Q4	F.E.T.		2SK19(Y)
Q5	F.E.T.		2SK19(Y)
Q6	Transistor silicon		2SC372(Y) or 2SC1815(Y)
Q7	Transistor silicon		2SC372(Y) or 2SC1815(Y)
Q8	Transistor silicon		2SC373 or 2SC1815(GR)
Q9	Transistor silicon		2SC394(Y)
Q10	Transistor silicon		2SC394(Y)
Q11	Transistor silicon		2SC784(O) or 2SC1923
Q12	Transistor silicon		2SC784(O) or 2SC1923
Q13	Transistor silicon		2SC1923(O) 2SC373 or 2SC1815(GR)
Q14	Transistor silicon		2SC373 or 2SC1815(GR)
Q15	Transistor silicon		2SC373 or 2SC1815(GR)
Q16	Transistor silicon		2SC373 or 2SC1815(GR)
Q17	Transistor silicon		2SC373 or 2SC1815(GR)
Q18	Transistor silicon		2SC373 or 2SC1815(GR)
Q19	Transistor silicon		2SC373 or 2SC1815(GR)
D1	Diode silicon	DX0270	1S1555
D2	Diode silicon	DX0270	1S1555
D3	Diode silicon	DX0270	1S1555
D4	Diode silicon	DX0113	EQA01-11(R)
D5	Diode variable capacitor	DX0718	FC52



Ref. No.	Description	RS Part Number	MFR's Part Number
D6	Diode variable capacitor	DX0718	FC52
D7	Diode silicon	DX0270	1S1555
D8	Diode silicon	DX0270	1S1555
D9	Diode silicon	DX0270	1S1555
D10	Diode silicon	DX0270	1S1555
D11	Diode variable capacitor	DX0718	FC52
D12	Diode silicon	DX0987	EQA01-05(S)
D13	Diode silicon	DX0270	1S1555
D14	Diode silicon	DX0270	1S1555
D15	Diode silicon	DX0270	1S1555
D16	Diode silicon	DX0989	EQA01-05(S)
D17	Diode variable capacitor	DX0718	FC52
D18	Diode silicon	DX0989	EQA01-05(S)
D19	Diode germanium	DX0162	1N60P
D20	Diode germanium	DX0162	1N60P
D21	Diode germanium	DX0162	1N60P
D22	Diode germanium	DX0162	1N60P
D23	Diode silicon	DX0270	1S1555
D24	Diode silicon	DX0990	EQA01-06(S)
D25	Diode silicon	DX0989	EQA01-05(S)
D26	Diode silicon	DX0991	EQA01-08(S)
D27	Diode germanium	DX0162	1N60P
D28	Diode germanium	DX0162	1N60P
D29	Diode silicon	DX0270	1S1555
D30	Diode silicon	DX0270	1S1555
IC1	Integrated circuit	MX3336	SN76600
IC2	Integrated circuit	MX3138	REC-86345
IC3	Integrated circuit	MX3139	SL-1626/(C)
<b>CONTROL RESISTORS</b>			
VR1	100K $\Omega$	P-6459	SR-19R-100KB
VR2	4.7K $\Omega$	P-6445	SR-19R-4.7KB
VR3	100 $\Omega$	P-6447	SR-19R-100B
VR4	10K $\Omega$	P-6446	SR-19R-10KB
VR5	47K $\Omega$	P-6444	SR-19R-47KB
<b>CRYSTALS</b>			
X1	Crystal 7.8025 MHz		
X2	Crystal 11.161 MHz		
X3	Crystal 11.1625 MHz		
X4	Crystal 10.240 MHz		
<b>MISCELLANEOUS</b>			
	VCO Shield case	HB-6650	GE-21D-6146
	VCO Shield case top	HB-6652	GE-21D-6159
	X'tal osc shield case	HB-6650	GE-21D-6146
	X'tal osc shield case top	HB-6652	GE-21D-6159
	PLL Shield case bottom	HB-6651	GE-21D-6147
	PLL Shield plate	RT-1036	GE-22D-6429
	Balanced modulator shield case	HB-6653	GE-21D-6150
	Fiber insulator for PLL shield case bottom	HB-6654	GE-21D-6162

# MAIN P.C.BOARD ASSEMBLY PARTS LIST

Ref. No.	Description	RS Part Number	MFR's Part Number
<b>CAPACITORS/TRIMMER</b>			
C201	Ceramic 150pF 50WV ±10%		NPO
C202	Ceramic 27~68pF 50WV ±10%		NPO
C203	Ceramic 0.01μF 25WV -20 ~ +80%		
C204	Ceramic 150pF 50WV ±10%		
C205	Ceramic 0.01μF 25WV -20 ~ +80%		
C206	Ceramic 0.01μF 25WV -20 ~ +80%		
C207	Ceramic 4pF 50WV ±0.25pF		
C208	Ceramic 150pF 50WV ±20%		FCR
C209	Ceramic 4pF 50WV ±0.25pF		
C210	Ceramic 150pF 50WV ±10%		FCR
C211	Ceramic 4pF 50WV ±0.25pF		
C212	Ceramic 62pF 50WV ±10%		
C213	Ceramic 0.01μF 25WV -20 ~ +80%		
C214	Ceramic 0.01μF 25WV -20 ~ +80%		
C215	Ceramic 0.01μF 25WV -20 ~ +80%		
C216	Ceramic 100pF 50WV -20 ~ +80%		FCR
C217	Ceramic 0.01μF 25WV -20 ~ +80%		
C218	Ceramic 0.01μF 25WV -20 ~ +80%		
C219	Mylar 0.01μF 25WV ±10%		
C220	Ceramic 500pF 50WV ±10%		
C221	Electrolytic 1μF 50WV		
C222	Electrolytic 10μF 16WV		
C223	Ceramic 0.01μF 25WV -20 ~ +80%		
C224	Not used		
C225	Ceramic 0.01μF 25WV -20 ~ +80%		
C226	Not used		
C227	Mylar 0.01μF 25WV ±10%		
C228	Ceramic 47pF 50WV ±10%		NPO
C229	Ceramic 82pF 50WV ±10%		NPO
C230	Mylar 0.01μF 25WV ±10%		
C231	Polystyrene 360pF 250WV ±20%		
C232	Mylar 0.0039μF 50WV ±20%		
C233	Polystyrene 360pF 250WV ±20%		
C234	Polystyrene 180pF 250WV ±20%		
C235	Ceramic 47pF 50WV ±10%		NPO
C236	Ceramic 33pF 50WV ±10%		NPO
C237	Ceramic 120pF 50WV ±10%		NPO
C238	Ceramic 0.001μF 50WV -20 ~ +80%		
C239	Mylar 0.001μF 50WV ±20%		
C240	Ceramic 2pF 50WV ±0.25pF		NPO
C241	Mylar 0.01μF 50WV ±20%		
C242	Ceramic 3pF 50WV ±0.25pF		
C243	Mylar 0.01μF 50WV ±20%		
C244	Electrolytic 10μF 16WV		
C245	Ceramic 0.01μF 25WV -20 ~ +80%		
C246	Mylar 0.01μF 50WV ±20%		
C247	Ceramic 0.04μF 25WV -20 ~ +80%		
C248	Mylar 0.01μF 50WV ±20%		
C249	Ceramic 0.01μF 25WV -20 ~ +80%		
C250	Mylar 0.039μF 50WV ±20%		

Ref. No.	Description	RS Part Number	MFR's Part Number
C251	Electrolytic 47 $\mu$ F 16WV		
C252	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C253	Ceramic 0.04 $\mu$ F 25WV -20 ~ +80%		
C254	Ceramic 0.01 $\mu$ F 25WV -20 ~ +80%		
C255	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C256	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C257	Ceramic 0.01 $\mu$ F 25WV -20 ~ +80%		
C258	Ceramic 33pF 50WV $\pm$ 10%		NPO
C259	Ceramic 0.04 $\mu$ F 25WV -20 ~ +80%		
C260	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C261	Ceramic 0.001 $\mu$ F 50WV -20 ~ +80%		
C262	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C263	Ceramic 0.01 $\mu$ F 25WV -20 ~ +80%		
C264	Ceramic 0.01 $\mu$ F 25WV -20 ~ +80%		
C265	Mylar 0.01 $\mu$ F 25WV $\pm$ 20%		
C266	Ceramic 7pF 50WV $\pm$ 10%		NPO
C267	Mylar 0.001 $\mu$ F 50WV $\pm$ 20%		
C268	Mylar 0.001 $\mu$ F 50WV $\pm$ 20%		
C269	Not used		
C270	Electrolytic 3.3 $\mu$ F 35WV		
C271	Electrolytic 3.3 $\mu$ F 35WV		
C272	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C273	Ceramic 56pF 50WV -20 ~ +80%		
C274	Mylar 0.022 $\mu$ F 50WV $\pm$ 20%		
C275	Electrolytic 1 $\mu$ F 50WV		
C276	Electrolytic 1 $\mu$ F 50WV		
C277	Mylar 0.022 $\mu$ F 50WV $\pm$ 20%		
C278	Not used		
C279	Tantalum 0.47 $\mu$ F 6.3WV $\pm$ 20%		
C280	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C281	Ceramic 5pF 50WV $\pm$ 0.25pF		NPO
C282	Tantalum 10 $\mu$ F 6.3WV $\pm$ 20%		
C283	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C284	Ceramic 3pF 50WV $\pm$ 10%		NPO
C285	Ceramic 0.01 $\mu$ F 25WV -20 ~ +80%		
C286	Mylar 0.0068 $\mu$ F 50WV $\pm$ 20%		
C287	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C288	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C289	Electrolytic 10 $\mu$ F 16WV		
C290	Ceramic 56pF 50WV -20 ~ +80%		
C291	Electrolytic 1 $\mu$ F 50WV		
C292	Mylar 0.001 $\mu$ F 50WV $\pm$ 20%		
C293	Electrolytic 3.3 $\mu$ F 35WV		
C294	Electrolytic 1 $\mu$ F 50WV		
C295	Electrolytic 33 $\mu$ F 16WV		
C296	Electrolytic 1 $\mu$ F 50WV		
C297	Mylar 0.01 $\mu$ F 50WV $\pm$ 20%		
C298	Not used		
C299	Ceramic 10pF 25WV $\pm$ 10%		
C300	Electrolytic 1 $\mu$ F 50WV		
C301	Ceramic 0.001 $\mu$ F 50WV -20 ~ +80%		
C302	Ceramic 0.001 $\mu$ F 50WV -20 ~ +80%		

Ref. No.	Description				RS Part Number	MFR's Part Number
C303	Ceramic	0.001 $\mu$ F	50W	-20 ~ +80%		
C304	Ceramic	0.001 $\mu$ F	50WV	-20 ~ +80%		
C305	Mylar	0.001 $\mu$ F	50WV	$\pm$ 20%		
C306	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C307	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C308	Mylar	0.01 $\mu$ F	50WV	$\pm$ 20%		
C309	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C310	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C311	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C312	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C313	Ceramic	10pF	50WV	$\pm$ 10%		NPO
C314	Ceramic	0.01 $\mu$ F	25WV	$\pm$ 10%		
C315	Mylar	0.001 $\mu$ F	50WV	$\pm$ 20%		
C316	Mylar	0.001 $\mu$ F	50WV	$\pm$ 20%		
C317	Ceramic	150pF	50WV	$\pm$ 10%		NPO
C318	Not used					
C319	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C320	Mylar	0.039 $\mu$ F	50WV	$\pm$ 20%		
C321	Ceramic	68pF	50WV	$\pm$ 10%		
C322	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C323	Ceramic	0.04 $\mu$ F	25WV	-20 ~ +80%		
C324	Electrolytic	1 $\mu$ F	50WV			
C325	Electrolytic	1 $\mu$ F	50WV			
C326	Electrolytic	3.3 $\mu$ F	35WV			
C327	Ceramic	0.04 $\mu$ F	25WV	-20 ~ +80%		
C328	Electrolytic	220 $\mu$ F	16WV			
C329	Electrolytic	1 $\mu$ F	50WV			
C330	Ceramic	56pF	50WV	$\pm$ 10%		
C331	Mylar	0.001 $\mu$ F	50WV	$\pm$ 20%		
C332	Electrolytic	33 $\mu$ F	16WV			
C333	Electrolytic	220 $\mu$ F	16WV			
C334	Electrolytic	1 $\mu$ F	50WV			
C335	Ceramic	56pF	50WV	$\pm$ 10%		
C336	Electrolytic	10 $\mu$ F	16WV			
C337	Electrolytic	1000 $\mu$ F	16WV			
C338	Electrolytic	220 $\mu$ F	16WV			
C339	Mylar	0.015 $\mu$ F	50WV	$\pm$ 20%		
C340	Mylar	0.015 $\mu$ F	50WV	$\pm$ 20%		
C341	Mylar	0.01 $\mu$ F	50WV	$\pm$ 20%		
C342	Electrolytic	33 $\mu$ F	16WV			
C343	Mylar	0.01 $\mu$ F	50WV	$\pm$ 20%		
C344	Not used					
C345	Electrolytic	220 $\mu$ F	16WV			
C346	Electrolytic	1000 $\mu$ F	16WV	$\pm$ 20%		
C347	Mylar	0.022 $\mu$ F	50WV	$\pm$ 20%		
C348	Mylar	0.022 $\mu$ F	50WV	$\pm$ 20%		
C349	Not used					
C350	Electrolytic	47 $\mu$ F	35WV			
C351	Electrolytic	470 $\mu$ F	35WV			
C352	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C353	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C354	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		

Ref. No.	Description				RS Part Number	MFR's Part Number
C355	Ceramic	0.1 $\mu$ F	25WV	-20 ~ +80%		
C356	Ceramic	0.1 $\mu$ F	25WV	-20 ~ +80%		
C357	Not used					
C358	Not used					
C359	Not used					
C360	Not used					
C361	Ceramic	0.1 $\mu$ F	25WV	-20 ~ +80%		
C362	Ceramic	0.1 $\mu$ F	25WV	-20 ~ +80%		
C363	Ceramic	0.1 $\mu$ F	25WV	-20 ~ +80%		
C364	Ceramic	0.1 $\mu$ F	25WV	-20 ~ +80%		
C365	Ceramic	0.1 $\mu$ F	25WV	-20 ~ +80%		
C366	Ceramic	0.04 $\mu$ F	25WV	-20 ~ +80%		
C367	Mylar	0.001 $\mu$ F	50WV	$\pm$ 20%		
C368	Electrolytic	1000 $\mu$ F	16WV			
C369	Ceramic	0.001 $\mu$ F	50WV	-20 ~ +80%		
C370	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C371	Ceramic	0.01 $\mu$ F	25WV	-20 ~ +80%		
C372	Mylar	0.01 $\mu$ F	25WV	$\pm$ 20%		
C373	Electrolytic	33 $\mu$ F	16WV			
C374	Mylar	0.01 $\mu$ F	25WV	$\pm$ 20%		
C375	Mylar	0.01 $\mu$ F	25WV	$\pm$ 20%		
TC201	Trimmer	30pF			C-0842	ECV-1ZW30x32

### RESISTORS/CONTROL RESISTORS

R201	Carbon film	1K $\Omega$	1/4W	$\pm$ 5%	FEE0196	ELR-25J-102
R202	Carbon film	22K $\Omega$	1/4W	$\pm$ 5%	FEE0311	ELR-25J-223
R203	Carbon film	47K $\Omega$	1/4W	$\pm$ 5%	FEE0340	ELR-25J-473
R204	Carbon film	330 $\Omega$	1/4W	$\pm$ 5%	FEE0159	ELR-25J-331
R205	Carbon film	470K $\Omega$	1/4W	$\pm$ 5%	FEE0423	ELR-25J-474
R206	Carbon film	22 $\Omega$	1/4W	$\pm$ 5%	FEE0078	ELR-25J-220
R207	Carbon film	120 $\Omega$	1/4W	$\pm$ 5%	FEE0136	ELR-25J-121
R208	Carbon film	2.2 $\Omega$	1/4W	$\pm$ 5%	FEE0032	ELR-25J-2R2
R209	Carbon film	12K $\Omega$	1/4W	$\pm$ 5%	FEE0288	ELR-25J-123
R210	Carbon film	2.2K $\Omega$	1/4W	$\pm$ 5%	FEE0216	ELR-25J-222
R211	Carbon film	33 $\Omega$	1/4W	$\pm$ 5%	FEE0087	ELR-25J-330
R212	Carbon film	22K $\Omega$	1/4W	$\pm$ 5%	FEE0311	ELR-25J-223
R213	Carbon film	39K $\Omega$	1/4W	$\pm$ 5%	FEE0330	ELR-25J-393
R214	Not used					
R215	Carbon film	220 $\Omega$	1W	$\pm$ 10%	NFG0149	ERX-1ANJ-221
R216	Carbon film	33 $\Omega$	1/4W	$\pm$ 5%	FEE0087	ELR-25J-330
R217	Carbon film	1K $\Omega$	1/4W	$\pm$ 5%	FEE0196	ELR-25J-102
R218	Carbon film	1 $\Omega$	1W	$\pm$ 5%	NEG0022	ERX-1ANJ-1R0
R219	Carbon film	150 $\Omega$	1/4W	$\pm$ 5%	FEE0142	ELR-25J-151
R220	Carbon film	1 $\Omega$	1W	$\pm$ 5%	NEG0022	ERX-1ANJ-1R0
R221	Not used					
R222	Carbon film	1K $\Omega$	1/2W	$\pm$ 10%	NFE0196	ERX-12ANJ-102
R223	Carbon film	4.7K $\Omega$	1/4W	$\pm$ 5%	NEE0247	ELR-25J-472
R224	Carbon film	100 $\Omega$	1W	$\pm$ 5%	NEG0132	
R225	Carbon film	27 $\Omega$	1/4W	$\pm$ 5%	FEE0082	ELR-25J-270
R226	Not used					
R227	Carbon film	47 $\Omega$	1/4W	$\pm$ 5%	FEE0099	ELR-25J-470

Ref. No.	Description	RS Part Number	MFR's Part Number
R228	Carbon film 1K $\Omega$ 1/2W $\pm$ 10%	FEE0196	ELR-25J-102
R229	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R230	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R231	Carbon film 220K $\Omega$ 1/4W $\pm$ 5%	FEE0396	ELR-25J-224
R232	Carbon film 22K $\Omega$ 1/4W $\pm$ 5%	FEE0311	ELR-25J-223
R233	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R234	Carbon film 100 $\Omega$ 1/4W $\pm$ 5%	FEE0132	ELR-25J-101
R235	Carbon film 330 $\Omega$ 1/4W $\pm$ 5%	FEE0159	ELR-25J-331
R236	Carbon film 68K $\Omega$ 1/4W $\pm$ 5%	FEE0354	ELR-25J-683
R237	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R238	Carbon film 33 $\Omega$ 1/4W $\pm$ 5%	FEE0087	ELR-25J-330
R239	Carbon film 47 $\Omega$ 1/4W $\pm$ 5%	FEE0099	ELR-25J-470
R240	Carbon film 33K $\Omega$ 1/4W $\pm$ 5%	FEE0324	ELR-25J-333
R241	Carbon film 4.7K $\Omega$ 1/4W $\pm$ 5%	FEE0247	ELR-25J-472
R242	Carbon film 56 $\Omega$ 1/4W $\pm$ 5%	FEE0107	ELR-25J-560
R243	Carbon film 33 $\Omega$ 1/4W $\pm$ 5%	FEE0087	ELR-25J-330
R244	Carbon film 47 $\Omega$ 1/4W $\pm$ 5%	FEE0099	ELR-25J-470
R245	Carbon film 33K $\Omega$ 1/4W $\pm$ 5%	FEE0324	ELR-25J-333
R246	Carbon film 4.7K $\Omega$ 1/4W $\pm$ 5%	FEE0247	ELR-25J-472
R247	Carbon film 68 $\Omega$ 1W $\pm$ 5%	NEG0111	ERX-1ANJ-680
R248	Carbon film 33 $\Omega$ 1/2W $\pm$ 5%	NEF0087	
R249	Carbon film 56 $\Omega$ 1/4W $\pm$ 5%	FEE0107	ELR-25J-560
R250	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R251	Carbon film 1M $\Omega$ 1/4W $\pm$ 5%	FEE0445	ELR-25J-105
R252	Carbon film 220 $\Omega$ 1/4W $\pm$ 5%	FEE0149	ELR-25J-221
R253	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R254	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R255	Carbon film 4.7K $\Omega$ 1/4W $\pm$ 5%	FEE0247	ELR-25J-472
R256	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R257	Carbon film 4.7K $\Omega$ 1/4W $\pm$ 5%	FEE0247	ELR-25J-472
R258	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R259	Carbon film 56K $\Omega$ 1/4W $\pm$ 5%	FEE0345	ELR-25J-563
R260	Carbon film 33K $\Omega$ 1/4W $\pm$ 5%	FEE0324	ELR-25J-333
R261	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R262	Carbon film 180K $\Omega$ 1/4W $\pm$ 5%	FEE0387	ELR-25J-184
R263	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R264	Carbon film 1M $\Omega$ 1/4W $\pm$ 5%	FEE0445	ELR-25J-105
R265	Carbon film 3.3M $\Omega$ 1/4W $\pm$ 5%		ELR-25J-335
R266	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R267	Carbon film 470 $\Omega$ 1/4W $\pm$ 5%	FEE0169	ELR-25J-471
R268	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R269	Carbon film 100 $\Omega$ 1/4W $\pm$ 5%	FEE0132	ELR-25J-101
R270	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R271	Carbon film 4.7K $\Omega$ 1/4W $\pm$ 5%	FEE0247	ELR-25J-472
R272	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R273	Carbon film 1M $\Omega$ 1/4W $\pm$ 5%	FEE0445	ELR-25J-105
R274	Carbon film 220 $\Omega$ 1/4W $\pm$ 5%	FEE0149	ELR-25J-221
R275	Carbon film 1.2K $\Omega$ 1/4W $\pm$ 5%	FEE0199	ELR-25J-122
R276	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R277	Carbon film 4.7K $\Omega$ 1/4W $\pm$ 5%	FEE0247	ELR-25J-472
R278	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R279	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R280	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102

Ref. No.	Description	RS Part Number	MFR's Part Number
R281	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R282	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R283	Carbon film 150K $\Omega$ 1/4W $\pm$ 5%	FEE0384	ELR-25J-154
R284	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R285	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R286	Carbon film 5.6K $\Omega$ 1/4W $\pm$ 5%	FEE0257	ELR-25J-562
R287	Carbon film 68K $\Omega$ 1/4W $\pm$ 5%	FEE0354	ELR-25J-683
R288	Carbon film 12K $\Omega$ 1/4W $\pm$ 5%	FEE0288	ELR-25J-123
R289	Carbon film 220 $\Omega$ 1/4W $\pm$ 5%	FEE0149	ELR-25J-221
R290	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R291	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R292	Carbon film 12K $\Omega$ 1/4W $\pm$ 5%	FEE0288	ELR-25J-123
R293	Carbon film 22K $\Omega$ 1/4W $\pm$ 5%	FEE0311	ELR-25J-223
R294	Carbon film 470 $\Omega$ 1/4W $\pm$ 5%	FEE0169	ELR-25J-471
R295	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R296	Carbon film 18K $\Omega$ 1/4W $\pm$ 5%	FEE0303	ELR-25J-183
R297	Carbon film 470 $\Omega$ 1/4W $\pm$ 5%	FEE0169	ELR-25J-471
R298	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R299	Carbon film 22K $\Omega$ 1/4W $\pm$ 5%	FEE0311	ELR-25J-223
R300	Carbon film 56 $\Omega$ 1/4W $\pm$ 5%	FEE0107	ELR-25J-560
R301	Carbon film 330K $\Omega$ 1/4W $\pm$ 5%	FEE0410	ELR-25J-334
R302	Carbon film 180K $\Omega$ 1/4W $\pm$ 5%	FEE0387	ELR-25J-184
R303	Carbon film 7.5K $\Omega$ 1/4W $\pm$ 5%	FEE0266	ELR-25J-752
R304	Carbon film 68K $\Omega$ 1/4W $\pm$ 5%	FEE0354	ELR-25J-683
R305	Carbon film 2.7K $\Omega$ 1/4W $\pm$ 5%	FEE0224	ELR-25J-272
R306	Not used		
R307	Carbon film 22K $\Omega$ 1/4W $\pm$ 5%	FEE0311	ELR-25J-223
R308	Carbon film 22K $\Omega$ 1/4W $\pm$ 5%	FEE0311	ELR-25J-223
R309	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	FEE0196	ELR-25J-102
R310	Carbon film 3.3K $\Omega$ 1/4W $\pm$ 5%	FEE0230	ELR-25J-332
R311	Carbon film 4.7K $\Omega$ 1/4W $\pm$ 5%	FEE0247	ELR-25J-472
R312	Carbon film 330K $\Omega$ 1/4W $\pm$ 5%	FEE0410	ELR-25J-334
R313	Carbon film 220 $\Omega$ 1/4W $\pm$ 5%	FEE0149	ELR-25J-221
R314	Carbon film 390 $\Omega$ 1/4W $\pm$ 5%	FEE0162	ELR-25J-391
R315	Carbon film 0.47 $\Omega$ 1W $\pm$ 10%	NEG0008	ERX-1ANJ-0R5
R316	Carbon film 1.5M $\Omega$ 1/4W $\pm$ 5%	FEE0450	ELR-25J-155
R317	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R318	Carbon film 270 $\Omega$ 1/4W $\pm$ 5%	FEE0155	ELR-25J-271
R319	Carbon film 33K $\Omega$ 1/4W $\pm$ 5%	FEE0324	ELR-25J-333
R320	Carbon film 10K $\Omega$ 1/4W $\pm$ 5%	FEE0281	ELR-25J-103
R321	Carbon film 100 $\Omega$ 1/4W $\pm$ 5%	FEE0132	ELR-25J-101
R322	Carbon film 330 $\Omega$ 1/4W $\pm$ 5%	FEE0159	ELR-25J-331
R323	Carbon film 220 $\Omega$ 1/4W $\pm$ 5%	FEE0149	ELR-25J-221
R324	Carbon film 1.2K $\Omega$ 1/4W $\pm$ 5%	FEE0199	ELR-25J-122
R325	Carbon film 47 $\Omega$ 1/4W $\pm$ 5%	FEE0099	ELR-25J-470
R326	Carbon film 68 $\Omega$ 1/4W $\pm$ 5%	FEE0111	ELR-25J-680
R327	Carbon film 0.47 $\Omega$ 1W $\pm$ 10%	NFG0008	ERX-1ANJ-0R47
R328	Carbon film 0.47 $\Omega$ 1W $\pm$ 10%	NFG0008	ERX-1ANJ-0R47
R329	Carbon film 2.2K $\Omega$ 1/4W $\pm$ 5%	FEE0216	ELR-25J-222
R330	Carbon film 22 $\Omega$ 1W $\pm$ 10%	NFG0078	ERX-1ANJ-220
R331	Carbon film 2.2 $\Omega$ 1W $\pm$ 10%	NFG0032	ERX-1ANJ-2R2
R332	Carbon film 330K $\Omega$ 1/4W $\pm$ 5%	FEE0410	ELR-25J-334

Ref. No.	Description	RS Part Number	MFR's Part Number
R333	Carbon film 330K $\Omega$ 1/4W $\pm$ 5%	NEE0410	ELR-25J-334
R334	Carbon film 33K $\Omega$ 1/4W $\pm$ 5%	NEE0324	ELR-25J-333
R335	Carbon film 180K $\Omega$ 1/4W $\pm$ 5%	NEE0387	ELR-25J-184
R336	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	NEE0196	ELR-25J-102
R337	Carbon film 47 $\Omega$ 1/4W $\pm$ 5%	NEE0099	ELR-25J-470
R338	Carbon film 470K $\Omega$ 1/4W $\pm$ 5%	NEE0423	ELR-25J-474
R339	Carbon film 100K $\Omega$ 1/4W $\pm$ 5%	NEE0371	ELR-25J-104
R340	Carbon film 220K $\Omega$ 1/4W $\pm$ 5%	NEE0396	ELR-25J-224
R341	Carbon film 3.3K $\Omega$ 1/4W $\pm$ 5%	NEE0230	ELR-25J-332
RA1	Resistor array	RX-0017	7403
VR201	Potentiometer 1K $\Omega$	P-6451	SR-19R1KB
VR202	Potentiometer 470 $\Omega$	P-1403	SR-19R470B
VR203	Potentiometer 5K $\Omega$	P-6456	EVN-K4AA00B53
VR204	Potentiometer 47K $\Omega$	P-6452	SR19R 47K
VR205	Potentiometer 10K $\Omega$	P-6454	EVN-K4AA00B14
VR206	Potentiometer 50K $\Omega$	P-6457	EVN-K4AA00B54
VR207	Potentiometer 10K $\Omega$	P-6454	ENV-K4AA00B14
VR208	Potentiometer 1K $\Omega$	P-6453	EVN-K4AA00B13
VR209	Potentiometer 500K $\Omega$	P-6458	EVN-K4AA00B55
VR210	Potentiometer 500 $\Omega$	P-6455	EVN-K4AA00B52
<b>COILS</b>			
L201	RFC (10 $\mu$ H)	CA-2971	LF1-100K
L202	RFC (10 $\mu$ H)	CA-2971	LF1-100K
L203	Coil (27 MHz)	CB-2362	4LNC-120
L204	Coil (0.2 $\mu$ H)	CA-3488	4LNC-092
L205	RFC (10 $\mu$ H)	CA-2971	LF1-100K
L206	Coil (2 $\mu$ H)	CA-2645	4LNC-054
L207	Coil (27 MHz)	CA-3808	10SNP-119
L208	Coil (27 MHz)	CA-3808	10SNP-119
L209	Coil (0.2 $\mu$ H)	CA-3488	4LNC-092
L210	Coil (0.2 $\mu$ H)	CA-3488	4LNC-092
L211	RFC (47 $\mu$ H)	CB-2137	LF1-470K
L212	RFC (10 $\mu$ H)	CA-2971	LF1-100K
L213	RFC (2 $\mu$ H)	CA-2645	4LNC-054
L214	RFC (2 $\mu$ H)	CA-2645	4LNC-054
L215	RFC (2 $\mu$ H)	CA-2645	4LNC-054
<b>TRANSFORMERS/FILTER</b>			
T201	Transformer (27 MHz)	CA-3807	GR-N-535
T202	Transformer (27 MHz)	CA-3807	GR-N-535
T203	Transformer (27 MHz)	CA-3807	GR-N-535
T204	Transformer (27 MHz)	CA-3806	GR-N-534
T205	Transformer (27 MHz)	CA-3142	8SND-065
T206	Transformer (27 MHz)	CA-2268	10PNP-028
T207	Transformer (7.8 MHz)	CA-3809	GR-K-532
T208	Transformer (7.8 MHz)	CA-3809	GR-K-532
T209	Transformer (7.8 MHz)	CA-3810	GR-K-533
T210	Transformer (27 MHz)	CA-3811	GR-K-23345
T211	Transformer (27 MHz)	CA-3812	GR-K-23504
T212	Transformer (27 MHz)	CA-3809	GR-K-532



Ref. No.	Description	RF Part Number	MFR's Part Number
T213	Transformer (40 MHz)	CA-3738	GR-K-519
T214	Transformer (40 MHz)	CA-3738	GR-K-519
T215	Input transformer	TN-0055	E6169
T216	Output transformer	TD-0162	E6209
T217	Not used		
T218	Choke coil	CB-2364	E5N08
T219	Choke coil	CB-2363	E5003
XF-201	Crystal filter (7.8 MHz)	C-0843	HF-1
<b>SEMICONDUCTORS</b>			
Q201	F.E.T.		3SK45
Q202	Transistor silicon		2SC1634 or 2SC1364
Q203	Transistor silicon		2SC1634 or 2SC1364
Q204	Transistor silicon		2SC2020
Q205	Transistor silicon		2SC2098 or 2SC1307
Q206	Not used		
Q207	Transistor silicon		2SC1634 or 2SC1364
Q208	Transistor silicon		2SC1634 or 2SC1364
Q209	Transistor silicon		2SC372(Y) or 2SC1815(Y)
Q210	Transistor silicon		2SC373 or 2SC1815(GR)
Q211	Transistor silicon		2SC373 or 2SC1815(GR)
Q212	Transistor silicon		2SA495(Y)
Q213	Transistor silicon		2SC372(Y) or 2SC1815(Y)
Q214	F.E.T.		2SK19(Y)
Q215	Transistor silicon		2SA495(Y)
Q216	Transistor silicon		2SA495(Y)
Q217	Transistor silicon		2SC373 or 2SC1815(GR)
Q218	Transistor silicon		2SC734(Y)
Q219	Transistor silicon		2SC373 or 2SC1815(GR)
Q220	Transistor silicon		2SC784(O) or 2SC1923(O)
Q221	Transistor silicon		2SC373 or 2SC1815(GR)
Q222	Transistor silicon		2SC373 or 2SC1815(GR)
Q223	Transistor silicon		2SC784(O) or 2SC1923(O)
Q224	Transistor silicon		2SC372(Y) or 2SC1815(Y)
Q225	F.E.T.		3SK45

Ref. No.	Description	RS Part Number	MFR's Part Number
Q226	Transistor silicon		2SC784(O) or 2SC1923(O)
Q227	Transistor silicon		2SC784(O) or 2SC1923
Q228	Transistor silicon		2SC784(O) or 2SC1923
Q229	Transistor silicon		2SD526
Q230	Transistor silicon		2SA495(Y)
Q231	Transistor silicon		2SC373 or 2SC1815(GR)
Q232	Transistor silicon		2SC373 or 2SC1815(GR)
Q233	Transistor silicon		2SC373 or 2SC1815(GR)
Q234	Transistor silicon		2SD526
Q235	Transistor silicon		2SD526
Q236	Transistor silicon		2SD526
IC-201	Integrated circuit	MX3336	SN76600
TH-1	Thermister	T1012	M-10K
TH-2	Thermister	T1138	M-60
D201	Diode silicon	DX0282	1S1885
D202	Diode silicon	DX0282	1S1885
D203	Diode silicon	DX0112	EQA01-05(S)
D204	Diode silicon	DX0121	EQB01-33
D205	Diode silicon	DX0270	1S1555
D206	Diode germanium	DX0162	1N60P
D207	Diode germanium	DX0162	1N60P
D208	Diode silicon	DX0270	1S1555
D209	Diode germanium	DX0162	1N60P
D210	Diode germanium	DX0162	1N60P
D211	Diode germanium	DX0162	1N60P
D212	Diode germanium	DX0162	1N60P
D213	Diode germanium	DX0162	1N60P
D214	Diode germanium	DX0162	1N60P
D215	Diode germanium	DX0162	1N60P
D216	Diode silicon	DX0270	1S1555
D217	Diode silicon	DX0270	1S1555
D218	Diode silicon	DX0270	1S1555
D219	Diode silicon	DX0270	1S1555
D220	Diode silicon	DX0270	1S1555
D221	Diode silicon	DX0162	1N60P
D222	Diode germanium	DX0270	1S1555
D223	Diode silicon	DX0270	1S1555
D224	Diode germanium	DX0162	1N60P
D225	Diode silicon	DX0270	1S1555
D226	Diode silicon	DX0270	1S1555
D227	Diode germanium	DX0162	1N60P
D228	Diode silicon	DX0445	SIB-01-02
D229	Diode silicon	DX0270	1S1555
D230	Diode silicon	DX0270	1S1555
D231	Diode silicon	DX0270	1S1555

Ref. No.	Description	RS Part Number	MFR's Part Number
D232	Diode silicon	DX0270	1S1555
D233	Diode silicon	DX0270	1S1555
D234	Diode silicon	DX0270	1S1555
D235	Diode silicon	DX0270	1S1555
D236	Diode germanium	DX0162	1N60P
D237	Diode germanium	DX0162	1N60P
D238	Diode germanium	DX0162	1N60P
D239	Diode germanium	DX0162	1N60P
D240	Diode silicon	DX0270	1S1555
D241	Diode silicon	DX0270	1S1555
D242	Diode silicon	DX0270	1S1555
D243	Diode silicon	DX0270	1S1555
D244	Diode silicon	DX0399	EQA-01-11
D245	Diode germanium	DX0162	1N60P
D246	Diode germanium	DX0162	1N60P
D247	Diode germanium	DX0162	1N60P
D248	Diode germanium	DX0162	1N60P
D249	Diode silicon	DX0445	SIB-01-02
D250	Diode silicon	DX0445	SIB-01-02
D251	Diode silicon	DX0445	SIB-01-02
D252	Diode silicon	DX0445	SIB-01-02
D253	Diode germanium	DX0162	1N60P
D254	Diode germanium	DX0162	1N60P
D255	Diode silicon	DX0270	1S1555
<b>MISCELLANEOUS</b>			
RY-1	Relay	R-8090	MY-4
	Shield plate	HB-6841	GE-21D-6148
	Shield plate bottom	HB-6842	GE-18D-6149
	Fiber insulator for shield plate bottom	HB-6843	GE-18D-4185
TP216	Test pin (crystal socket)	J-6006	S2-101P

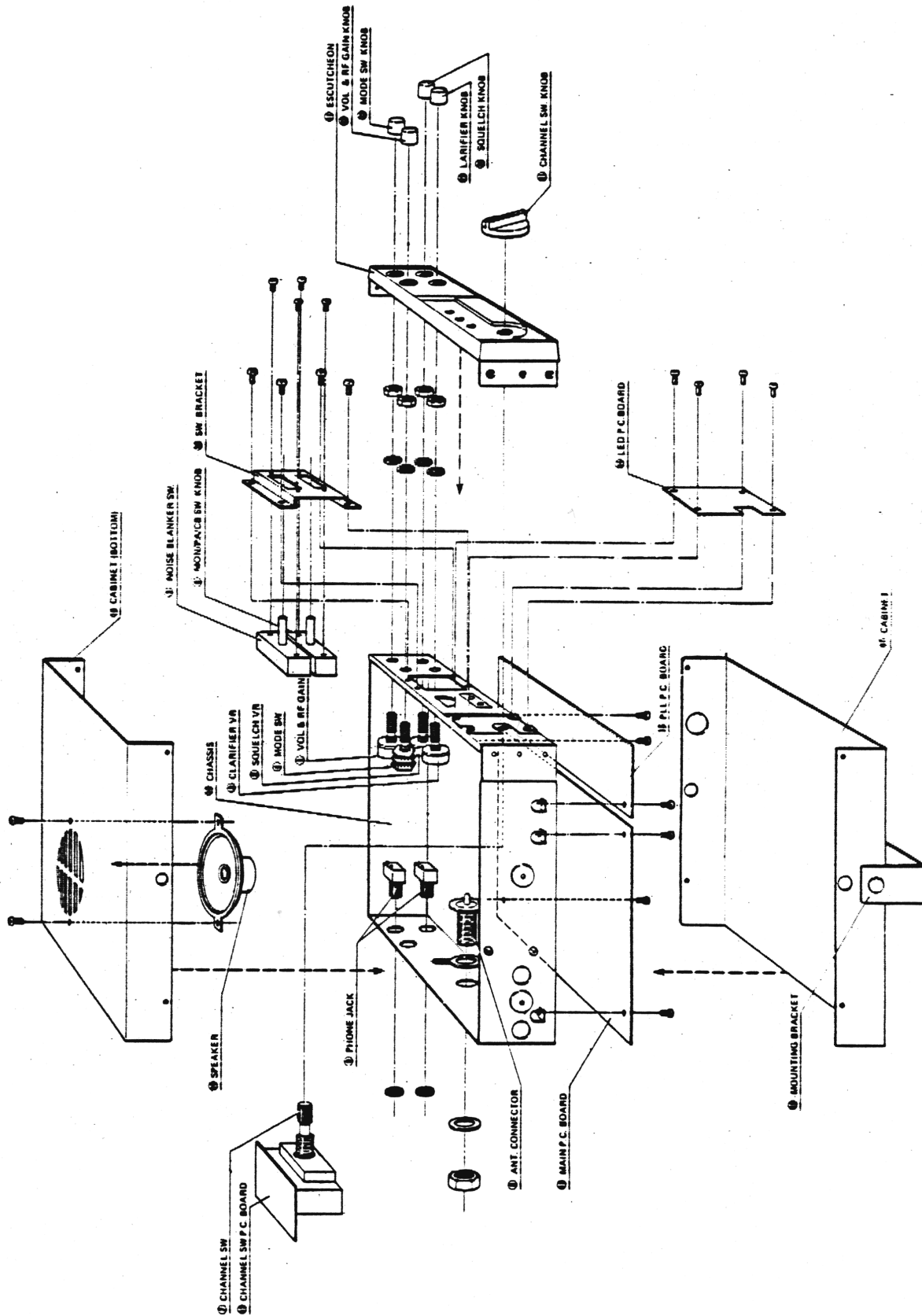
## LED P.C.BOARD ASSEMBLY PARTS LIST

Ref. No.	Description	RS Part Number	MFR's Part Number
R501	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	NEE0196	EXR-25J-102
R502	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	NEE0196	EXR-25J-102
R503	Carbon film 1K $\Omega$ 1/4W $\pm$ 5%	NEE0196	EXR-25J-102
RA2	Resistor array 1K $\Omega$ 1/3W	RX0048	EXB-RB7102M
RA3	Resistor array 1K $\Omega$ 1/3W	RX0048	EXB-RB7102M
LED1	MODE LED	L0832	TLR-103
LED2	MODE LED	L0832	TLR-103
LED3	MODE LED	L0832	TLR-103
LED4	CH LED	L0831	SG-N72-01

# CHASSIS ASSEMBLY PARTS LIST

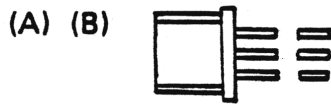
Ref. No.	Description	RS Part Number	MFR's Part Number
<b>MISCELLANEOUS</b>			
VR-301/VR-302 (1)	Volume/RF Gain 10K/50K	P-0803	DM11A720-5M1222
VR-303 (2)	Squelch 50KΩ C	P-0804	VM10A947-50KC
VR-304 (3)	Clarifier 10KΩ B	P-0805	VM10A947-10KB
(4)	Mode SW.	S-0814	ESR-E263K25E
(5)	Slide SW. (A) (PA CB)	S-2403	SSM04304W
(6)	Slide SW. (B) - (Noise blanker)	S-2404	SSM02209
(7)	Channel SW.	S1284	SRH202U125
(8)	Antenna connector	J6480	NY-R
(9)	Phone jack	J6385	SG-8016
(10)	Speaker	S-4709	PD-960ST
(11)	Escutcheon	X-7534	GE-21B-6154
(12)	MAIN P.C. Board	HB-6651	GE-21B-6221
(13)	P.L.L. P.C. Board		GE-21D-6147
(14)	L.E.D. P.C. Board		GE-21D-6013
(15)	Channel SW. P.C. Board		GE-21D-6222
(16)	Chassis		GE-21A-6143
(17)	Cabinet Top	Z-3670	GE-21B-6144
(18)	Cabinet Bottom	Z-3671	GE-21B-6145
(19)	Bracket	MB-0189	GE-21D-6153
(20)	SW. bracket	HB-6103	GE-21D-5843
(21)	Channel SW. knob		GE-21D-3166
(22)	Volume knob	K-2727	GE-22D-6647
	RF gain knob	K-2728	GE-22D-6648
(23)	Mode SW. knob		GE-21D-6158
(24)	Squelch knob		GE-21D-6158
(25)	Clarifier knob		GE-21D-6158
	DC cable		GE-20G-5135
	MIC jack	J-0533	CS-257
	S/RF meter	M-0354	KL-218L-128
	Fuse		4A
	Meter lamp		BU-687
	Bracket screw		GE-16D-3166
	1L2P Lug		95KV4643
	Ground Lug	HD-1234	GE-21D-6137
	Smoked panel	HB-6658	GE-21D-6155
	Microphone	M-2287	DF-209
	Model label	HB-6660	GE-21D-6182
	Heat sink	HH0240	GE-21D-6151
	Lamp	L-0263	14V 50mA
	Lamp grommet	HB-1182	BU-687
	Badge		
	DC cable	W-1909	GE-20C-5135
	Cord strain relief	HB-0705	SR-3P4
	Fiber for Mic. Jack	HB-6655	GE-18D-4186
	Car mounting bracket screw	HD-1234	GE-16D-3166
	Speaker holder	HB-6656	GE-21D-5829
	Speaker cloth	HB-6103	GE-21D-5843
	Meter pad	HB-6659	GE-21D-6141
	Screws		
	Pan head tapping		3x6mm.
	Pan head tapping		3x6mm. (BLK)
	Pan head screw		3x6mm.
	Plastic screw		3x6mm.
	Nut		3mm.
C401	Electrolytic 1μF 50WV		
C402	Electrolytic 1μF 50WV		
C403	Ceramic 0.04μF 25WV -20 ~ +80%		

# EXPLODED VIEW



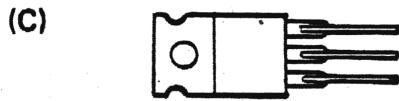
# SEMICONDUCTORS LEAD IDENTIFICATION

- (A) : 2SA495(O), 2SC372(O), 2SC373, 2SC387(A), 2SC394(Y), 2SC784
- (B) : 2SK19(Y)
- (C) : 2SD526, 2SC2020, 2SC2098
- (D) : 2SC1634, 2SC1364, 2SC1815, 2SC1923
- (E) : 3SK45, 3SK35

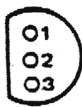
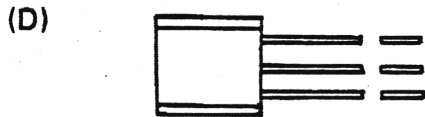


- (A)
1. Base
  2. Collector
  3. Emitter

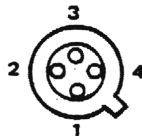
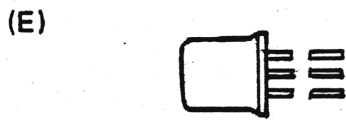
- (B)
1. Gate
  2. Source
  3. Drain



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



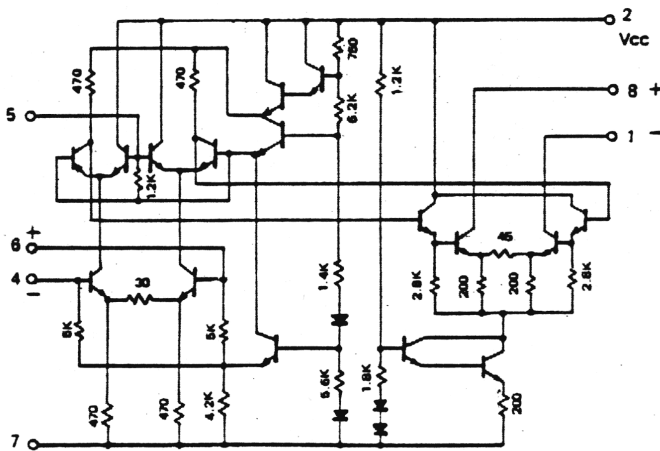
- (D)
1. Base
  2. Collector
  3. Emitter



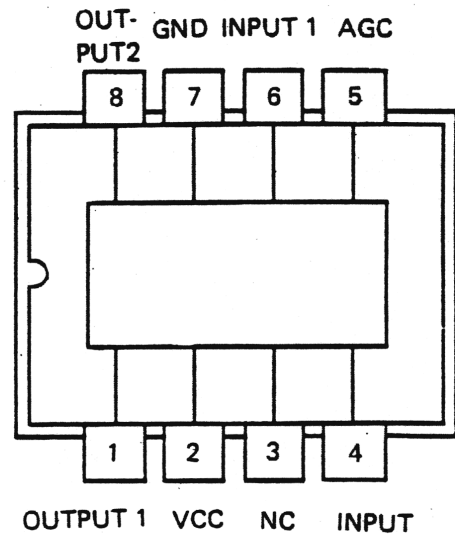
- (E)
1. Drain
  2. Gate 2
  3. Gate 1
  4. Source (Case)

## IC PIN CONFIGURATIONS

SN76600 SCHEMATIC DIAGRAM

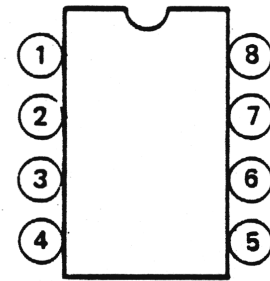
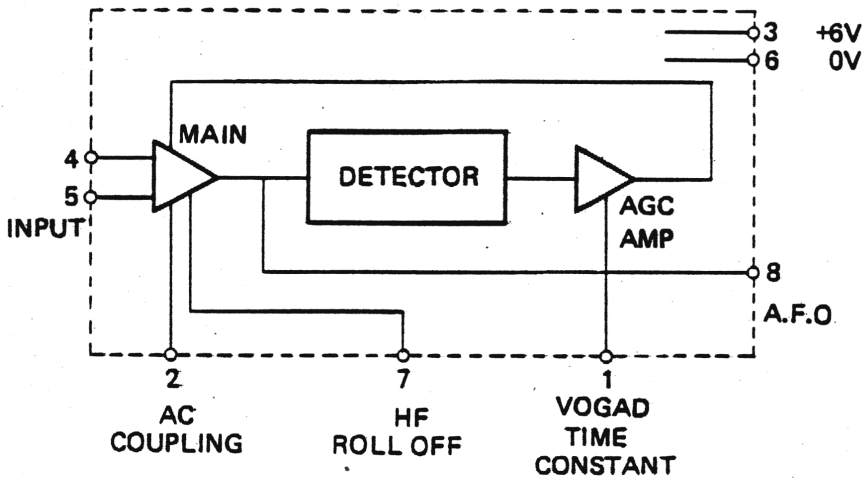


SN76600 LEAD IDENTIFICATION

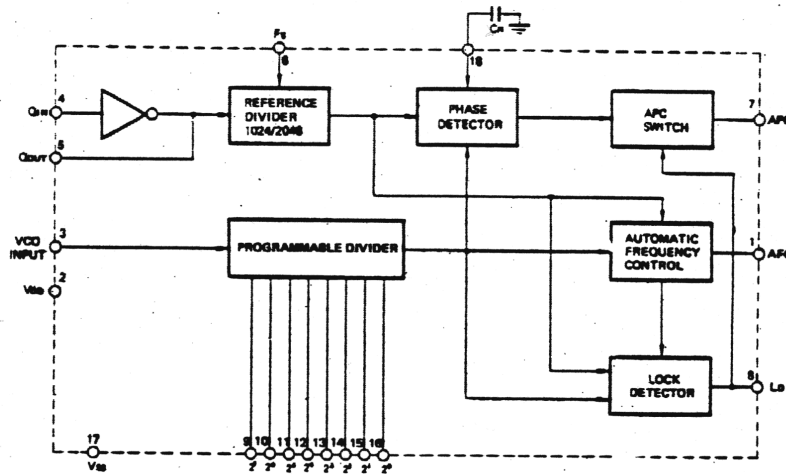


SL1626C SCHEMATIC DIAGRAM

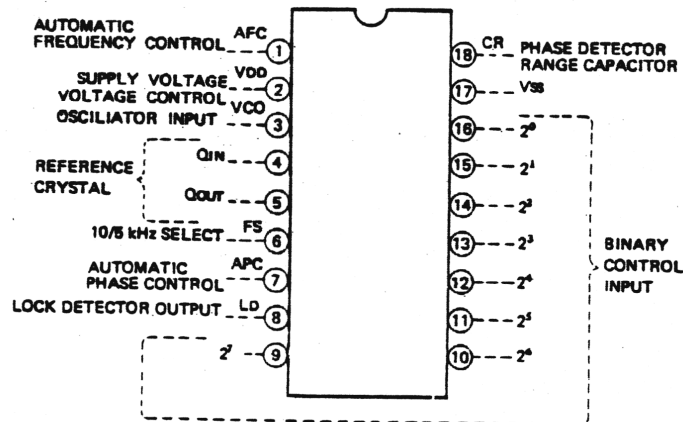
SL1626C LEAD IDENTIFICATION




REC86345 SCHEMATIC DIAGRAM



REC86345 LEAD IDENTIFICATION



**RADIO SHACK  A DIVISION OF TANDY CORPORATION**  
**U.S.A.: FORT WORTH, TEXAS 76102**  
**CANADA: BARRIE, ONTARIO L4M 4W5**

---

**TANDY CORPORATION**

<b>AUSTRALIA</b>	<b>BELGIUM</b>	<b>U. K.</b>
<b>280-316 VICTORIA ROAD RYDALMERE. N.S.W. 2116</b>	<b>PARC INDUSTRIEL DE NANINNE 5140 NANINNE</b>	<b>BILSTON ROAD WEDNESBURY, WEST MIDLANS WS10 7JN</b>