Realistic TRC-459 Service Manual

REALISTIC®

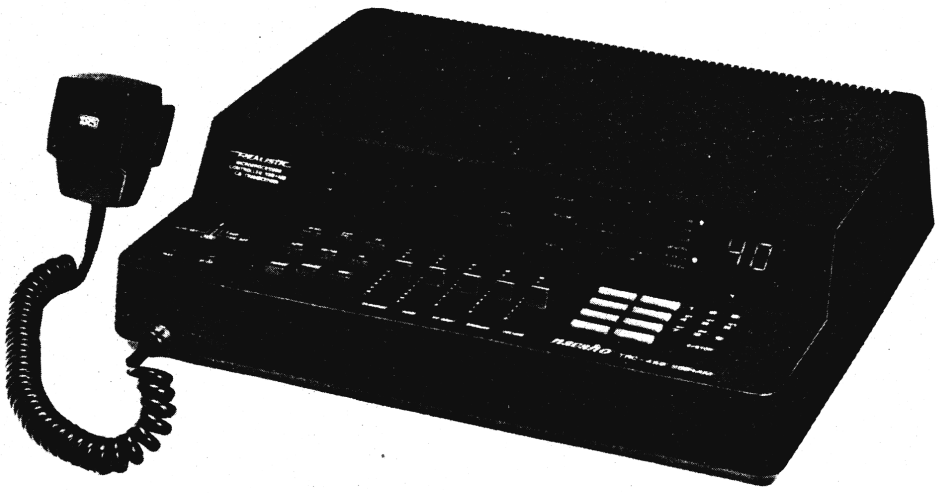
Service Manual

21-1582

TRC-459

40-CHANNEL AM/SSB MICROPROCESSOR CONTROLLED CB BASE STATION TRANSCEIVER

Catalog Number: 21-1582



CUSTOM MANUFACTURED FOR RADIO SHACK A DIVISION OF TANDY CORPORATION

CONTENTS

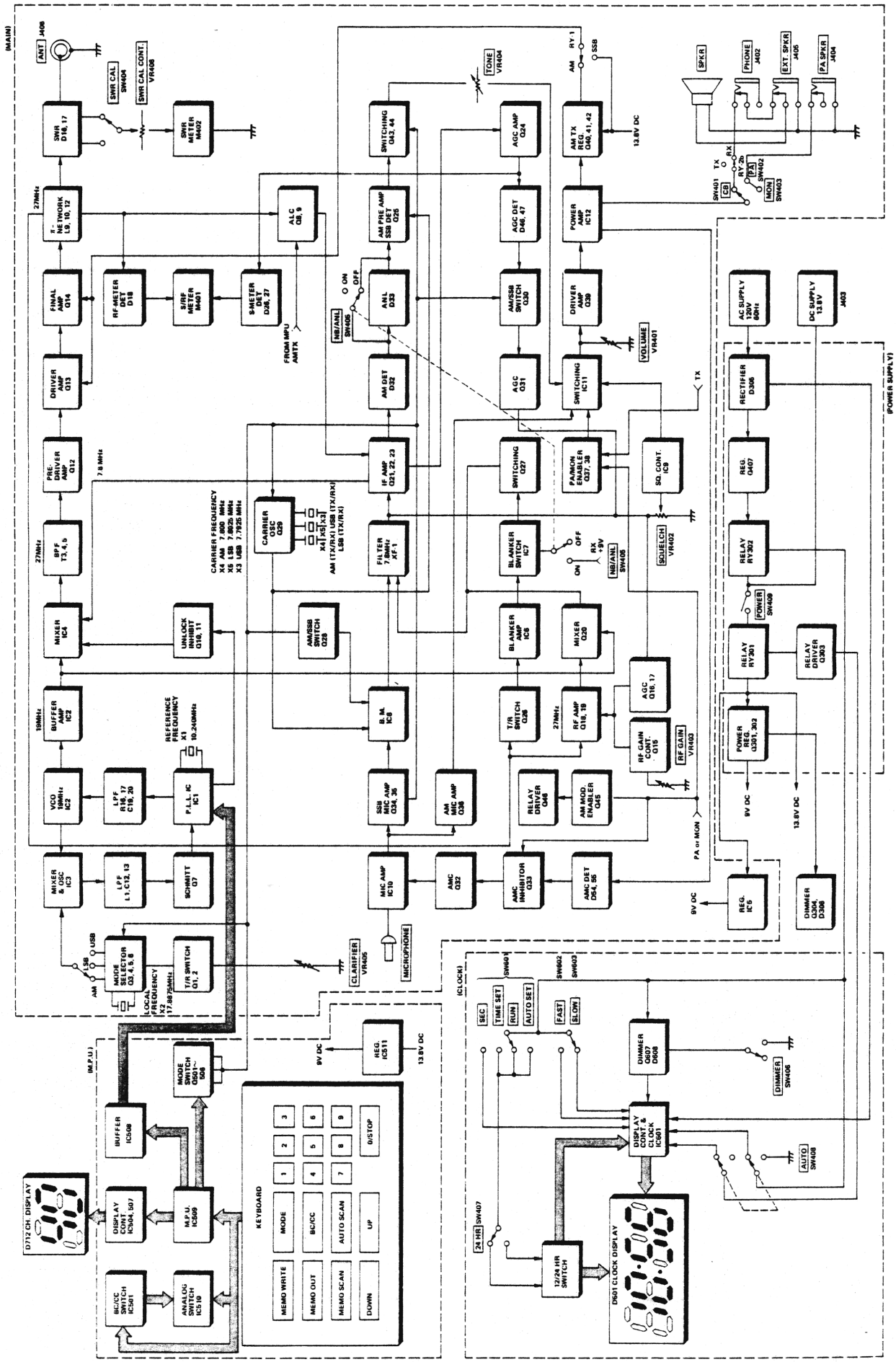
SPECIFICATIONS

DESCRIPTION		CONDITION		NOMINAL	LIMIT
TRANSMITTER					
Frequency Tolerance	AM	at 25°C		±0.0005%	±0.005%
	SSB	at 25°C		±0.0005%	±0.005%
RF Output	AM	13.8 V DC, No Modulation		4 W max.	3.6 ~ 4.4 W
	SSB	13.8 V DC		12 W PEP max.	10 ~ 13.2 W
Modulation Distortion		80% MOD at 1 kHz		3%	8%
Spurious Harmonic Emission	AM			−70 dB	−60 dB
	SSB			−70 dB	−60 dB
Carrier Suppression	SSB			−55 dB	−40 dB
Unwanted Sideband Suppression		2.5 kHz (SSB)		−55 dB	−40 dB
Current Drain		No Modulation (AM)		2100 mA	2500 mA
		(SSB)		800 mA	1200 mA
		80% MOD (AM) at 1 kHz		2500 mA	3000 mA
		10 W PEP Two-Tone (SSB)		2100 mA	3000 mA
Modulation Frequency Response		1 kHz 0 dB			
		Lower 450 Hz		AM SSB −6 dB	AM SSB −6 ± 3 dB
		Upper 2.5 kHz		AM SSB −6 dB	AM SSB −6 ± 3 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, 1000 Hz Single-Tone (SSB)		2 dB	3 dB
Intermodulation Distortion		500 and 2400 Hz Two-Tone		−30 dB	−25 dB
MIC Input Level Uniformity		LSB to USB for 4W Output, 1.5 kHz Single Tone		1 dB	3 dB
Microphone Sensitivity		AM 50% MOD at 1 kHz		0.5 mV	1.0 mV
		SSB 4 W PEP		0.5 mV	1.0 mV
AMC Range		AM 50~100% MOD at 1 kHz		60 dB	50 dB
		SSB 10 ~ 13.2 W PEP		60 dB	50 dB
RECEIVER					
Max. Sensitivity		AM		0.3 μV	1.0 μV
		SSB		0.2 μV	0.5 μV
Sensitivity		for 10 dB S/N	AM	0.5 μV	1 μV
			SSB	0.25 μV	0.5 μV
AGC Figure of Merit		50 mV, 10 dB	AM	90 dB	80 dB
			SSB	90 dB	80 dB
Overload AGC Characteristics		10 mV to 1 V	AM	±2 dB	±5 dB
			SSB	±2 dB	±5 dB
Overall Audio Fidelity		at 6 dB Down			
		Upper Frequency	AM	2100 Hz	1750 ~ 2500 Hz
			SSB	3800 Hz	3000 ~ 4500 Hz
		Lower Frequency	AM	500 Hz	300 ~ 650 Hz
			SSB	500 Hz	300 ~ 650 Hz
Cross Modulation, RS Standard		AM		60 dB	50 dB
Adjacent Channel Selectivity		10 kHz	AM	70 dB	60 dB
Maximum Audio Output Power		AM		6 W	5 W
		SSB		6 W	5 W
Audio Output Power		10% THD	SSB	4.5 W	3.5 W
			AM	4.5 W	3.5 W
THD AM		500 mW Output, 1 mV			
		Input 30% (MOD) at 1 kHz		3%	6%
		80% (MOD) at 1 kHz		5%	10%
THD SSB		1 mV Input 1 kHz			
		Single Tone		3%	8%

DESCRIPTION	CONDITION	NOMINAL	LIMIT
RF Gain Control Range at Max. Sensitivity	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 μV	1 μV
	SSB	0.5 μV	1 μV
Squelch Sensitivity at Tight	AM	1000 μV	350 ~ 2800 μV
	SSB	1000 μV	350 ~ 2800 μV
Skirt Rejection (±20 kHz)	AM	80 dB	70 dB
S Meter Sensitivity at "S-9"	AM	100 μV	50 ~ 200 μV
(No Modulation AM)	SSB	100 μV	50 ~ 200 μV
Image Rejection Ratio	AM	80 dB	60 dB
fo + (2 x 7.8 MHz)	SSB	80 dB	60 dB
1/2 IF Rejection Ratio	AM	80 dB	60 dB
fo + 7.8 MHz/2	SSB	80 dB	60 dB
IF Rejection Ratio 7.8 MHz	AM	80 dB	60 dB
	SSB	80 dB	60 dB
Oscillator Drop-out Voltage	AM	9 V	10 V
	SSB	9 V	10 V
Current Drain at No Signal	AM	450 mA	600 mA
	SSB	450 mA	600 mA
Current Drain at Maximum	AM	1300 mA	1500 mA
	SSB	1300 mA	1500 mA
Clarifier Range	AM	±1.2 kHz	±0.6 ~ ±1.8 kHz
	SSB	±1.2 kHz	±0.6 ~ ±1.8 kHz
Spurious Rejection Ratio			
Within Band	AM	65 dB	60 dB
	SSB	65 dB	60 dB
Outside of Band	AM	60 dB	55 dB
	SSB	60 dB	55 dB
PUBLIC ADDRESS			
Microphone Sensitivity	4 W Output 1 kHz	0.5 mV	1.5 mV
Output Power at Maximum	Input 15 mV	6.0 W	5.0 W
Output Power	10% Distortion	4.5 W	4.0 W
Audio Fidelity	at 6 dB Down		
	Lower Frequency (400 Hz)	300 Hz	250 Hz
	Upper Frequency (3000 Hz)	3000 Hz	5000 Hz
Current Drain	No Signal	800 mA	1200 mA
	Max. Output Power	1500 mA	1800 mA
GENERAL			
Frequency Coverage	29.965 to 27.405 MHz		
Channel	40 Channels		
Frequency Control	Crystal Control (PLL System)		
Frequency Tolerance	Less than ±0.005%		
Operating Temperature	−10°C to +50°C		
Humidity	10 to 95%		
Microphone	Dynamic Type with PTT Switch		
Operating Voltage and Power Consumption	120 V AC 60 Hz 115 Watts		
	13.8 V DC (12.0 ~ 15.0 V DC) 4 A		
Meter (9-Segment LED Display)	TX Power, Signal Strength and SWR		
Size	390 (W) x 100 (H) x 300 (D) mm (15-6/16" x 3-15/16" x 11-13/16")		

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 provides a brief technical description of unique or special circuits which you might otherwise find a little hard to understand, may not notice or be able to troubleshoot.

PLL CIRCUITRY

The TRC-459 uses Digital Phase Locked Loop circuitry to synthesize each of the channel frequencies. The PLL circuitry consists of IC-1 (Programmable Counter, Reference Frequency Divider and Phase Detector), IC-2 (Voltage Controlled Osc.), IC-3 (Mixer, Osc.), Reference Frequency Osc. (10.24 MHz), Low Pass Filters and related circuits.

Refer to the Block Diagram as you read the following description. A 10.24 MHz Crystal is used as a reference frequency. The crystal is connected between Pins 4 and 5 of the PLL IC, IC-1.

The M.P.U. provides a Binary Code output, selected by the Channel Keyboard, which is connected to pins 10 through 15 of IC-1. The code determines "N", the divisor which produces the required output frequency for each channel (precisely spaced 10 kHz apart).

Three different frequency signals which correspond with each mode are generated at IC-3. Those are: 17.885 MHz in AM Mode, 17.8875 MHz in USB Mode, and 17.8825 MHz in LSB Mode. The signals are mixed by IC-3 Mixer with the IC-2 VCO frequency (See Table on page 20). The resulting down-mix produces signals of 1.28 through 1.72 MHz, which pass through LPF, and an amplifier, and then are applied to Pin 2 of PLL IC, IC-1. These frequencies are divided by "N" (128 through 172) internally at IC-1; the resulting output will always be 10 kHz.

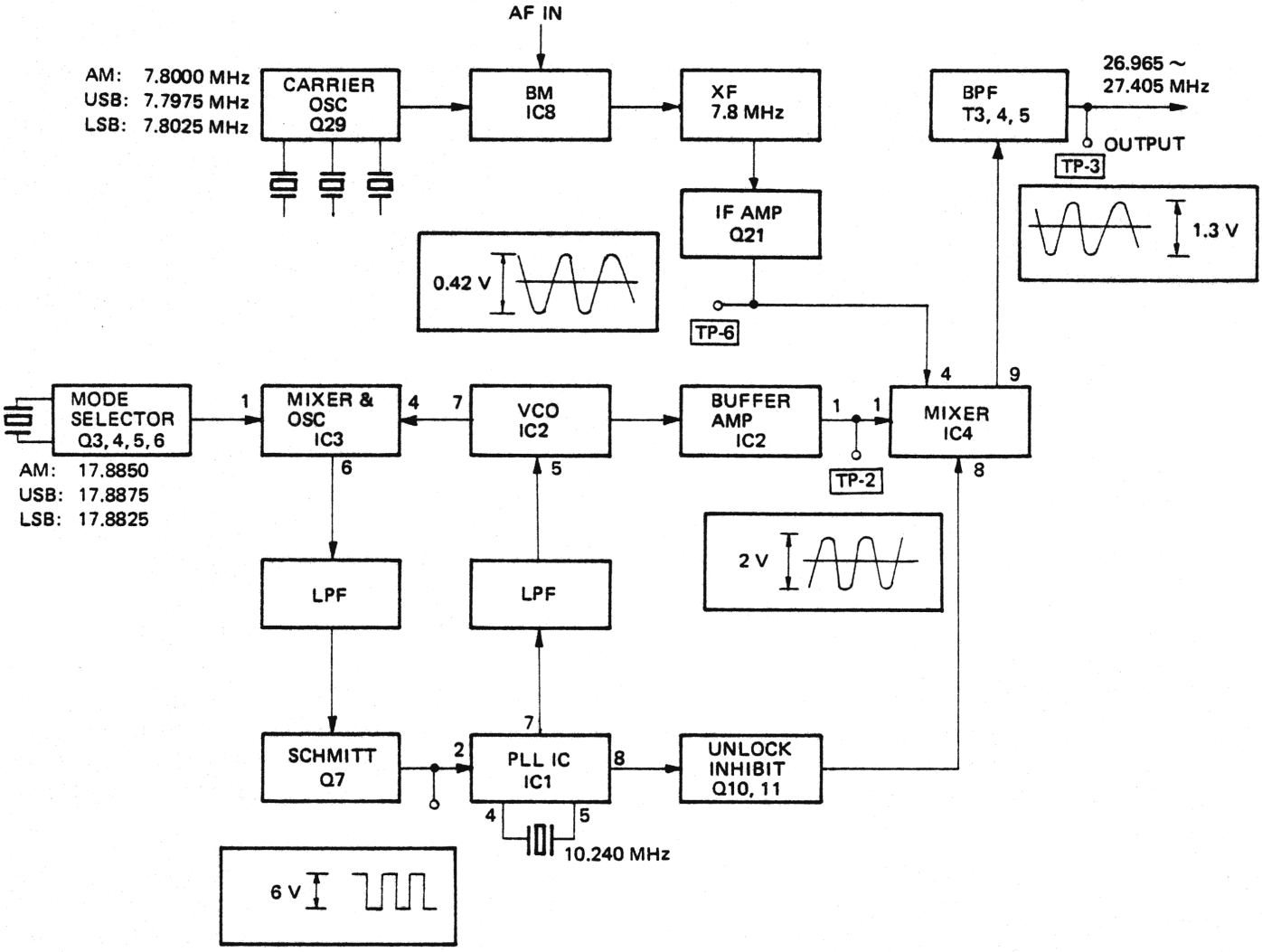
Also, the Reference Oscillator, 10.24 MHz, is divided by 1024 (again, internally by IC-1) resulting in another 10 kHz frequency.

These two 10 kHz signals are fed to the Phase Detector. 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 of IC-1 and passes through the LPF where the error voltage is integrated, and harmonics and noise are filtered out. The resulting DC voltage is applied to the Varicap Diode (part of VCO) whose capacity varies with applied DC voltage. Thus the output frequency of VCO is corrected. With proper circuit design and precise adjustments, the VCO frequency is accurate and precise. When the system is "locked", the Phase Detector senses no phase differences between the two 10 kHz signals and the VCO generates a frequency which is as accurate and stable as the reference crystal oscillator.

For AM Mode, a 7.8000 MHz signal, produced by Crystal X4 is used for the carrier. This signal is fed to Crystal Filter XF-1 through IC-8, and is mixed with the VCO Signals (19.165 to 19.605 MHz) in IC-4 to produce the desired frequency signal (26.965 to 27.405 MHz).

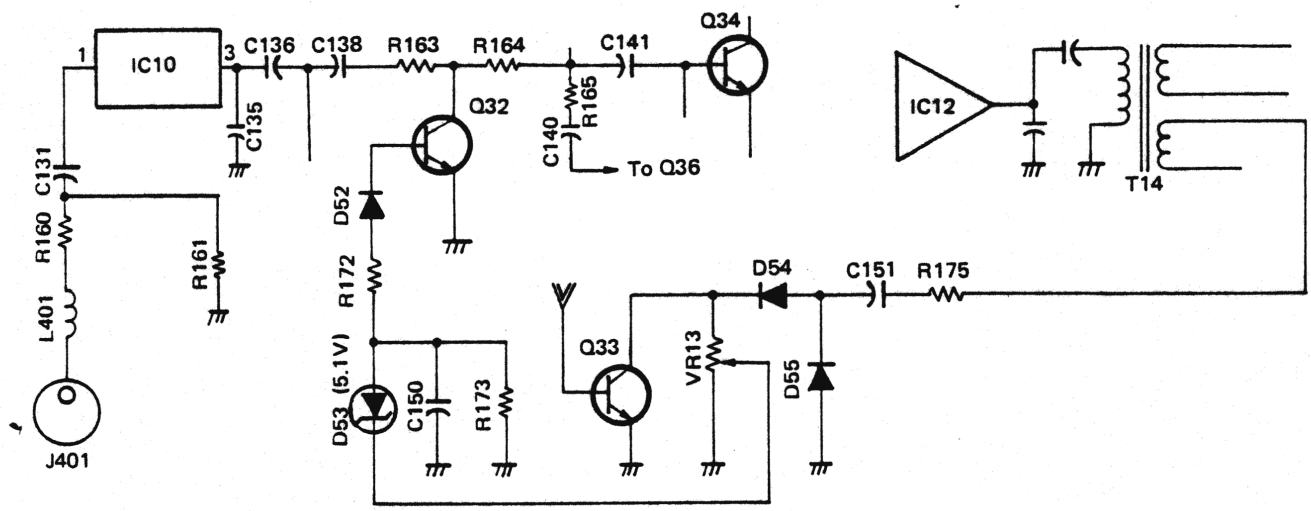
For USB Mode, a 7.7975 MHz signal, produced by Crystal X3 is used for the carrier. This signal is fed to the Balanced-Modulator IC-8 where it is combined with the audio signal. The resulting signal from the Balanced Modulator contains two signals. Only the upper sideband is needed for USB Mode. Crystal Filter XF-1 eliminates the unnecessary lower sideband, and only the upper sideband (USB) appears at its output. In IC-4, the USB Signal is mixed with the VCO Signals (19.1675 to 19.6075 MHz) to produce the desired frequency signal (26.965 to 27.405 MHz).

For LSB Mode, the circuit function is the same as for USB Mode, except Crystal X5 (7.8025 MHz) provides the carrier frequency and the VCO Signals are 19.1625 to 19.6025 MHz.



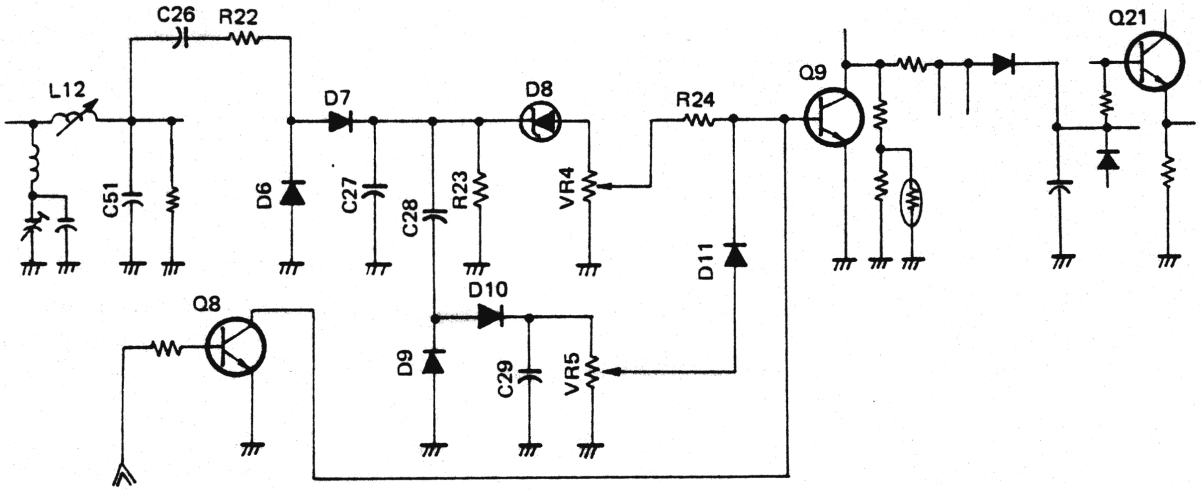
AUTOMATIC MODULATION CONTROL CIRCUIT

The Automatic Modulation Control (AMC) Circuit consists of Q32 and D52 – 55.
Mic input signal is fed to pin 4 of Microphone Jack J401 and through R160 and C131 to pin 1 of IC-10. The amplified mic signal (from pin 3 of IC-10) is applied to the base of Q36 and is amplified once again. This signal is conveyed to IC-12 the Audio Frequency Power Amplifier through IC-11. IC-12 drives T14, whose secondary couples a portion of the signal through R175 and C151 to AMC detector diodes D54 and D55. D53 (5.1 V Zener) is connected to the output of D54/D55 through VR13 ; when the detected DC voltage from D54/D55 exceeds 5.1 V, D53 conducts and applies DC voltage to the base of Q32 through R172 and D52, decreasing the potential at the collector of Q32. VR13 is adjusted for less than 100% modulation level. Q33 disables the AMC when PA or MON button is pressed in.



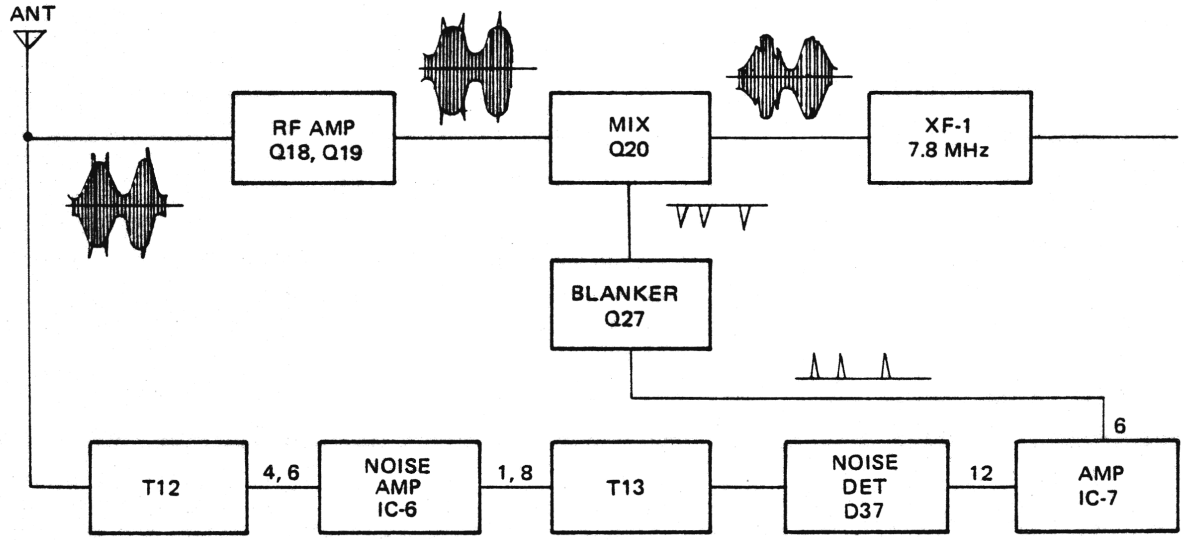
AUTOMATIC LIMITER CONTROL

The Automatic Limiter Control (ALC) circuit consists of D6, D7, D8 (5.1 V Zener), D9 – 11, Q9 and Q8. A portion of the transmitter's RF modulated signal is detected by D6 and D7 (for single – tone modulation). If the detected DC voltage exceeds 5.1 V, a positive voltage is applied to the base of Q9. This decreases the potential at the collector of Q9. Thus the base of Q21 is less-biased than before. In this way the desired RF output level is determined.
VR4 is adjusted to set maximum RF power level to less than 12 W PEP. (Single tone)
RF signals modulated by two or more different tones are detected by D6, D7, D9 and D10. The detected DC voltage is applied to the base of Q9 and the potential at the base of Q21 is controlled in the same way. VR5 is adjusted to set maximum RF power level to less than 12 W PEP. (Two tone)
In AM Transmit mode, Q8 turns on and disables ALC.



NOISE BLANKER

Noise pulses are amplified by IC-6 and detected by D37. Detected pulses are then amplified by IC-7. IC-7 applies a positive pulse to the base of Q27, thus decreasing its collector impedance to shunt Q20 gate impedance during the duration of the noise pulses. The most objectional noise pulse frequencies are distributed around 40 MHz, thus T12 and T13 are tuned to this frequency.



MICROPROCESSOR SYSTEM CONCEPT

Refer to MICROPROCESSOR SCHEMATIC DIAGRAM.

Instruction

The instruction timing is fixed and each requires six oscillator cycles to excute. Each of the 43 basic instructions is defined to enable one or more microinstructions that activate control lines during one instruction cycle. These microinstructions explain the firmware bridge between software instructions and the individual logic block capabilities. A hardwired logic decoder that cannot be modified decodes 12 "fixed" basic instruction codes into 12 fixed microinstructions for output instructions, branching, subroutines, RAM X addressing, reset and set bit instructions. The remaining 31 basic instructions activate a combination of 16 programmable microinstructions that are encoded by the instruction PLA (programmable logic array).

Output

The MPU has two kinds of outputs, labeled "R" and "O".
R outputs are used to control external devices such as PLL system and channel display. Also input encoding and dedicated status logic outputs are controlled by the R outputs. The R outputs can be strobed by the ROM program to scan a keyboard matrix which makes a simple short from R line to a K input. The ROM program detects this short and interprets which key is pressed.
O outputs are used to transfer information for channel numbers to the display.

Input

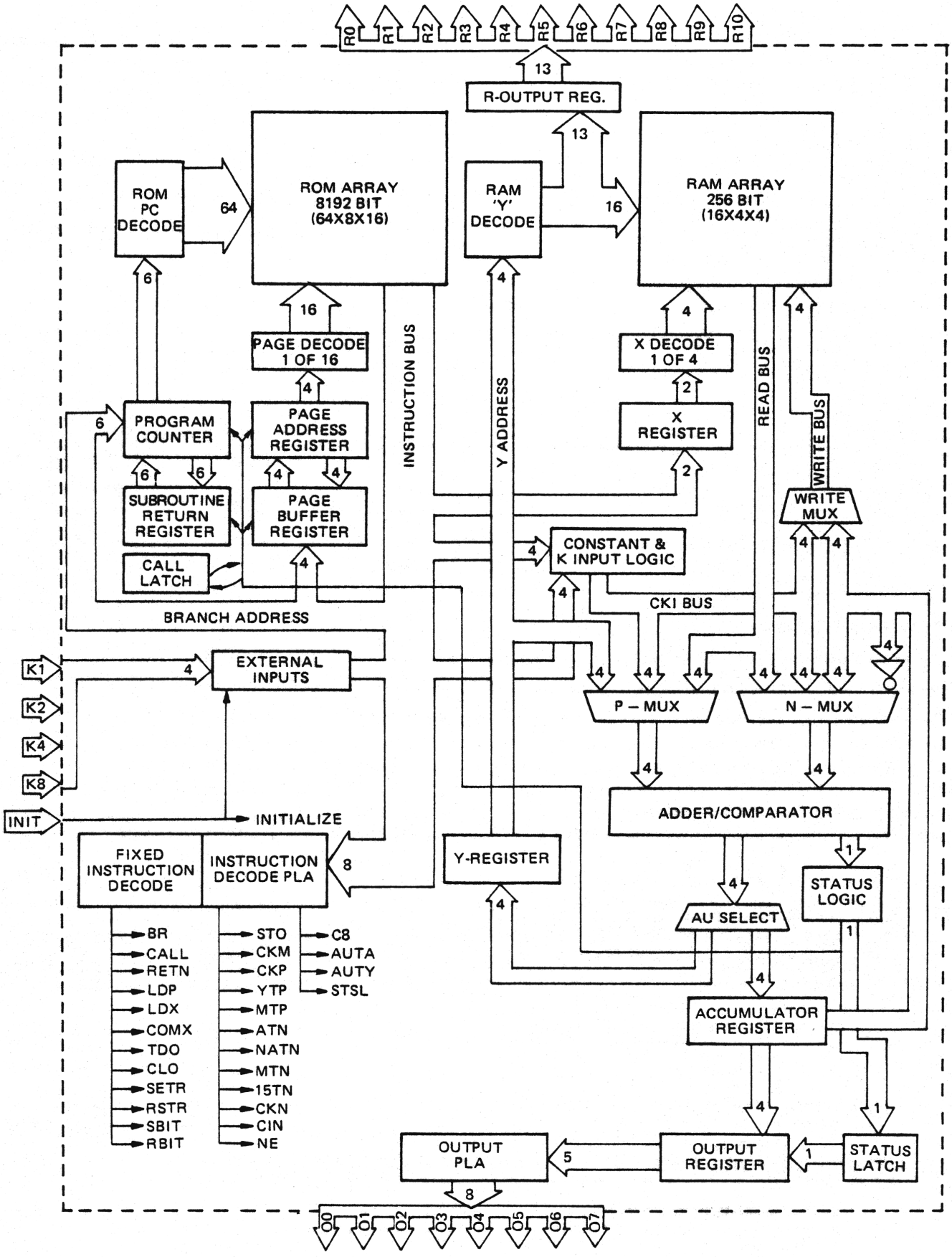
Peripheral logics and Keyboard signal to the K-input pins (K1, K2, K4 and K8).

K1 (pin 5):

1. TX level transfered with R0 timing through pin 2 of IC510 and D528 disables any key entry.
2. BC/CC detector sends high level with R1 timing through pin 3 of IC510 and D527 to stop scanning when BC*SQL or CC*$\overline{\text{SQL}}$ is met.
3. When the system is powered up, high level with R3 timing is applied through pin 10 of IC510 to initialize to US1 code.

K2 (pin 6), K4 (pin 7), and K8 (pin 8) receive information encoded by the keyboard matrix.

FUNCTIONAL BLOCK DIAGRAM



INITIAL SETTING

When the TRC-459 is connected to a power source, MPU is initialized to AM mode and CH-1, receiving a positive voltage (9 V) at pin-9.
Also, all memories are "AM mode" and "CH-1".

KEYBOARD ENTRY

The MPU generates 3 kinds of timing pulses, labeled R0, R1 and R2 timing to search the KEYBOARD. These outputs appear at pin-21, 22, 23 respectively and are transferred to input pins pin-6, 7, 8 by the KEYBOARD MATRIX. MPU determines which key is pressed by input timing and 3 input combinations as illustrated below.

KEYBOARD MATRIX OUTPUT CODE TABLE 1 = 9 V
0 = GND LEVEL

KEY / MPU INPUT PIN	UP	DOWN	MODE	AUTO SCAN	MEMO SCAN	O/STOP	MEMO WRITE	MEMO OUT	1	2	3	4	5	6	7	8	9
(K2) 6	1	0	0	1	0	0	1	0	1	1	1	1	1	1	0	0	0
(K4) 7	0	1	0	0	1	0	0	1	1	1	1	0	0	0	1	1	1
(K8) 8	0	0	1	0	0	1	0	0	0	0	0	1	1	1	1	1	1
TIMING	R0	R0	R0	R1	R1	R1	R2	R2	R0	R1	R2	R0	R1	R2	R0	R1	R2

MODE SWITCH

MODE SWITCH consists of Q501 – 506, D501 and D502. The MPU controls this switch by outputs of pins 2 and 3.

USB	$\overline{A}*\overline{B}$	Only Q503 is conducting and 9 V appears on J102 – 4.
LSB	$A*\overline{B}$	Q505 will conduct, disabling USB. D501 conveys 9 V voltage to the base of Q504. Q504 conducts, cutting off Q503. 9 V appears on J102 – 5.
AM(RX)	$\overline{A}*B$	Q506 will conduct, supplying 9 V voltage on J102 – 6. Because D502 conveys 9 V voltage to the base of Q504, USB is also inhibited.
AM (TX)	$\overline{A}*B*TX$	Q501 and Q502 will conduct and 9 V voltage appears on J102 – 3.

Notes: pin 2 output = A pin 3 output = B TX = Transmit

BC/CC DETECTOR

The MPU will determine that BC or CC is active when input voltage at pin-5 (K1) is a positive voltage (9 V) with R1 timing. BC/CC Detector circuitry consists of D503, D504, IC-501, D505, D506, D507, D523, D524, Q507, IC-510 and D527. IC-501 contains BC/CC Flip-Flop and two drivers for BC and CC LED indicator. BC/CC button sends a positive voltage (9 V) to pin-12 of IC-501 through R511. This voltage reverses BC/CC Flip-Flop. If this Flip-Flop is set to BC, the output of pin-3 is high (9 V) and pin-4 is LOW (GND); and vice versa.

CHANNEL DISPLAY CONTROL

Channel Display Control circuitry consists of IC-502, IC-503 (Inverter Driver), RA-701, 702, D509 – D522 and IC-504 – IC-507 (AND Gate).
MPU sends channel display information from pin-21, pin-22 and pins 11 – 17 to the AND Gate chips.

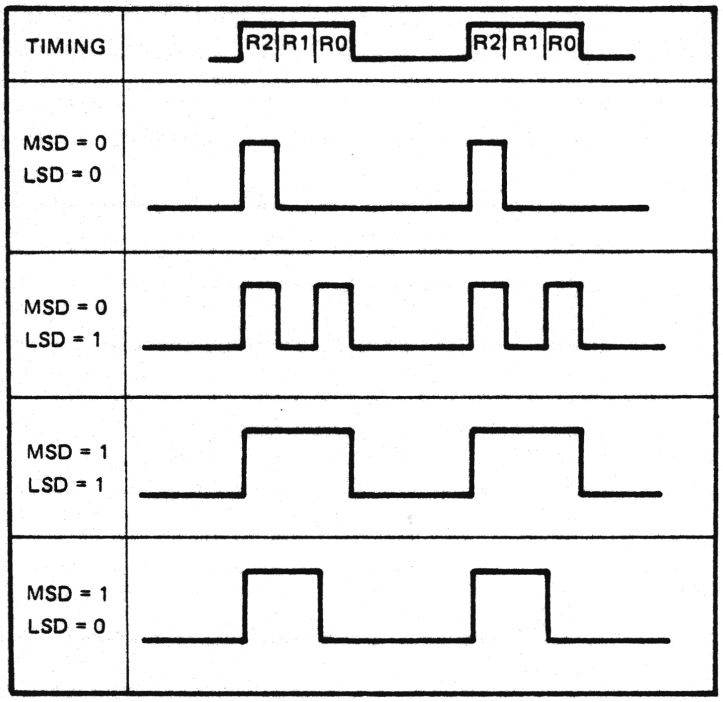
DIGIT SELECTION

Output of pin-21 selects the Least Significant Digit (LSD) and pin-22, the Most Significant Digit (MSD) respectively at R0 or R1 timing.

SEGMENT SELECTION

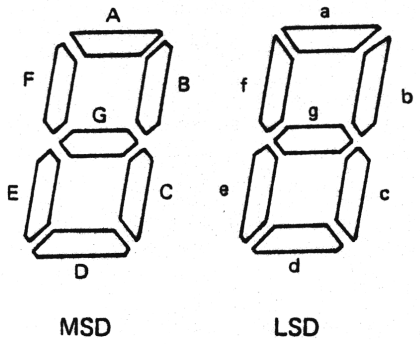
Segment information from pins 11 – 17 of IC-509 is gated in IC-504 – IC-507 and sent to LSD at R0 and to MSD at R1 timing. At R2 timing every output is high (9 V).

IC504 ~ 507 OUTPUT TIMING CHART



CHANNEL DISPLAY DIGIT AND SEGMENT SELECTION CHART

SEGMENT	A	B	C	D	E	F	G	a	b	c	d	e	f	g
TIMING	R1							R0						
IC509 Pin No.	17	16	15	14	13	12	11	17	16	15	14	13	12	11



P.L.L. CONTROL

The MPU controls the P.L.L. circuit by outputs from pin-1 and pins 24 – 28. The P.L.L. data is buffered in IC-508 and sent to P.L.L. circuit IC-1. Refer to Table on page 20 for P.L.L. data combinations (VCO OUTPUT FREQUENCY, IC-1 INPUT FREQUENCY AND CODE TABLE).

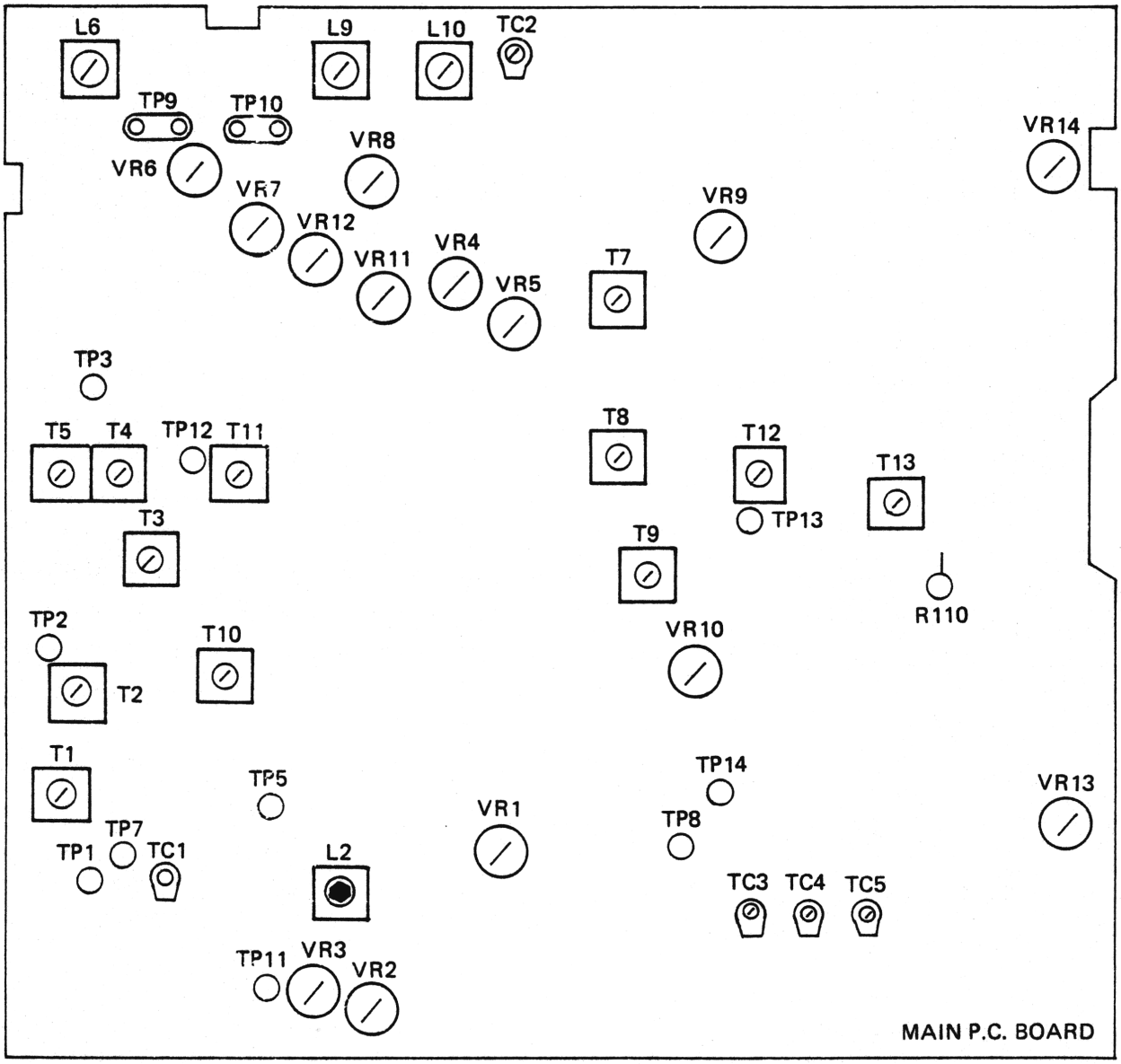
ALIGNMENT/OPERATION CHECK PREPARATION

Test instruments required

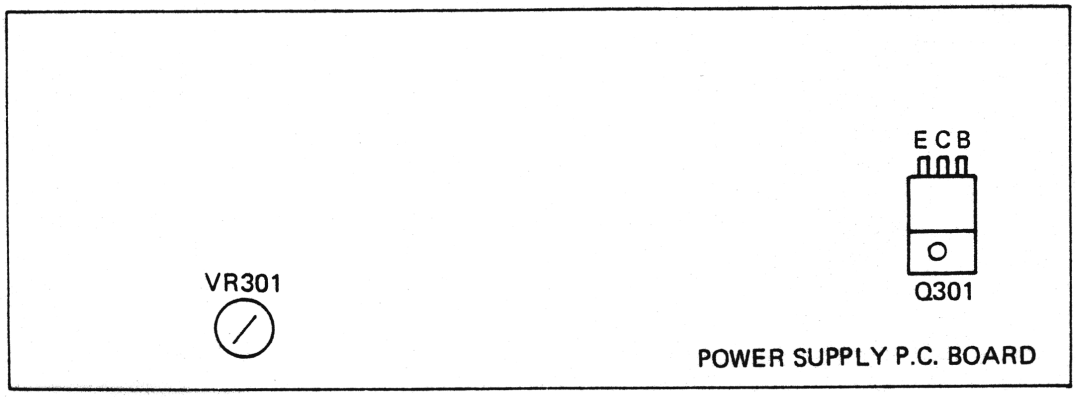
1. Oscilloscope
2. AC VTVM
3. DC VTVM
4. Frequency Counter
5. 8Ω Dummy Load
6. RF Signal Generator
7. Power Meter (50Ω)
8. 50Ω, 10 W Dummy Load
9. AF Signal Generator (2)
10. 54 MHz Monitor Receiver (or Spectrum Analyzer)
11. DC Current Meter
12. Pulse Generator
13. Distortion Meter

NOTE: Use non-metallic tuning tools. Prior to alignment allow instruments and unit 15 minutes to warm-up. Maintain Generator output level at minimum necessary to obtain usable output readings (this will avoid distortion, saturation and clipping).

ALIGNMENT POSITIONS AND POINTS



NOTE: TP11 – 14 connected to GND.



POWER SUPPLY ADJUSTMENT

Step	Control Setting	Test Instrument	Test Instrument Connection	Remarks
1	Supply Voltage : AC 120 V Power Switch : ON	DC VTVM	Connect DC VTVM to Collector of Q301	Adjust VR301 for 13.8 V

PLL SECTION ALIGNMENT

Step	Control Setting	Test Instrument	Test Instrument Connection	Remarks
1	Power Switch : ON	Frequency Counter	Refer to Figure 1 (TP-7)	Adjust TC-1 for 10.240 MHz
2	Power Switch : ON CLARIFIER : Center Mode : USB	Frequency Counter	Refer to Figure 1 (TP-5)	Adjust L2 for 17.8875 MHz
3	Power Switch : ON CLARIFIER : Center Mode : LSB	Frequency Counter	Refer to Figure 1 (TP-5)	Adjust VR3 for 17.8825 MHz
4	Power Switch : ON CLARIFIER : Center Mode : AM	Frequency Counter	Refer to Figure 1 (TP-5)	Adjust VR2 for 17.885 MHz
5	Power Switch : ON CLARIFIER : Center Mode : AM CH : 1 and 40	DC VTVM	Refer to Figure 2 (TP-1)	Adjust T1 for 2 V readings at CH1, 3.5 – 4 V readings at CH40.
6	Power Switch : ON CLARIFIER : Center Mode : USB CH : 18	Frequency Counter	Refer to Figure 1 (TP-2)	Adjust L2 for 19.3775 MHz
7	Power Switch : ON CLARIFIER : Center Mode : LSB CH : 18	Frequency Counter	Refer to Figure 1 (TP-2)	Adjust VR3 for 19.3725 MHz
8	Power Switch : ON CLARIFIER : Center Mode : AM CH : 18	Frequency Counter	Refer to Figure 1 (TP-2)	Adjust VR2 for 19.3750 MHz
9	Same as Step 8	RF VTVM	Refer to Figure 2 (TP-2)	Adjust T2 for max.

NOTE: You can check each channel frequency (CH-1 through CH-40) at TP-1 after Step 8. The frequency should be as shown on Table on page 20.

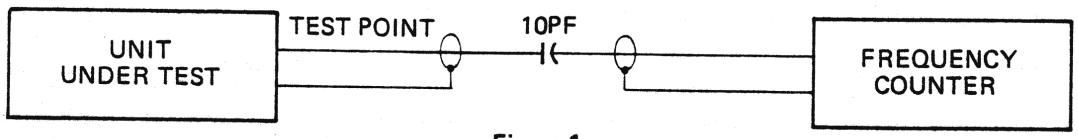


Figure 1

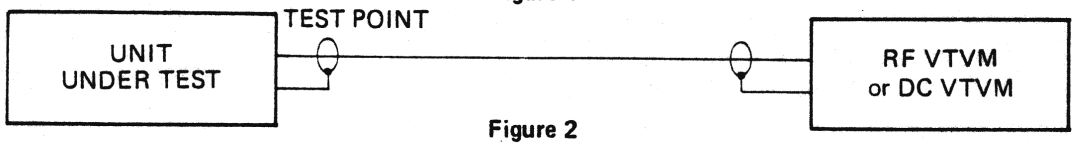
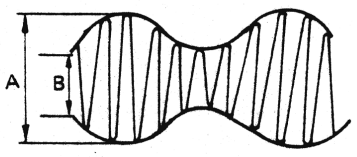


Figure 2

TRANSMITTER SECTION ALIGNMENT

NOTE: Alignment of Transmitter Section must not be done until PLL section alignment is completed.

Step	Control Setting	Test Instrument Connection and Setting	Adjust	Remarks
1	POWER Switch : ON Mode : AM	Connect Frequency Counter to TP-8. (Figure 1)	TC-4	Frequency Adjustment Adjust TC-4 for 7.800 MHz
2	POWER Switch : ON Mode : USB	Same as Step 1	TC-3	Frequency Adjustment Adjust TC-3 for 7.7975 MHz
3	POWER Switch : ON Mode : LSB	Same as Step 1	TC-5	Frequency Adjustment Adjust TC-5 for 7.8025 MHz
4	POWER Switch : ON CH : 18 Mode : LSB or USB TX : ON	Connect DC Current Meter to TP-9. Connect RF-Power Meter and 50Ω Dummy Load to ANT Jack J406. (Figure 3)	VR-6	Current Adjustment Adjust VR-6 for approx. 20 mA
5	Same as Step 4	Connect DC Current Meter to TP-10. Connect RF-Power Meter and 50Ω Dummy Load to ANT Jack J406 (Figure 3)	VR-7	Current Adjustment Adjust VR-7 for approx. 40 mA
6	POWER Switch : ON CH : 18 Mode : AM TX : ON	Connect RF VTVM to TP-3. Connect RF-Power Meter and 50Ω Dummy Load to ANT Jack J406 (Figure 4)	T3 T4 T5	Alignment of Power Stage Adjust T3, T4 and T5 for max. on RF VTVM.
7	POWER Switch : ON CH : 18 Mode : AM TX : ON	Connect RF-Power Meter and 50Ω Dummy Load to ANT Jack J406 (Figure 5)	L6 L9 L10	Alignment of Power Stage Adjust L6, L9 and L10 for max. output
8	Same as Step 7	Same as Step 7	VR-14	Power Output Adjustment Adjust VR-14 for 4 W output
9	Same as Step 7	Connect Frequency Counter and 50Ω Dummy Load to ANT Jack J406 (Figure 5)	VR-1	Frequency Adjustment Adjust VR-1 for 27.175 MHz
10	POWER Switch : ON CH : 18 Mode : USB or LSB TX : ON	Connect RF Power Meter, 50Ω Dummy Load and Monitor Scope to ANT Jack J406. (Figure 6)	VR-10	Adjustment of Balanced Modulator Adjust VR-10 for min. output
11	POWER Switch : ON CH : 18 Mode : AM TX : ON	Connect RF Power Meter, Dummy Load and Monitor Scope to ANT Jack J406. Connect AF Generator (1 kHz) to Pin 4 of MIC Jack J401. (Figure 6) Adjust AF Generator so that the waveform on Monitor Scope shows 50% modulation. Calculation of Modulation Degree. Mod. $\frac{A-B}{A+B} \times 100$ Mod. (%) : Modulation Degree		

12	Same as Step 11	Same instrument connection as Step 11. Increase AF Generator output +30 dB from 50% modulation output level.	VR-13	**Adjustment of AMC** Adjust VR-13 for 90 – 100% Mod. (but not so that over Mod. occurs).
13	POWER Switch : ON CH : 18 Mode : USB or LSB TX : ON	Same instrument connection as Step 12. Set AF Generator output to 10 mV.	VR-4	**Adjustment of ALC (single tone)** Adjust VR-4 for 10 – 12 W output.
14	Same as Step 13	Connect 50Ω Dummy Load and RF-Power Meter to ANT Jack J406. Connect two AF Generators to Pin 4 of Mic Jack J401. Set one AF Generator to 500 Hz and the other to 2400 Hz, output to 10 mV. (Figure 6)	VR-5	**Adjustment of ALC (two tone)** Adjust VR5 for 10 – 12 W output.
15	Same as Step 7	Same as Step 7	VR-8	**Adjustment of Power Indicator** Adjust VR-8 so that the Power LEDs light up to 4.
16	POWER Switch : ON CH : 18 Mode : AM TX : ON	Connect 50Ω Dummy Load, RF Power Meter and 54 MHz Monitor Receiver (or Spectrum Analyzer, if available) to ANT Jack J406. (Figure 7)	TC-2	**Alignment of 2nd harmonic spurious radiation.** Adjust TC-2 for minimum reading on the scope.

NOTE: You can check each channel frequency (CH-1 through CH-40) at J406 after Step 9. The frequency should be as shown on Table on page 20.

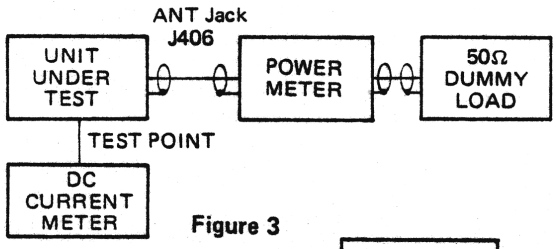


Figure 3

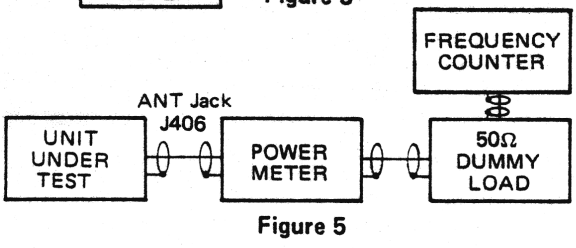


Figure 5

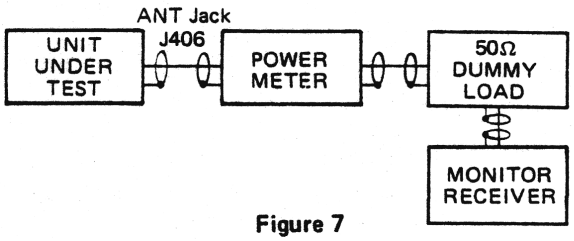


Figure 7

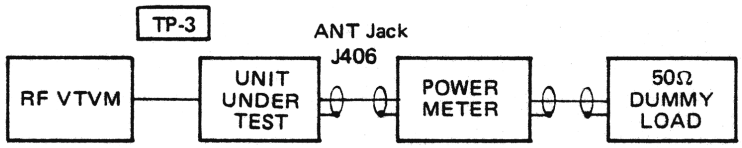


Figure 4

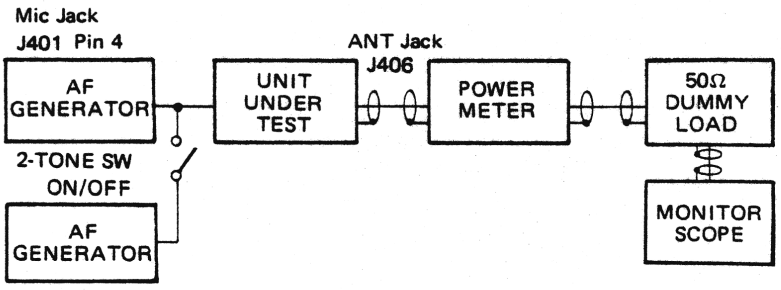


Figure 6

RECEIVER SECTION ALIGNMENT

NOTE: Alignment of Receiver Section must not be done until PLL Section and Transmitter Section alignment is completed.

Step	Control Setting	Test Instrument	Signal Generator Setting	Adjust	Remarks
1	POWER Switch : ON RF GAIN : Max. SQUELCH : Min. VOLUME : Max. CH : 18 Mode : AM	Connect Oscilloscope and AC VTVM to EXT SPKR Jack J405 across 8 ohm Dummy Load. Connect RF Signal Generator to ANT Jack J406. (Figure 8)	Freq. 27.175 MHz (Channel 18) at 1 kHz 30% Modulation. Set output level to minimum necessary	T7 T8 T9 T10 T11	**Alignment of RF** Adjust T7, T8, T9, T10 and T11 for Max. S/N on Oscilloscope and AC VTVM.
2	Same as Step 1	Same as Step 1	Set output level to 100μV	VR-12	**Adjustment of S-Indicator** Adjust VR-12 so that the S-Indicator lights up to 9.
3	POWER Switch : ON RF GAIN : Max. SQUELCH : Max. VOLUME : Max. CH : 18 Mode : AM	Same as Step 1	Set output Level to 1 mV	VR-11	**Adjustment of SQUELCH** Adjust VR-11 to the point where waveform just appears.
4	POWER Switch : ON RF GAIN : Max. SQUELCH : Min. VOLUME : Set AF output level for approx. 0.775 V (0 dB) with 100 μV RF input, with VR-9 set to full counter clockwise position CH : 18 Mode : AM	Same as Step 1	Set SG output to 100μV before adjustment	VR-9	**Adjustment of AGC** Increase RF input level to 100 mV, adjust VR-9 for AF output of 0.775 V (0 dB).

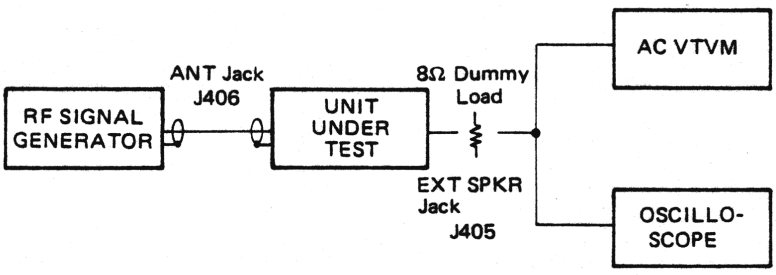


Figure 8

NOISE BLANKER ALIGNMENT

Without Pulse Generator

Control Setting	Test Instrument Connection and Setting	Adjust	Remarks
POWER Switch : ON	Connect RF Signal Generator to ANT Jack J406. Set Freq. to 40 MHz, and output to 10 μV. Connect DC VTVM to the both ends of R110 (Figure 9).	T12 T13	Adjust T12 and T13 for max. reading on DC VTVM.

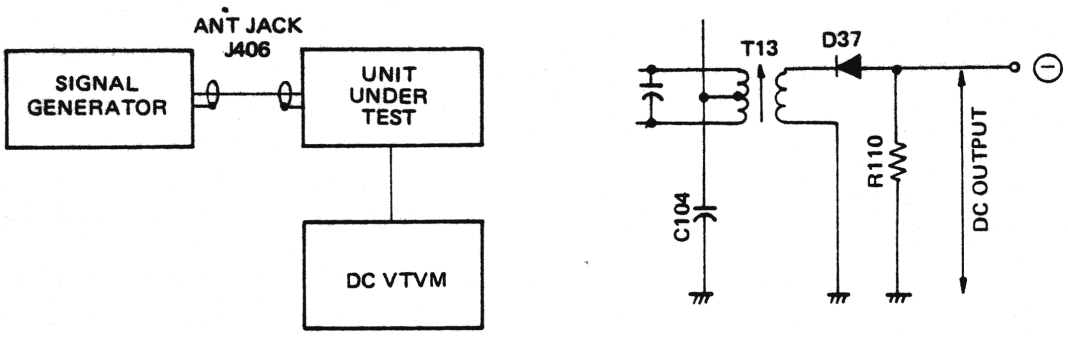


Figure 9

Using Pulse Generator

Control Setting	Test Instrument Connection and Setting	Adjust	Remarks
POWER Switch : ON SQUELCH: Min. VOLUME : Max. CH : 18 (27.175 MHz)	Connect Signal Generator and Pulse Generator to ANT Jack J406. Set SG Freq. to 27.175 MHz, and output to 1 μV. Set PG pulse width to 1 μ Sec, cycle to 10 m Sec, and output to 1 V P-P. Connect Oscilloscope to EXT SPKR Jack J405, across 8 ohm Dummy Load. (Figure 10)	T12 only (or T13 only)	Adjust T12 (or T13) for max. S/N ratio on oscilloscope.

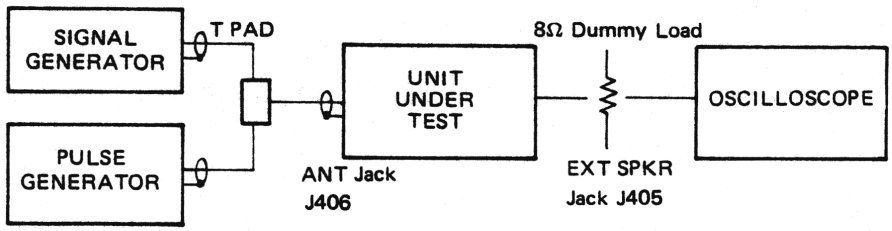
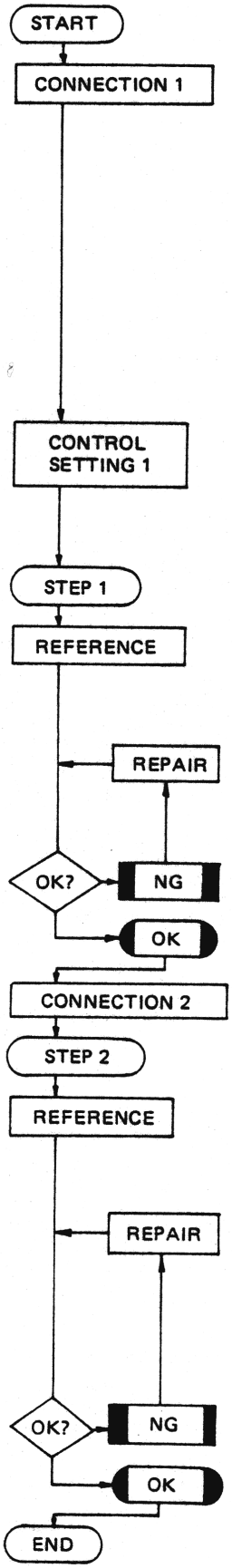


Figure 10

VCO OUTPUT FREQUENCY, IC1 INPUT FREQUENCY AND CODE TABLE

CH	Frequency (MHz)	VCO Frequency (MHz)			fin (MHz)	N	INPUT CODE PIN No. (IC-1)					
		TX (AM) RX (AM) ±1.2 kHz	TX (LSB) RX (LSB) ±1.2 kHz	TX (USB) RX (USB) ±1.2 kHz			10	11	12	13	14	15
1	26.965	19.165	19.1625	19.1675	1.28	128	0	0	0	0	0	0
2	26.975	19.175	19.1725	19.1775	1.29	129	0	0	0	0	0	1
3	26.985	19.185	19.1825	19.1875	1.30	130	0	0	0	0	1	0
4	27.005	19.205	19.2025	19.2075	1.32	132	0	0	0	1	0	0
5	27.015	19.215	19.2125	19.2175	1.33	133	0	0	0	1	0	1
6	27.025	19.225	19.2225	19.2275	1.34	134	0	0	0	1	1	0
7	27.035	19.235	19.2325	19.2375	1.35	135	0	0	0	1	1	1
8	27.055	19.255	19.2525	19.2575	1.37	137	0	0	1	0	0	1
9	27.065	19.265	19.2625	19.2675	1.38	138	0	0	1	0	1	0
10	27.075	19.275	19.2725	19.2775	1.39	139	0	0	1	0	1	1
11	27.085	19.285	19.2825	19.2875	1.40	140	0	0	1	1	0	0
12	27.105	19.305	19.3025	19.3075	1.42	142	0	0	1	1	1	0
13	27.115	19.315	19.3125	19.3175	1.43	143	0	0	1	1	1	1
14	27.125	19.325	19.3225	19.3275	1.44	144	0	1	0	0	0	0
15	27.135	19.335	19.3325	19.3375	1.45	145	0	1	0	0	0	1
16	27.155	19.355	19.3525	19.3575	1.47	147	0	1	0	0	1	1
17	27.165	19.365	19.3625	19.3675	1.48	148	0	1	0	1	0	0
18	27.175	19.375	19.3725	19.3775	1.49	149	0	1	0	1	0	1
19	27.185	19.385	19.3825	19.3875	1.50	150	0	1	0	1	1	0
20	27.205	19.405	19.4025	19.4075	1.52	152	0	1	1	0	0	0
21	27.215	19.415	19.4125	19.4175	1.53	153	0	1	1	0	0	1
22	27.225	19.425	19.4225	19.4275	1.54	154	0	1	1	0	1	0
23	27.255	19.455	19.4525	19.4575	1.57	157	0	1	1	1	0	1
24	27.235	19.435	19.4325	19.4375	1.55	155	0	1	1	0	1	1
25	27.245	19.445	19.4425	19.4475	1.56	156	0	1	1	1	0	0
26	27.265	19.465	19.4625	19.4675	1.58	158	0	1	1	1	1	0
27	27.275	19.475	19.4725	19.4775	1.59	159	0	1	1	1	1	1
28	27.285	19.485	19.4825	19.4875	1.60	160	1	0	0	0	0	0
29	27.295	19.495	19.4925	19.4975	1.61	161	1	0	0	0	0	1
30	27.305	19.505	19.5025	19.5075	1.62	162	1	0	0	0	1	0
31	27.315	19.515	19.5125	19.5175	1.63	163	1	0	0	0	1	1
32	27.325	19.525	19.5225	19.5275	1.64	164	1	0	0	1	0	0
33	27.335	19.535	19.5325	19.5375	1.65	165	1	0	0	1	0	1
34	27.345	19.545	19.5425	19.5475	1.66	166	1	0	0	1	1	0
35	27.355	19.555	19.5525	19.5575	1.67	167	1	0	0	1	1	1
36	27.365	19.565	19.5625	19.5675	1.68	168	1	0	1	0	0	0
37	27.375	19.575	19.5725	19.5775	1.69	169	1	0	1	0	0	1
38	27.385	19.585	19.5825	19.5875	1.70	170	1	0	1	0	1	0
39	27.395	19.595	19.5925	19.5975	1.71	171	1	0	1	0	1	1
40	27.405	19.605	19.6025	19.6075	1.72	172	1	0	1	1	0	0

PLL OPERATION CHECK (TRANSMIT MODE)



Connect the Frequency counter to TP-5, and 50Ω Dummy Load to ANT Jack J406. Refer to Figure 11.

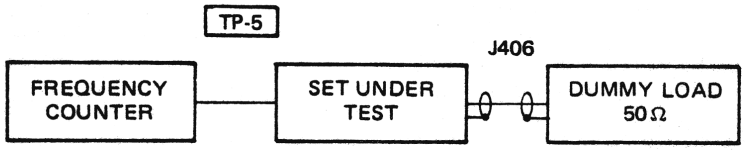


Figure 11

POWER Switch : ON (Press in)
CB Switch : ON (Press in)
Channel : CH-19
Push-to-talk switch : PUSH

Check frequency in each mode : AM, USB, and LSB.

Frequencies are : 17.8850 MHz ± 100 Hz in AM, 17.8875 MHz ± 100 Hz in USB, and 17.8825 MHz ± 100 Hz in LSB.

Readjust VR-2 and/or VR-3 and/or L2. Check D1, D2, Q3, Q4 and/or associated circuit components. Check Microprocessor circuit components.

Wrong frequencies appear or no signal appears.

Frequencies are OK.

Connect the Frequency Counter to TP-2.

Check frequency in each mode : AM, USB, and LSB.

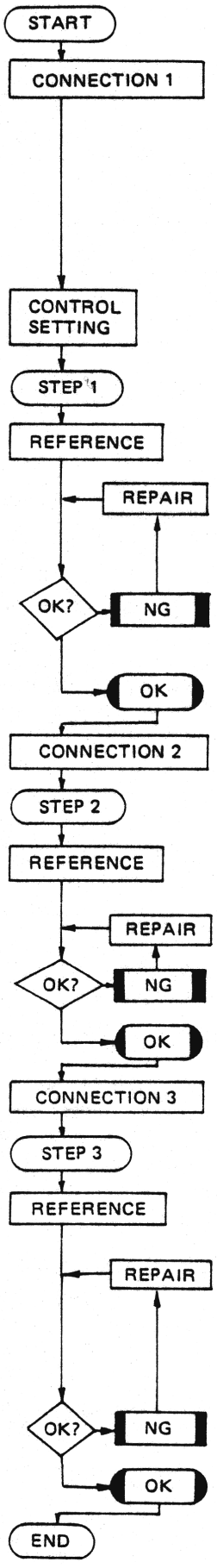
Frequencies are : 19.385 MHz ± 100 Hz in AM, 19.3875 MHz ± 100 Hz in USB, and 19.3825 MHz ± 100 Hz in LSB.

Check IC-1, IC-2 and/or associated circuit components.
Check Microprocessor circuit components.

Wrong frequencies appear or no signal appears.

Frequencies are OK.

PLL OPERATION CHECK (RECEIVE MODE)



Connect the Frequency counter to TP-7. Refer to Figure 12.

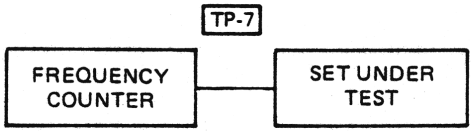


Figure 12

POWER Switch : ON (Press in)
Channel : CH-19 , CLARIFIER : Center

Check frequency

Frequency is 10.240 MHz ± 100 Hz.

Adjust TC-1 until the frequency is 10.240 MHz ± 100 Hz. Check IC-1 and/or associated circuit components.

Frequency is not 10.240 MHz ± 100 Hz or no signal appears.

Frequency is OK.

Connect the Frequency Counter to TP-5.

Check frequency in each mode : AM, USB and LSB.

Frequencies are : 17.8850 MHz ± 100 Hz in AM, 17.8875 MHz ±100 Hz in USB, and 17.8825 MHz ±100 Hz in LSB.

Check IC-3 and/or associated circuit components.

Wrong frequencies appear or no signal appears.

Frequencies are OK.

Connect the Frequency Counter to TP2.

Check frequency in each mode : AM, USB, and LSB.

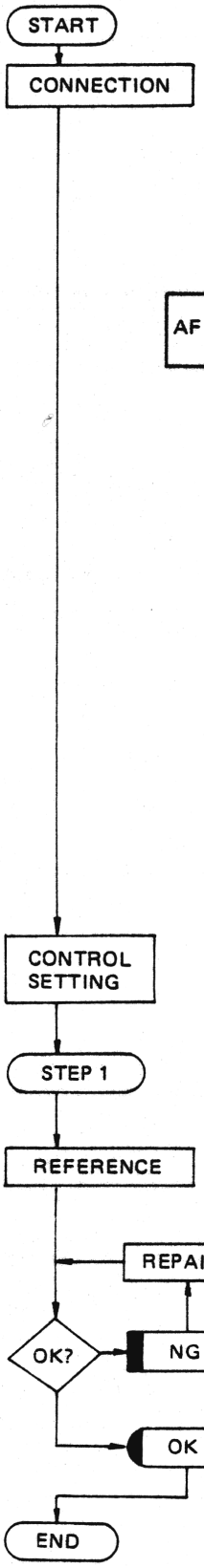
Frequencies are : 19.385 MHz ±100 Hz in AM, 19.3875 MHz ± 100 Hz in USB, and 19.3825 MHz ±100 Hz in LSB.

Check IC-1, IC-2 and/or associated circuit components. Check Input code to IC-1 (Pin 10-15). See Table on page 20.
Check Microprocessor circuit components.

Wrong frequencies appear or no signal appears.

Frequencies are OK.

AF OPERATION CHECK



Connect the instruments as shown in Figure 13.

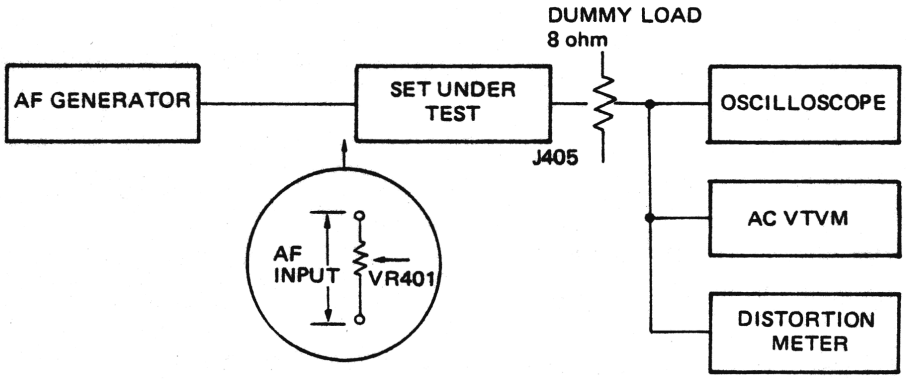


Figure 13

POWER Switch : ON (Press in)
Mode : AM
VOLUME Control : Max.

Check AF Output with 0.7 – 2.0 mV input.
A.F. GENERATOR Frequency is 1 kHz.

A.F. Output Power is 0.5 W with 0.7 – 2.0 mV Input. And Distortion is below 6%.

Check AF amplifier Q39, IC-12 and/or associated circuit components.

A.F. Output Power is not 0.5 W with 0.7 – 2.0 mV Input. And/or Distortion exceeds 6%.

A.F. Output Power is 0.5 W with 0.7 – 2.0 mV Input. And Distortion is less than 6%.

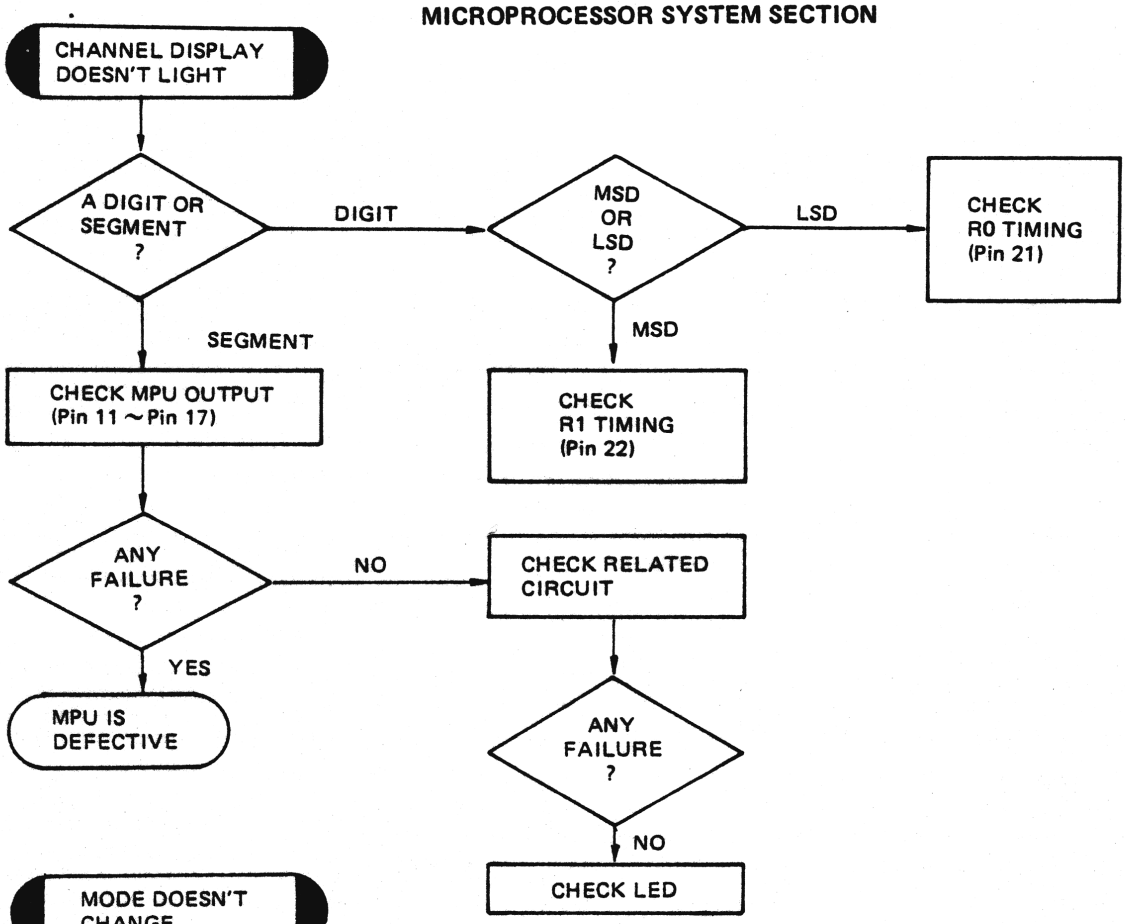
TROUBLESHOOTING GUIDE

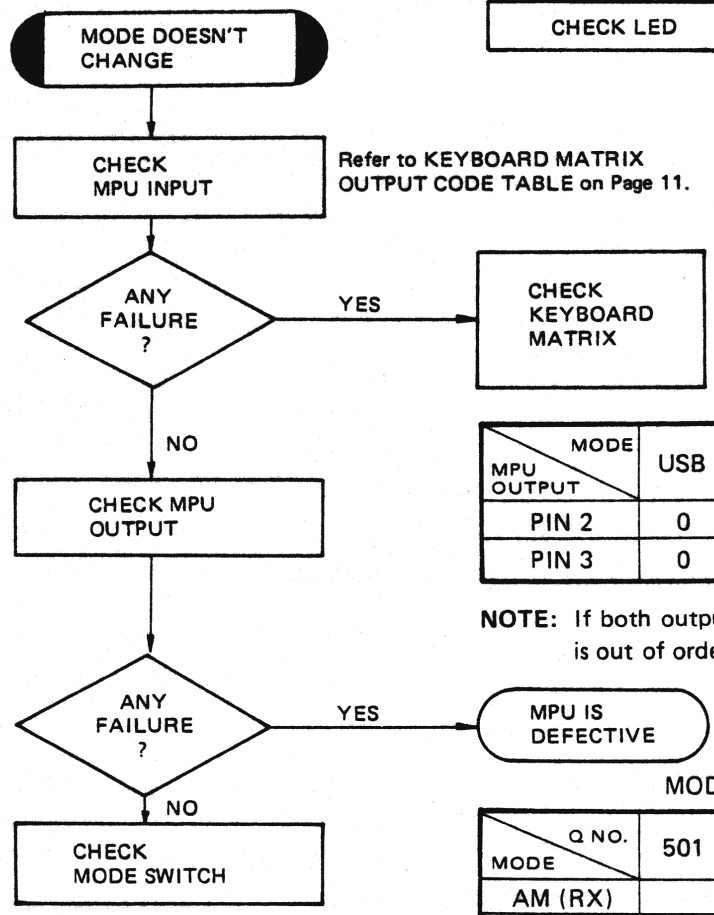
GENERAL

Symptom	Possible Cause
1) LEDs do not light and/or set fails to operate when POWER is on	A) Faulty power cord. B) Defective D305, IC-301, Q401, RY-301, RY-302, Q301, Q302, Q303, Q304, and/or associated circuit components. C) Defective LEDs. D) Fuse blown. E) Defective Microprocessor Circuit Components.
2) Fuse blows	A) Collector of the Q401 is shorted to ground. B) Reverse polarity (DC operation). C) Defective D305, IC-301, Q401 and/or associated circuit components.
3) Does not receive either AM or SSB	A) Defective PLL circuit. Proceed to PLL OPERATION CHECK (RECEIVE MODE). B) Defective RF Stage amplifier Q18, Q19, Mix Stage Q20 and/or associated circuit components. C) Defective D32, Q25 and/or associated circuit components.
4) No sound TX SSB : OK	A) Defective AF amplifier. Proceed to AF OPERATION CHECK.
5) No sound TX AM SSB : OK	A) Defective speaker or defective EXT SPKR jack. B) Faulty Squelch control circuit. C) Defective Relay RY-2.
6) Does not transmit AM or SSB	A) Defective PLL circuit. Proceed to PLL OPERATION CHECK (TRANSMIT MODE). B) Defective Q12, Q13, Q14 and/or associated circuit components. C) Defective IC-10, Q34, Q35, IC-8 and/or assoicated circuit components.
7) Does not transmit AM. SSB : OK	A) Defective Q40, Q41, Q42 and/or associated circuit components. B) Defective Relay RY-1.
8) Programming/Channel Keyboard does not function	A) Defective Key switch and/or Microprocessor circuit components.
9) SQUELCH Control does not function	A) Defective VR-402. B) Defective IC-9 and/or associated circuit components.
10) Poor sensitivity TX : OK	A) Faulty AGC circuit Q24, Q30, Q31, D46, D47 and/or associated circuit components. B) Defective Q21, Q22, Q23 and/or associated circuit components.
11) No modulation on AM. RX AM SSB : OK	A) Defective Q36 and/or associated circuit components.

Symptom	Possible Cause
12) RX AGC does not function	A) Defective Q24, Q30, Q31, D46, D47 and/or associated circuit components.
13) AMC does not function	A) Defective Q32, Q33, D52, D53, D54, D55 and/or associated circuit components.
14) Noise Blanker and ANL does not function	A) Defective Q26, Q27, IC-6, IC-7 and/or associated circuit components. B) Defective D33 and/or associated circuit components. C) Defective NB/ANL switch.
15) ALC does not function	A) Defective D6, D7, D8, D9, D10, D11, Q8, Q9 and/or associated circuit components.
16) PA does not function CB : OK	A) Defective PA switch. B) Defective PA SPKR jack.
17) RF GAIN control does not function	A) Defective Q15 and/or associated circuit components.
18) CLARIFIER does not function	A) Defective D1, D2, Q1, Q2 and/or associated circuit components.
19) Clock does not function	A) Defective IC-601 and/or associated circuit components. *You may find the Special Service Information Bulletin on clock models for clock radios helpful in troubleshooting/servicing clock portion.*

MICROPROCESSOR SYSTEM SECTION





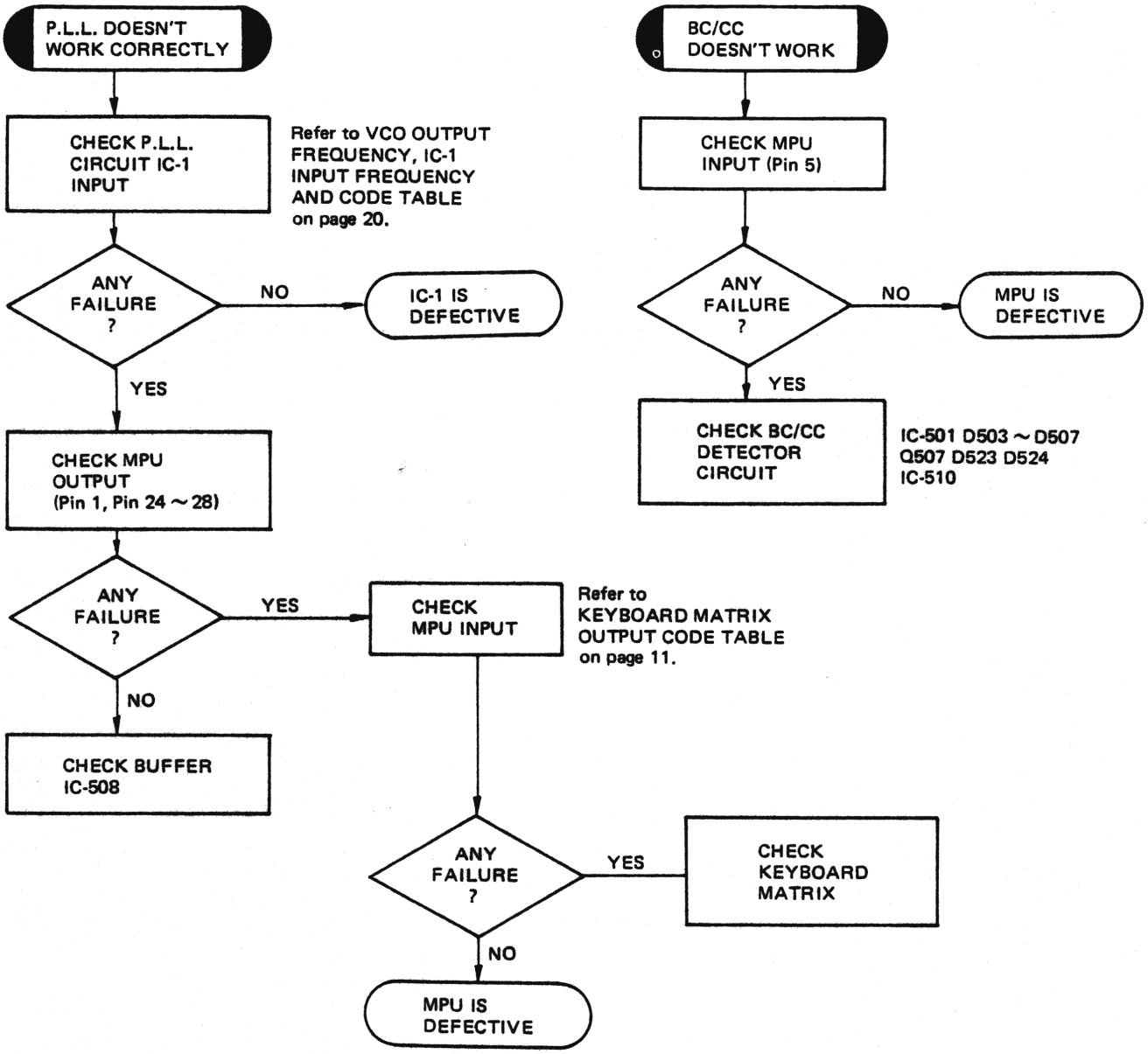
MODE / MPU OUTPUT	USB	LSB	AM
PIN 2	0	1	0
PIN 3	0	0	1

1 = 9 V
0 = Gnd Level

NOTE: If both outputs are 1, MPU is out of order.

MODE SWITCH STATUS

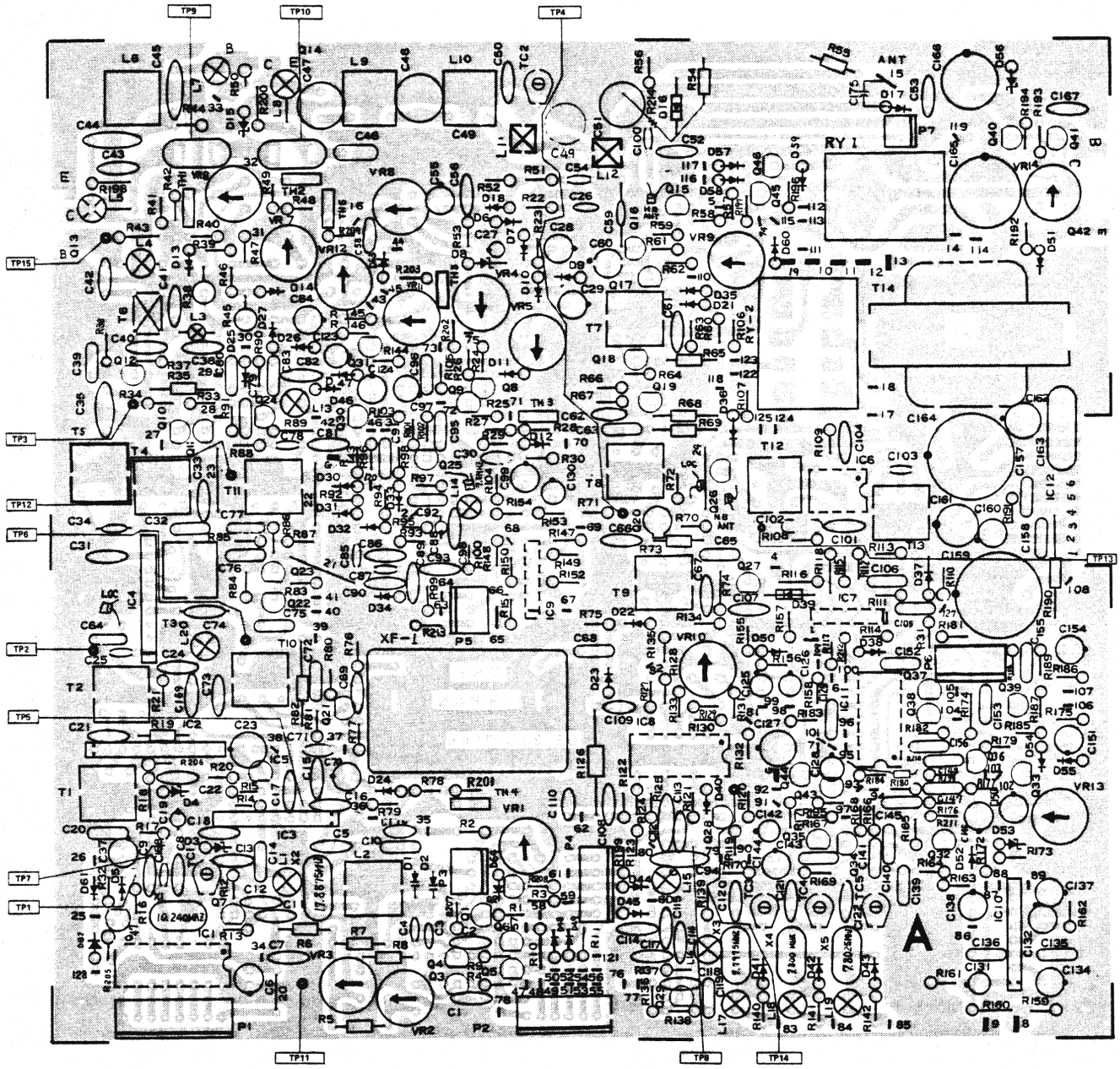
Q NO. / MODE	501	502	503	504	505	506
AM (RX)				ON		ON
AM (TX)	ON	ON		ON		ON
USB			ON			
LSB				ON	ON	



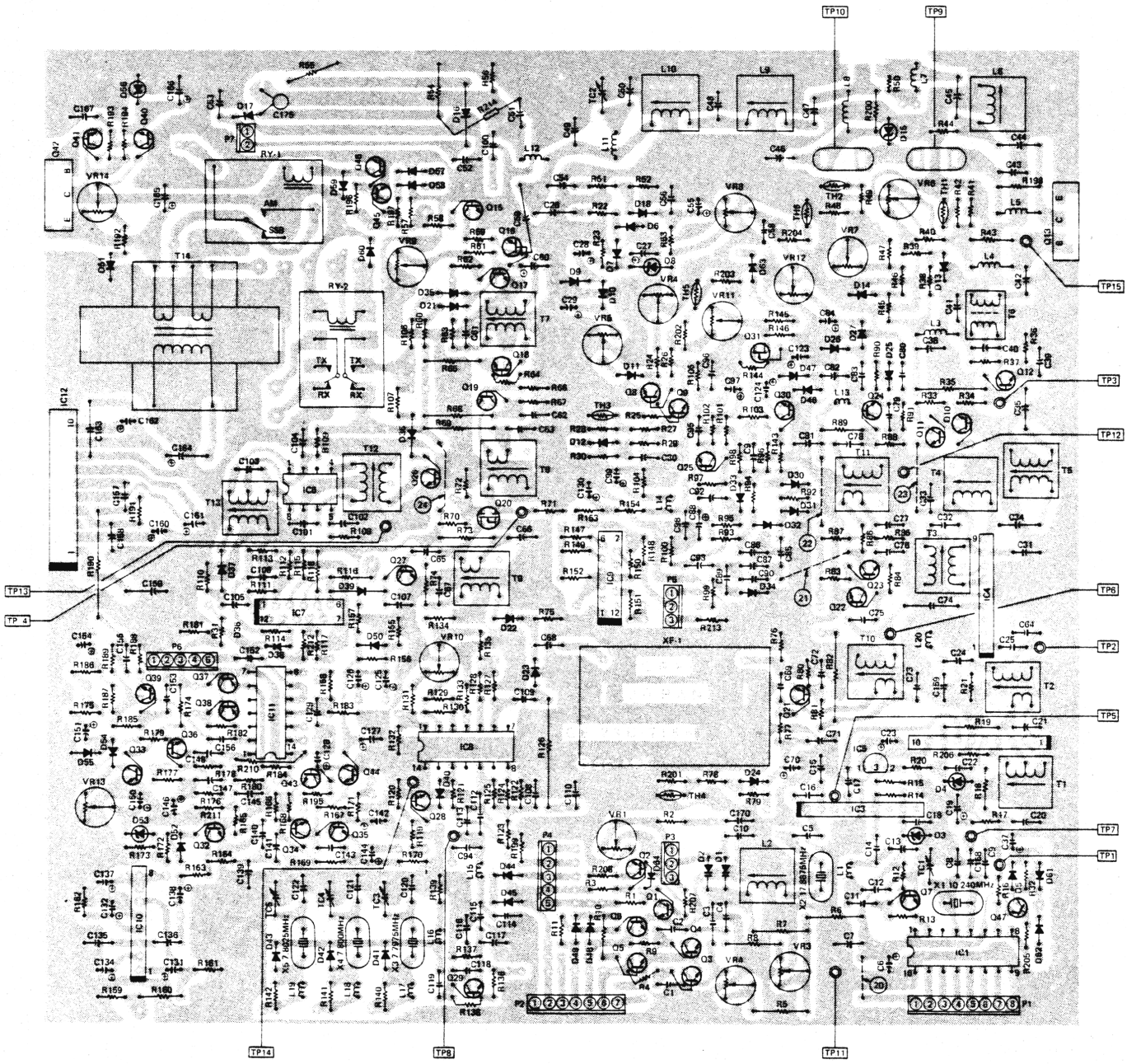
NOTE: Oscilloscope is necessary and helpful for troubleshooting of Microprocessor portion because the system is clocked and dynamic.

PARTS LOCATION

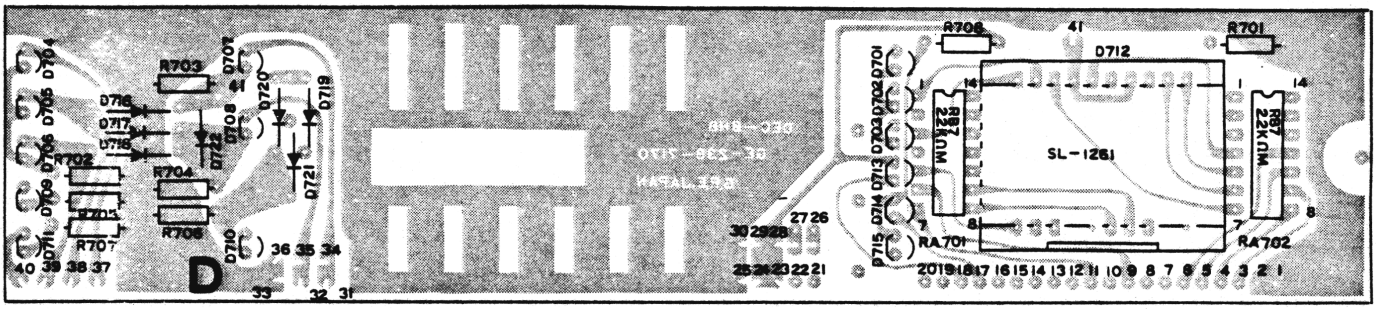
Main P.C.B. — Top View —



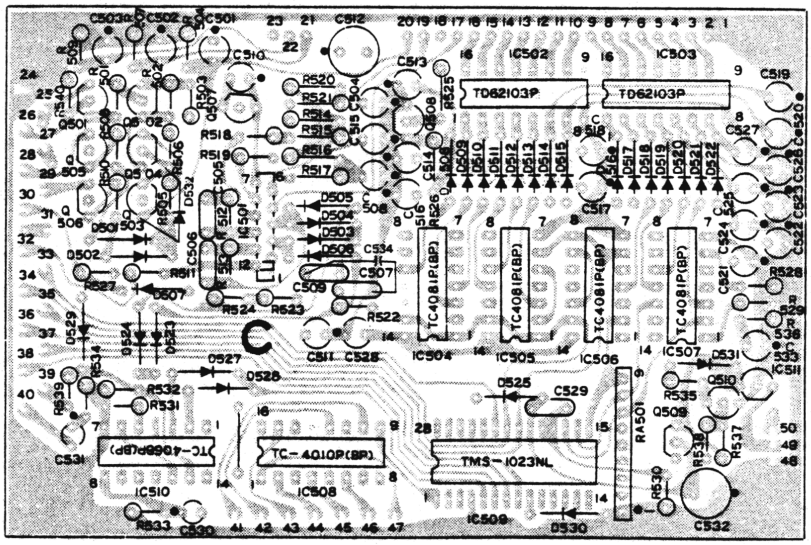
Main P.C.B. — Bottom View —



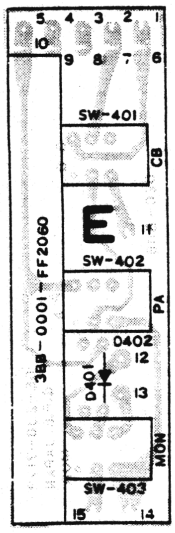
Display P.C.B. — Top View —



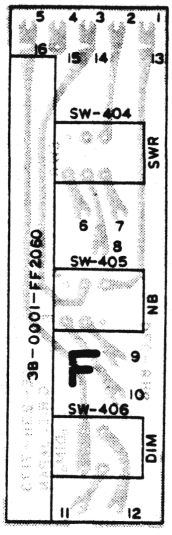
M.P.U. P.C.B. — Top View —



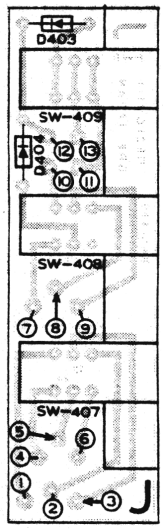
Function (24HR, AUTO, POWER) SW P.C.B. — Top View —



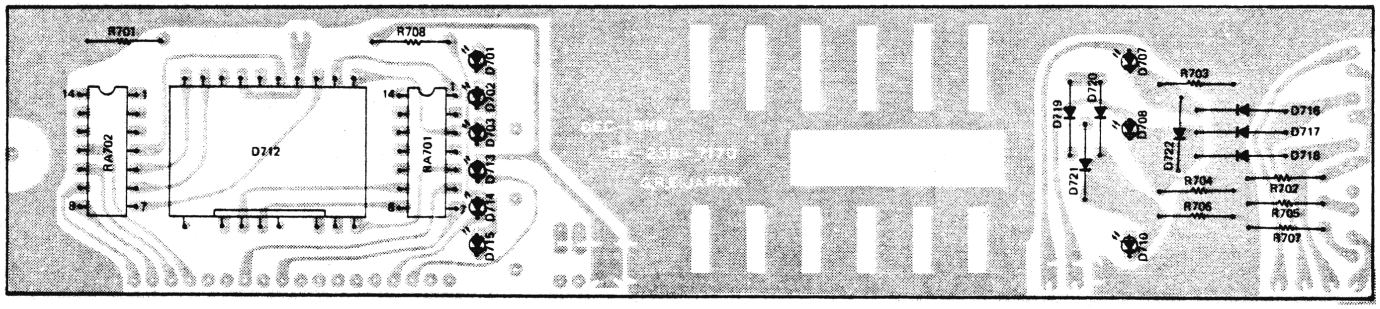
Function (SWR CAL, NB/ANL, DIMMER) SW P.C.B. — Top View —



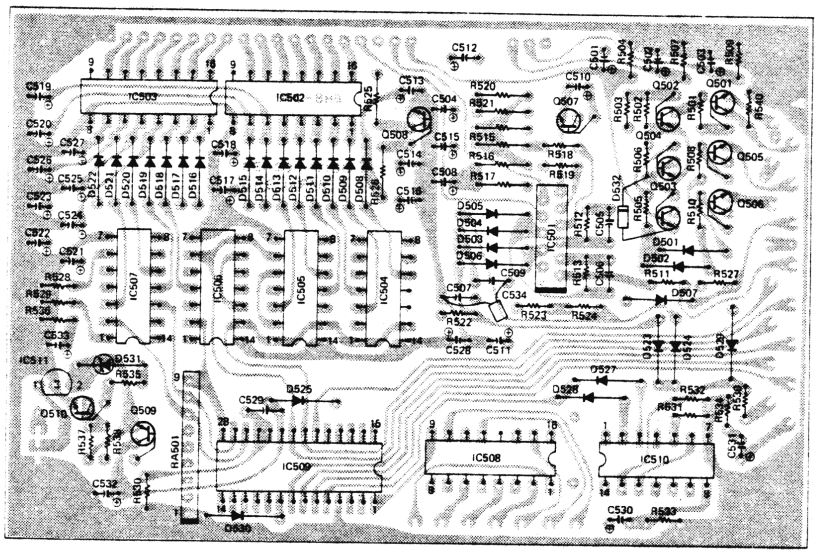
Mode (CB, PA, MON) SW P.C.B. — Top View —



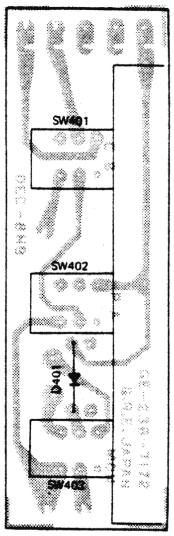
Display P.C.B. — Bottom View —



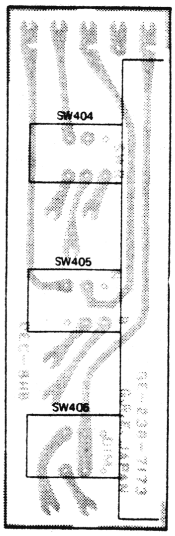
M.P.U. P.C.B. — Bottom View —



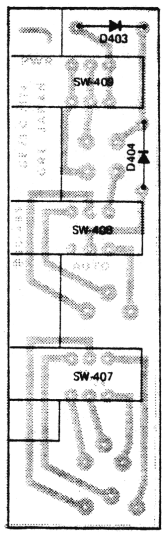
Mode (CB, PA, MON) SW P.C.B. — Bottom View —



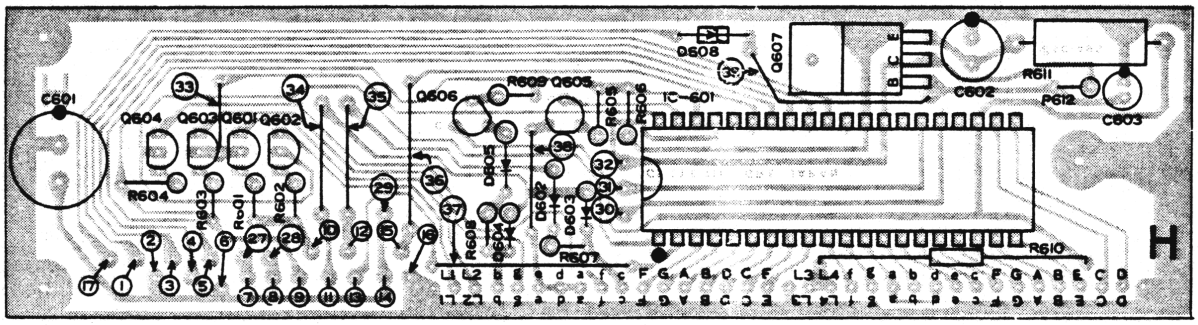
Function (SWR CAL, NB/ANL, DIMMER) SW P.C.B. — Bottom View —



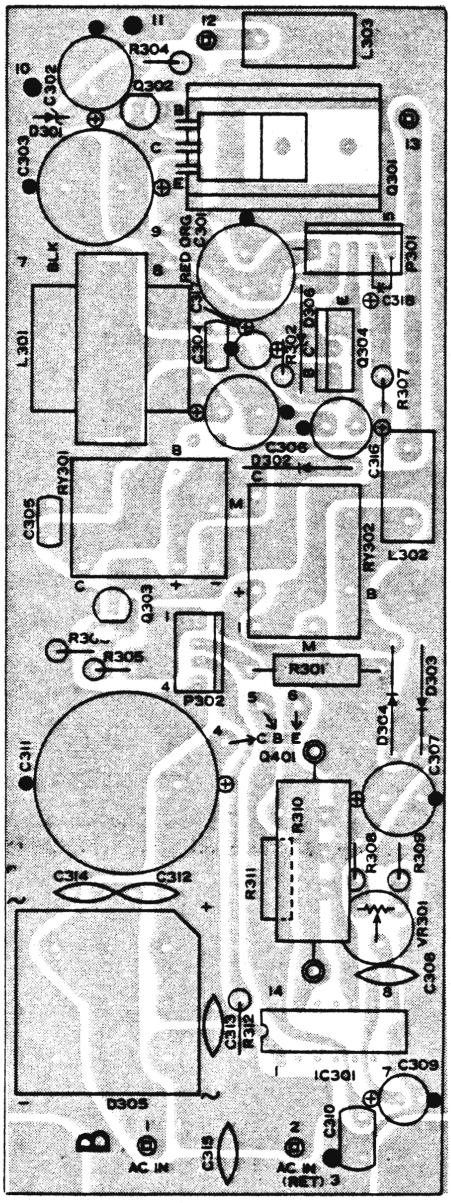
Function (24 HR, AUTO, POWER) SW P.C.B. — Bottom View —



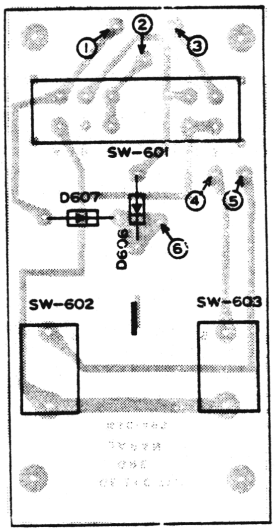
Clock P.C.B. — Top View —



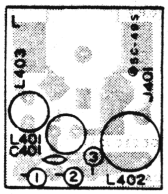
Power Supply P.C.B. — Top View —



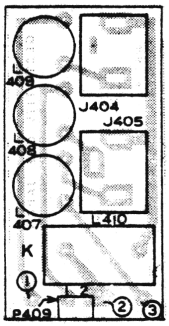
Clock Control P.C.B. — Top View —



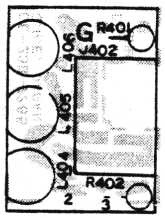
Mic Jack P.C.B. — Top View —



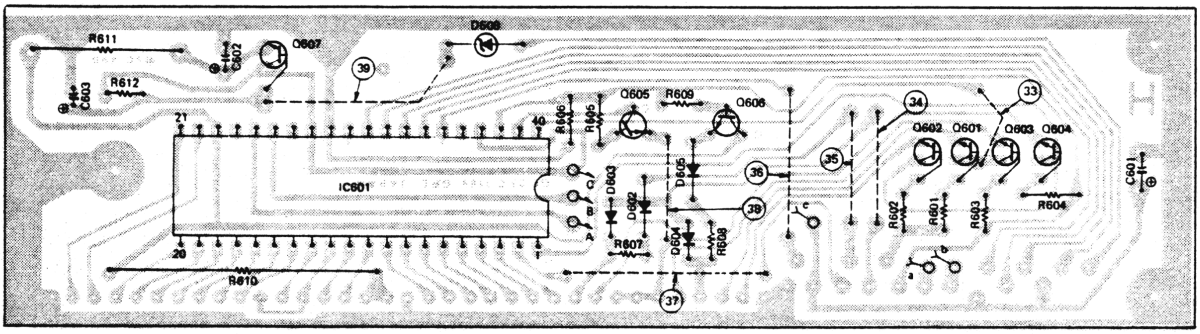
PA/EXT SPKR Jack P.C.B. — Top View —



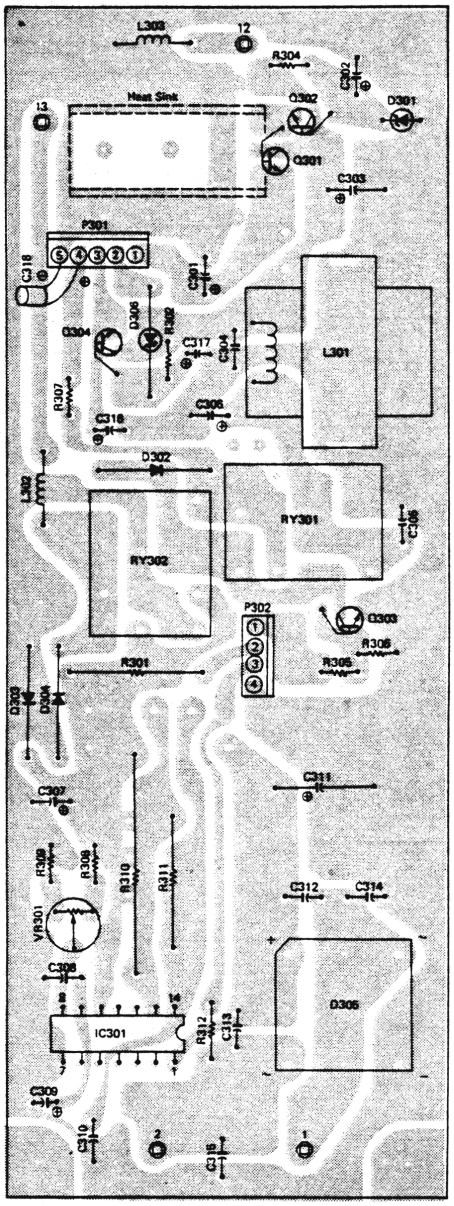
Phone Jack P.C.B. — Top View —



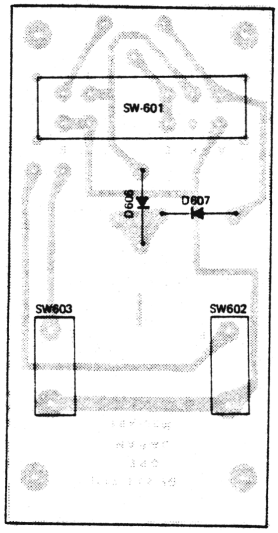
Clock P.C.B. — Bottom View —



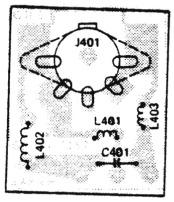
Power Supply P.C.B. — Bottom View —



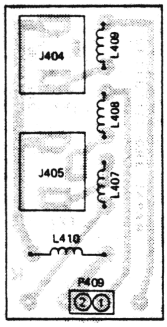
Clock Control P.C.B. — Bottom View —



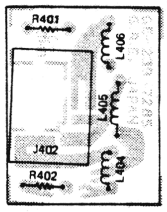
Mic Jack P.C.B. — Bottom View —



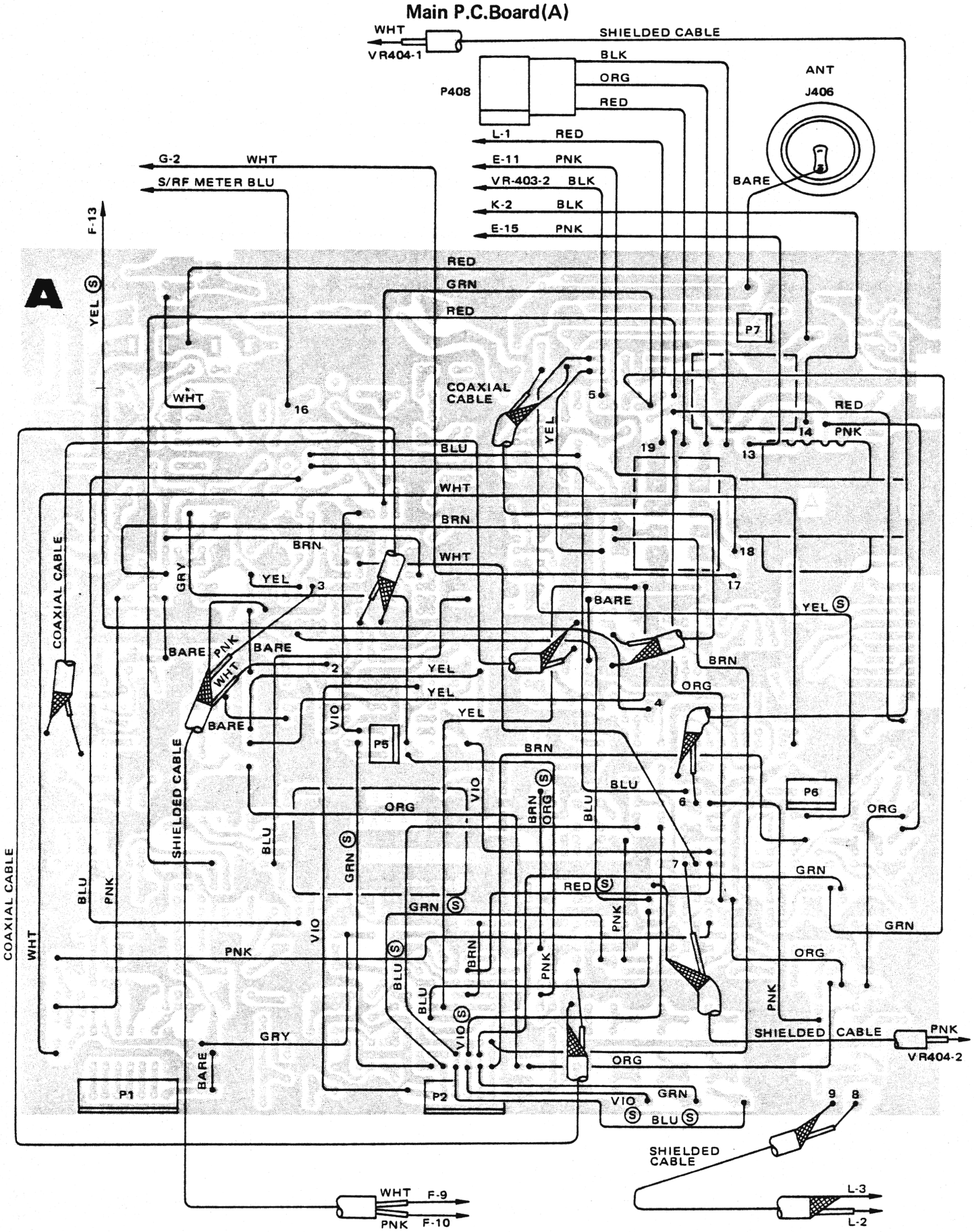
PA/EXT SPKR Jack — Bottom View —



Phone Jack P.C.B. — Bottom View —

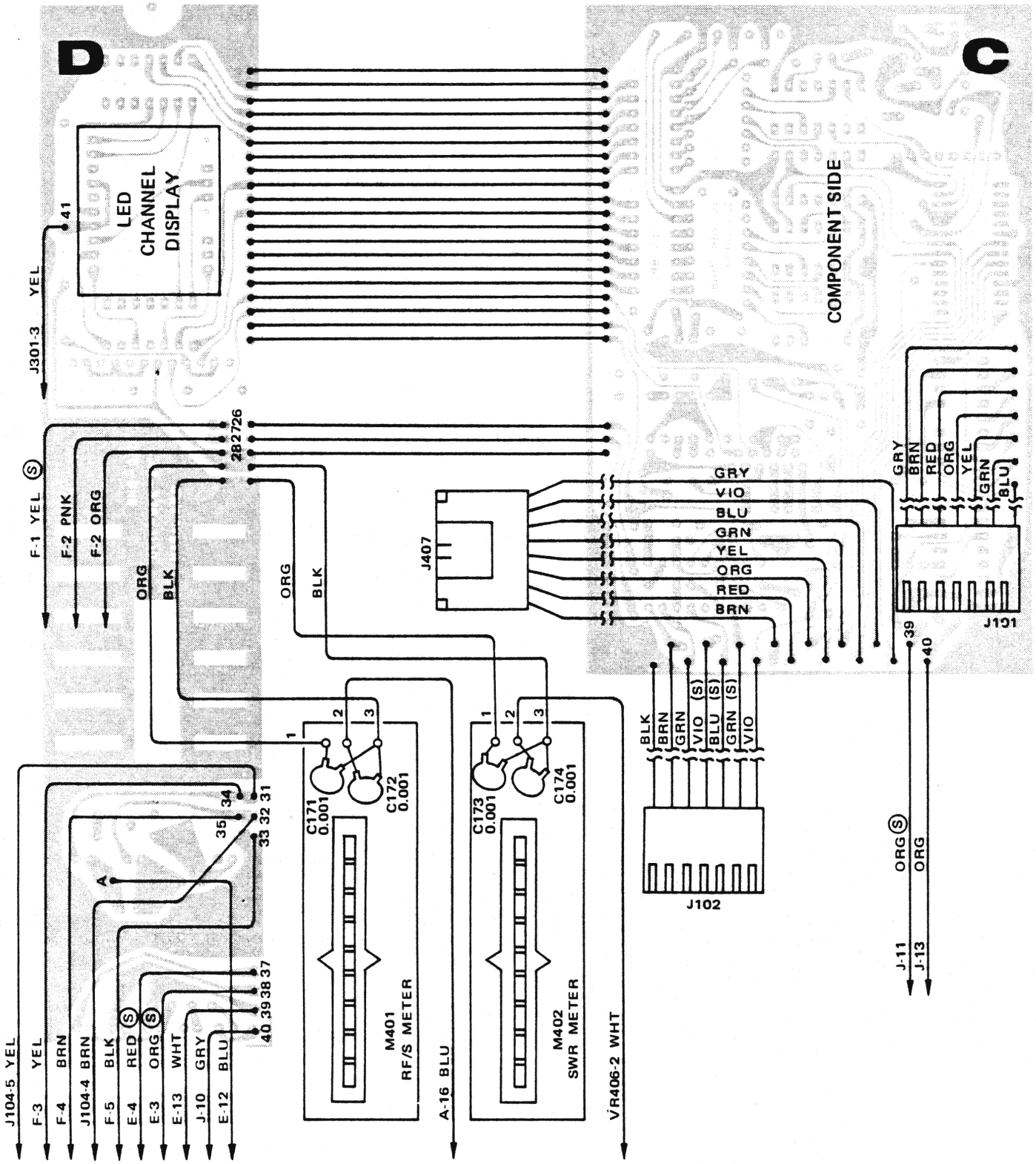


WIRING DIAGRAM

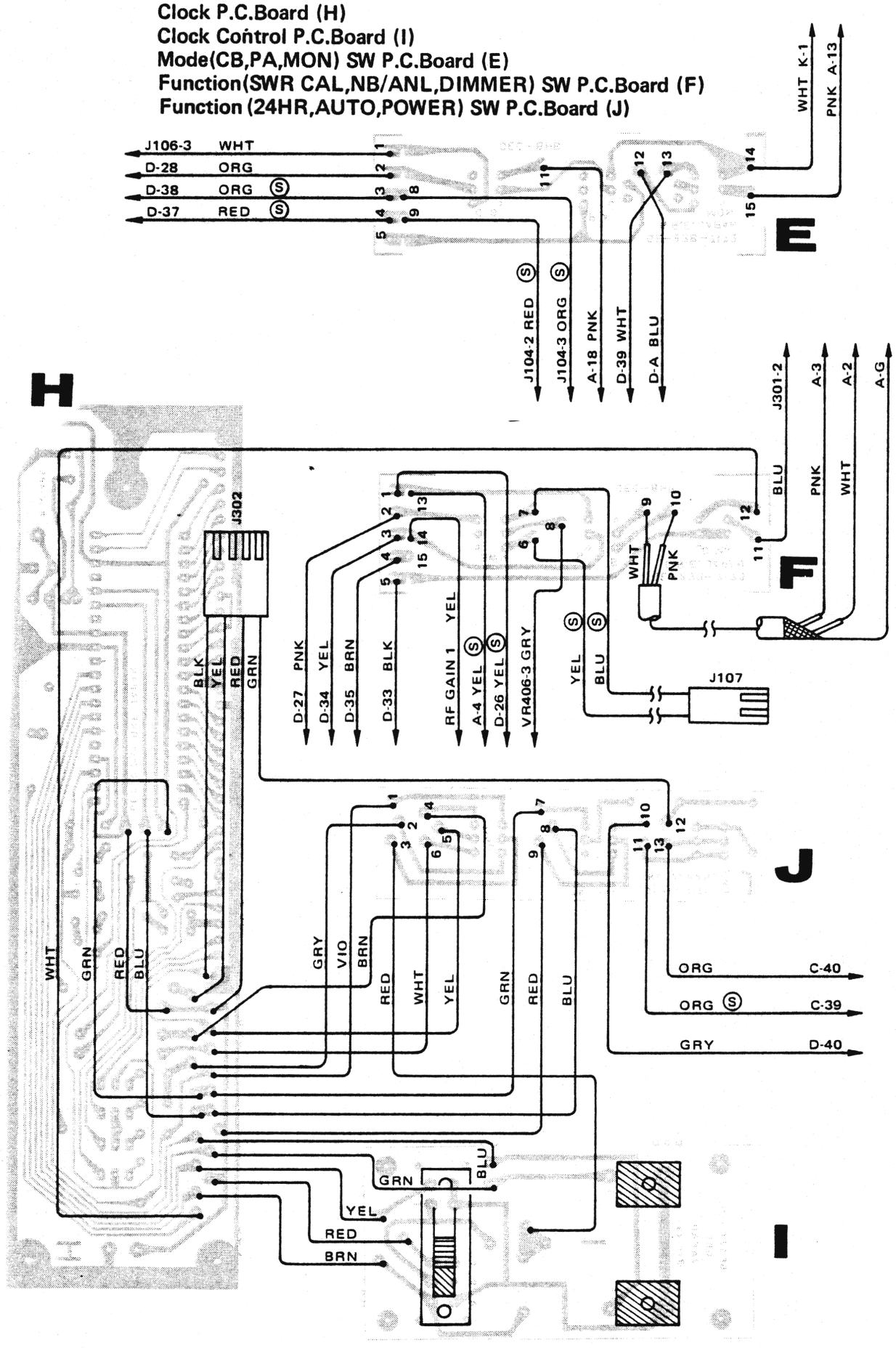


Ⓢ = SPIRAL

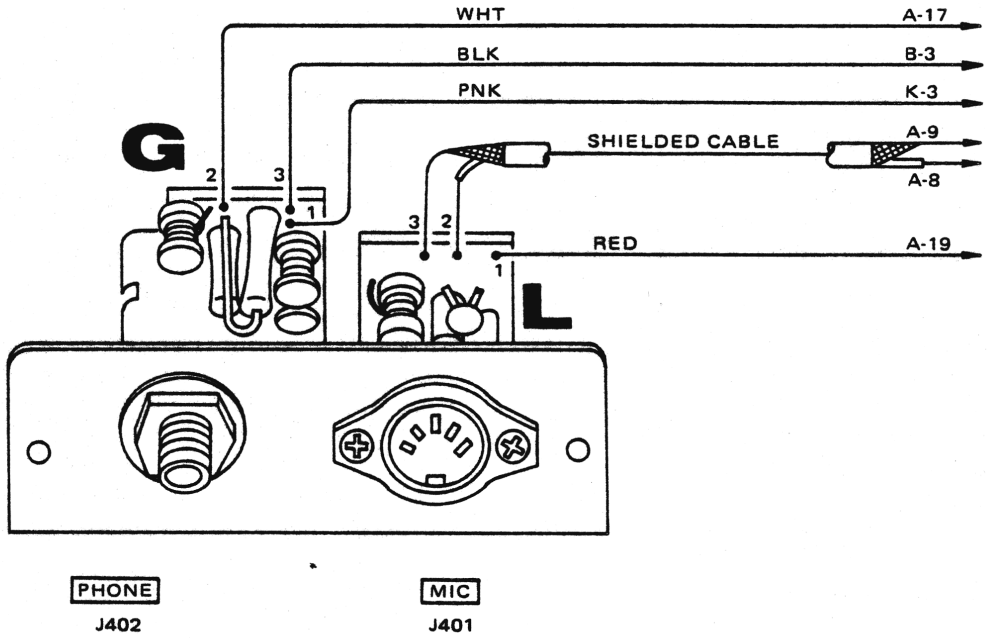
M.P.U. P.C.Board (C)
Display P.C.Board (D)



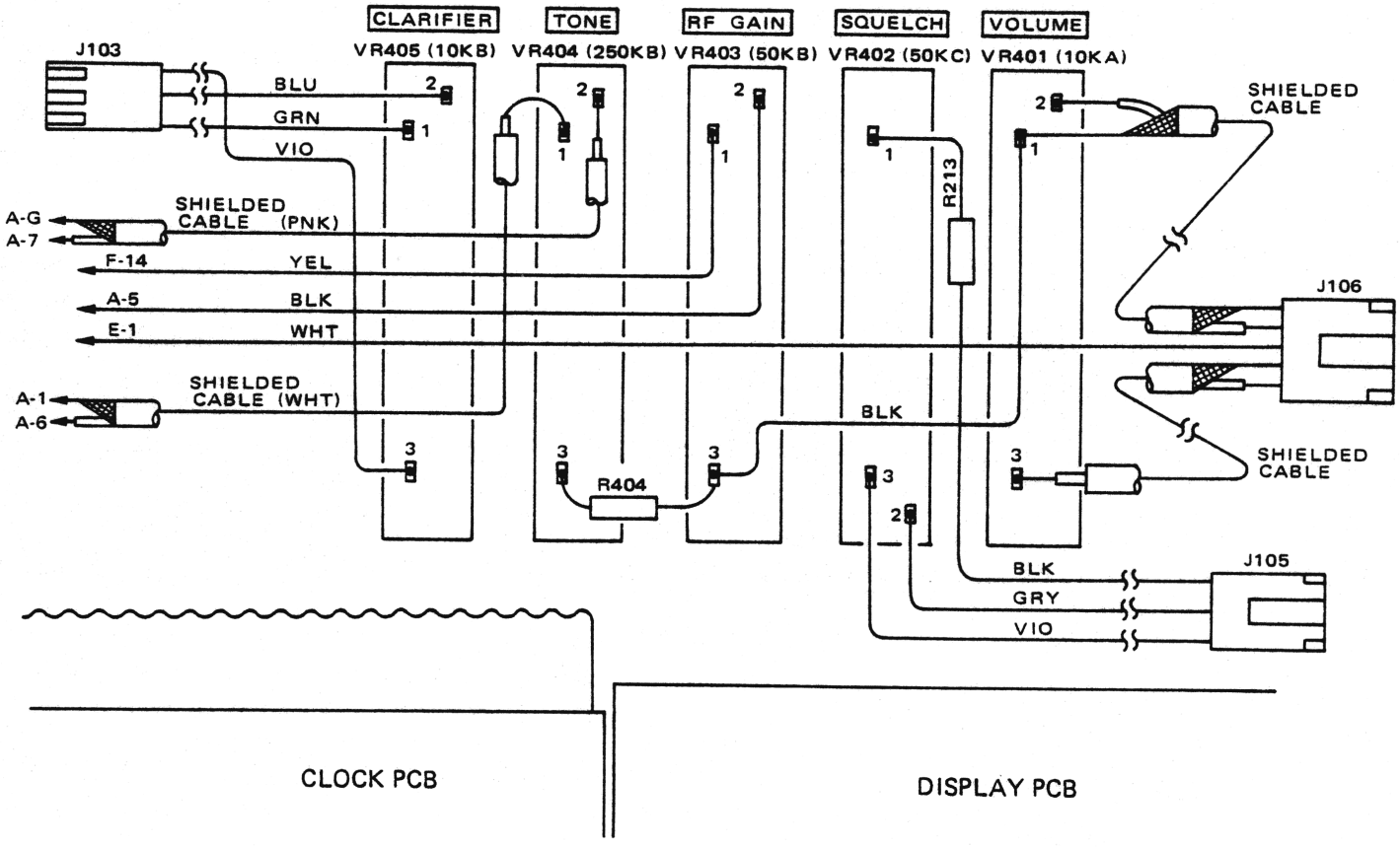
Clock P.C.Board (H)
Clock Control P.C.Board (I)
Mode(CB,PA,MON) SW P.C.Board (E)
Function(SWR CAL,NB/ANL,DIMMER) SW P.C.Board (F)
Function (24HR,AUTO,POWER) SW P.C.Board (J)



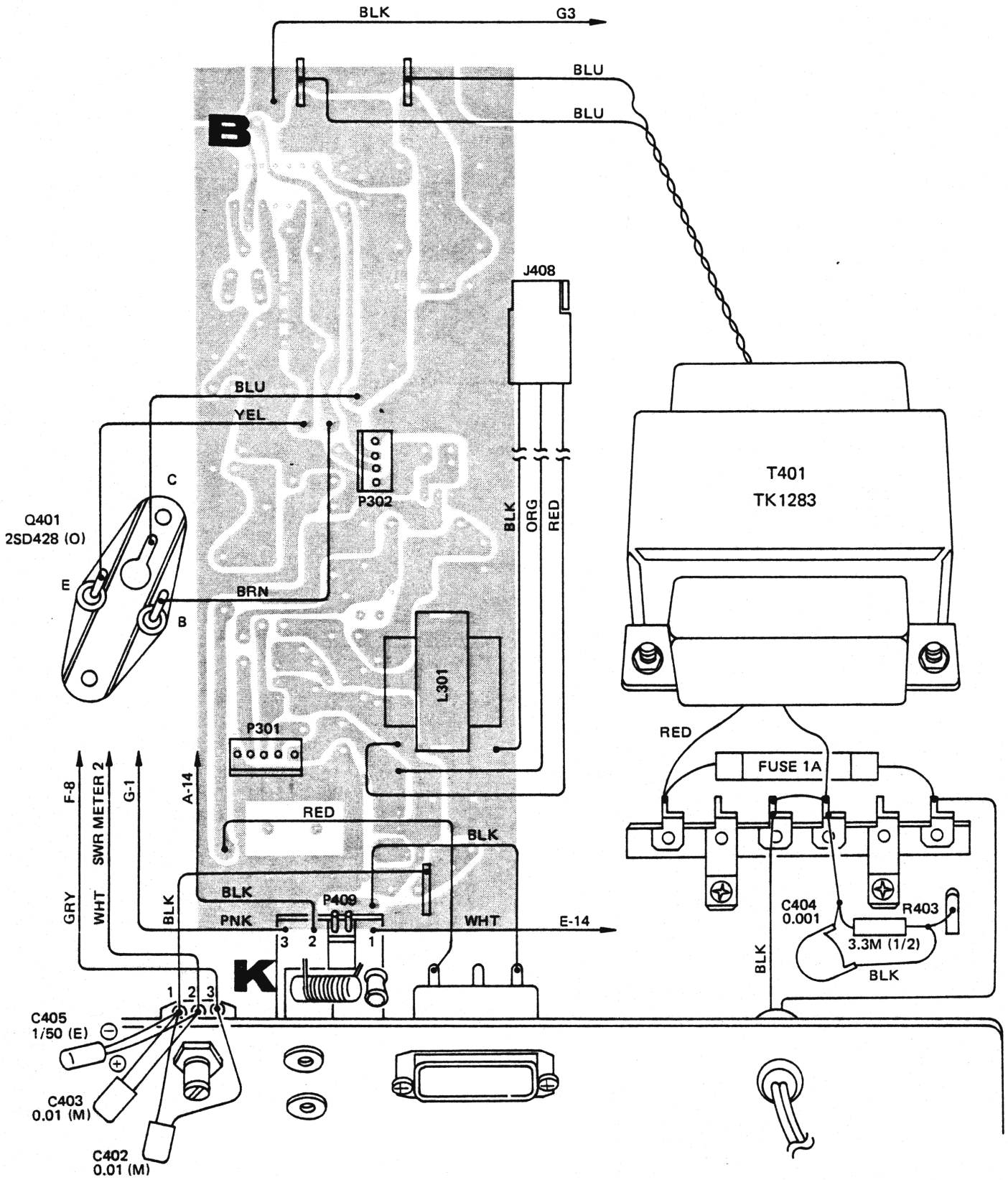
Phone Jack P.C.Board (G)
Mick Jack P.C.Board (L)



CONTROLS



Power Supply P.C.Board (B)
PA/EXT SPKR Jack P.C.Board (K)



ELECTRICAL PARTS LIST

CAPACITORS

NOTE: Temperature characteristics
(C) NP0
(R) N220
(TH) N470
(U) N750

Ref. No.	Value	Voltage (V)	Tolerance (%)	Material
C1	0.01μF	50	−20, +80	Ceramic
C2	0.01μF	50	−20, +80	Ceramic
C3	4pF	50	±0.25pF	Ceramic (C)
C4	10pF	50	±0.5pF	Ceramic (TH)
C5	10pF	50	±0.5pF	Ceramic (U)
C6	10μF	16	−10, +50	Electrolytic
C7	0.01μF	50	−20, +80	Ceramic
C8	10pF	50	±0.5pF	Ceramic (R)
C9	150pF	50	±10	Ceramic (R)
C10	0.01μF	50	±10	Mylar
C11	0.01μF	50	±10	Mylar
C12	220pF	50	±10	Ceramic
C13	56pF	50	±10	Ceramic (C)
C14	0.01μF	50	±10	Mylar
C15	18pF	50	±10	Ceramic (C)
C16	27pF	50	±10	Ceramic (C)
C17	33pF	50	±10	Ceramic (C)
C18	0.01μF	50	−20, +80	Ceramic
C19	6.8μF	10	±20	Tantalum
C20	0.01μF	50	±10	Mylar
C21	0.01μF	50	−20, +80	Ceramic
C22	0.01μF	50	−20, +80	Ceramic
C23	33μF	16	−10, +50	Electrolytic
C24	39pF	50	±10	Ceramic (C)
C25	5pF	50	±0.25pF	Ceramic (C)
C26	4pF	50	±0.25pF	Ceramic (C)
C27	0.1μF	35	±20	Tantalum
C28	4.7μF	10	±20	Tantalum
C29	1μF	50	−10, +75	Electrolytic
C30	0.01μF	50	−20, +80	Ceramic
C31	0.01μF	50	−20, +80	Ceramic
C32	0.01μF	50	±10	Mylar
C33	0.01μF	50	−20, +80	Ceramic
C34	3pF	50	±0.25pF	Ceramic (C)
C35	220pF	50	±10	Ceramic (C)
C36	Not used			
C37	1μF	50	−10, +75	Electrolytic
C38	0.01μF	50	−20, +80	Ceramic
C39	0.001μF	50	±10	Mylar
C40	68pF	50	±10	Ceramic (C)
C41	0.01μF	50	−20, +80	Ceramic
C42	0.01μF	50	−20, +80	Ceramic
C43	0.01μF	50	−20, +80	Ceramic
C44	56pF	50	±10	Ceramic (C)
C45	180pF	50	±10	Ceramic (C)
C46	0.01μF	50	±10	Mylar
C47	330pF	250	±5	Polystyrene
C48	470pF	500	±5	Polystyrene
C49	150pF	250	±5	Polystyrene
C50	47pF	50	±10	Ceramic (C)
C51	150pF	250	±5	Polystyrene
C52	0.01μF	50	−20, +80	Ceramic
C53	0.01μF	50	−20, +80	Ceramic
C54	4pF	50	±0.25pF	Ceramic (C)
C55	10μF	16	−10, +50	Electrolytic
C56	0.01μF	50	−20, +80	Ceramic
C57	Not used			
C58	0.01μF	50	−20, +80	Ceramic
C59	10pF	50	±0.5pF	Ceramic (C)
C60	10μF	16	−10, +50	Electrolytic
C61	0.01μF	50	−20, +80	Ceramic
C62	0.022μF	50	−20, +80	Ceramic
C63	0.01μF	50	±10	Mylar
C64	0.001μF	50	±10	Mylar
C65	0.01μF	50	±10	Mylar
C66	0.01μF	50	−20, +80	Ceramic
C67	0.01μF	50	−20, +80	Ceramic
C68	0.01μF	50	±10	Mylar
C69	220pF	50	±10	Ceramic
C70	10μF	16	−10, +50	Electrolytic
C71	0.01μF	50	−20, +80	Ceramic
C72	0.039μF	50	±10	Mylar
C73	0.039μF	50	±10	Mylar
C74	68pF	50	±10	Ceramic (C)
C75	0.039μF	50	±10	Mylar
C76	0.039μF	50	±10	Mylar
C77	0.039μF	50	±10	Mylar
C78	5pF	50	±0.25pF	Ceramic (C)
C79	0.022μF	50	±10	Mylar
C80	0.01μF	50	±10	Mylar
C81	0.01μF	50	−20, +80	Ceramic
C82	47pF	50	±10	Ceramic (C)
C83	0.022μF	50	±10	Mylar
C84	1μF	50	−10, +75	Electrolytic
C85	22pF	50	±10	Ceramic (C)
C86	330pF	50	±10	Ceramic
C87	5pF	50	±0.25pF	Ceramic (C)
C88	0.1μF	35	±20	Tantalum
C89	0.01μF	50	±10	Mylar
C90	47pF	50	±10	Ceramic (C)
C91	0.01μF	50	±10	Mylar
C92	0.022μF	50	±10	Mylar
C93	22pF	50	±10	Ceramic (C)
C94	100pF	50	±10	Ceramic (C)
C95	0.039μF	50	±10	Mylar
C96	0.022μF	50	±10	Mylar
C97	47μF	10	−10, +50	Electrolytic
C98	150pF	50	±10	Ceramic
C99	10μF	16	−10, +50	Electrolytic
C100	5pF	50	±0.25pF	Ceramic (C)
C101	0.01μF	50	−20, +80	Ceramic
C102	0.01μF	50	±10	Mylar
C103	10pF	50	±0.5pF	Ceramic (C)
C104	0.01μF	50	−20, +80	Ceramic
C105	0.01μF	50	±10	Mylar
C106	0.01μF	50	±10	Mylar
C107	100pF	50	±10	Ceramic
C108	0.01μF	50	−20, +80	Ceramic
C109	0.01μF	50	−20, +80	Ceramic
C110	0.01μF	50	−20, +80	Ceramic
C111	Not used			
C112	100pF	50	±10	Ceramic (C)
C113	82pF	50	±10	Ceramic (C)
C114	82pF	50	±10	Ceramic (C)

Ref. No.	Value	Voltage (V)	Tolerance (%)	Material
C115	56pF	50	±10	Ceramic (C)
C116	0.01μF	50	−20, +80	Ceramic
C117	39pF	50	±10	Ceramic (R)
C118	12pF	50	±10	Ceramic (C)
C119	0.001μF	50	±10	Mylar
C120	18pF	50	±10	Ceramic (C)
C121	18pF	50	±10	Ceramic (C)
C122	18pF	50	±10	Ceramic (C)
C123	2.2μF	16	±20	Tantalum
C124	10μF	16	−10, +50	Electrolytic
C125	10μF	16	−10, +50	Electrolytic
C126	10μF	16	−10, +50	Electrolytic
C127	100μF	10	−10, +50	Electrolytic
C128	1μF	50	−10, +75	Electrolytic
C129	0.0039μF	50	±10	Mylar
C130	4.7μF	35	−10, +75	Electrolytic
C131	22μF	6.3	±20	Tantalum
C132	10μF	16	−10, +50	Electrolytic
C133	Not used			
C134	33μF	16	−10, +50	Electrolytic
C135	0.033μF	50	±10	Mylar
C136	0.01μF	50	±10	Mylar
C137	10μF	16	−10, +50	Electrolytic
C138	1μF	50	−10, +75	Electrolytic
C139	0.01μF	50	±10	Mylar
C140	0.001μF	50	±10	Mylar
C141	0.0068μF	50	±10	Mylar
C142	33μF	16	−10, +50	Electrolytic
C143	0.01μF	50	±10	Mylar
C144	1μF	50	−10, +75	Electrolytic
C145	0.0068μF	50	±10	Mylar
C146	10μF	16	−10, +50	Electrolytic
C147	0.056μF	50	±10	Mylar
C148	0.022μF	50	±10	Mylar
C149	Not used			
C150	3.3μF	35	−10, +75	Electrolytic
C151	1μF	50	−10, +75	Electrolytic
C152	0.022μF	50	±10	Mylar
C153	0.01μF	50	±10	Mylar
C154	10μF	16	−10, +50	Electrolytic
C155	0.056μF	50	±10	Mylar
C156	0.033μF	50	±10	Mylar
C157	0.047μF	50	±10	Mylar
C158	0.022μF	50	±10	Mylar
C159	1000μF	16	−10, +50	Electrolytic
C160	4.7μF	35	−10, +75	Electrolytic
C161	100μF	10	−10, +50	Electrolytic
C162	47μF	10	−10, +50	Electrolytic
C163	0.22μF	50	±10	Mylar
C164	1000μF	16	−10, +50	Electrolytic
C165	470μF	16	−10, +50	Electrolytic
C166	220μF	10	−10, +50	Electrolytic
C167	0.01μF	50	−20, +80	Ceramic
C168	5pF	50	±0.25pF	Ceramic (C)
C169	150pF	50	±10	Ceramic
C170	0.01μF	50	−20, +80	Ceramic
C171	0.001μF	50	−20, +80	Ceramic
C172	0.001μF	50	−20, +80	Ceramic
C173	0.001μF	50	−20, +80	Ceramic
C174	0.001μF	50	−20, +80	Ceramic
C175	2pF	50	±0.25pF	Ceramic (C)

Ref. No.	Value	Voltage (V)	Tolerance (%)	Material
C301	470μF	16	−10, +50	Electrolytic
C302	220μF	16	−10, +50	Electrolytic
C303	1000μF	16	−10, +50	Electrolytic
C304	0.022μF	50	±10	Mylar
C305	0.022μF	50	±10	Mylar
C306	100μF	16	−10, +50	Electrolytic
C307	220μF	16	−10, +50	Electrolytic
C308	0.01μF	50	−20, +80	Ceramic
C309	10μF	16	−10, +50	Electrolytic
C310	0.039μF	50	±10	Mylar
C311	4700μF	35	−10, +30	Electrolytic
C312	0.01μF	50	−20, +80	Ceramic
C313	0.01μF	50	−20, +80	Ceramic
C314	0.01μF	50	−20, +80	Ceramic
C315	0.01μF	50	−20, +80	Ceramic
C316	47μF	16	−10, +50	Electrolytic
C317	1μF	50	−10, +75	Electrolytic
C318	4.7μF	35	−10, +75	Electrolytic
C401	0.001μF	50	−20, +80	Ceramic
C402	0.01μF	50	±10	Mylar
C403	0.01μF	50	±10	Mylar
C404	0.001μF	150	−20, +80	Ceramic
C405	1μF	50	−10, +75	Electrolytic
C501	10μF	16	−10, +50	Electrolytic
C502	10μF	16	−10, +50	Electrolytic
C503	10μF	16	−10, +50	Electrolytic
C504	10μF	16	−10, +50	Electrolytic
C505	0.01μF	50	±10	Mylar
C506	0.01μF	50	±10	Mylar
C507	0.01μF	50	±10	Mylar
C508	1μF	50	−10, +75	Electrolytic
C509	0.001μF	50	±10	Mylar
C510	1μF	50	−10, +75	Electrolytic
C511	10μF	16	−10, +50	Electrolytic
C512	100μF	10	−10, +50	Electrolytic
C513	1μF	50	−10, +75	Electrolytic
C514	1μF	50	−10, +75	Electrolytic
C515	1μF	50	−10, +75	Electrolytic
C516	1μF	50	−10, +75	Electrolytic
C517	1μF	50	−10, +75	Electrolytic
C518	1μF	50	−10, +75	Electrolytic
C519	1μF	50	−10, +75	Electrolytic
C520	1μF	50	−10, +75	Electrolytic
C521	1μF	50	−10, +75	Electrolytic
C522	1μF	50	−10, +75	Electrolytic
C523	1μF	50	−10, +75	Electrolytic
C524	1μF	50	−10, +75	Electrolytic
C525	1μF	50	−10, +75	Electrolytic
C526	1μF	50	−10, +75	Electrolytic
C527	1μF	50	−10, +75	Electrolytic
C528	10μF	16	−10, +50	Electrolytic
C529	100pF	50	±10	Ceramic
C530	2.2μF	16	±20	Tantalum
C531	6.8μF	10	±20	Tantalum
C532	100μF	10	−10, +50	Electrolytic
C533	10μF	16	−10, +50	Electrolytic
C534	0.01μF	50	±10	Mylar

Ref. No.	Value	Voltage (V)	Tolerance (%)	Material
C601	470μF	16	−10, +50	Electrolytic
C602	47μF	16	−10, +50	Electrolytic
C603	1μF	50	−10, +75	Electrolytic

COILS & TRANSFORMERS

Ref. No.	Description	RS Part No.	MFR's Part No.
L1	Inductor (100μF)	CB-2427	LF1-101K
L2	OSC Coil	CA-4999	GR-B560
L3	Inductor (270μH)	CB-2429	LF1-271K
L4	Inductor (180μH)	CB-2428	LF1-181K
L5	Choke Coil	CB-2195	4LNC-027
L6	Driver Coil	CB-2426	10PND-142
L7	Inductor (180μH)	CB-2428	LF1-181K
L8	Choke Coil	CB-2195	4LNC-027
L9	Output Coil	CA-2268	10PNP-028
L10	Output Coil	CA-2268	10PNP-028
L11	Choke Coil	CA-3488	4LNC-092
L12	Choke Coil	CA-3488	4LNC-092
L13	Inductor (470μH)	C-0835	LF1-471K
L14	Inductor (100μH)	CB-2427	LF1-101K
L15	Inductor (10μH)	CB-2196	LF1-100K
L16	Inductor (470μH)	C-0835	LF1-471K
L17	Inductor (470μH)	C-0835	LF1-471K
L18	Inductor (470μH)	C-0835	LF1-471K
L19	Inductor (470μH)	C-0835	LF1-471K
L20	Inductor (10μH)	CB-2196	LF1-100K
L301	Choke Transformer	CB-2430	E5N08
L302	Choke Coil	CB-2170	6LNC-053
L303	Choke Coil	CB-2170	6LNC-053
L401	Inductor (10μH)	CB-2196	LF1-100K
L402	Choke Coil	CA-3182	3B-037
L403	Inductor (10μH)	CB-2196	LF1-100K
L404	Choke Coil	CA-3182	3B-037
L405	Choke Coil	CA-3182	3B-037
L406	Choke Coil	CA-3182	3B-037
L407	Choke Coil	CA-3182	3B-037
L408	Choke Coil	CA-3182	3B-037
L409	Choke Coil	CA-3182	3B-037
L410	Choke Coil	CB-2170	6LNC-053
T1	VCO (19MHz)	CA-5001	GR-K574
T2	VCO (19MHz)	CA-5000	GR-K573
T3	B.P.F. (27MHz)	CA-3885	GR-K15950
T4	B.P.F. (27MHz)	CA-3885	GR-K15950
T5	B.P.F. (27MHz)	CA-3885	GR-K15950
T6	TX (27MHz)	CA-5002	TR-2
T7	RF (27MHz)	CA-3811	GR-K23345
T8	RF (27MHz)	CA-4998	GR-K575
T9	IF (7.8MHz)	CA-3809	GR-K532
T10	IF (7.8MHz)	CA-3809	GR-K532
T11	IF (7.8MHz)	CA-3810	GR-K533
T12	Noise Blanker	CA-3738	GR-K519
T13	Noise Blanker	CA-3738	GR-K519
T14	Modulation Transformer	TD-0184	E7Z19
T401	Power Transformer	TA-0702	TK-1283

CRYSTALS & CRYSTAL FILTERS

Ref. No.	Description	RS Part No.	MFR's Part No.
X1	Crystal	MX-2309	10.240MHz
X2	Crystal	MX-2370	17.8875MHz
X3	Crystal	MX-2371	7.7975MHz
X4	Crystal	MX-2372	7.800MHz
X5	Crystal	MX-2331	7.8025MHz
XF1	Filter (7.8MHz)	C-0964	HG-7A

DIODES

Ref. No.	Description	RS Part No.	MFR's Part No.
D1, 2	Vari-Cap	DX-1196	1S2789(W)
D3, 4	Zener (6.2V)	DX-1194	05Z6.2(L)
D5– 7	Silicon	DX-0270	1S1555
D8	Zener (5.1V)	DX-1193	05Z5.1(L)
D9 – 11	Germanium	DX-0161	1N60
D12	Silicon	DX-0270	1S1555
D13, 14	Silicon	DX-1131	S5277B
D15	Zener (33V)	DX-1195	1Z33-A
D16, 17	Germanium	DX-0161	1N60
D18	Silicon	DX-0270	1S1555
D19, 20	Not used		
D21	Silicon	DX-0270	1S1555
D22 – 24	Germanium	DX-0161	1N60
D25	Silicon	DX-0270	1S1555
D26, 27	Germanium	DX-0161	1N60
D28, 29	Not used		
D30	Silicon	DX-0270	1S1555
D31 – 33	Germanium	DX-0161	1N60
D34 – 36	Silicon	DX-0270	1S1555
D37 – 39	Germanium	DX-0161	1N60
D40	Silicon	DX-0270	1S1555
D41 – 43	Germanium	DX-0161	1N60
D44, 45	Silicon	DX-0270	1S1555
D46, 47	Germanium	DX-0161	1N60
D48, 49	Silicon	DX-0270	1S1555
D50	Germanium	DX-0161	1N60
D51, 52	Silicon	DX-0270	1S1555
D53	Zener (5.1V)	DX-1193	05Z5.1(L)
D54, 55	Germanium	DX-0161	1N60
D56	Zener (4V)	DX-1192	HZ4C2
D57, 58	Silicon	DX-0270	1S1555
D59, 60	Silicon	DX-1131	S5277B
D61 – 63	Silicon	DX-0270	1S1555
D64	Germanium	DX-0161	1N60
D301	Zener (10V)	DX-1034	05Z10(L)
D302 – 304	Silicon	DX-1131	S5277B
D305	Rectifier	DX-0447	S5-VB-20
D306	Zener (5.1V)	DX-1193	05Z5.1(L)
D401	Silicon	DX-0270	1S1555
D402	Not used		
D403, 404	Silicon	DX-0270	1S1555
D501 – 525	Silicon	DX-0270	1S1555
D526	Not used		
D527 – 530	Silicon	DX-0270	1S1555
D531	Zener (6.2V)	DX-1194	05Z6.2(L)
D532	Silicon	DX-0270	1S1555
D601	LED (Clock Ind.)	L-0984	SL-1462-10C
D602	Silicon	DX-0270	1S1555
D603, 604	Germanium	DX-0161	1N60
D605 – 607	Silicon	DX-0270	1S1555
D608	Zener (5.1V)	DX-1193	05Z5.1(L)
D701 – 711	LED	L-0983	TLR-124
D712	LED (CH Ind.)	L-0982	SL-1261
D713 – 715	LED	L-0983	TLR-124
D716 – 722	Silicon	DX-0270	1S1555

INTEGRATED CIRCUITS

Ref. No.	Type No.	Substitute Type No.
IC1	LC7113	
IC2	KH3207	
IC3, 4	TA7310P	
IC5	TA78L009P	
IC6	SN76600P	
IC7	TA58 or TA78	
IC8	MC1496P	LM1496N
IC9	TA58 or TA78	
IC10	μPC1170H	
IC11	TC4066P or BP	MC14066
IC12	TA7222AP	
IC301	TA7089P	
IC501	TA58 or TA78	
IC502, 503	TD62103P	
IC504 – 507	TC4081P or BP	
IC508	TC4010P or BP	
IC509	TMS1023NL	
IC510	TC4066P or BP	MC14066
IC511	TA78L009P	
IC601	LM8360	

METERS

Ref. No.	Description	RS Part No.	MFR's Part No.
M401	S/RF	M-0409	LEVEL-M-G.R.E.
M402	SWR	M-0409	LEVEL-M-G.R.E.

RELAYS

Ref. No.	Description	RS Part No.	MFR's Part No.
RY1	AM/SSB	R-8106	LZ-12H-P
RY2	TX/RX	R-8085	MX-2P-0
RY301	Power ON	R-8106	LZ-12H-P
RY302	Power ON	R-8106	LZ-12H-P

RESISTORS

NOTE: Unless otherwise specified all resistors are carbon film, wattage 1/4 W, tolerance ±5%.

Ref. No.	Value	RS Part No.	Wattage (W)	Tolerance (%)	Material
R1	10kΩ	NEE-0281			
R2	15kΩ	NEE-0297			
R3	10kΩ	NEE-0281			
R4	10kΩ	NEE-0281			
R5	10kΩ	NEE-0281			
R6	4.7kΩ	NEE-0247			
R7	100kΩ	NEE-0371			
R8	3.3kΩ	NEE-0230			
R9	10kΩ	NEE-0281			
R10	10kΩ	NEE-0281			
R11	10kΩ	NEE-0281			
R12	1kΩ	NEE-0196			
R13	82kΩ	NEE-0360			
R14	1kΩ	NEE-0196			
R15	56Ω	NEG-0107	1	±5	Metal
R16	10kΩ	NEE-0281			
R17	470Ω	NEE-0169			
R18	39kΩ	NEE-0330			
R19	220Ω	NEE-0149			
R20	150Ω	NEE-0142			
R21	220Ω	NEE-0149			
R22	1.2kΩ	NEE-0199			
R23	33kΩ	NEE-0324			
R24	33kΩ	NEE-0324			
R25	5.6kΩ	NEE-0257			
R26	10kΩ	NEE-0281			
R27	1.2kΩ	NEE-0199			
R28	2.7kΩ	NEE-0224			
R29	2.2kΩ	NEE-0216			
R30	12kΩ	NEE-0288			
R31	10kΩ	NEE-0281			
R32	33kΩ	NEE-0324			
R33	4.7kΩ	NEE-0247			
R34	470Ω	NEE-0169			
R35	2.7kΩ	NEE-0224			
R36	10Ω	NEE-0063			
R37	2.2kΩ	NEE-0216			
R38	82Ω	NEH-0122	2	±5	Metal
R39	1Ω	NEE-0022			
R40	2.2Ω	NEE-0032			
R41	39Ω	NEE-0092			
R42	10Ω	NEE-0063			
R43	330Ω	NEE-0159			
R44	1kΩ	NEE-0196			
R45	82Ω	NEH-0122	2	±5	Metal
R46	1Ω	NEE-0022			
R47	2.2Ω	NEE-0032			
R48	39Ω	NEE-0092			
R49	3.3Ω	NEE-0037			
R50	150Ω	NEE-0142			
R51	4.7kΩ	NEE-0247			
R52	560Ω	NEE-0176			
R53	2.2kΩ	NEE-0216			
R54	100Ω	NEE-0132			
R55	47Ω	NEE-0099			
R56	3.3MΩ	NFF-0458	1/2	±10	Solid
R57	3.3kΩ	NEE-0230			
R58	10kΩ	NEE-0281			
R59	47Ω	NEE-0099			
R60	10kΩ	NEE-0281			
R61	22kΩ	NEE-0311			
R62	12kΩ	NEE-0288			
R63	4.7kΩ	NEE-0247			
R64	56Ω	NEE-0107			
R65	820Ω	NEE-0187			
R66	1kΩ	NEE-0196			
R67	10kΩ	NEE-0281			
R68	4.7kΩ	NEE-0247			
R69	100Ω	NEE-0132			
R70	220kΩ	NEE-0396			
R71	47kΩ	NEE-0340			
R72	18kΩ	NEE-0303			
R73	220Ω	NEE-0149			
R74	220Ω	NEE-0149			
R75	220Ω	NEE-0149			
R76	330Ω	NEE-0159			
R77	330Ω	NEE-0159			
R78	18kΩ	NEE-0303			
R79	15kΩ	NEE-0297			
R80	56Ω	NEE-0107			
R81	4.7kΩ	NEE-0247			
R82	100Ω	NEE-0132			
R83	3.3kΩ	NEE-0230			
R84	47kΩ	NEE-0340			
R85	150Ω	NEE-0142			
R86	100Ω	NEE-0132			
R87	220Ω	NEE-0149			
R88	10kΩ	NEE-0281			
R89	27kΩ	NEE-0316			
R90	820Ω	NEE-0187			
R91	470Ω	NEE-0169			
R92	5.6kΩ	NEE-0257			
R93	820kΩ	NEE-0440			
R94	100kΩ	NEE-0371			
R95	220kΩ	NEE-0396			
R96	680kΩ	NEE-0433			
R97	82kΩ	NEE-0360			
R98	56kΩ	NEE-0345			
R99	33kΩ	NEE-0324			
R100	10kΩ	NEE-0281			
R101	82kΩ	NEE-0360			
R102	10kΩ	NEE-0281			
R103	1kΩ	NEE-0196			
R104	1kΩ	NEE-0196			
R105	68kΩ	NEE-0354			
R106	2.7kΩ	NEE-0224			
R107	2.7kΩ	NEE-0224			
R108	2.2kΩ	NEE-0216			
R109	56Ω	NEE-0107			
R110	330kΩ	NEE-0410			
R111	1.5MΩ	NEE-0450			
R112	10kΩ	NEE-0281			
R113	180kΩ	NEE-0387			
R114	6.8kΩ	NEE-0262			
R115	68kΩ	NEE-0354			
R116	2.2kΩ	NEE-0216			

Ref. No.	Value	RS Part No.	Watt-age (W)	Toler-ance (%)	Material
R117	22kΩ	NEE-0311			
R118	10kΩ	NEE-0281			
R119	22kΩ	NEE-0311			
R120	10kΩ	NEE-0281			
R121	1kΩ	NEE-0196			
R122	3.3kΩ	NEE-0230			
R123	1.2kΩ	NEE-0199			
R124	56Ω	NEE-0107			
R125	56Ω	NEE-0107			
R126	1kΩ	NEE-0196			
R127	680Ω	NEE-0183			
R128	8.2kΩ	NEE-0271			
R129	560Ω	NEE-0176			
R130	1kΩ	NEE-0196			
R131	560Ω	NEE-0176			
R132	1kΩ	NEE-0196			
R133	1kΩ	NEE-0196			
R134	470Ω	NEE-0169			
R135	470Ω	NEE-0169			
R136	2.2kΩ	NEE-0216			
R137	2.2kΩ	NEE-0216			
R138	150kΩ	NEE-0384			
R139	2.2kΩ	NEE-0216			
R140	47kΩ	NEE-0340			
R141	47kΩ	NEE-0340			
R142	47kΩ	NEE-0340			
R143	4.7kΩ	NEE-0247			
R144	220kΩ	NEE-0396			
R145	4.7kΩ	NEE-0247			
R146	47kΩ	NEE-0340			
R147	10kΩ	NEE-0281			
R148	2.2MΩ	NEE-0454			
R149	4.7kΩ	NEE-0247			
R150	15kΩ	NEE-0297			
R151	10kΩ	NEE-0281			
R152	10kΩ	NEE-0281			
R153	10kΩ	NEE-0281			
R154	4.7kΩ	NEE-0247			
R155	1.5kΩ	NEE-0206			
R156	10kΩ	NEE-0281			
R157	220kΩ	NEE-0396			
R158	22kΩ	NEE-0311			
R159	Not used				
R160	10kΩ	NEE-0281			
R161	4.7kΩ	NEE-0247			
R162	100kΩ	NEE-0371			
R163	220Ω	NEE-0149			
R164	2.2kΩ	NEE-0216			
R165	10kΩ	NEE-0281			
R166	270kΩ	NEE-0402			
R167	10kΩ	NEE-0281			
R168	470Ω	NEE-0169			
R169	1M Ω	NEE-0445			
R170	1kΩ	NEE-0196			
R171	100Ω	NEE-0132			
R172	680Ω	NEE-0183			
R173	56kΩ	NEE-0345			
R174	4.7kΩ	NEE-0247			
R175	680Ω	NEE-0183			
R176	3.9kΩ	NEE-0237			
R177	1kΩ	NEE-0196			

Ref. No.	Value	RS Part No.	Watt age (W)	Toler-ance (%)	Material
R178	1MΩ	NEE-0445			
R179	33Ω	NEE-0087			
R180	10kΩ	NEE-0281			
R181	10kΩ	NEE-0281			
R182	10kΩ	NEE-0281			
R183	10kΩ	NEE-0281			
R184	10kΩ	NEE-0281			
R185	1.5MΩ	NEE-0450			
R186	1kΩ	NEE-0196			
R187	3.3kΩ	NEE-0230			
R188	270Ω	NEE-0155			
R189	2.2kΩ	NEE-0216			
R190	2.2kΩ	NEE-0216			
R191	2.2kΩ	NEE-0216			
R192	560Ω	NEE-0176			
R193	330Ω	NEE-0159			
R194	820Ω	NEE-0187			
R195	2.2kΩ	NEE-0216			
R196	10kΩ	NEE-0281			
R197	10kΩ	NEE-0281			
R198	220 Ω	NEE-0149			
R199	10kΩ	NEE-0281			
R200	1kΩ	NEE-0196			
R201	10kΩ	NEE-0281			
R202	12kΩ	NEE-0288			
R203	18kΩ	NEE-0303			
R204	3.9kΩ	NEE-0237			
R205	100kΩ	NEE-0371			
R206	3.3kΩ	NEE-0230			
R207	10kΩ	NEE-0281			
R208	5.6kΩ	NEE-0257			
R209	Not used				
R210	100kΩ	NEE-0371			
R211	330kΩ	NEE-0410			
R212	180kΩ	NEE-0387			
R213	47kΩ	NEE-0340			
R214	82Ω	NEE-0122			
R301	22Ω	NEG-0078	1	±5	Metal
R302	270Ω	NEE-0155			
R303	Not used				
R304	220Ω	NEE-0149			
R305	2.2kΩ	NEE-0216			
R306	4.7kΩ	NEE-0247			
R307	22Ω	NEE-0078			
R308	10kΩ	NEE-0281			
R309	3.3kΩ	NEE-0230			
R310	0.15Ω		5	±10	Cement
R311	68Ω	NEG-0111	1	±5	Metal
R312	100kΩ	NEE-0371			
R401	2.2Ω	NEG-0032	1	±5	Metal
R402	82Ω	NEG-0122	1	±5	Metal
R403	3.3MΩ	NFF-0458	1/2	±10	Solid
R404	10kΩ	NEE-0281			
R501	2.2kΩ	NEE-0216			
R502	10kΩ	NEE-0281			
R503	10kΩ	NEE-0281			
R504	10kΩ	NEE-0281			

Ref. No.	Value	RS Part No.	Watt-age (W)	Toler-ance (%)	Material
R505	3.3kΩ	NEE-0230			
R506	10kΩ	NEE-0281			
R507	10kΩ	NEE-0281			
R508	3.3kΩ	NEE-0230			
R509	10kΩ	NEE-0281			
R510	3.3kΩ	NEE-0230			
R511	10kΩ	NEE-0281			
R512	470kΩ	NEE-0423			
R513	470kΩ	NEE-0423			
R514	10kΩ	NEE-0281			
R515	10kΩ	NEE-0281			
R516	4.7kΩ	NEE-0247			
R517	10kΩ	NEE-0281			
R518	100kΩ	NEE-0371			
R519	100kΩ	NEE-0371			
R520	100Ω	NEE-0132			
R521	470kΩ	NEE-0423			
R522	22kΩ	NEE-0311			
R523	10kΩ	NEE-0281			
R524	10kΩ	NEE-0281			
R525	3.3kΩ	NEE-0230			
R526	10kΩ	NEE-0281			
R527	100kΩ	NEE-0371			
R528	56kΩ	NEE-0345			
R529	10kΩ	NEE-0281			
R530	47kΩ	NEE-0340			
R531	100kΩ	NEE-0371			
R532	100kΩ	NEE-0371			
R533	5.6kΩ	NEE-0257			
R534	68kΩ	NEE-0354			
R535	10kΩ	NEE-0281			
R536	10kΩ	NEE-0281			
R537	2.2kΩ	NEE-0216			
R538	3.3kΩ	NEE-0230			
R539	10kΩ	NEE-0281			
R540	10kΩ	NEE-0281			
R601	100kΩ	NEE-0371			
R602	100kΩ	NEE-0371			
R603	100kΩ	NEE-0371			
R604	100kΩ	NEE-0371			
R605	100kΩ	NEE-0371			
R606	10kΩ	NEE-0281			
R607	470Ω	NEE-0169			
R608	1.5kΩ	NEE-0206			
R609	33kΩ	NEE-0324			
R610	680Ω	NEE-0183			
R611	68Ω	NEH-0111	2	±5	Metal
R612	270Ω	NEE-0155			
R701	3.3kΩ	NEE-0230			
R702	3.3kΩ	NEE-0230			
R703	3.3kΩ	NEE-0230			
R704	3.3kΩ	NEE-0230			
R705	3.3kΩ	NEE-0230			
R706	3.3kΩ	NEE-0230			
R707	3.3kΩ	NEE-0230			
R708	3.3kΩ	NEE-0230			

RESISTOR ARRAYS

Ref. No.	Description	RS Part No.	MFR's Part No.
RA501	56kΩ x 8	RX-0082	EXB-P88-563M
RA701	2.2kΩ x 7	RX-0083	EXB-RB7-222M
RA702	2.2kΩ x 7	RX-0083	EXB-RB7-222M

SWITCHES

Ref. No.	Description	RS Part No.	MFR's Part No.
	Mode SW Ass'y	S-0905	3BB-0001FF2060
SW401	CB		
SW402	PA		
SW403	MON		
	Function SW Ass'y	S-0907	3B-0001FF2060
SW404	SWR CAL		
SW405	NB/ANL		
SW406	DIMMER		
	Function SW Ass'y	S-0907	3B-0001FF2060
SW407	24HR		
SW408	AUTO		
SW409	POWER		
SW601	Clock Function SW (AUTO SET/RUN/ TIME SET/SEC)	S-2499	SQP-24-04P
SW602	Clock Function SW (FAST)	S-0906	KS-R11-010811-01
SW603	Clock Function SW (SLOW)	S-0906	KS-R11-010811-01

THERMISTORS

Ref. No.	Description	RS Part No.	MFR's Part No.
TH1, 2	Thermistor (60Ω)	T-1206	M-60
TH3	Thermistor (100Ω)	T-1207	M-100
TH4 – 6	Thermistor (10kΩ)	T-1208	M-10K

VARIABLE CAPACITORS

Ref. No.	Description	RS Part No.	MFR's Part No.
TC1	Trimmer (20pF)	C-0965	ECV-1ZW20X53N
TC2	Trimmer (25pF)	C-0966	ECV-1ZW25X53N
TC3 – 5	Trimmer (20pF)	C-0965	ECV-1ZW20X53N

TRANSISTORS

Ref. No.	Type No.	Substitute Type No.
Q1, 2	2SC1815(GR)	2SC373
Q3, 4	2SC1923(O)	2SC784(O)
Q5, 6	2SC1815(Y)	2SC372(Y)
Q7 – 10	2SC1815(GR)	2SC373
Q11	2SC735(O) or (Y)	
Q12	2SC2086	
Q13	2SC2393	
Q14	2SC2394	
Q15, 16	2SC1923(O)	2SC784(O)
Q17	2SC1815(GR)	2SC373
Q18	2SC1923(O)	2SC784(O)
Q19	2SC1815(GR)	2SC373
Q20	3SK59(GR)	
Q21 – 24	2SC1815(Y)	2SC372(Y)
Q25	2SC732(GR)	
Q26, 27	2SC1923(O)	2SC784(O)
Q28	2SC1815(GR)	2SC373
Q29	2SC1815(Y)	2SC372(Y)
Q30	2SC1815(GR)	2SC373
Q31	2SK19(GR)	
Q32 – 36	2SC1815(GR)	2SC373
Q37, 38	2SA1015(Y)	2SA495(Y)
Q39	2SC732(GR)	
Q40	2SC1815(GR)	2SC373
Q41	2SC509(O) or (Y)	
Q42	2SD525(O) or (Y)	
Q43 – 45	2SC1815(GR)	2SC373
Q46	2SC735(O) or (Y)	
Q47	2SA1015(Y)	2SA495(Y)
Q301	2SD234(O) or (Y)	
Q302	2SC1815(GR)	2SC373
Q303	2SC735(O) or (Y)	
Q304	2SC1173(O)	
Q401	2SD428(O)	
Q501	2SA1015(Y)	2SA495(Y)
Q502 – 508	2SC1815(GR)	2SC373
Q509	2SA1015(Y)	2SA495(Y)
Q510	2SC1815(GR)	2SC373
Q601 – 606	2SC1815(GR)	2SC373
Q607	2SC1173(O)	

VARIABLE RESISTORS

Ref. No.	Description	RS Part No.	MFR's Part No.
VR1	Semi-fixed (10kΩ B)	P-6446	SR-19R 10kB
VR2	Semi-fixed (22kΩ B)	P-6523	SR-19R 22kB
VR3	Semi-fixed (10kΩ B)	P-6446	SR-19R 10kB
VR4	Semi-fixed (4.7kΩ B)	P-6445	SR-19R 4.7kB
VR5	Semi-fixed (47kΩ B)	P-6444	SR-19R 47kB
VR6, 7	Semi-fixed (50Ω B)	P-0836	TM10K(PV)B50
VR8	Semi-fixed (22kΩ B)	P-6523	SR-19R 22kB
VR9	Semi-fixed (47kΩ B)	P-6444	SR-19R 47kB
VR10	Semi-fixed (100Ω B)	P-1351	SR-19R 100B
VR11, 12	Semi-fixed (47kΩ B)	P-6444	SR-19R 47kB
VR13	Semi-fixed (22kΩ B)	P-6523	SR-19R 22kB
VR14	Semi-fixed (470Ω B)	P-1403	SR-19R 470B
VR301	Semi-fixed (4.7kΩ B)	P-6445	SR-19R 4.7kB
VR401	VOLUME Control 10kΩ A	P-1927	LE14A013-10kA
VR402	SQUELCH Control 50kΩ C	P-0861	LE14A114-50kC
VR403	RF GAIN Control 50kΩ B	P-0862	LE14A013-50kB
VR404	TONE Control 250kΩ B	P-2101	LE14E030-250kB
VR405	CLARIFIER Control 10kΩ B	P-0863	LE14E029-10kB
VR406	SWR CAL Control 20kΩ B	P-1928	VM10A624A20kB

MISCELLANEOUS			
Ref. No.	**Description**	**RS Part No.**	**MFR's Part No.**
P1	Connector (8P : male)		IL-8P-S3EN2
P2	Connector (7P : male)		IL-7P-S3EN2
P3	Connector (3P : male)		IL-3P-S3EN2
P4	Connector (5P : male)		IL-5P-S3EN2-(N)
P5	Connector (3P : male)		IL-3P-S3EN2
P6	Connector (5P : male)		IL-5P-S3EN2-(N)
P7	Connector (2P : male)		IL-2P-S3EN2
P301	Connector (5P : male)		IL-5P-S3EN2-(N)
P302	Connector (4P : male)		IL-4P-S3EN2
P409	Connector (2P : male)		IL-2P-S3EN2
J101	8P Wire Connector Ass'y		GE-23D-7353
J102	7P Wire Connector Ass'y		GE-23D-7352
J103	3P Wire Connector Ass'y		GE-23D-7347
J104	5P Wire Connector Ass'y		GE-23D-7351
J105	3P Wire Connector Ass'y		GE-23D-7346
J106	5P Wire Connector Ass'y		GE-23D-7349
J107	2P Wire Connector Ass'y		GE-23D-7345
J301	5P Wire Connector Ass'y		GE-23D-7350
J302	4P Wire Connector Ass'y		GE-23D-7348
J401	Mic Jack	J-1008	D5-704B-00S
J402	Phone Jack	J-1007	SG-7625-01
J403	DC 12 V Jack	J-6653	S-10812
J404	PA SPKR Jack	J-0840	SG-8022
J405	EXT SPKR Jack	J-0840	SG-8022
J406	ANT Jack	J-6487	NY-R
J407	8P Wire Connector Ass'y		GE-23D-7354
J409	2P Wire Connector Ass'y		GE-23D-7382
P408, J408	Interconnect Cable Ass'y		GE-23D-7344
TP1 – 8, TP11 – 15	Test Point		CHP-02A
TP9, 10	Crystal Socket (for test point)	J-6652	S2-101P-01

MECHANICAL PARTS LIST

Ref. No.	Description	RS Part No.	MFR's Part No.
(1)	VOLUME Control	P-1927	LE14A013-10kA
(2)	SQUELCH Control	P-0861	LE14A114-50kC
(3)	RF GAIN Control	P-0862	LE14A013-50kB
(4)	TONE Control	P-2101	LE14E030-250kB
(5)	CLARIFIER Control	P-0863	LE14E029-10kB
(6)	SWR CAL Control	P-1928	VM10A624A20kB
(7)	Control Knobs (VOL, SQ, RF, TONE, CLAR)	K-3257	GE-23D-7106
(8)	Mode/Function SW Buttons (CB, PA, MON, SWR CAL, NB/ANL, DIMMER, 24HR, AUTO, POWER)	K-3258	GE-23D-7107
(9)	Clock Function SW Knob	K-3259	GE-23D-7108
(10)	Clock Function SW Buttons (FAST, SLOW)	K-3260	GE-23D-7109
(11)	Top Case Ass'y	Z-4451	GE-23E-7252
	Top Case		
	Filter Cover		
	Protection Cloth for Speaker		
	Control Panel		
(12)	Bottom Cover Ass'y	Z-4455	GE-23E-7422
	Bottom Cover		
	Protection Cloth (larger)		
	Protection Cloth (smaller)		
	Foot		
(13)	Keyboard Ass'y	K-3256	SCF-55001
	Keyboard		
	6 Diodes		
	Connector (8P : male)		
	Spacer		
(14)	Speaker	S-4785	C100A21G-0311
(15)	Filter Plate	Z-4454	GE-23C-7105
(16)	Masking Plate	RT-1865	GE-23D-7110
(17)	Main Chassis		GE-23A-7098
(18)	Console Chassis		GE-23A-7099
(19)	Main P.C. Board Ass'y	X-7955	GE-23E-7310
(20)	Power Supply P.C. Board Ass'y	X-7956	GE-23E-7301
(21)	M.P.U. P.C. Board Ass'y	X-7957	GE-23E-7302
(22)	Display P.C. Board Ass'y	X-7958	GE-23E-7307
(23)	Clock P.C. Board Ass'y	X-7966	GE-23E-7303
(24)	Clock Control P.C. Board Ass'y	X-7963	GE-23E-7304
(25)	Mode SW (CB, PA, MON) P.C. Board Ass'y	X-7959	GE-23E-7305
(26)	Function SW (SWR CAL, NB/ANL, DIMMER) P.C. Board Ass'y	X-7960	GE-23E-7338
(27)	Function SW (24HR, AUTO, POWER) P.C. Board Ass'y	X-7961	GE-23E-7339
(28)	PA/EXT SPKR Jack P.C. Board Ass'y	X-7964	GE-23E-7306
(29)	Phone Jack P.C. Board Ass'y	X-7962	GE-23E-7365
(30)	Mic Jack P.C. Board Ass'y	X-7965	GE-23E-7366
(31)	LED (clock indicator)	L-0984	SL-1462-10C
(32)	Mic Jack	J-1008	D5-704B-00S
(33)	Phone Jack	J-1007	SG-7625-01
(34)	DC 12 V Jack	J-6653	S-10812
(35)	ANT Jack	J-6487	NY-R
(36)	Power Transformer	TA-0702	TK-1283
(37)	Supporter for Modulation Transformer		GE-23D-7534
(38)	Heat Sink		GE-23B-7100
(39)	Spacer for Clock LED	RT-1864	GE-23D-7335

Ref. No.	Description	RS Part No.	MFR's Part No.
(40)	Supporter for LED Meter	RT-1862	GE-23D-7244
(41)	Spacer for Mode/Function Indicator	RT-1861	GE-23D-7245
(42)	Protection Cloth for Volume Controls		GE-23D-7232
(43)	Protection Cloth for Clock Function SW (FAST, SLOW)		GE-23D-7254
(44)	Lug Terminal Strips	J-4580	2L-4P
(45)	Ground Lug (ANT)	HB-6658	GE-21D-6137
(46)	Stud		GE-23D-7368
(47)	Transistor Socket	J-6654	S2-110B-03
	Screws		
(48)	Flat-Head Self Tapping Screws		3 x 6 mm
(49)	Round-Head Self Tapping Screws		3 x 6 mm
(50)	Round-Head Self Tapping Screws		3 x 8 mm
(51)	Round-Head Self Tapping Screws		4 x 10 mm
(52)	Binding-Head Self Tapping Screws		2.6 x 7 mm
(53)	Pan-Head Screws		3 x 6 mm
(54)	Pan-Head Screws		3 x 8 mm
(55)	Pan-Head Screws		3 x 12 mm
(56)	Pan-Head Screws		4 x 5 mm
(57)	Binding-Head Screws		2.6 x 6 mm
(58)	Binding-Head Screws		3 x 15 mm
(59)	Binding-Head Screws		4 x 8 mm
(60)	Binding-Head Screws		4 x 10 mm
(61)	Hex Nuts		3 ϕ
(62)	Hex Nuts		4 ϕ
(63)	Speed Nuts		PSN-4
(64)	Internal Star Lock Washers		3 ϕ
(65)	Spring Washers		3 ϕ
(66)	Spring Washers		4 ϕ
	Flat Cable (Connect Clock P.C.B. to Clock LED)	W-2263	GE-23D-7317
	Heat Sink (Assembled in Power Supply P.C.B.)	HH-0313	GE-23D-7126
	Post Pin (Assembled in Power Supply P.C.B.)		MX-1. 14T-18
	Stand Off (Assembled in Clock P.C.B.)		3 ϕ x 5 mm
	Stand Off (Assembled in Power Supply P.C.B.)		3 ϕ x 20 mm
	Stand Off (Assembled in Power Supply P.C.B.)		4 ϕ x 10 mm
	Wire Clip (Al)		GE-23D-7319
	Wire Binder		220-JD485210-01
	Wire Binder		BK-1
	AC Power Cord		KP-10
	Cord Strain Relief	HB-0705	3P-4
	Fuse		1A, 125 V or 250 V
	Fuse Caution Label		GE-23D-7641
	Caution Notice Label		GE-19D-4860
	Model Label		GE-23D-7337

APPENDIX TO PARTS LIST

For Canadian model, some parts are changed. Following parts list information applies to this model.

Ref. No.	Description	RS Part No.	MFR's Part No.
	Fuse		1A, 125 V (62ML)
	Fuse Caution Label		GE-23D-7461
	Caution Notice Label (Not used)		
	Model Label		GE-23D-7158

ACCESSORY LIST

Ref. No.	Description	RS Part No.	MFR's Part No.
	DC Power Cord Ass'y	W-2264	GE-23D-7343
P403	3P Connector	J-6655	W-E1003
	F Terminal		W-T5302
	Fuse Holder		
	Fuse		4A, 125 V (UL 61ML)
	Cable		AWM1015
	Fuse Caution Label		GE-23D-7490
	Microphone with Mic Hanger		M049D50G0310
	Screws Kit		GE-17D-3738

APPENDIX TO ACCESSORY LIST

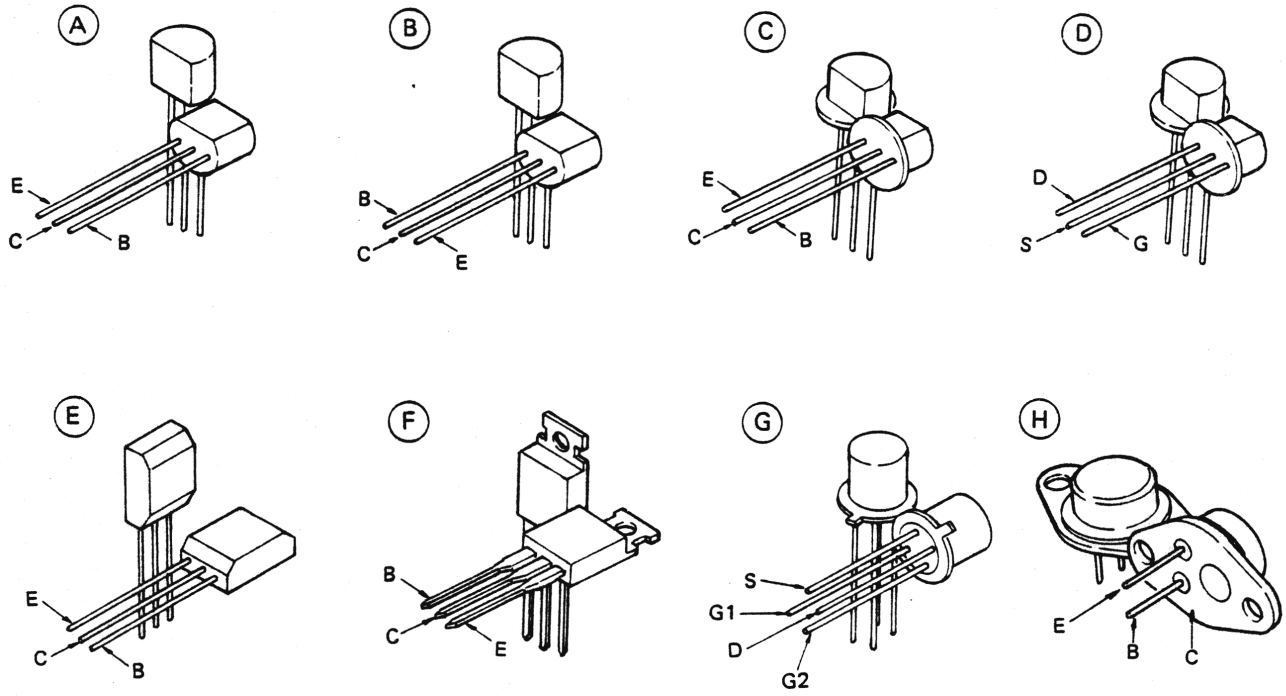
For Canadian model, some accessory are changed. Following accessory list information applies to this model.

Ref. No.	Description	RS Part No.	MFR's Part No.
	Fuse (Assembled in DC Power Cord)		4A, 125 V
	Fuse Label		4A
	Fuse Caution Label (Not used)		

SEMICONDUCTOR LEAD IDENTIFICATION

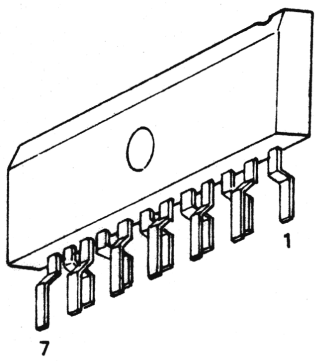
(1) TRANSISTOR

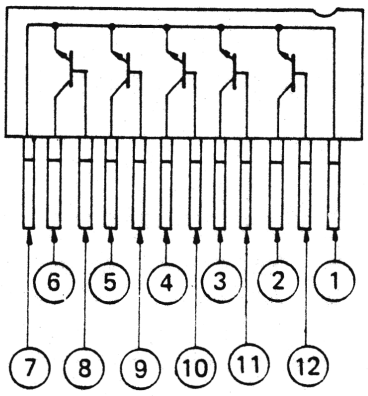
(A) ; 2SA1015(Y), 2SC1923(D), 2SC1815(Y), 2SC1815(GR)
(B) ; 2SC2086
(C) ; 2SC735(O) or (Y), 2SC732(GR)
(D) ; 2SK19(GR)
(E) ; 2SC509(O) or (Y)
(F) ; 2SD525(O) or (Y), 2SC1173(O), 2SC2393, 2SC2394, 2SD234(O) or (Y)
(G) ; 3SK59(GR)
(H) ; 2SD428(O)



(2) IC/TRANSISTOR ARRAY

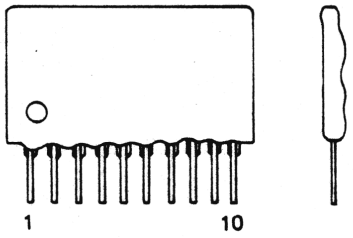
TA58/TA78

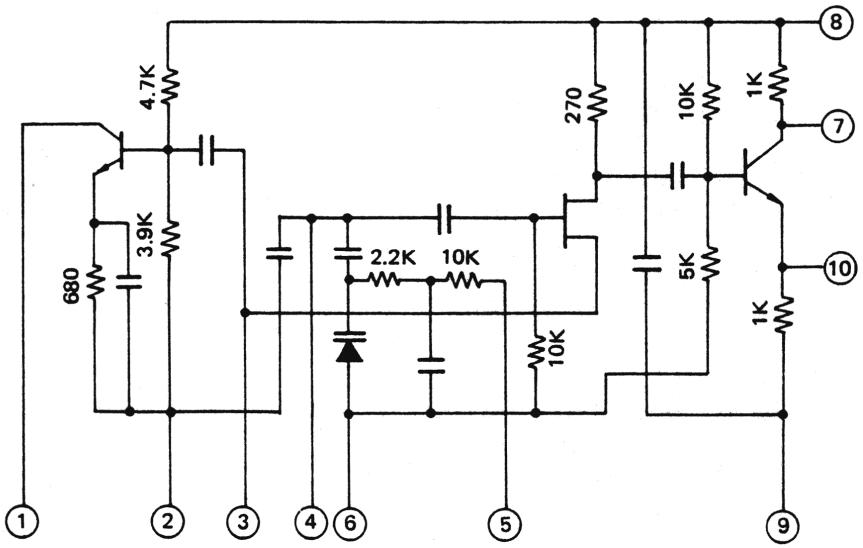




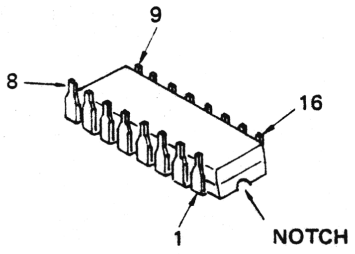
IC LEAD IDENTIFICATION AND EQUIVALENT CIRCUIT

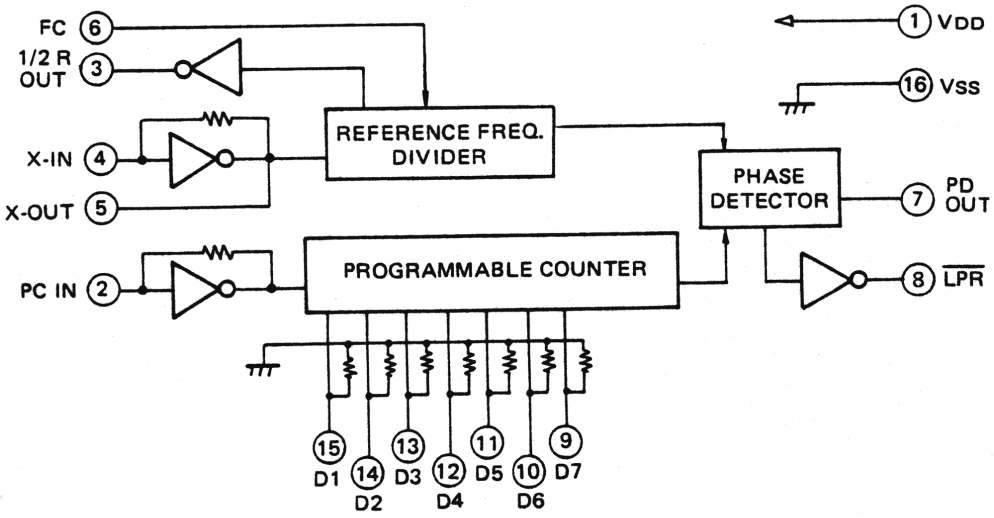
1. KH3207



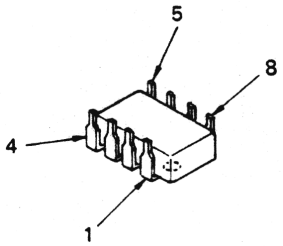


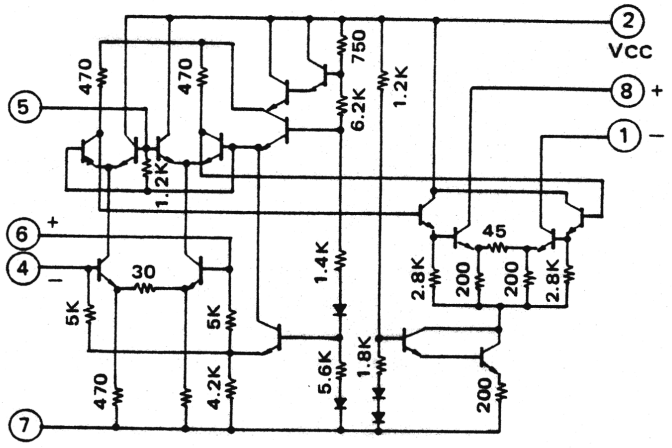
2. LC7113



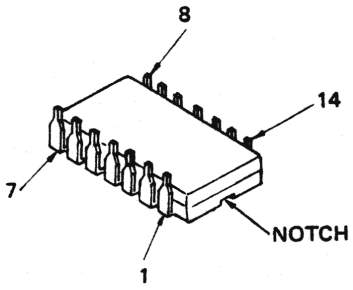


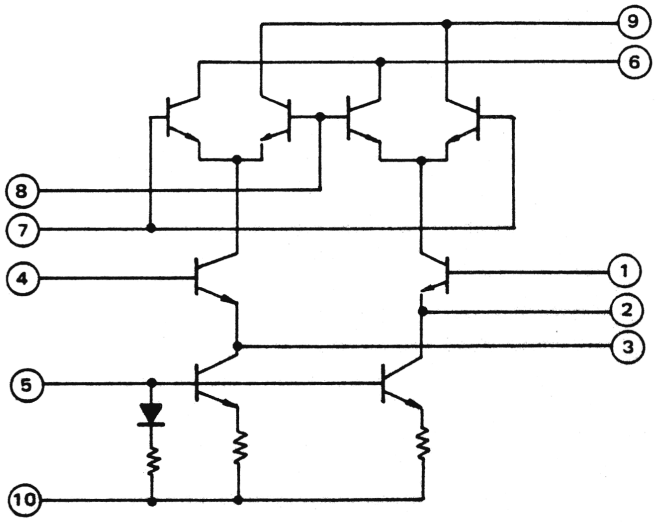
3. SN76600P



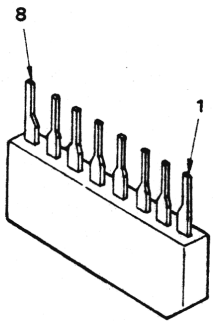


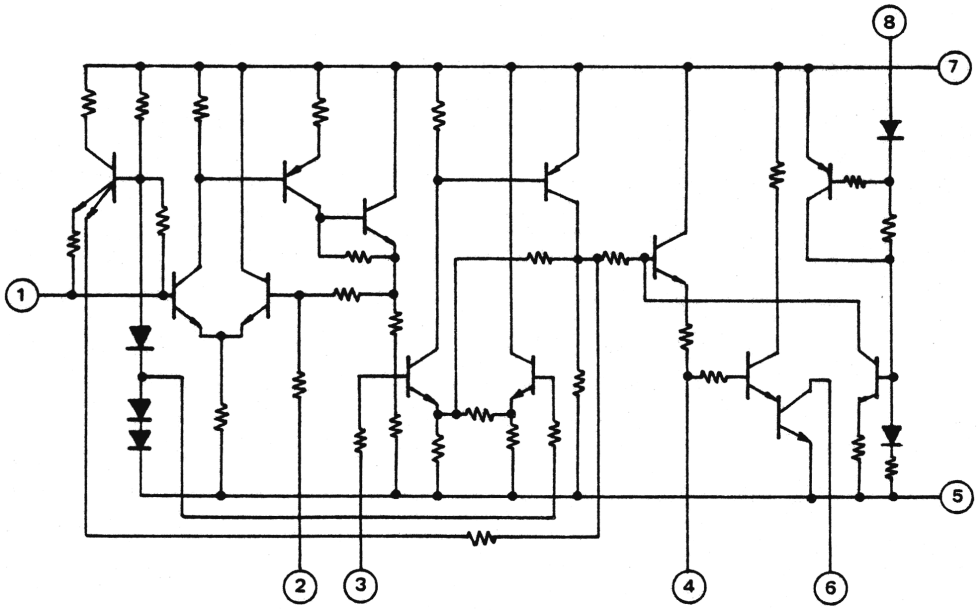
4. MC1496P



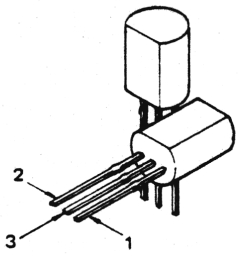


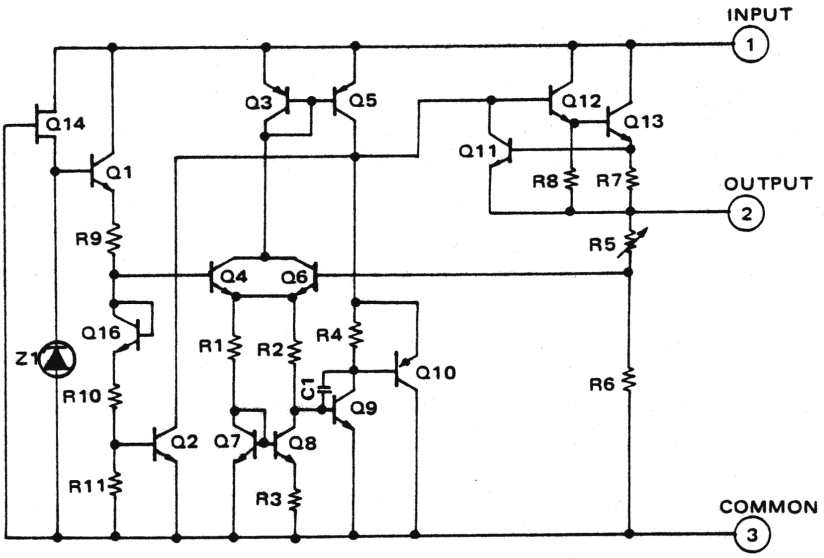
5. μPC1170H



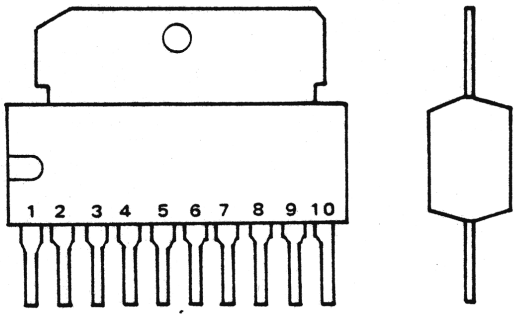


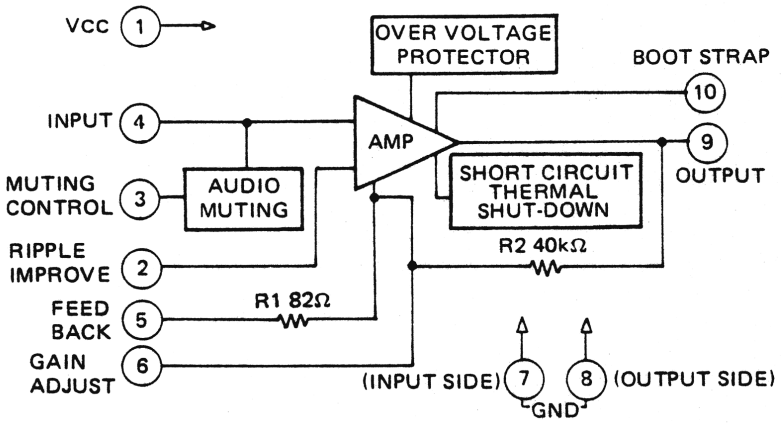
6. TA78L009P



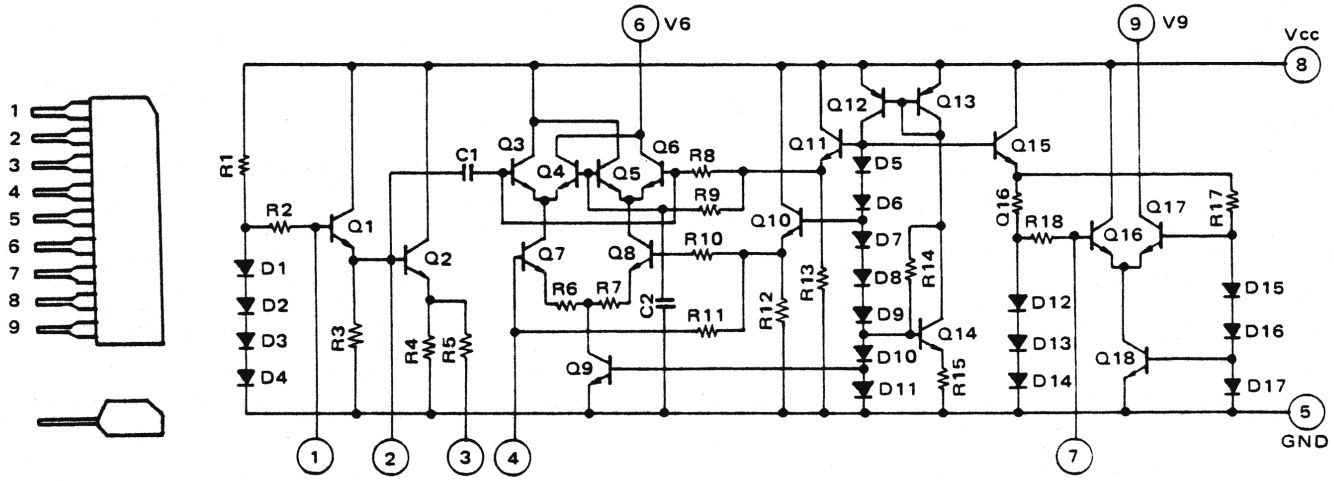


7. TA7222P

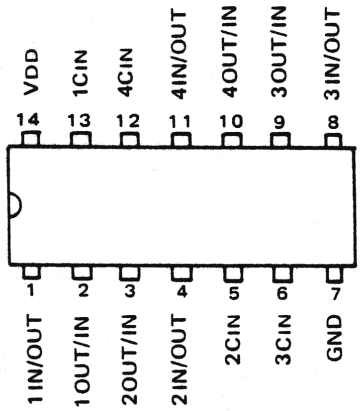




8. TA7310P

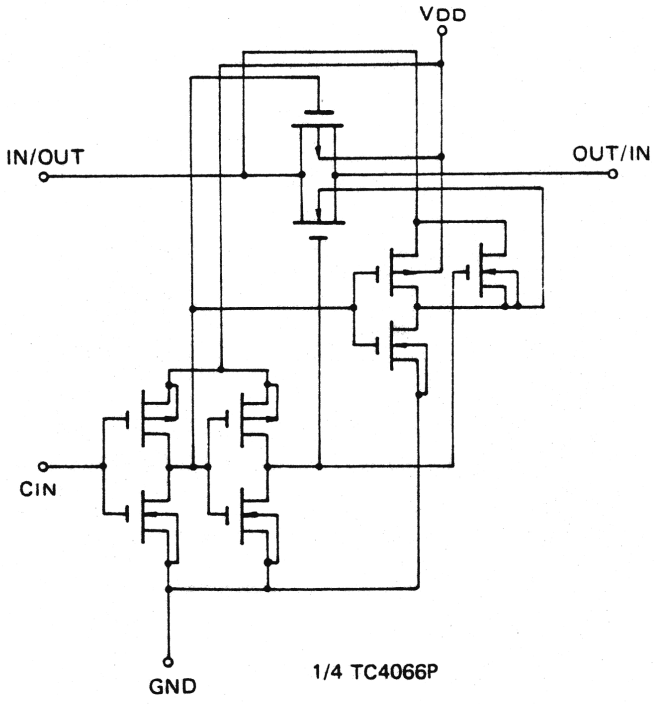


9. TC4066P



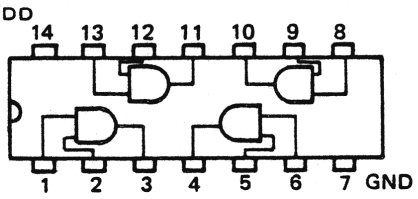
TRUTH TABLE

CIN	IN	OUT
H	VDD ~ GND	VIN
L	VDD ~ GND	High Impedance



10. TC4081P

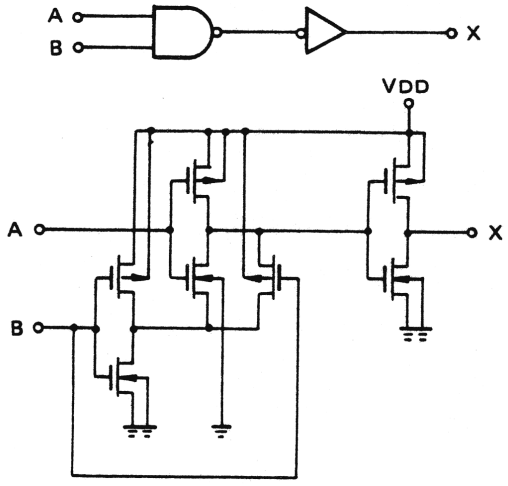
QUAD 2-INPUT POSITIVE AND GATE



TRUTH TABLE

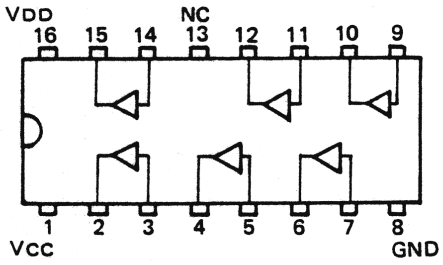
INPUT		OUTPUT
A	B	X
L	L	L
L	H	L
H	L	L
H	H	H

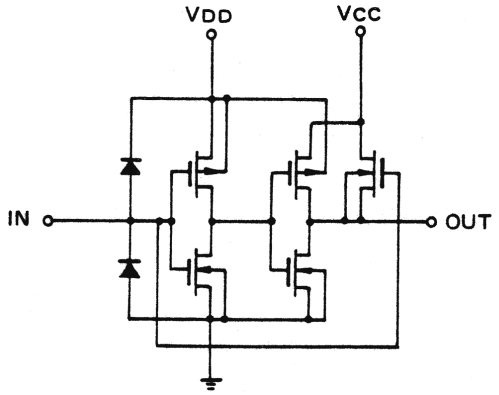
(1/4 TC4081P)



11. TC4010P

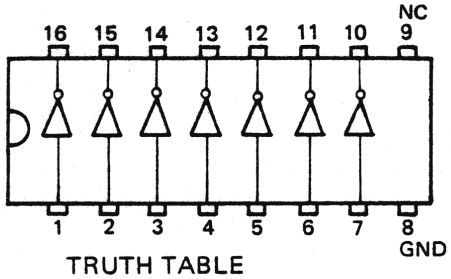
HEX BUFFER/CONVERTER (NON INVERTING TYPE)





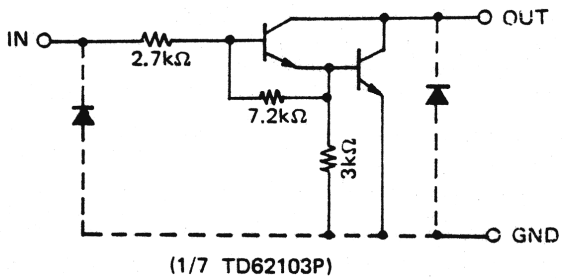
(1/6 TC4010P)

12. TD62103P



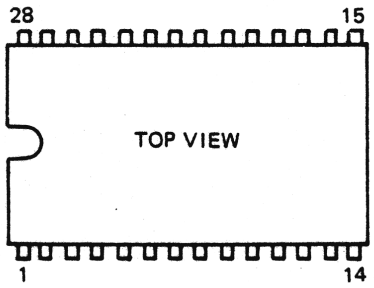
TRUTH TABLE

IN	OUT
H	L
L	H



(1/7 TD62103P)

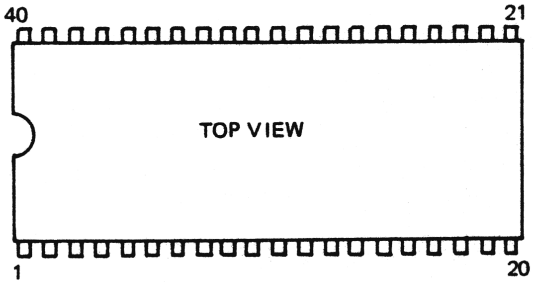
13. TMS1023NL (MPU)



Pin No.		Pin No.	
1	R8	15	O2
2	R9	16	O1
3	R10	17	O0
4	VDD	18	OSC
5	K1	19	OSC
6	K2	20	VSS
7	K4	21	R0
8	K8	22	R1
9	INT	23	R2
10	O7	24	R3
11	O6	25	R4
12	O5	26	R5
13	O4	27	R6
14	O3	28	R7

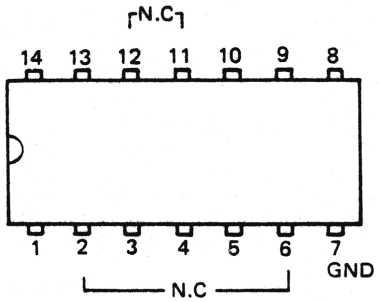
NOTE: Refer to the Schematic Diagram of Microprocessor for the Logic Terms.

14. LM8360

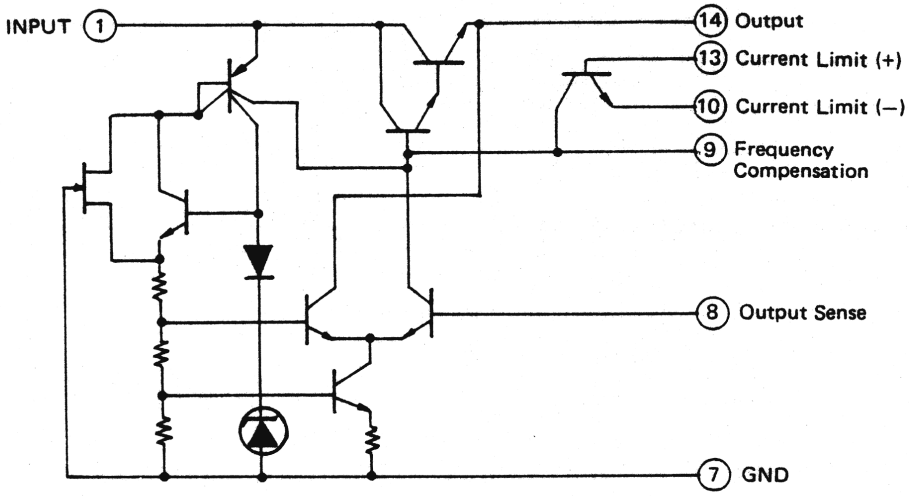


Pin No.		Pin No.	
1	AM OUTPUT	22	MINS c segment
2	10 HRS b & c segments	23	OUTPUT COMMON SOURCE
3	HRS f segment	24	Not used (floating)
4	HRS g segment	25	ALARM OUTPUT
5	HRS a segment	26	ALARM OFF INPUT
6	HRS b segment	27	Not used (floating)
7	HRS d segment	28	VSS
8	HRS c segment	29	VDD
9	HRS e segment	30	Not used (floating)
10	10 MINS f segment	31	ALARM DISPLAY INPUT
11	10 MINS g segment	32	SECONDS DISPLAY INPUT
12	10 MINS a & d segments	33	SLOW SET INPUT
13	10 MINS b segment	34	FAST SET INPUT
14	10 MINS e segment	35	50/60 Hz INPUT
15	10 MINS c segment	36	50/60 Hz SELECT (floating) 60 Hz is selected.
16	MINS f segment		
17	MINS g segment	37	BLANKING INPUT (connected to VSS)
18	MINS a segment		
19	MINS b segment	38	12/24 HRS SELECT
20	MINS e segment	39	1 Hz OUTPUT
21	MINS d segment	40	PM OUTPUT

15. TA7089P



NC : Pin 2 – 6, 11, 12



SEMICONDUCTOR VOLTAGE READINGS

REF. NO.		RECEIVING POWER SUPPLY 13.8 V DC (V DC)			TRANSMITTING POWER SUPPLY 13.8 V DC NO MODULATION (V DC)		
		AM	LSB	USB	AM	LSB	USB
Q1	B	0.68	0.68	0.68	0	0	0
	C	0	0	0	2.4	2.4	2.4
	E	0	0	0	0	0	0
Q2	B	0	0	0	0.68	0.68	0.68
	C	3.4	3.4	3.4	0	0	0
	E	0	0	0	0	0	0
Q3	B	0.75	0	0	0.75	0	0
	C	0	3.7	6	0	3.7	6
	E	0	0	0	0	0	0
Q4	B	0	0.75	0	0	0.75	0
	C	4.7	0	6	4.7	0	6
	E	0	0	0	0	0	0
Q5	B	0	0.7	0	0.5	0.7	0
	C	8	0	0	0.78	0	0
	E	0	0	0	0	0	0
Q6	B	0	0	0.7	0.1	0	0.7
	C	0	7.8	0	0	7.8	0
	E	0	0	0	0	0	0
Q7	B	0.6	0.6	0.6	0.6	0.6	0.6
	C	2.4	2.4	2.4	2.4	2.4	2.4
	E	0	0	0	0	0	0
Q8	B	0	0	0	0.7	0	0
	C	0	0	0	0	0	0
	E	0	0	0	0	0	0
Q9	B	0	0	0	0	0	0
	C	0	0	0	1.5	1.5	1.5
	E	0	0	0	0	0	0
Q10	B	0	0	0	0	0	0
	C	0	0	0	8	8	8
	E	0	0	0	0	0	0
Q11	B	0	0	0	8	8	8
	C	0	0	0	8.6	8.6	8.6
	E	0	0	0	7.2	7.2	7.2
Q12	B	0	0	0	1.2	1.2	1.2
	C	0	0	0	8.4	8.4	8.4
	E	0	0	0	0.54	0.5	0.5
Q13	B	0	0	0	0.58	0.64	0.64
	C	13.8	13.8	13.8	6	13.8	13.8
	E	0	0	0	0	0	0
Q14	B	0	0	0	0.58	0.64	0.64
	C	13.8	13.8	13.8	6	13.8	13.8
	E	0	0	0	0	0	0

REF. NO.		RECEIVING			TRANSMITTING		
		POWER SUPPLY 13.8 V DC (V DC)			POWER SUPPLY 13.8 V DC NO MODULATION (V DC)		
		AM	LSB	USB	AM	LSB	USB
Q15	B	RF MAX 0 RF MIN 0.74	RF MAX 0 RF MIN 0.74	RF MAX 0 RF MIN 0.74	0	0	0
	C	RF MAX 0 RF MIN 0	RF MAX 0 RF MIN 0	RF MAX 0 RF MIN 0	0	0	0
	E	RF MAX 0 RF MIN 0	RF MAX 0 RF MIN 0	RF MAX 0 RF MIN 0	0	0	0
Q16	B	RF IN:0V 0 RF IN: 50mV 0.55	RF IN:0V 0 RF IN: 50mV 0.55	RF IN:0V 0 RF IN: 50mV 0.55	0.78	0.78	0.78
	C	RF IN:0V 0 RF IN: 50mV 0	RF IN:0V 0 RF IN: 50mV 0	RF IN:0V 0 RF IN: 50mV 0	0	0	0
	E	RF IN:0V 0 RF IN: 50mV 0	RF IN:0V 0 RF IN: 50mV 0	RF IN:0V 0 RF IN: 50mV 0	0	0	0
Q17	B	RF IN:0V 0.62 RF IN: 50mV 0.62	RF IN:0V 0.62 RF IN: 50mV 0.62	RF IN:0V 0.62 RF IN: 50mV 0.62	0.2	0.2	0.2
	C	RF IN:0V 0.1 RF IN: 50mV 0.55	RF IN:0V 0.1 RF IN: 50mV 0.55	RF IN:0V 0.1 RF IN: 50mV 0.55	0.79	0.79	0.79
	E	RF IN:0V 0 RF IN: 50mV 0	RF IN:0V 0 RF IN: 50mV 0	RF IN:0V 0 RF IN: 50mV 0	0	0	0
Q18	B	RF IN:0V 1.3 RF IN: 50mV 1.02	RF IN:0V 1.3 RF IN: 50mV 1.02	RF IN:0V 1.3 RF IN: 50mV 1.02	0	0	0
	C	RF IN:0V 5.2 RF IN: 50mV 5.2	RF IN:0V 5.2 RF IN: 50mV 5.2	RF IN:0V 5.2 RF IN: 50mV 5.2	0	0	0
	E	RF IN:0V 0.6 RF IN: 50mV 0.46	RF IN:0V 0.6 RF IN: 50mV 0.46	RF IN:0V 0.6 RF IN: 50mV 0.46	0	0	0
Q19	B	RF IN:0V 5.8 RF IN: 50mV 5.8	RF IN:0V 5.8 RF IN: 50mV 5.8	RF IN:0V 5.8 RF IN: 50mV 5.8	0	0	0
	C	RF IN:0V 8 RF IN: 50mV 8	RF IN:0V 8 RF IN: 50mV 8	RF IN:0V 8 RF IN: 50mV 8	0	0	0
	E	RF IN:0V 5.2 RF IN: 50mV 5.2	RF IN:0V 5.2 RF IN: 50mV 5.2	RF IN:0V 5.2 RF IN: 50mV 5.2	0	0	0
Q20	G_1	0	0	0	0	0	0
	G_2	0.58	0.58	0.58	0	0	0
	S	0	0	0	0	0	0
	D	7.6	7.6	7.6	0	0	0
Q21	B	RF IN:0V 0.76 RF IN: 50mV 0.62	RF IN:0V 0.76 RF IN: 50mV 0.62	RF IN:0V 0.76 RF IN: 50mV 0.62	0.76	0.76	0.76
	C	RF IN:0V 8.4 RF IN: 50mV 8.4	RF IN:0V 8.4 RF IN: 50mV 8.4	RF IN:0V 8.4 RF IN: 50mV 8.4	8.4	8.4	8.4
	E	RF IN:0V 0.18 RF IN: 50mV 0.1	RF IN:0V 0.18 RF IN: 50mV 0.1	RF IN:0V 0.18 RF IN: 50mV 0.1	0.12	0.12	0.12
Q22	B	0.66	0.66	0.66	0	0	0
	C	2.0	2.0	2.0	0	0	0
	E	0	0	0	0	0	0
Q23	B	2.0	2.0	2.0	0	0	0
	C	6.0	6.0	6.0	0	0	0
	E	1.25	1.25	1.25	0	0	0
Q24	B	2.2	2.2	2.2	0	0	0
	C	8.6	8.6	8.6	0	0	0
	E	1.5	1.5	1.5	2.6	2.6	2.6
Q25	B	2.1	2.1	2.1	0	0	0
	C	3.0	3.0	3.0	0	0	0
	E	0.3	0.3	0.3	0	0	0
Q26	B	0	0	0	0.72	0.72	0.72
	C	0	0	0	0	0	0
	E	0	0	0	0	0	0
Q27	B	0	0	0	0	0	0
	C	0	0	0	0	0	0
	E	0	0	0	0	0	0
Q28	B	0	0	0	0.72	0	0
	C	0	0	0	0.1	7.4	7.4
	E	0	0	0	0	0	0

REF. NO.		RECEIVING			TRANSMITTING		
		POWER SUPPLY 13.8 V DC (V DC)			POWER SUPPLY 13.8 V DC NO MODULATION (V DC)		
		AM	LSB	USB	AM	LSB	USB
Q29	B	3.6	3.6	3.6	3.6	3.6	3.6
	C	5.1	5.1	5.1	5.1	5.1	5.1
	E	3.4	3.4	3.4	3.4	3.4	3.4
Q30	B	0	0.72	0.72	0	0	0
	C	0	0	0	0	0	0
	E	0	0	0	0	0	0
Q31	G	RF IN: 0V: 0 / RF IN: 50mV: -0.75	RF IN: 0V: 0 / RF IN: 50mV: -0.75	RF IN: 0V: 0 / RF IN: 50mV: -0.75	0	0	0
	S	2.4 / 1.35	2.4 / 1.35	2.4 / 1.35	0	0	0
	D	8.7 / 8.7	8.7 / 8.7	8.7 / 8.7	0	0	0
Q32	B	0	0	0	0	0	0
	C	0	0	0	0	0	0
	E	0	0	0	0	0	0
Q33	B	CB: 0 / PA/MON: 0.72	CB: 0 / PA/MON: 0.72	CB: 0 / PA/MON: 0.72	CB: 0 / PA/MON: 0.72	CB: 0 / PA/MON: 0.72	CB: 0 / PA/MON: 0.72
	C	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	E	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
Q34	B	0	0.6	0.6	0	0.6	0.6
	C	0	4.4	4.4	0	4.4	4.4
	E	0	0.1	0.1	0	0.1	0.1
Q35	B	0	4.4	4.4	0	4.4	4.4
	C	0	6.6	6.6	0	6.6	6.6
	E	0	3.8	3.8	0	3.8	3.8
Q36	B	0	0	0	0.63	0	0
	C	0	0	0	4.5	0	0
	E	0	0	0	0	0	0
Q37	B	CB: 0 / PA/MON: 8.6	CB: 0 / PA/MON: 8.6	CB: 0 / PA/MON: 8.6	CB: 0 / PA/MON: 8.6	CB: 0 / PA/MON: 8.6	CB: 0 / PA/MON: 8.6
	C	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0
	E	0.6 / 0.6	0.6 / 0.6	0.6 / 0.6	0.64 / 8.6	0.64 / 8.6	0.64 / 8.6
Q38	B	0	0	0	8.6	8.6	8.6
	C	0	0	0	0	0	0
	E	0.6	0.6	0.6	0.64	0.64	0.64
Q39	B	0.72	0.72	0.72	0.72	0.72	0.72
	C	5.2	5.2	5.2	5.2	5.2	5.2
	E	0.2	0.2	0.2	0.2	0.2	0.2
Q40	B	5.3	5.3	5.3	5.3	5.3	5.3
	C	7.4	7.4	7.4	7.6	7.4	7.4
	E	4.6	4.6	4.6	4.6	4.6	4.6
Q41	B	7.4	7.4	7.4	7.6	7.4	7.4
	C	13.8	13.8	13.8	13.8	13.8	13.8
	E	6.8	6.8	6.8	7.0	6.8	6.8
Q42	B	6.8	6.8	6.8	7.0	6.8	6.8
	C	13.8	13.8	13.8	13.8	13.8	13.8
	E	6.3	6.3	6.3	6.3	6.3	6.3

REF. NO.		RECEIVING POWER SUPPLY 13.8 V DC (V DC)			TRANSMITTING POWER SUPPLY 13.8 V DC NO MODULATION (V DC)		
		AM	LSB	USB	AM	LSB	USB
Q43	B	0	0	0	0	0	0
	C	0	0	0	0	0	0
	E	0	0	0	0	0	0
Q44	B	0.34	0.34	0.34	0	0	0
	C	0	0	0	0	0	0
	E	0	0	0	0	0	0
Q45	B	0.7	0.7	0.7	CB 0 PA/MON 0.7	CB 0 PA/MON 0.7	CB 0 PA/MON 0
	C	0	0	0	CB 0.8 PA/MON 0	CB 0 PA/MON 0	CB 0 PA/MON 0
	E	0	0	0	0 0	0 0	0 0
Q46	B	0	0	0	CB 0.8 PA/MON 0	CB 0 PA/MON 0	CB 0 PA/MON 0
	C	13.8	13.8	13.8	CB 0.2 PA/MON 13.8	CB 13.8 PA/MON 13.8	CB 13.8 PA/MON 13.8
	E	0	0	0	0 0	0 0	0 0
Q47	B	6	6	6	6	6	6
	C	0	0	0	0	0	0
	E	6	6	6	6	6	6
Q301	B	9.3	9.3	9.3	9.3	9.3	9.3
	C	13.8	13.8	13.8	13.8	13.8	13.8
	E	8.6	8.6	8.6	8.6	8.6	8.6
Q302	B	9.9	9.9	9.9	9.9	9.9	9.9
	C	13.8	13.8	13.8	13.8	13.8	13.8
	E	9.3	9.3	9.3	9.3	9.3	9.3
Q303	B	AC:120V 0.69 DC:13.8V 0	AC:120V 0.69 DC:13.8V 0	AC:120V 0.69 DC:13.8V 0	AC:120V 0.69 DC:13.8V 0	AC:120V 0.69 DC:13.8V 0	AC:120V 0.69 DC:13.8V 0
	C	AC:120V 0.2 DC:13.8V 13.8	AC:120V 0.2 DC:13.8V 13.8	AC:120V 0.2 DC:13.8V 13.8	AC:120V 0.2 DC:13.8V 13.8	AC:120V 0.2 DC:13.8V 13.8	AC:120V 0.2 DC:13.8V 13.8
	E	AC:120V 0 DC:13.8V 0	AC:120V 0 DC:13.8V 0	AC:120V 0 DC:13.8V 0	AC:120V 0 DC:13.8V 0	AC:120V 0 DC:13.8V 0	AC:120V 0 DC:13.8V 0
Q304	B	DIM OFF 13.8 DIM ON 5.2	DIM OFF 13.8 DIM ON 5.2	DIM OFF 13.8 DIM ON 5.2	DIM OFF 13.8 DIM ON 5.2	DIM OFF 13.8 DIM ON 5.2	DIM OFF 13.8 DIM ON 5.2
	C	DIM OFF 13.8 DIM ON 13.8	DIM OFF 13.8 DIM ON 13.8	DIM OFF 13.8 DIM ON 13.8	DIM OFF 13.8 DIM ON 13.8	DIM OFF 13.8 DIM ON 13.8	DIM OFF 13.8 DIM ON 13.8
	E	DIM OFF 13.1 DIM ON 4.6	DIM OFF 13.1 DIM ON 4.6	DIM OFF 13.1 DIM ON 4.6	DIM OFF 13.1 DIM ON 4.6	DIM OFF 13.1 DIM ON 4.6	DIM OFF 13.1 DIM ON 4.6
Q401	B	AC:120V 14.2 DC:13.8V 0	AC:120V 14.2 DC:13.8V 0	AC:120V 14.2 DC:13.8V 0	AC:120V 14.2 DC:13.8V 0	AC:120V 14.2 DC:13.8V 0	AC:120V 14.2 DC:13.8V 0
	C	AC:120V 22 DC:13.8V 0	AC:120V 22 DC:13.8V 0	AC:120V 22 DC:13.8V 0	AC:120V 22 DC:13.8V 0	AC:120V 22 DC:13.8V 0	AC:120V 22 DC:13.8V 0
	E	AC:120V 15 DC:13.8V 0	AC:120V 15 DC:13.8V 0	AC:120V 15 DC:13.8V 0	AC:120V 15 DC:13.8V 0	AC:120V 15 DC:13.8V 0	AC:120V 15 DC:13.8V 0
Q501	B	0	0	0	7.8	7.8	7.8
	C	0	0	0	8.5	8.5	8.5
	E	0	0	0	8.5	8.5	8.5
Q502	B	0.7	0.7	0.7	0.72	0.72	0.72
	C	0	0	0	0	0	0
	E	0	0	0	0	0	0
Q503	B	0	0	8.2	0	0	8.2
	C	8.6	8.6	8.6	8.6	8.6	8.6
	E	0	0	7.5	0	0	7.5
Q504	B	0.74	0.74	0	0.74	0.74	0
	C	0	0	8.2	0	0	8.2
	E	0	0	0	0	0	0

REF. NO.		RECEIVING			TRANSMITTING		
		POWER SUPPLY 13.8 V DC (V DC)			POWER SUPPLY 13.8 V DC NO MODULATION (V DC)		
		AM	LSB	USB	AM	LSB	USB
Q505	B	0	8.4	0	0	8.4	0
	C	8.6	8.6	8.6	8.6	8.6	8.6
	E	0	7.7	0	0	7.7	0
Q506	B	8.4	0	0	8.4	0	0
	C	8.6	8.6	8.6	8.6	8.6	8.6
	E	7.7	0	0	7.7	0	0
Q507	B	SQ ON 0.64 SQ OFF 0	SQ ON 0.64 SQ OFF 0	SQ ON 0.64 SQ OFF 0	SQ ON 0.58 SQ OFF 0.58	SQ ON 0.58 SQ OFF 0.58	SQ ON 0.58 SQ OFF 0.58
	C	0 0.72	0 0.72	0 0.72	0 0	0 0	0 0
	E	0 0	0 0	0 0	0 0	0 0	0 0
Q508	B	NO MEMORY OP. 0 MEMORY OP. 0.7	NO MEMORY OP. 0 MEMORY OP. 0.7	NO MEMORY OP. 0 MEMORY OP. 0.7	NO MEMORY OP. 0 MEMORY OP. 0.7	NO MEMORY OP. 0 MEMORY OP. 0.7	NO MEMORY OP. 0 MEMORY OP. 0.7
	C	7.1 0	7.1 0	7.1 0	7.1 0	7.1 0	7.1 0
	E	0 0	0 0	0 0	0 0	0 0	0 0
Q509	B	8.4	8.4	8.4	8.4	8.4	8.4
	C	9.1	9.1	9.1	9.1	9.1	9.1
	E	9.1	9.1	9.1	9.1	9.1	9.1
Q510	B	7.0	7.0	7.0	7.0	7.0	7.0
	C	0	0	0	0	0	0
	E	0	0	0	0	0	0
Q607	B	DIMMER OFF 12.5 DIMMER ON 5.2	DIMMER OFF 12.5 DIMMER ON 5.2	DIMMER OFF 12.5 DIMMER ON 5.2	DIMMER OFF 12.5 DIMMER ON 5.2	DIMMER OFF 12.5 DIMMER ON 5.2	DIMMER OFF 12.5 DIMMER ON 5.2
	C	12.5 DIMMER ON 12.5	12.5 DIMMER ON 12.5	12.5 DIMMER ON 12.5	12.5 DIMMER ON 12.5	12.5 DIMMER ON 12.5	12.5 DIMMER ON 12.5
	E	12.0 DIMMER ON 4.6	12.0 DIMMER ON 4.6	12.0 DIMMER ON 4.6	12.0 DIMMER ON 4.6	12.0 DIMMER ON 4.6	12.0 DIMMER ON 4.6
IC1	1	6	6	6	6	6	6
	2	2.3	2.3	2.3	2.3	2.3	2.3
	3	—	—	—	—	—	—
	4	—	—	—	—	—	—
	5	2.8	2.8	2.8	2.8	2.8	2.8
	6	6	6	6	6	6	6
	7	2.1	2.1	2.1	2.1	2.1	2.1
	8	6	6	6	6	6	6
	9	0	0	0	0	0	0
DATA	10	6 or 0	6 or 0	6 or 0	6 or 0	6 or 0	6 or 0
	11						
	12						
	13						
	14						
	15						
	16	0	0	0	0	0	0

REF. NO.		RECEIVING			TRANSMITTING		
		POWER SUPPLY 13.8 V DC (V DC)			POWER SUPPLY 13.8 V DC NO MODULATION (V DC)		
		AM	LSB	USB	AM	LSB	USB
IC2	1	5.3	5.3	5.3	5.3	5.3	5.3
	2	0	0	0	0	0	0
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
	5	2.1	2.1	2.1	2.1	2.1	2.1
	6	0	0	0	0	0	0
	7	4.8	4.8	4.8	4.8	4.8	4.8
	8	6	6	6	6	6	6
	9	0	0	0	0	0	0
	10	1.7	1.7	1.7	1.7	1.7	1.7
IC3	1	1.25	1.25	1.25	1.25	1.25	1.25
	2	6	6	6	6	6	6
	3	2	2	2	2	2	2
	4	3.3	3.3	3.3	3.3	3.3	3.3
	5	0	0	0	0	0	0
	6	2.5	2.5	2.5	2.5	2.5	2.5
	7	2.4	2.4	2.4	2.4	2.4	2.4
	8	2.3	2.3	2.3	2.3	2.3	2.3
	9	2.4	2.4	2.4	2.4	2.4	2.4
IC4	1	0	0	0	7.2	7.2	7.2
	2	0	0	0	7.2	7.2	7.2
	3	0	0	0	2.1	2.1	2.1
	4	0	0	0	7.2	7.2	7.2
	5	0	0	0	0	0	0
	6	0	0	0	2.6	2.6	2.6
	7	0	0	0	1.5	1.5	1.5
	8	0	0	0	2.3	2.3	2.3
	9	0	0	0	2.6	2.6	2.6
IC5	1	13.8	13.8	13.8	13.8	13.8	13.8
	2	9	9	9	9	9	9
	3	0	0	0	0	0	0
IC6	1	8.1	8.1	8.1	8.1	8.1	8.1
	2	8.1	8.1	8.1	8.1	8.1	8.1
	3	0	0	0	0	0	0
	4	2.4	2.4	2.4	2.4	2.4	2.4
	5	2.4	2.4	2.4	2.4	2.4	2.4
	6	2.4	2.4	2.4	2.4	2.4	2.4
	7	0	0	0	0	0	0
	8	8.1	8.1	8.1	8.1	8.1	8.1

REF. NO.		RECEIVING						TRANSMITTING		
		POWER SUPPLY 13.8 V DC (V DC)						POWER SUPPLY 13.8 V DC NO MODULATION (V DC)		
		AM		LSB		USB		AM	LSB	USB
IC7	1	0	0	0	0	0	0	0	0	0
	2	5	5	5	5	5	5	0	0	0
	3	0.7	0.6	0.7	0.6	0.7	0.6	0	0	0
	4	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0	0
	9	0.65	0.65	0.65	0.65	0.65	0.65	0	0	0
	10	0.7	0.6	0.7	0.6	0.7	0.6	0	0	0
	11	0.4	0.4	0.4	0.4	0.4	0.4	0	0	0
	12	0.56	0.56	0.56	0.56	0.56	0.56	0	0	0
IC8	1	0		0		0		1.7	2.1	2.1
	2	0		0		0		0	1.4	1.4
	3	0		0		0		1.0	1.4	1.4
	4	0		0		0		1.7	2.05	2.05
	5	0		0		0		1.2	1.4	1.4
	6	0		0		0		2.1	7.7	7.7
	7	0		0		0		0	0	0
	8	0		0		0		1.75	6.3	6.3
	9	0		0		0		0	0	0
	10	0		0		0		1.7	6.3	6.3
	11	0		0		0		0	0	0
	12	0		0		0		0.9	7.7	7.7
	13	0		0		0		0	0	0
	14	0		0		0		0	0	0
IC9	1	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0
	3	0	8.6	0	8.6	0	8.6	0	0	0
	4	0	8.6	0	8.6	0	8.6	0	0	0
	5	5.6	0	5.6	0	5.6	0	0	0	0
	6	0	0.7	0	0.7	0	0.7	0	0	0
	7	0	0	0	0	0	0	0	0	0
	8	0.65	0	0.65	0	0.65	0	0	0	0
	9	0	0.7	0	0.7	0	0.7	0	0	0
	10	0.67	0	0.67	0	0.67	0	0	0	0
	11	0	0	0	0	0	0	0	0	0
	12	0	0	0	0	0	0	0	0	0

NB/ANL : ON / NB/ANL : OFF

SQ ON / SQ OFF

REF. NO.		RECEIVING			TRANSMITTING		
		POWER SUPPLY 13.8 V DC (V DC)			POWER SUPPLY 13.8 V DC NO MODULATION (V DC)		
		AM	LSB	USB	AM	LSB	USB
IC10	1	1.8	1.8	1.8	1.8	1.8	1.8
	2	2.0	2.0	2.0	2.0	2.0	2.0
	3	1.35	1.35	1.35	1.35	1.35	1.35
	4	0	0	0	0	0	0
	5	0	0	0	0	0	0
	6	0	0	0	0	0	0
	7	8.6	8.6	8.6	8.6	8.6	8.6
	8	8.6	8.6	8.6	8.6	8.6	8.6
IC12	1	13.8	13.8	13.8	13.8	13.8	13.8
	2	3	3	3	3	3	3
	3	–	–	–	–	–	–
	4	–	–	–	–	–	–
	5	1.9	1.9	1.9	1.9	1.9	1.9
	6	1.9	1.9	1.9	1.9	1.9	1.9
	7	0	0	0	0	0	0
	8	0	0	0	0	0	0
	9	7.0	7.0	7.0	7.0	7.0	7.0
	10	13.8	13.8	13.8	13.8	13.8	13.8
IC301	1	22	22	22	22	22	22
	2	–	–	–	–	–	–
	3	–	–	–	–	–	–
	4	–	–	–	–	–	–
	5	–	–	–	–	–	–
	6	–	–	–	–	–	–
	7	0	0	0	0	0	0
	8	3.1	3.1	3.1	3.1	3.1	3.1
	9	16	16	16	16	16	16
	10	13.8	13.8	13.8	13.8	13.8	13.8
	11	–	–	–	–	–	–
	12	–	–	–	–	–	–
	13	13.8	13.8	13.8	13.8	13.8	13.8
	14	14.8	14.8	14.8	14.8	14.8	14.8

Ref. No.	IC501		IC502	IC503	IC504*	IC505*	IC506*	IC507*	IC508
Pin No.	BC Set (V DC)	CC Set (V DC)	Channel 38 selected (V DC)						
1	0	0	3.1	3.2	0.8	0	0.9	0.9	0
2	9	9	3.1	3.2	2.6	2.6	2.6	2.6	0
3	8.1	0	0	3.2	0	0	0	0	0
4	0	7.7	3.1	3.2	0	0	0	0	6.0
5	0	0	0	3.2	2.6	2.6	2.6	2.6	9.0
6	0	0	3.1	3.2	0.9	0.9	0.9	0.9	0
7	0	0	3.1	3.2	0	0	0	0	0
8	0	0.6	0	0	0.9	0.9	0.9	0.9	0
9	0.6	0	0	0	0	2.6	4	2.6	9.0
10	0.6	0.6	0.7	0.7	0	0	0	0	6.0
11	0	0	0.7	0.7	0	0	0	0	0
12	0	0	11.2	0.7	0	2.6	4.1	2.6	0
13			0.7	0.7	0.9	0.9	0.9	0.9	0
14			11.2	0.7	9.1	9.1	9.1	9.1	9.0
15			0.7	0.7					6.0
16			0.7	0.7					8.5

Ref. No.	RECEIVING			TRANSMITTING		
	Channel 38 selected, No buttons are pressed					
	AM	LSB	USB	AM	LSB	USB
1	9.0	9.0	9.0	9.0	9.0	9.0
2	0	8.7	0	0	8.7	0
3	8.5	0	0	8.5	0	0
4	0	0	0	0	0	0
5	0.8	0.8	0.8	1.7	1.7	1.7
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	4.1	2.8	2.8	4.1	2.8	2.8
12	2.9	2.9	2.9	2.9	2.9	2.9
13	2.9	2.9	2.9	2.9	2.9	2.9
IC509 14	2.9	4.1	4.1	2.9	4.1	4.1
15	4.1	2.8	4.1	4.1	4.1	4.1
16	4.1	2.8	4.1	4.1	4.1	4.1
17	4.1	2.8	2.8	4.1	2.8	4.1
18	6.0	6.0	6.0	6.0	6.0	6.0
19	6.0	6.0	6.0	6.0	6.0	6.0
20	9.1	9.1	9.1	9.1	9.1	9.1
21*	0.9	0.9	0.9	0.9	0.9	0.9
22*	0.9	0.9	0.9	0.9	0.9	0.9
23*	1.0	1.0	1.0	1.0	1.0	1.0
24	0	0	0	0	0	0
25	9.0	9.0	9.0	9.0	9.0	9.0
26	0	0	0	0	0	0
27	9.0	9.0	9.0	9.0	9.0	9.0
28	0	0	0	0	0	0

* Voltage readings may differ due to MPU clock timing.

Ref. No.		POWER : ON, RX, No buttons are pressed (V DC)
IC510	1	0.9
	2	0
	3	0
	4	0.9
	5	0
	6	0
	7	0
	8	0
	9	9.0
	10	0
	11	0
	12	0
	13	0
	14	9.0
IC511	1	13.8
	2	9.1
	3	0

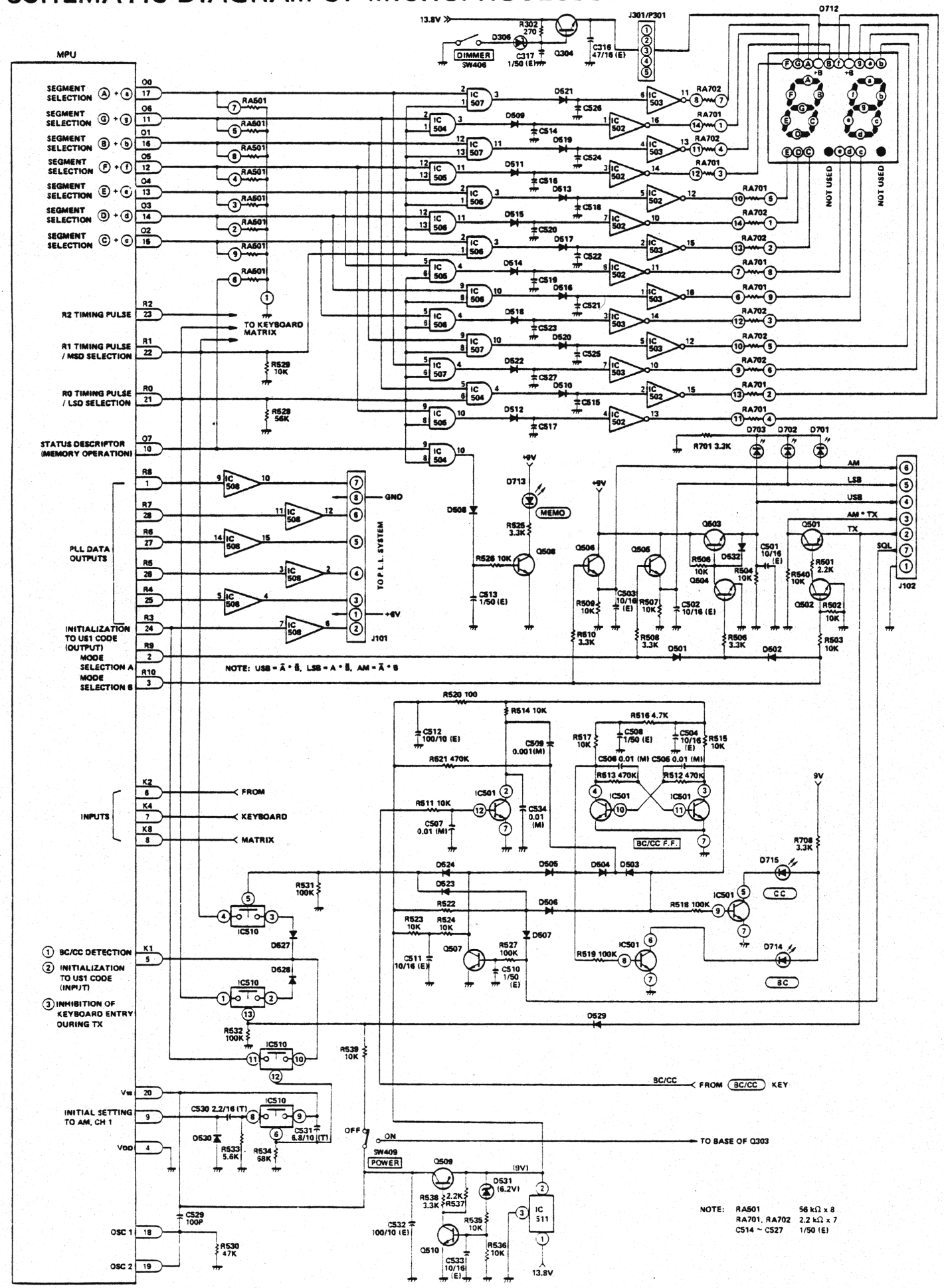
Ref. No.		24HR : OFF Clock Display; AM 10 : 56 (V DC)	24HR : ON Clock Display; 23 : 01 (V DC)
Q601	B	2.3	0
	C	1.9	1.9
	E	1.7	0
Q602	B	2.3	0
	C	1.7	1.7
	E	1.7	0
Q603	B	0	2.5
	C	1.7	1.9
	E	0	1.9
Q604	B	0	2.3
	C	1.9	1.7
	E	0	1.7
Q605	B	0	2.5
	C	0 ~ 5	1.9
	E	0	1.9

Ref. No.		24HR : ON (V DC)	24HR : OFF (V DC)
Q606	B	6.5	0
	C	5.7	6.1
	E	5.7	0

Ref. No.		24HR : OFF Clock Display; AM 10 : 56 (V DC)	24HR : ON Clock Display; 23 : 01 (V DC)
IC601	1	2.0	1.7
	2	2.4	0
	3	1.9	0
	4	0	1.9
	5	1.9	1.9
	6	1.9	1.9
	7	1.9	1.9
	8	1.9	1.9
	9	1.9	0
	10	1.9	1.9
	11	1.9	0
	12	1.9	1.9
	13	0	1.9
	14	0	1.9
	15	1.9	1.9
	16	1.9	0
	17	1.9	0
	18	1.9	0
	19	0	1.9
	20	1.9	0
	21	1.9	0
	22	1.9	1.9
	23	6.0 (3.5)	6.0 (3.5)
	24	0	0
	25	0	0
	26	12.0	12.0
	27	0	0
	28	12.0	12.0
	29	0	0
	30	0	0
	31	0	0
	32	0	0
	33	0	0
	34	0	0
	35	5 V AC	5 V AC
	36	0	0
	37	12.0	12.0
	38	0	11.2
	39	0 ~ 5	1.9
	40	1.7	2.0

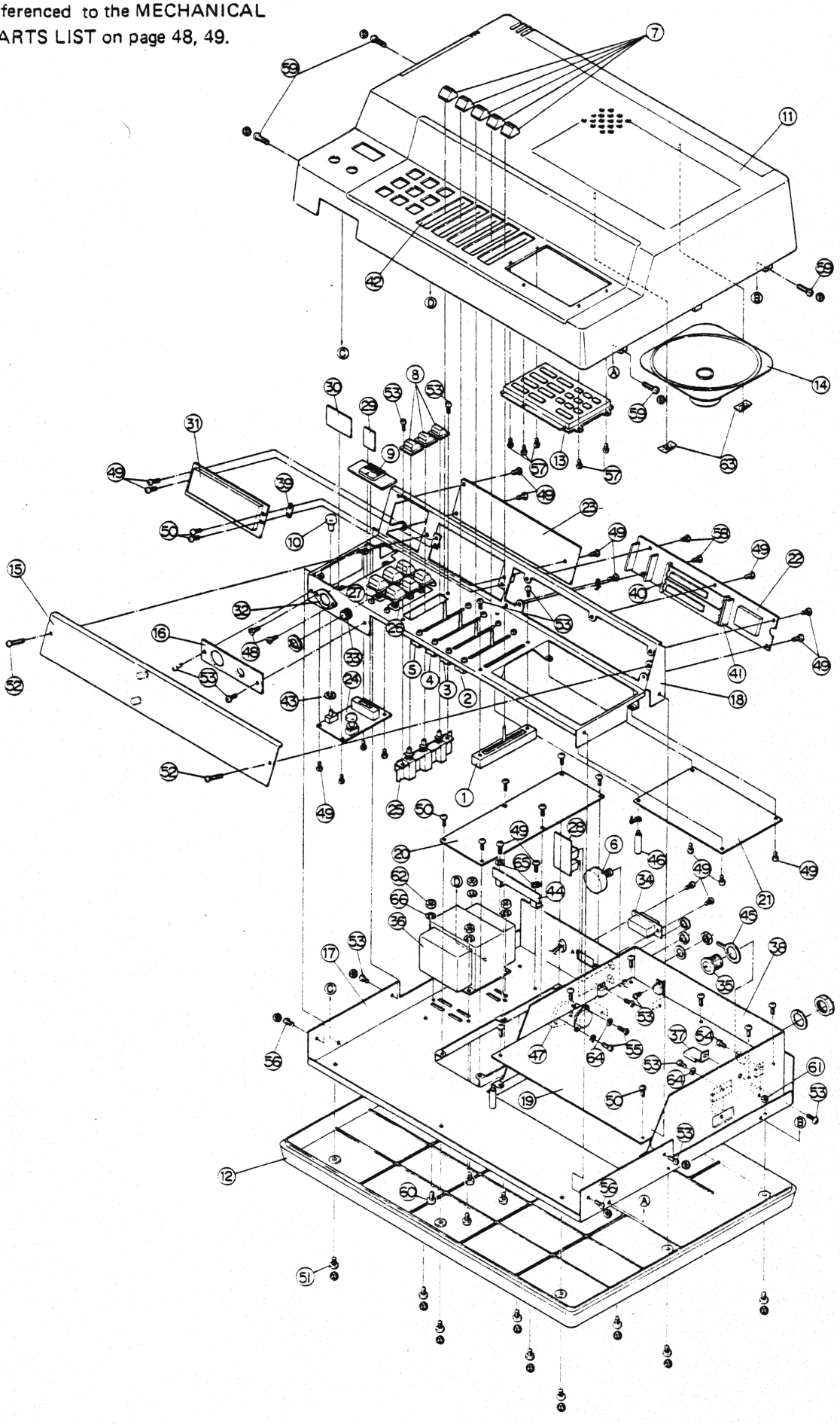
Clock switch in "RUN" position.
AUTO button in "OUT" position.
( ) : DIMMER button in "ON" position.

SCHEMATIC DIAGRAM OF MICROPROCESSOR SECTION



DISASSEMBLY/EXPLODED VIEW

NOTE: Index numbers in this illustration are referenced to the MECHANICAL PARTS LIST on page 48, 49.



RADIO SHACK A DIVISION OF TANDY CORPORATION

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