REALISTIC®

Service Manual

21-1519

TRC-479
40-CHANNEL
CB TRANSCEIVER

Catalog Number: 21-1519

CONTENTS

SPECIFICATIONS

General

Transmitter ---------- Crystal controlled PLL synthesizer, amplitude modulation
Receiver ---------- Crystal controlled double conversion, superheterodyne system
Communication frequencies ---------- All 40 CB channels (26.965 to 27.405 MHz)
Voltage operation ---------- 12 – 16V DC (negative ground vehicles)
Temperature and humidity range ---------- –22° F to +140° F (–30° C to +60° C) and 10% to 90%
Transmitter/Receiver switching ---------- Electrical

Standard Test Conditions

Power supply voltage ---------- 13.8V DC
Signal input level ---------- 1000μV
Modulation frequency and modulation percentage ---------- 1000Hz, 30%
Receiver output power ---------- 500mW at external SP
Receiver output load impedance ---------- 8 ohms, non-inductive
Antenna load impedance of transmitter/receiver ---------- 50 ohms, non-inductive
Measuring channel ---------- 18
Ambient conditions
  Temperature ---------- 77° F (25° C)
  Humidity ---------- 40 to 70% RH

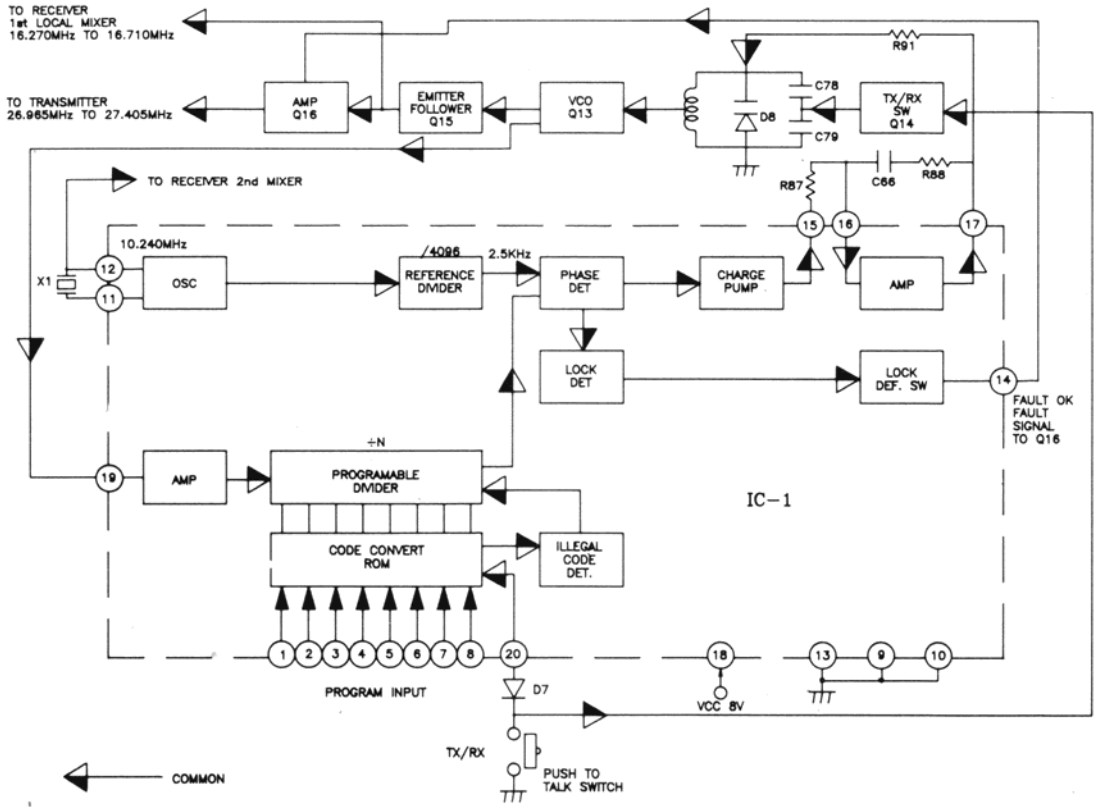
Transmitter		**Unit**	**Nominal**	**Limit**
Frequency tolerance at 77 ° F (25° C) (5 minutes after switch on)		Hz	± 100	± 1300
Carrier power at no modulation		W	3.9	3.6 – 4.4
Modulation attack time		m sec.	18	25
Modulation release time		m sec.	300	300 ± 200
Modulation distortion at 1 kHz 80% modulation		%	3	6
Spurious emission 2nd/3rd/4th/5th/6th 7th/8th/9th/10th		dB	– 70	– 60
Modulation 100% capability positive/negative		%	90	80
Current drain at no modulation		mA	1100	1300
at 80% modulation		mA	1500	2000
Modulation frequency response (1 kHz 0dB reference)				
lower at 450 Hz, EIA		dB	– 6	– 6 ± 3
upper at 2.5 kHz, EIA		dB	– 6	– 6 ± 3
Carrier power uniformity CH to CH at no modulation		W	0.2	0.5
Microphone sensitivity AM for 50% modulation		mV	1.0	2.0
AMC range between 50 to 100% modulation		dB	40	30
Occupied band width	± 5.0 kHz	dB	– 35	– 26
	± 7.5 kHz	dB	– 35	– 26
	± 10.0 kHz	dB	– 45	– 35
	± 12.5 kHz	dB	– 45	– 35
	± 15.0 kHz	dB	– 45	– 35
	± 17.5 kHz	dB	– 45	– 35
	± 20.0 kHz	dB	– 65	– 60
	± 22.5 kHz	dB	– 65	– 60

Receiver	**Unit**	**Nomial**	**Limit**
Maximum sensitivity	μV	0.3	0.6
Sensitivity for 10 dB S/N	μV	0.5	1.0
Squelch sensitivity at threshold	μV	0.7	1.4
at tight	μV	1000	355 – 2820
AGC figure of merit for – 10 dB audio output (Reference RF input 50 mV)	dB	90	70
Overload AGC characteristics from 50 mV to 1V	dB	3	3 ± 6
Overall audio fidelity (1 kHz 0 dB Ref.)			
lower frequency 450 Hz	dB	– 6	– 6 + 3
upper frequency 2500 Hz	dB	– 6	– 6 + 3
Adjacent channel selectivity (±10 kHz)	dB	60	55
Maximum audio output power	W	6.0	4.5
Audio output power at 10% THD	W	5.0	3.5
THD at 500 mW AM: 1 mV input			
30% modulation	%	2.5	5
50% modulation	%	3	6
80% modulation	%	4	8
S/N ratio at 1 mV input	dB	40	35
Image rejection ratio (1st IF/2nd IF)	dB	45	35
1/2 IF rejection ratio (2nd IF)	dB	60	50
IF rejection ratio (1st IF/2nd IF)	dB	70	60
Spurious rejection ratio	dB	50	40
Skirt rejection, 20 kHz single signal	dB	60	50
Cross modulation, RS standard	dB	50	40
Desensitivity at 100 μV desired, 20 kHz away, 3 dB desensitivity	dB	50	40
Oscillator on voltage	V	8.0	10
Current drain at no signal	mA	200	300
Current drain at maximum output	mA	1000	1500
Local emission (Antenna Terminal)	dB m	– 73	– 67

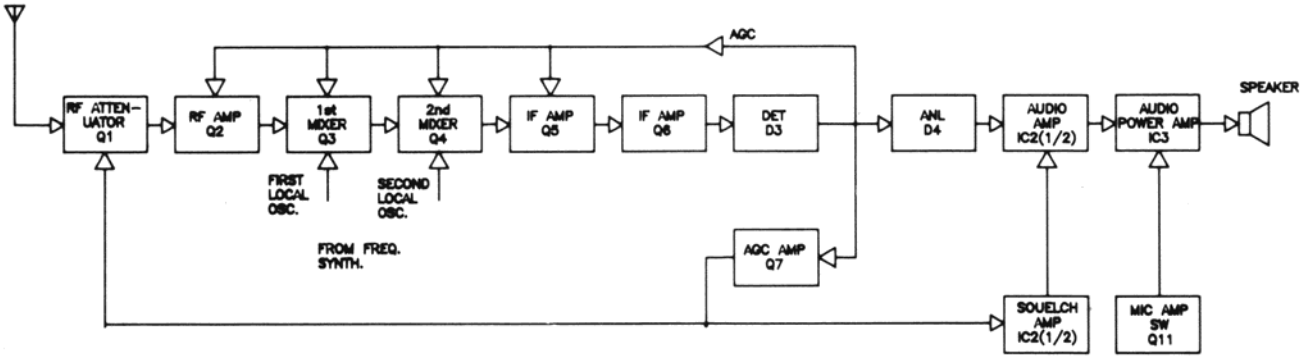
Note: Nominal specs represent the design specs. All units should be able to approximate these – some will exceed and some might drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; in no case should a unit fail to meet limit specs.

BLOCK DIAGRAM

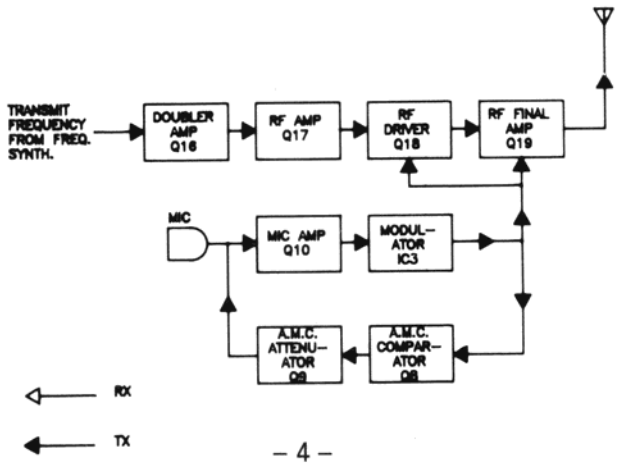
Frequency Synthesizer



Receive



Transmit



CIRCUIT DESCRIPTION

1. General

The TRC–479 is a 40–channel, crystal controlled mobile transceiver which consists of a PLL-synthesizer circuit, a receiver circuit and a transmitter circuit. Diode D12 is a polarity-protector. Power is supplied by a car battery (13.8 V DC). Refer to the Block Diagram and the Schematic Diagram as you read the following descriptions.

2. PLL Synthesizer Section

The TRC–479 uses a Phase-Locked-Loop (PLL) circuit to synthesize the local-oscillator frequencies for receiving and transmitting.

It employs one IC and only one crystal. IC1 is a CMOS large scale integrated circuit containing a reference oscillator, phase detector, active low pass filter, reference divider (1/4096 for transmit, 1/2048 for receive) and a programmable divider.

The programmable divider directly divides the output of the VCO (voltage controlled oscillator) down to a 2.5 kHz (5 kHz for the receiver) signal. Crystal X1 provides a reliable frequency standard which controls the local-oscillator frequencies. The reference-frequency divider inside IC1 counts down the oscillator signal to 1/4096, and passes it on to the phase detector, where it is compared with the 2.5 kHz (5 kHz for receiver) signal from the programmable divider. An error voltage is generated by the phase detector, which is proportional to the phase difference between the two 2.5 kHz (5 kHz for receiver) signals.

This error voltage appears at pin 14 of IC1 and passes through the active LPF (low pass filter), where the error voltage is integrated and harmonics and noise are filtered out. The resulting DC voltage is applied to the varicap diode (D8). Its capacity varies with the applied DC voltage. Because of this capacity change, the output frequency of the VCO is corrected. With proper circuit design and precise adjustments, the VCO frequency is accurate and precise when the system is "locked".

This means that the phase detector senses no phase differences between the two 2.5 kHz (5 kHz for receiver) signals, and the VCO generates a frequency that is as accurate and stable as the reference crystal oscillator. The VCO circuit consists of D8, Q13 and T6.

The circuit is connected in the form of a Hartley oscillator with varicap diode D8 as part of the tank circuit. The VCO circuit generates a signal ranging from 13.4825 to 16.710 MHz. The IC1 also includes an unlock-signal-detector circuit. Should the condition occur, the output at pin 14 of IC1, which is normally open, will be shorted to ground. This means that VCO frequency (1st local oscillator for receiving, 1/2 carrier for transmitting) is "sunk" to pin 14 of IC1 and the transmitter circuit are inhibited.

3. Transmitter Circuit

RF Amplication

The output of doubler amp Q16 is fed through doubler tuning (27 MHz) T7 and T8 to the base of RF amp Q17. The output is then supplied through tuning circuit T9 to RF driver amp Q18. The Q18 output capacitance is devided by tuning circuit L7, C94 and C95 and passed through tuning circuit L8 to the base of final RF stage Q19.

Suppression of Spurious Radiation

The tuning circuit between frequency synthesizer and final amp Q19, and 3 - stage "PI" network C98, L11, C99, L12, C2, L1 and C1 in the Q19 output circuit serve to suppress spurious radiation. This network serves to match Q19 impedance to the antenna and to reduce spurious content to acceptable levels. In-band spurious is reduced to acceptable levels by filtering.

Limiting Power

During factory alignment, the series base resistor of final Q19 (R114) is selected to limit the available power to slightly more than 4 watts. The tuning is adjusted so the actual power is from 3.6 to 3.9 watts, and there are no other controls for adjusting power.

Modulation

The mic input is fed to mic amp Q10 and then to audio power IC3, which feeds the signal to the modulator transformer T5. The audio output at the step up of T5 is fed in series with the B+ voltage through diode D11 to the collectors of Q18 and final Q19 to collector modulate both these stages.

Limiting Modulation

A portion of the modulating voltage is rectified by Q8 to turn on Q9, which attenuates the mic input to mic amp Q10. The resulting feedback loop keeps the modulation from exceeding 100 percent for inputs approximately 40dB greater than required to produce 50 percent modulation. The attack time is about 18 msec. and the release time is about 300 msec.

4. Receiver Circuit

Receiver

The receiver is a double conversion superheterodyne with the first IF at 10.695MHz and the second IF at 455kHz. The synthesizer supplies the first local oscillator 10.695MHz below the received frequency and the second local oscillator at 10.240MHz. The detector output provides reverse AGC to all previous stages except Q6. The AGC voltage is also amplified by Q7 and used to drive RF attenuator Q1, squelch amp and audio amp are IC2.

Indicators

Two additional wafers on the selector switch provide appropriate voltage to a two-digit / seven segment LED display which indicates the selected channel.

When receiving : Q12 base will be high.
Q12 will be turn on.
RX LED indicator (LD202) will light.

When transmitting : D6 cathode will be shorted to ground.
D6 will be turn on.
TX LED indicator (LD203) will light.

FREQUENCIES GENERATED AND MIXED TO OBTAIN EACH CHANNEL

RECEIVE

* VCO FREQUENCY = (N/2048) x REFERENCE FREQUENCY (10.240MHz)

TRANSMIT

* VCO FREQUENCY = (N/4096) x REFERENCE FREQUENCY (10.240MHz)
* TRANSMIT FREQUENCY = VCO FREQUENCY x 2

CHANNEL NUMBER	BCD INPUT TO IC1	RECEIVE		TRANSMIT		
	IC1 PIN NUMBER 8 7 6 5 4 3 2 1	N	VCO FREQUENCY (MHz)	N	VCO FREQUENCY (MHz)	TRANSMIT FREQUENCY (MHz)
1	1 1 1 0 1 1 1 1	3254	16.270	5393	13.4825	26.965
2	1 1 1 0 0 0 0 1	3256	16.280	5395	13.4875	26.975
3	1 1 1 0 1 0 0 1	3258	16.290	5397	13.4925	26.985
4	1 1 1 0 1 0 1 0	3262	16.310	5401	13.5025	27.005
5	1 1 1 1 1 0 0 0	3264	16.320	5403	13.5075	27.015
6	1 1 1 1 0 0 0 0	3266	16.330	5405	13.5125	27.025
7	1 1 1 0 1 1 0 0	3268	16.340	5407	13.5175	27.035
8	1 1 1 0 0 0 0 0	3272	16.360	5411	13.5275	27.055
9	1 1 1 0 1 0 0 0	3274	16.370	5413	13.5325	27.065
10	1 1 0 0 0 1 0 0	3276	16.380	5415	13.5375	27.075
11	1 1 0 0 1 1 1 1	3278	16.390	5417	13.5425	27.085
12	1 1 0 0 0 0 0 1	3282	16.410	5421	13.5525	27.105
13	1 1 0 0 1 0 0 1	3284	16.420	5423	13.5575	27.115
14	1 1 0 0 1 0 1 0	3286	16.430	5425	13.5625	27.125
15	1 1 0 1 1 0 0 0	3288	16.440	5427	13.5675	27.135
16	1 1 0 1 0 0 0 0	3292	16.460	5431	13.5775	27.155
17	1 1 0 0 1 1 0 0	3294	16.470	5433	13.5825	27.165
18	1 1 0 0 0 0 0 0	3296	16.480	5435	13.5875	27.175
19	1 1 0 0 1 0 0 0	3298	16.490	5437	13.5925	27.185
20	0 0 1 0 0 1 0 1	3302	16.510	5441	13.6025	27.205
21	1 0 1 0 0 0 0 1	3304	16.520	5443	13.6075	27.215
22	1 0 1 0 0 0 0 1	3306	16.530	5445	13.6125	27.225
23	1 0 1 0 1 0 0 1	3312	16.560	5451	13.6275	27.255
24	1 0 1 0 1 0 1 0	3308	16.540	5447	13.6175	27.235
25	1 0 1 1 1 0 0 0	3310	16.550	5449	13.6225	27.245
26	1 0 1 1 0 0 0 0	3314	16.570	5453	13.6325	27.265
27	1 0 1 0 1 1 0 0	3316	16.580	5455	13.6375	27.275
28	1 0 1 0 0 0 0 0	3318	16.590	5457	13.6425	27.285
29	1 0 1 0 1 0 0 0	3320	16.600	5459	13.6475	27.295
30	1 0 0 0 0 1 0 0	3322	16.610	5461	13.6525	27.305
31	1 0 0 0 1 1 1 1	3324	16.620	5463	13.6575	27.315
32	1 0 0 0 0 0 0 1	3326	16.630	5465	13.6625	27.325
33	1 0 0 0 1 0 0 1	3328	16.640	5467	13.6675	27.335
34	1 0 0 0 1 0 1 0	3330	16.650	5469	13.6725	27.345
35	1 0 0 1 1 0 0 0	3332	16.660	5471	13.6775	27.355
36	1 0 0 1 0 0 0 0	3334	16.670	5473	13.6825	27.365
37	1 0 0 0 1 1 0 0	3336	16.680	5475	13.6875	27.375
38	1 0 0 0 1 0 0 0	3338	16.690	5477	13.6925	27.385
39	1 0 0 0 1 0 0 0	3340	16.700	5479	13.6975	27.395
40	0 1 0 0 0 1 0 0	3342	16.710	5481	13.7025	27.405

ALIGNMENT PROCEDURES

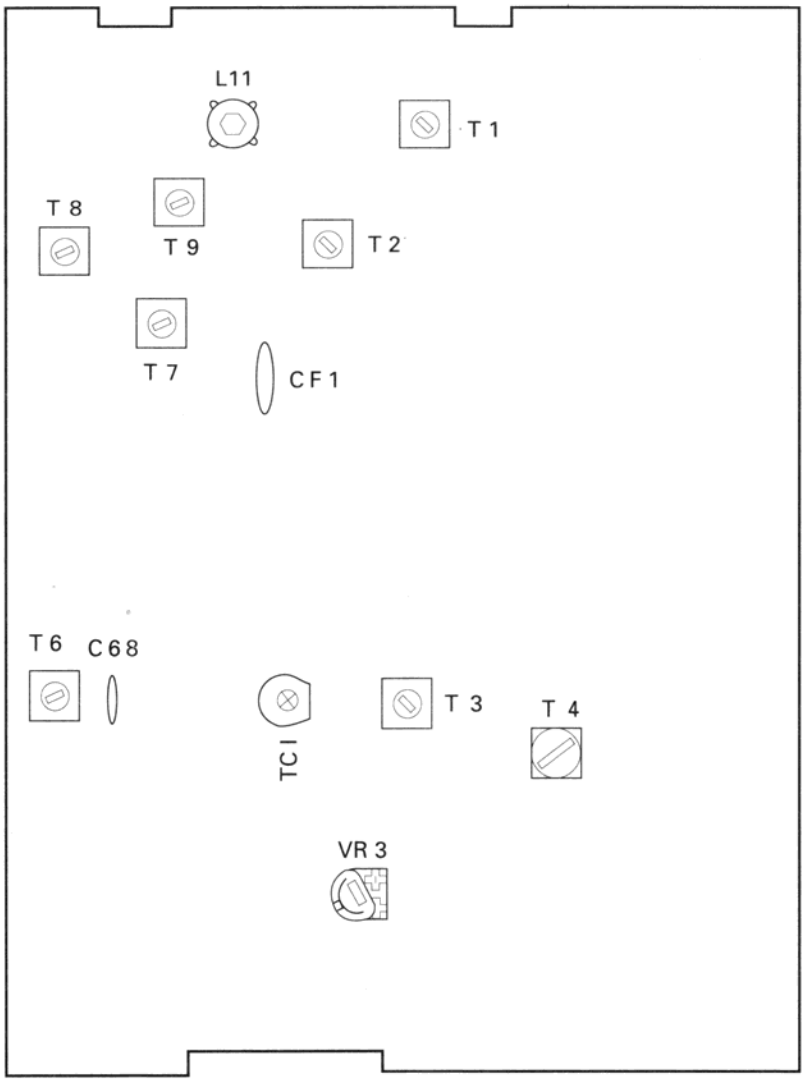


Figure 1

A. PLL SECTION

1. Test Equipment Required

- Frequency counter
- DC voltmeter (above 100 k ohm/V)
- DC power supply (13.8V, 2.5 Amp)

Note: Figure 1 provides test point and all alignment location information.

2. Test Set-up

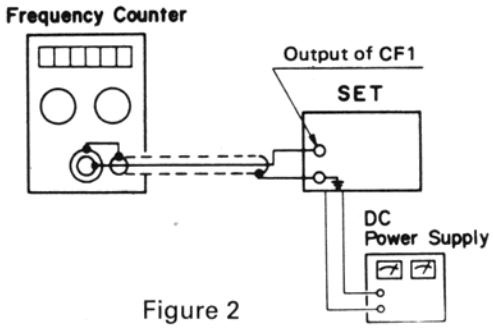


Figure 2

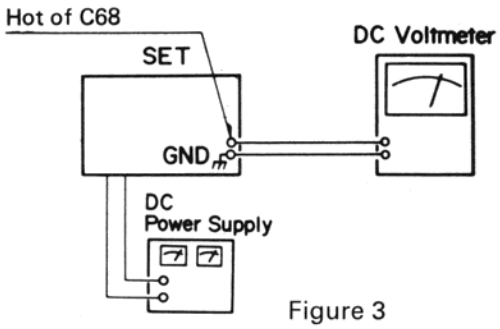


Figure 3

3. Alignment Procedure

STEP	CONTROL SETTING	OUTPUT INDICATOR CONNECTION	ADJUST	ADJUST FOR
1	Alignment of Ref. Osc.			
	MIC: Receive POWER: On VOLUME: Optional SQUELCH: Optional Channel Selector: Channel 19	Connect frequency counter to output of CF1. (Figure 2)	TC1	Adjust for 10.240MHz ±100Hz indication on frequency counter.
2	Alignment of VCO			
	MIC: Transmit POWER: On VOLUME: Optional SQUELCH: Optional Channel Selector: Channel 40	Connect DC voltmeter to hot of C68. (Figure 3)	T6	Adjust for 5.0V indication on DC voltmeter.
3	MIC: Receive POWER: On VOLUME: Optional SQUELCH: Optional Channel Selector: Channel 1	Same as Step 2.	Check the indication on DC voltmeter (must be 2.5–3.5V). If DC voltmeter does not indicate 2.5–3.5V, readjust T6 and reutrn to step 2.	

B. TRANSMITTER SECTION

1. Test Equipment Required

- RF power meter
- 50 ohm load (non-inductive)
- DC power supply (13.8V, 2.5 Amp)
- Field strength meter (or spectrum analyzer with RF attenttator)
- Frequency counter
- Coupler

Note: Figure 1 provides test point and all alignment location information.

2. Test Set-up

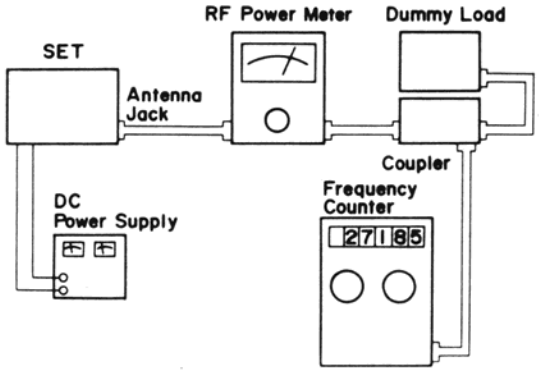


Figure 4

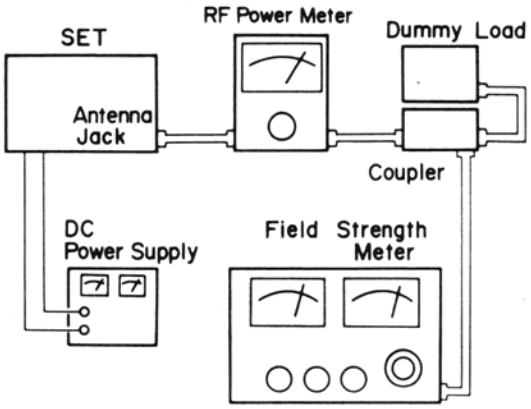


Figure 5

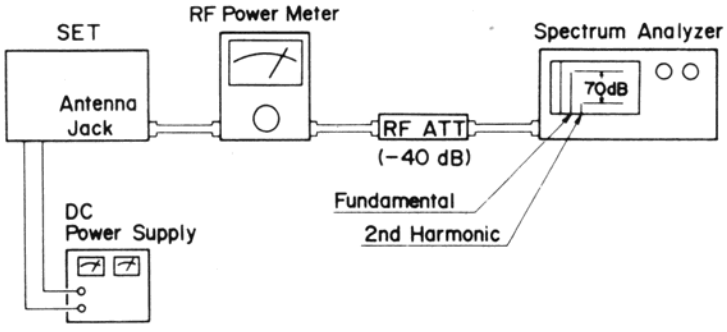


Figure 6

3. Alignment Procedure

STEP	CONTROL SETTING	OUTPUT INDICATOR CONNECTION	ADJUST	ADJUST FOR
1	Alignment of Overall			
	Set channel selector to CH19.	Connect dummy load and frequency counter through coupler to RF power meter. Connect RF power meter to ANT jack on set. (Figure 4)	T7, T8 T9, L11	Adjust for maximum indication on RF power meter.
2	Repeat Step 1 twice or 3 times.			
3	Realignment of T9			
	Set channel selector to CH1.	Same as Step 1.	T9	Adjust for maximum indication on RF power meter.
4	Set channel selector from CH1 to CH19, then from CH19 to CH40.	Same as Step 1.	Check that difference in RF output power between channels is less than 0.2W.	
5	Same as Step 4.	Same as Step 1.	Check that RF output power is 3.8 to 4.2W on all channels with no modulation. If it is not within the above range, go back to steps 1 through 4 and readjust. If still improper, change R114 value.	
6	Alignment of Transmitter Frequency			
	Return to CH19.	Same as Step 1.	TC1	Make sure that the transmitter frequency is 27.185MHz ± 300Hz on frequency counter. If not, readjust TC1.
7	Set channel selector to CH1, CH19, and CH40.	Connect dummy load and field strength meter through coupler to RF power meter. Connect RF power meter to ANT jack on set. (Figure 5) Tune to 2nd harmonic frequency (54.37MHz) on field strength meter. Or connect spectrum analyzer, RF attenuator and RF power meter to ANT jack on set. (Figure 6)	Check level of fundamental and 2nd harmonic frequency (54.37MHz). Check suppression of 2nd harmonic frequency (54.37MHz) compared to fundamental (must be better than 60dB). Check all channels and if necessary, make sure that the 2nd harmonic frequency suppression is more than –60dB on all channels with no modulation. (Reference : –70dB)	

C. RECEIVER SECTION

1. Test Equipment Required

- RF signal generator
- Distortion meter
- SSVM
- Dummy load (8 ohm)
- DC power supply (13.8V, 2.5 Amp)

2. General Alignment Conditions

a. Signal input must be kept as low as possible, to avoid overload and clipping. (Use highest possible sensitivity of output indicator.)

b. Standard modulation is 1000Hz at 30% amplitude.

c. A non-metalic alignment tool must be used for all adjustments.

d. Power supply is adjusted for 13.8V DC, 2A.

Note: Figure 1 shows test point and all alignment location information.

3. Test Set-up

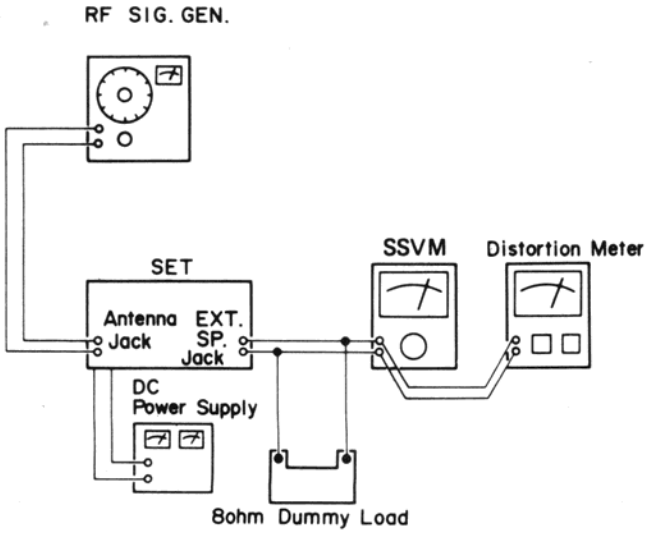


Figure 7

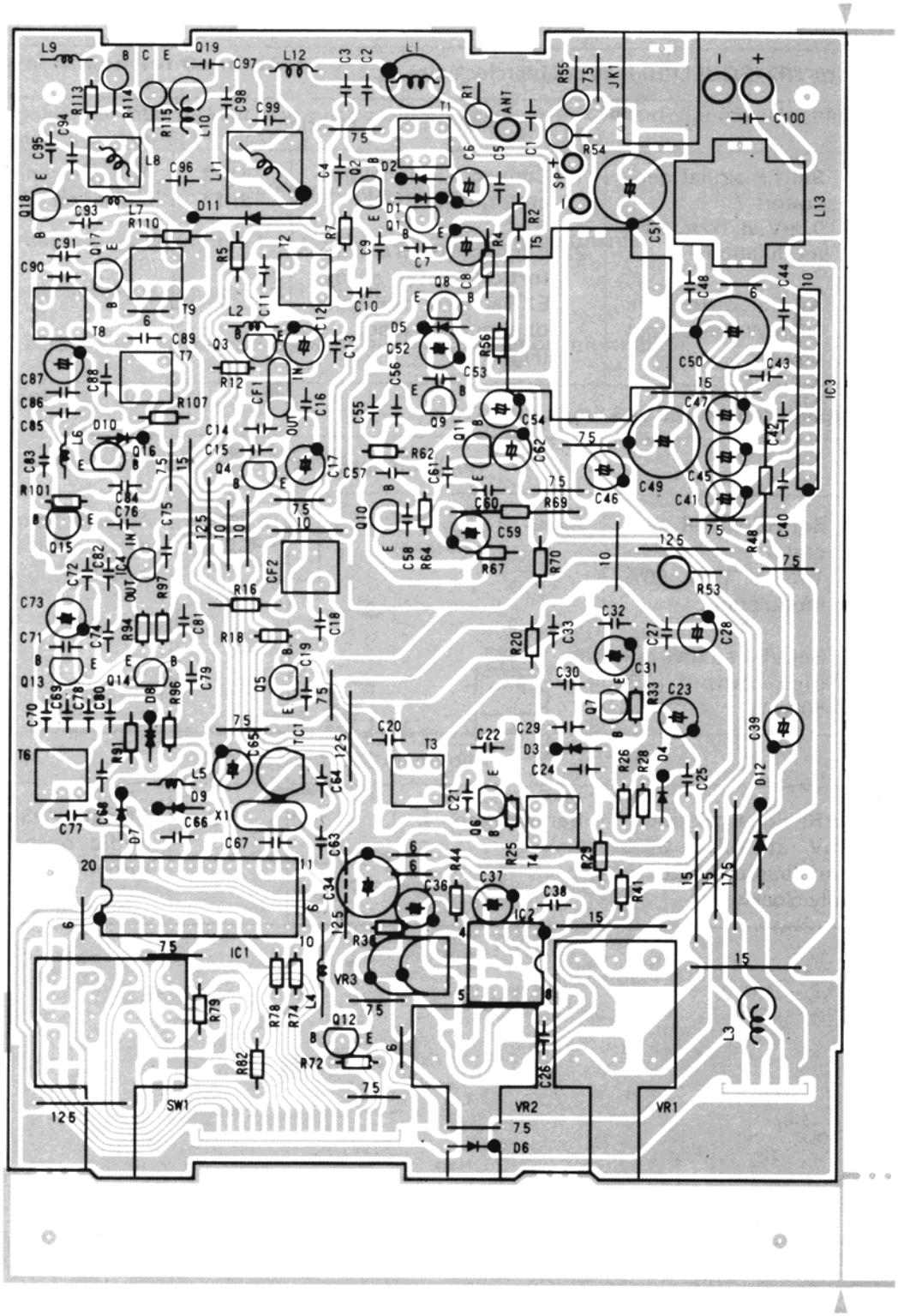
4. Alignment Procedure

STEP	SIGNAL SOURCE CONNECTION	OUTPUT INDICATOR CONNECTION	ADJUST	ADJUST FOR
1	Set channel selector to CH19.			
2	Turn VR1 (VOLUME) fully clockwise.			
3	Turn VR2 (SQUELCH) fully counterclockwise.			
4	Alignment of Overall			
	1) Set RF signal generator: 0.3μV at 1kHz, 30% modulation. 2) Audio output is 500mW (Ref. output power).	1) Connect RF signal generator to ANT jack. 2) Connect SSVM and distortion meter across EXT speaker jack with 8 ohm dummy load. (Figure 7)	T1, T2 T3, T4	Adjust for maximum indication on SSVM.
5	Repeat step 4 twice or 3 times.			
6	Realignment of T4			
	1) Set RF signal generator: 1mV at 1kHz, 80% modulation. 2) Set VR1 so that audio output is 500mW.	Same as Step 4.	T4	Adjust for minimum indication on distortion meter.
7	Alignment of Squelch			
	Set RF signal generator: 1mV at 1kHz, 30% modulation. SQUELCH: Fully clockwise.	Same as Step 4.	VR3	Adjust VR3 so that audio output is just turned on.

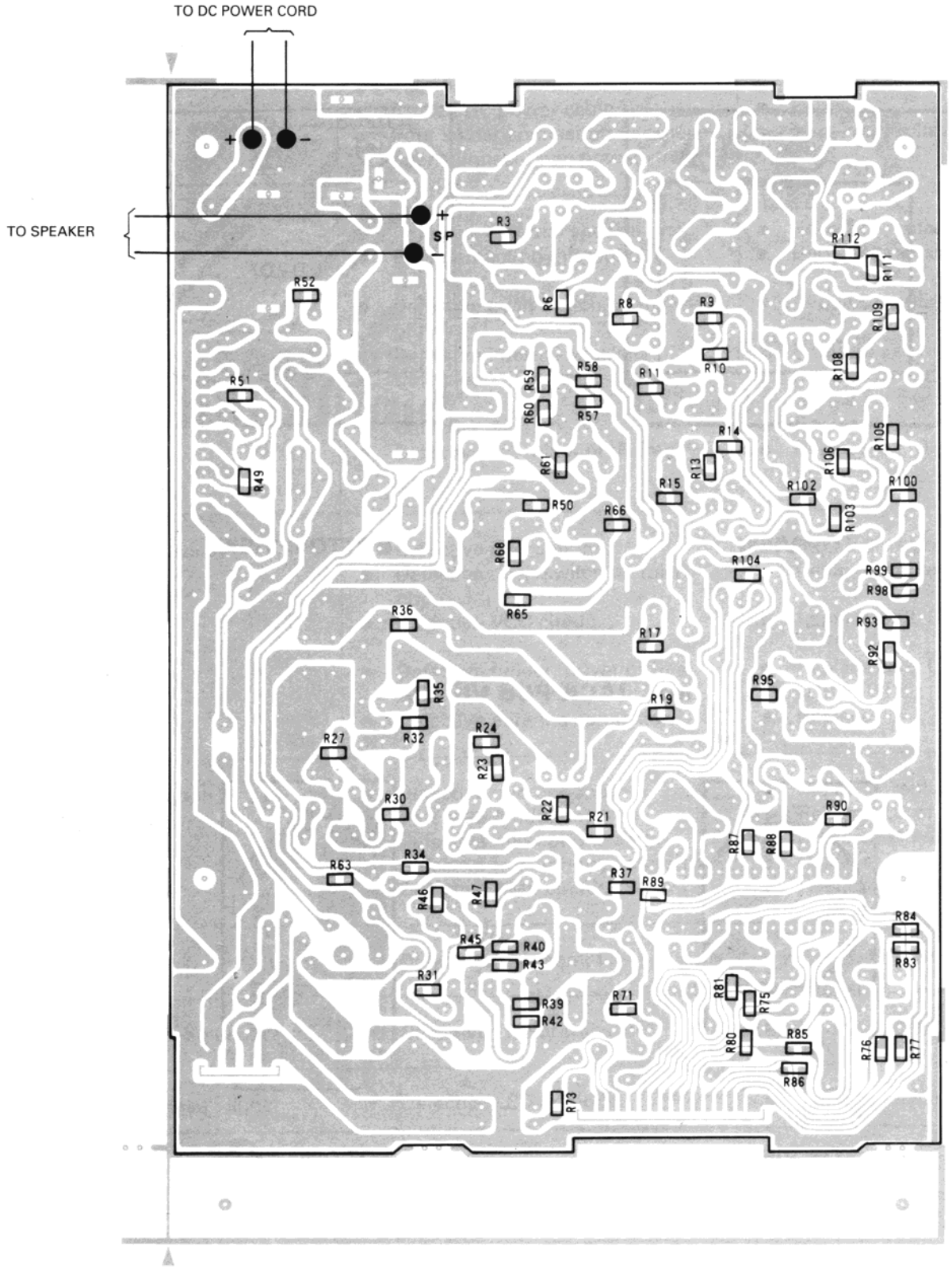
PRINTED CIRCUIT BOARD
(TOP AND BOTTOM VIEW / WIRING DIAGRAM)

MAIN PCB

Top View



Bottom View


TO DC POWER CORD
+
–
TO SPEAKER
+
SP
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R8
R9
R10
R11
R112
R111
R109
R108
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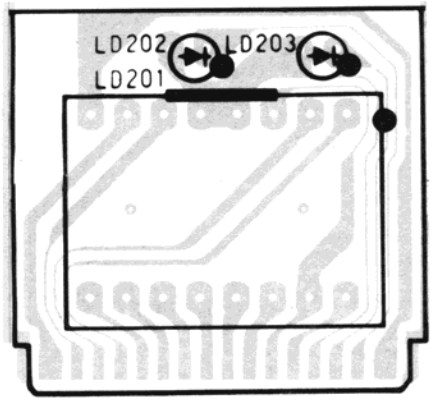
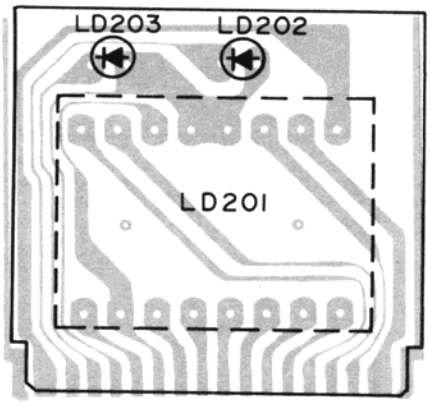
DISPLAY PCB VIEWS

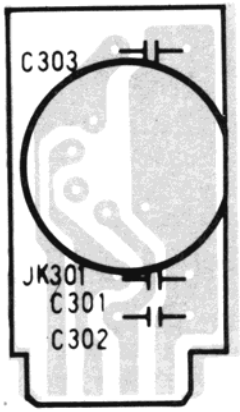


TOP VIEW



BOTTOM VIEW

MIC JACK PCB VIEWS



TOP VIEW

BOTTOM VIEW

TROUBLESHOOTING

Symptom	Cause	Remedy
Unit doesn't turn on	● Defective power switch. ● Fuse blown. ● Broken DC power cable. ● Poor solder connection or other open connection in power circuit.	● Replace. ● Replace. ● Replace. ● Repair or replace.
No sound received	● Defective external speaker jack. ● Poor contact on microphone connector. ● Defective push switch on micro-phone. ● Defective internal speaker. ● Defective VCO circuit. ● Defective AF amp. ● Defective RF, mixer or IF amp.	● Repair or replace. ● Repair or replace. ● Repair or replace. ● Replace. ● Replace Q13, Q14, D8 or T6. ● Replace IC2, IC3 or T5. ● Replace Q2, Q3, Q4, Q5 or Q6.
No transmission	● Defective microphone. ● Defective push switch on micro-phone. ● Defective VCO circuit. ● Defective holder, driver or final amp. ● Defective antenna connector.	● Repair or replace. ● Repair or replace. ● Replace Q13, Q14, D8 or T6. ● Replace Q16, Q17, Q18, Q19 or D11. ● Replace.
No modulation	● Defective microphone. ● Defective modulator. ● Defective microphone amp. ● Defective microphone connector. ● Defective AMC circuit.	● Repair or replace. ● Replace IC3 or T5. ● Replace Q10 or Q11. ● Replace. ● Replace Q8 or Q9.
No squelch	● Defective IC or semi-fixed resistor.	● Replace IC2 or VR3.
RX LED doesn't light	● Defective LED or transistor.	● Replace LD202 or Q12.
TX LED doesn't light	● Defective LED or diode.	● Replace LD203 or D6.

ELECTRICAL PARTS LIST

Ref. No.	Description				RS Part No.	Mfr's Part No.
	PCB, Assembly, Main consists of the following:			US CA		MH00339 MH00549
	CAPACITORS					
C1	Ceramic NPO	220 pF	50 V	± 5%		CCJBK221J*
C2	Ceramic NPO	220 pF	50 V	± 5%		CCJBK221J*
C3	Ceramic NPO	33 pF	50 V	± 5%		CCJBK330J*
C4	Ceramic NPO	22 pF	50 V	± 5%		CCJBK220J*
C5	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C6	Electrolytic	22 µF	16 V	± 20%		CEACG226M*
C7	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C8	Electrolytic	4.7 µF	50 V	± 20%		CEACK475M*
C9	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C10	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C11	Ceramic	1000 pF	50 V	± 10%		CKJEK102K*
C12	Electrolytic	22 µF	16 V	± 20%		CEACG226M*
C13	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C14	Ceramic	1000 pF	50 V	± 10%		CKJEK102K*
C15	Ceramic SL	2 pF	50 V	0.25P		CCJVK2R0C*
C16	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM or CGJLG223K*
C17	Electrolytic	22 µF	16 V	± 20%		CEACG226M*
C18	Ceramic	1000 pF	50 V	± 10%		CKJEK102K *
C19	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM or CGJLG473K*
C20	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM or CGJLG473K*
C21	Ceramic	1000 pF	50 V	± 10%		CKJEK102K*
C22	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM or CGJLG473K*
C23	Electrolytic	1 µF	50 V	± 20%		CEACK105M*
C24	Ceramic	3300 pF	16 V	± 10%		CGJLR332KM
C25	Ceramic	4700 pF	16 V	± 10%		CGJLR472KM
C26	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM
C27	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM or CGJLG223K*
C28	Electrolytic	33 µF	16 V	± 20%		CEACG336M*
C29	Ceramic NPO	68 pF	50 V	± 5%		CCJBK680J*
C30	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM or CGJLG473K*
C31	Electrolytic	22 µF	16 V	± 20%		CEACG226M*
C32	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM or CGJLG223K*
C33	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM or CGJLG223K*

Ref. No.	Description				RS Part No.	Mfr's Part No.
C34	Electrolytic	220 µF	10 V	± 20%		CEACE227M*
C35	Not Used					
C36	Electrolytic	4.7 µF	50 V	± 20%		CEACK475M*
C37	Electrolytic	4.7 µF	50 V	± 20%		CEACK475M*
C38	Ceramic	560 pF	50 V	± 10%		CKJEK561K*
C39	Electrolytic	1 µF	50 V	± 20%		CEACK105M*
C40	Ceramic	0.068 µF	16 V	± 10%		CGJRG683KM
C41	Electrolytic	47 µF	10 V	± 20%		CEACE476M*
C42	Ceramic SL	180 pF	50 V	± 5%		CCJVK181J*
C43	Ceramic	1000 pF	50 V	± 10%		CKJEK102K*
C44	Ceramic SL	100 pF	50 V	± 5%		CCJVK101J*
C45	Electrolytic	47 µF	10 V	± 20%		CEACE476M*
C46	Electrolytic	1 µF	50 V	± 20%		CEACK105M*
C47	Electrolytic	4.7 µF	50 V	± 20%		CEACK475M*
C48	Ceramic	0.068 µF	16 V	± 10%		CGJRG683KM
C49	Electrolytic	330 µF	10 V	± 20%		CEACE337M*
C50	Electrolytic	1000 µF	16 V	± 20%		CECCG108M*
C51	Electrolytic	220 µF	16 V	± 20%		CEACG227M*
C52	Electrolytic	47 µF	10 V	± 20%		CEACE476M*
C53	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C54	Electrolytic	1 µF	50 V	± 20%		CEACK105M*
C55	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C56	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM or CGJLG473K*
C57	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM or CGJLG473K*
C58	Ceramic	4700 pF	16 V	± 10%		CGJRG472KM or CGJLG472K*
C59	Electrolytic	33 µF	16 V	± 20%		CEACG336M*
C60	Ceramic	0.039 µF	16 V	± 10%		CGJRG393KM
C61	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM or CGJLG473K*
C62	Electrolytic	10 µF	25 V	± 20%		CEACI106M*
C63	Ceramic NPO	68 pF	50 V	± 5%		CCJBK680J*
C64	Ceramic NPO	24 pF	50V	± 5%		CCJBK240J*
C65	Electrolytic	22 µF	16 V	± 20%		CEACG226M*
C66	Ceramic	0.1 µF	16 V	± 10%		CGJRG104KM or CGJLG104K*
C67	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C68	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM or CGJLG473K*
C69	Ceramic NPO	82 pF	50 V	± 5%		CCJBK820J*
C70	Ceramic NPO	24 pF	50 V	± 5%		CCJBK240J*
C71	Ceramic NPO	68 pF	50 V	± 5%		CCJBK680J*
C72	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C73	Electrolytic	47 µF	10 V	± 20%		CEACE476M*
C74	Ceramic NPO	47 pF	50 V	± 5%		CCJBK470J*
C75	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM or CGJLG223K*

Ref. No.	Description				RS Part No.	Mfr's Part No.
C76	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM or CGJLG223K*
C77	Ceramic SL	100 pF	50 V	± 5%		CCJVK101J*
C78	Ceramic N220	68 pF	50 V	± 5%		CCJHK680J*
C79	Ceramic N220	56 pF	50 V	± 5%		CCJHK560J*
C80	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C81	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C82	Ceramic SL	4 pF	50 V	0.25p		CCJVK4R0C*
C83	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C84	Ceramic	1000 pF	50 V	± 10%		CKJEK102K*
C85	Ceramic	1000 pF	50 V	± 10%		CKJEK102K*
C86	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C87	Electrolytic	4.7 µF	50 V	± 20%		CEACK475M*
C88	Ceramic	0.01 µF	16 V	± 10%		CGRJG103KM or CGJLG103K*
C89	Ceramic NPO	12 pF	50 V	± 5%		CCJBK120J*
C90	Ceramic SL	100 pF	50 V	± 5%		CCJVK101J*
C91	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
C92	Not Used					
C93	Ceramic NPO	220 pF	50 V	± 5%		CCJBK221J*
C94	Ceramic NPO	33 pF	50 V	± 5%		CCJBK330J*
C95	Ceramic NPO	68 pF	50 V	± 5%		CCCJBK680K*
C96	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM or CGJLG223K*
C97	Ceramic NPO	82 pF	50 V	± 5%		CCJBK820J*
C98	Ceramic NPO	150 pF	50 V	± 5%		CCJBK151J*
C99	Ceramic NPO	220 pF	50 V	± 5%		CCJBK221J*
C100	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM or CGJLG103K*
	CERAMIC FILTERS					
CF1	SFE10.7MJ–A			or		392300560B or 392390010A
CF2	CFU455HT					392100611A
	DIODES					
D1	Silicon	1N4148				SDSI00062– or SDSI00064– or SDSI00149–
D2	Silicon	1N4148				SDSI00062– or SDSI00064– or SDSI00149–
D3	Germanium	1N60P				SDGE00001P or SDGE00003P
D4	Silicon	1N4148				SDAI00062– or SDSI00064– or SDSI00149–

Ref. No.	Description			RS Part No.	Mfr's Part No.	
D5	Silicon	1N4148			SDSI00062–	or
					SDSI00064–	or
					SDSI00149–	
D6	Silicon	1N4148			SDSI00062–	or
					SDSI00064–	or
					SDSI00149–	
D7	Silicon	1N4148			SDSI00062–	or
					SDSI00064–	or
					SDSI00149–	
D8	Varicap	ITT310			SDVC00005–	
D9	Silicon	1N4148			SDSI00062–	or
					SDSI00064–	or
					SDSI00149–	
D10	Silicon	1N4148			SDSI00062–	or
					SDSI00064–	or
					SDSII00149–	
D11	Silicon	1N4002			SDSI00007–	
D12	Silicon	1N4002			SDSI00007–	
	ICS					
IC1	LC7132				SILC7132– –	
IC2	NJM4558D				SINM4558D–	
IC3	KIA7217AP				SIKA7217A–	
IC4	MC78L08ACP		or		SIMC78L08A	or
	NM78L08(A)		or		SINM78L08A	or
	MC78L08ACE				SIMUL08ACZ	
	JACK					
JK1	3.5MM	HSJ0615–01–010			191201330A	
	COILS					
L1	AIR	VR5–7.5T	or	CA–2878	141002080A	or
		5x7.5Tx0.6			141190170A	
L2	Inductor	LAL03NA 100 μH			142011510A	
L3	Inductor	1μH K	or		142310920A	or
		1μH K (4645–0048)	or		142390040A	or
		1μH K			142390050A	
L4	Inductor	10μH K LAL03NA			142011150A	
L5	Inductor	10μH K LAL03NA			142011150A	
L6	Inductor	1.0μH K LAL03NA			142012880A	
L7	Inductor	1.8μH K LAL03NA			142012830A	
L8	Air	HR5.5–10T	or	CA–2880	141102500A	or
		5.5x10Tx0.6			141190160A	
L9	Inductor	0.47μH K LAL03NA			142012840A	
L10	Inductor	1μH K	or	CA–2879	142310920A	or
		1μH (4645–0048)	or		142390040A	or
		LμHK			142390050A	
L11		27MHz D10 3C053	or	CA–2882	143310530A	or
		27MHz S10 3C054			143310540A	

Ref. No.	Description				RS Part No.	Mfr's Part No.	
L12	Air	HR5.5–10T 5.5x10Tx0.6		or		141102500A 141190160A	or
L13	Choke	0.2mH E119 CH020 EI–19 HF/C2220R–V		or	CA–2882	144010200A 144090030A	or
	TRANSISTORS						
Q1	2SA733(P)					ST2A733– –P	
Q2	2SC1674(L)					ST2C1674–L	
Q3	2SC1675(L) KTC380TM(O)			or		ST2C1675–L STKC380TMO	or
Q4	2SC1675(L) KTC380TM(O)			or		ST2C1675–L STKC380TMO	or
Q5	2SC930(E)					ST2C930– –E	
Q6	2SC945(P)					ST2C945– –P	
Q7	2SC945(P)					ST2C945– –P	
Q8	2SA733(P)					ST2A733– –P	
Q9	2SC945(P)					ST2C945– –P	
Q10	2SC945(P)					ST2C945– –P	
Q11	2SC945(P)					ST2C945– –P	
Q12	2SC945(P)					ST2C945– –P	
Q13	2SC945(P)					ST2C945– –P	
Q14	2SA733(P)					ST2A733– –P	
Q15	2SC945(P)				2TR–1090	ST2C945– –P	
Q16	2SC945(P)				2TR–1090	ST2C945– –P	
Q17	2SC945(P)				2TR–1090	ST2C945– –P	
Q18	KTC2036B					STKC2036B–	
Q19	KTC2075(A)				2TR–1091	STKC2075–A	
	RESISTORS Resistors are Metal – Glaze, 1/10W, ± 5% unless otherwise indicated. Unit = Ohm						
R1	Carbon	1.5 k	1/2 W	± 5%		RCSHP152J*	
R2	Carbon	2 k	1/6 W	± 5%		RC0XP202J*	
R3		560				RG0TV561J*	
R4	Carbon	1 k	1/6 W	± 5%		RC0XP102J*	
R5	Carbon	10 k	1/6 W	± 5%		RC0XP103J*	
R6		470				RG0TV471J*	
R7	Carbon	820	1/6 W	± 5%		RC0XP821J*	
R8		470				RG0TV471J*	
R9		180				RG0TV181J*	
R10		100 k				RG0TV104J*	
R11		220				RG0TV221J*	
R12	Carbon	560	1/6 W	± 5%		RC0XP561J*	
R13		560				RG0TV561J*	
R14		10 k				RG0TV103J*	
R15		470				RG0TV471J*	
R16	Carbon	2.2 k	1/6 W	± 5%		RC0XP222J*	
R17		2.2 k				RG0TV222J*	
R18	Carbon	22 k	1/6 W	± 5%		RC0XP223J*	
R19		1 k				RG0TV102J*	
R20	Carbon	470	1/6 W	± 5%		RC0XP471J*	
R21		33 k				RG0TV333J*	
R22		10 k				RG0TV103J*	

Ref. No.	Description				RS Part No.	Mfr's Part No.
R23		5.1				RG0TV5R1J*
R24		470				RG0TV471J*
R25	Carbon	470	1/6 W	±5%		RC0XP471J*
R26	Carbon	47 k	1/6 W	± 5%		RC0XP473J*
R27		47 k				RG0TV473J*
R28	Carbon	39 k	1/6 W	± 5%		RC0XP393J*
R29	Carbon	120 k	1/6 W	± 5%		RC0XP124J*
R30		33 k				RG0TV333J*
R31		10 k				RG0TV103J*
R32		68 k				RG0TV683J*
R33	Carbon	1 M	1/6 W	± 5%		RC0XP105J*
R34		5.1 k				RG0TV512J*
R35		560				RG0TV561J*
R36		100 k				RG0TV104J*
R37		470				RG0TV471J*
R38	Carbon	7.5K	1/6 W	± 5%		RC0XP752J*
R39		10 k				RG0TV103J*
R40		680				RG0TV681J*
R41	Carbon	22 k	1/6 W	± 5%		RC0XP223J*
R42		270 k				RG0TV274J*
R43		2.2 k				RG0TV222J*
R44	Carbon	39 k	1/6 W	± 5%		RC0XP393J*
R45		47 k				RG0TV473J*
R46		180 k				RG0TV184J*
R47		560 k				RG0TV564J*
R48	Carbon	680	1/6 W	± 5%		RC0XP681J*
R49		100 k				RG0TV104J*
R50		10 k				RG0TV103J*
R51		82				RG0TV820J*
R52		10				RG0TV100J*
R53	M–Oxide	270	2 W	± 5%		RX02P271J*
R54	M–Film	10	2 W	± 5%		RM02P100J*
R55	M–Film	15	1 W	± 5%		RM01P150J*
R56	Carbon	10 k	1/6 W	± 5%		RC0XP103J*
R57		910				RG0TV911J*
R58		1.8 k				RG0TV182J*
R59		2.2 k				RG0TV222J*
R60		18 k				RG0TV183J*
R61		1.2 k				RG0TV122J*
R62	Carbon	4.7 k	1/6 W	± 5%		RC0XP472J*
R63		1 k				RG0TV102J*
R64	Carbon	2.2 k	1/6 W	± 5%		RC0XP222J*
R65		56 k				RG0TV563J*
R66		8.2 k				RG0TV822J*
R67	Carbon	680	1/6 W	± 5%		RC0XP681J*
R68		6.8 k				RG0TV682J*
R69	Carbon	3.3 k	1/6 W	± 5%		RC0XP332J*
R70	Carbon	100 k	1/6 W	± 5%		RC0XP104J*
R71		10 k			NDA–028IEDG	RG0TV103J*
R72	Carbon	620	1/6 W	± 5%		RC0XP621J*
R73		1.2 k				RG0TV122J*
R74	Carbon	620	1/6 W	± 5%		RC0XP621J*
R75		1.2 k				RG0TV122J*
R76		1.2 k				RG0TV122J*

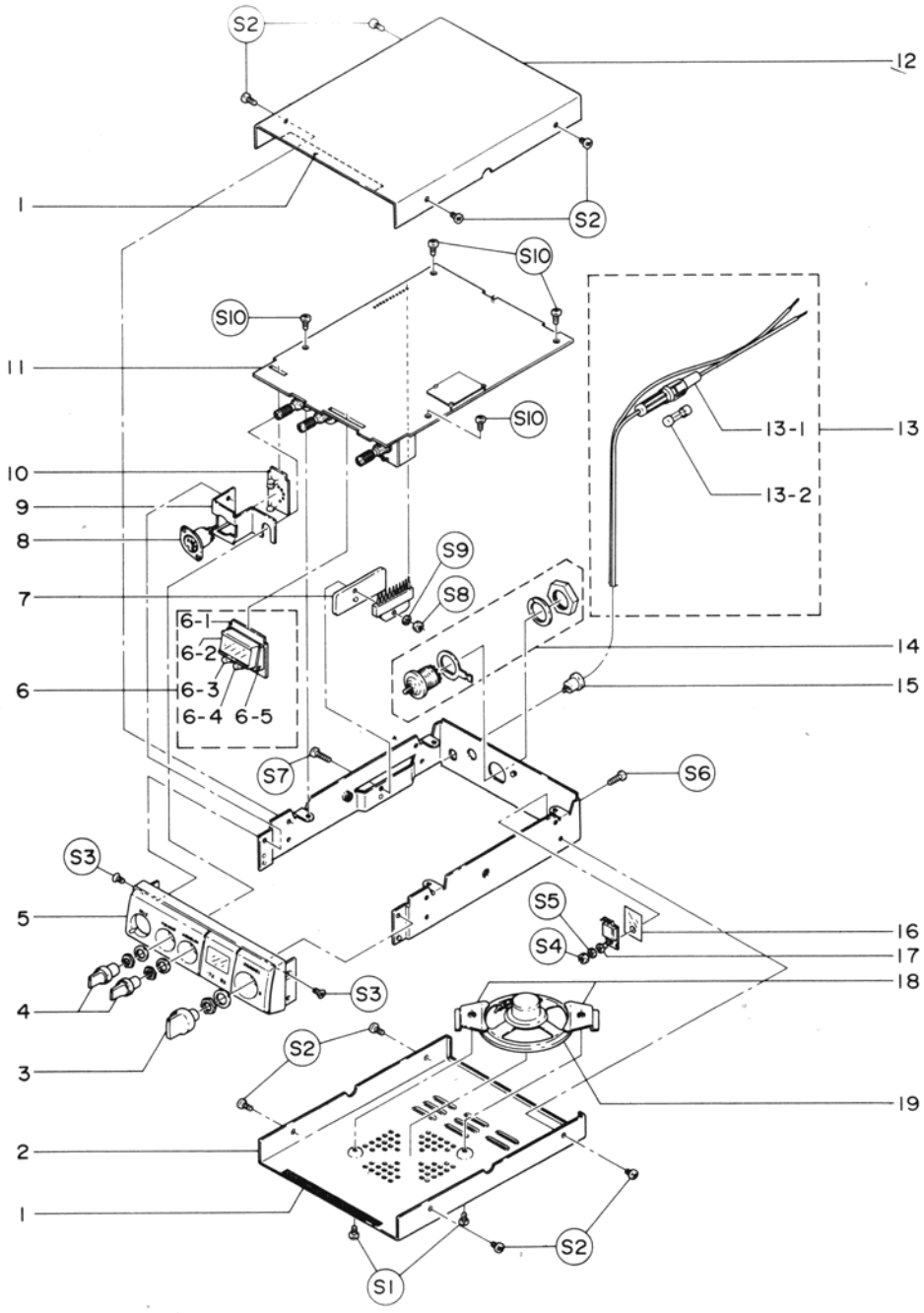
Ref. No.	Description				RS Part No.	Mfr's Part No.
R77		1.2 k				RG0TV122J*
R78	Carbon	1.2 k	1/6 W	± 5%		RC0XP122J*
R79	Carbon	1.2 k	1/6 W	± 5%		RC0XP122J*
R80		1.2 k				RG0TV122J*
R81		1.2 k				RG0TV122J*
R82	Carbon	1.2 k	1/6 W	± 5%		RC0XP122J*
R83		1.2 k				RG0TV122J*
R84		1.2 k				RG0TV122J*
R85		1.2 k				RG0TV122J*
R86		1.2 k				RG0TV122J*
R87		2.2 k			NDA–0216EDG	RG0TV222J*
R88		47 k				RG0TV473J*
R89		10 k				RG0TV103J*
R90		22 k				RG0TV223J*
R91	Carbon	47 k	1/6 W	± 5%		RC0XP473J*
R92		220 k				RG0TV224J*
R93		2.7 k				RG0TV272J*
R94	Carbon	470	1/6 W	± 5%		RC0XP471J*
R95		47 k				RG0TV473J*
R96	Carbon	2.2 k	1/6 W	± 5%		RC0XP222J*
R97	Carbon	470	1/6 W	± 5%		RC0XP471J*
R98		6.8 k				RG0TV682J*
R99		22 k				RG0TV223J*
R100		1 k			NDA–0196EDG	RG0TV102J*
R101	Carbon	470	1/6 W	± 5%		RC0XP471J*
R102		1.2 k				RG0TV122J*
R103		4.7 k				RG0TV472J*
R104		4.7 k				RG0TV472J*
R105		6.8k				RG0TV682J*
R106		180				RG0TV181J*
R107	Carbon	100	1/6 W	± 5%		RC0XP101J*
R108		6.8 k				RG0TV682J*
R109		3.3 k				RG0TV332J*
R110	Carbon	150	1/6 W	± 5%		RC0XP151J*
R111		220				RG0TV221J*
R112		1 k				RG0TV102J*
R113	Carbon	15	1/6 W	± 5%		RC0XP150J*
R114	Carbon	6.8	1/2 W	± 5%		RCSHP6R8J*
		TX POWER ADJ.				
	Carbon	7.5	1/2 W	± 5%		RCSHP7R5J*
		TX POWER ADJ.				
	Carbon	8.2	1/2 W	± 5%		RCSHP8R2J*
		TX POWER ADJ.				
	Carbon	9.1	1/2 W	± 5%		RCSHP9R1J*
		TX POWER ADJ.				
	Carbon	10	1/2 W	± 5%		RCSHP100J*
		TX POWER ADJ.				
	Carbon	11	1/2 W	± 5%		RCSHP110J*
		TX POWER ADJ.				
	Carbon	12	1/2W	± 5%		RCSHP120J*
		TX POWER ADJ.				
R115	Carbon	470	1/2 W	± 5%		RCSHP471J*

Ref. No.	Description	RS Part No.	Mfr's Part No.
	SWITCH		
SW1	Rotary SRS202U CHANNEL		181110100A
	COILS		
T1	Coil 27 MHz S7 1C038		143100381A
T2	Coil 27 MHz S7 1C258		143112580A
T3	IFT 455 S7 1I066		131000660A
T4	IFT 455 S7 1I027		131000270A
T5	Modulation Transformer EI24		10301005SA or 103390060A
T6	Coil 16MHz S7 1C259 or 2075–0152		143112590A or 143190290A
T7	Coil 27MHz S7 1C260		143112600A
T8	Coil 27MHz S7 1C260		143112600A
T9	Coil 27MHz S7 1C258		143112580A
	TRIMMER		
TC1	TZ03T200FR		154010220A
	POTS		
VR1	Rotary 10KA L20 VOLUME		171310200A
VR2	Rotary 100KB L20 SQUELCH or 16K1-B100k–L20KC		171211230A or 171290040A
VR3	Semi–Fixed 1KB TT24R100		175206162A or
	1KB RVF6P01A–102N or		177310040A or
	1KB TT24R100 or KVSF637A1KB		175206162A or 177390150A
	CRYSTAL		
X1	10.240MHz HC–18/U		391010310A or 391012040A
	MISCELLANEOUS		
	Plate, Shield		473211370A
	Sheet, Insulation		483013260A

	PCB, Assembly, Display US consists of the following: CA		MH00340 MH00550
	LEDS		
LD201	LED UL–1241–17 CHANNEL		555010111A
LD202	LED SLR–34MG3F, RX		SL–G00061–
LD203	LED SLR–34VR3F, TX		SL–R00125–
	MISCELLANEOUS		
	Holder, For LED		413102240A

Ref. No.	Description	RS Part No.	Mfr's Part No.
	PCB, Assembly Micropone Jack consists of the following:		MH00341
	CAPACITORS		
C301	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
C302	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
C303	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
	MISCELLANEOUS		
	Sheet, Insulation		483013260A

EXPLODED VIEW / DISASSEMBLY INSTRUCTIONS



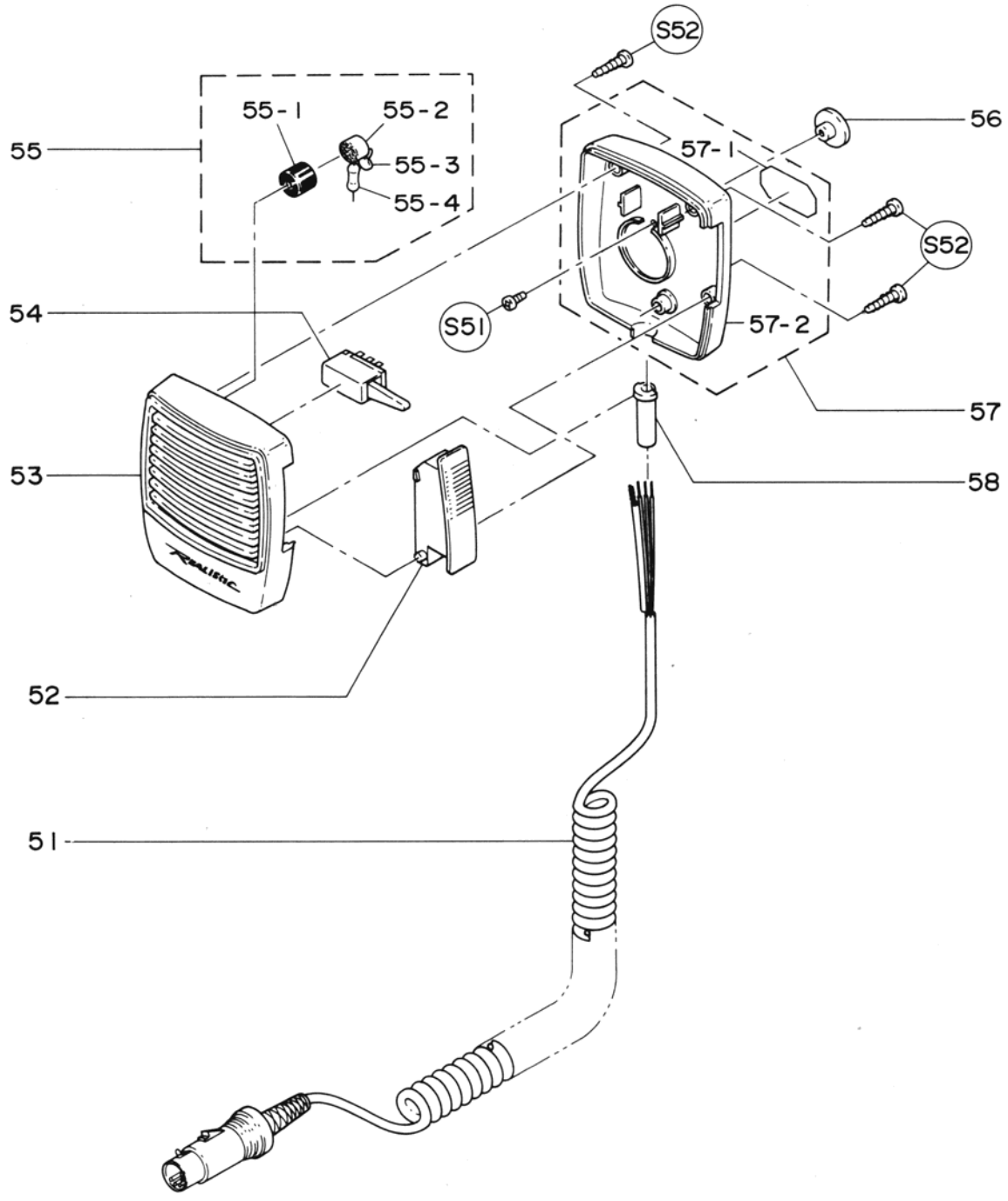
Disassembly Instructions :

1. Remove four screws (S2) from top cover 12.
2. Remove four screws (S2) from bottom cover 2.
3. Remove two screws (S3) from front cabinet assembly 5.
4. Remove two knobs 4 and one knob 3 from front cabinet assembly 5.
5. Remove the nuts from the knobs 3 and 4 above.
6. Remove four screws (S10) from main PCB assembly 11.

EXPLODED VIEW PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
1	Blind, Himelon for Top/Bottom Cabinets		851211370A
2	Cover, Bottom	E–4117	602210130A
3	Knob 25, CHANNEL	K–2635	652510880A
4	Knob 25, SQ/VOL	K–2636	652510870A
5	Assembly, Cabinet, Front (Non-repairable)	E–4115	MH00346
	Cabinet, Front		
	Plate, Front		
6	Assembly, PCB, Display US	XB–3447	MH00340
	CA		MH00550
6-1	PCB 21 for Display PCB		20211064*A
6-2	Module, LED, UL–1241–17, CHANNEL (LD201)		555010111A
6-3	LED, SLR–34VR3F, TX, Red (LD203)		SL–R00125–
6-4	LED, SLR–34MG3F, RX, Green (LD202)		SL–G00061–
6-5	Holder for LED		413102240A
7	Heat Sink		471010960A
8	Jack, DIN for Microphone (JK301)		193410120A or 193490010A
9	Holder for Microphone This holder has been changed to 411102900A from serial no. 25329.	HB–0801	411116400A
10	Assembly, PCB, Mic Jack		MH00341
11	Assembly, PCB, Main US		MH00339
	CA		MH00549
12	Cover, Top	E–4116	602410090A
13	Assembly, Holder, Fuse	NG–0201	MH00345
13-1	Holder, Fuse with Lead Wire		197210080A or 197290020A
13-2	Fuse, 125V, 2A (F401)		251010310A
14	Connector, M–type (JK401)		193010011A or 193090010A
15	Bushing, Cord		481000100A
16	Sheet, Insulation for Q19		483011470A
17	Grommet for Q19		481110120A
18	Holder fro Speaker		411012400A
19	Speaker, D66, 8 ohm, 0.7 W (SP401) SP–0138		271011050A
	Hardware Kit (S1 – S10)		HWK0211519
S1	Screw, 3 x 6P/ZnB for SP Holder		HMP03006SB
S2	Screw, Taptite, 3 x 6BT–C/ZnB for TOP/Bottom Cover		HCBC3006SB
S3	Screw, Taptite, 2.6 x 6FCT–B/ZnY for Front Cabinet		HCCB2606SY
S4	Nut, 3N–1/Ni–3		HANN301–SN
S5	Washer, Spring, 3SW/Ni–3		HWAS30SSSN
S6	Screw, 3 x 10B/Ni–3		HMB03010SN
S7	Screw, 3 x 8B/ZnY		HMB03008SY
S8	Nut, 3N–1/ZnY		HANN301–SY
S9	Washer, Spring, 3SW/ZnY		HAWS30SSSY
S10	Screw, Taptite, 3 x 8BT–B/ZnY for PCB		HCBB3008SY

Ref. No.	Description	RS Part No.	Mfr's Part No.
	Accessories:		
	Shaft, Handle (2pcs)		432201700A
	Holder for Hanger	HB–0802	411116390A
	Speaker, NEOP Rubber (2pcs)		852013230A
	Holder for Hand Mic	HB–0803	411116410A
	Screw, 3 x 10B/ZnY (2pcs)		HMB03010SY
	Washer, Spring, 3SW/ZnY (2pcs)		HAWS30SSSY
	Washer, 3W/ZnY (2pcs)		HAWP30SSSY
	Screw, Tapping, 3 x 8BT–B/ZnY (2pcs)		HCBB3008SY
	Nut, 3N–1/ZnY (2pcs)		HANN301–SY
	Bolt, 6 x 16H/ZnY (2pcs)		HBH06016SY
	Nut, 6N–1/ZnY (2pcs)		HANN601–SY
	Washer, 6W/ZnY (2pcs)		HAWP60SSSY
	Washer, Spring, 6SW/ZnY (2pcs)		HAWS60SSSY
	Screw, Tapping, 6 x 20PT–2/ZnY (2pcs)		HTPS6020SY



Microphone Disassembly Instruction :

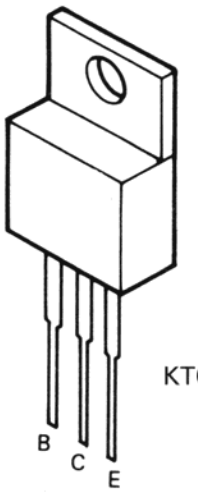
Remove three screws (S52) from back cabinet assembly 57.

HAND MIC UNIT EXPLODED VIEW PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
	Unit, Hand Mic US		WU00014
	CA		WU00636
51	Assembly, Cord (Non-repairable)	W–0144	MH00344
	Plug, DIN		
	Cord		
52	Knob 95		659512670A
53	Cabinet, Front		601010610B
54	Switch, Push (SW501)		182210310A
55	Assembly, Microphone US		MH00343
	CA		MH00552
55-1	Holder, NEOP Rubber for Microphone		413102330A
55-2	Unit, Microphone, EM–80 (MC501)		273100730A
55-3	Capacitor, Ceramic (C501)		CGJRG393KM
55-4	Resistor, Carbon, 4.7 Kohm (R501)		RC0XP472J*
56	Piece, Mounting	HC–3539	604010470A
57	Assembly, Cabinet, Back US		MH00342
	CA		MH00551
57-1	Label, Rating		738013930A
57-2	Cabinet, Back		601110310A
58	Bushing, Cord		481010180A
	Hardware Kit (S51, S52) HW–2101519		HWK211519M
S51	Screw, Taptite, 2.6 x 6PT–B/ZnY		HCPB2606SY
S52	Screw, Taptite, 3 x 12BT–B/ZnB		HCBB3012SB

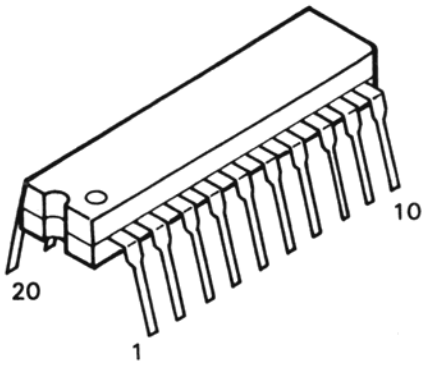
IC AND TRANSISTOR LEAD IDENTIFICATION AND IC INTERNAL DIAGRAM

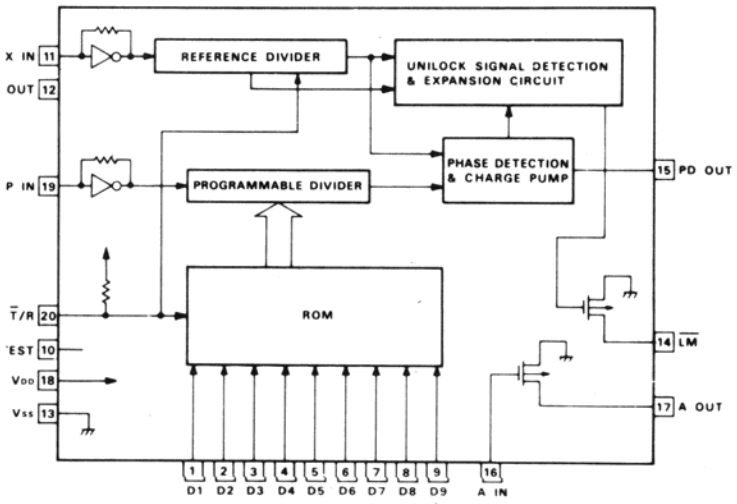
2SC930
2SC945
KTC2036B
2SA733
2SC1675
2SC1674



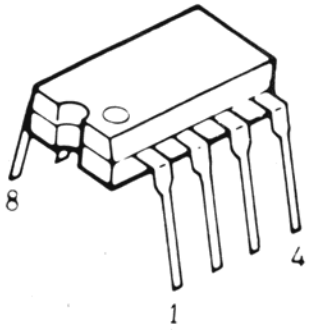
KTC2075

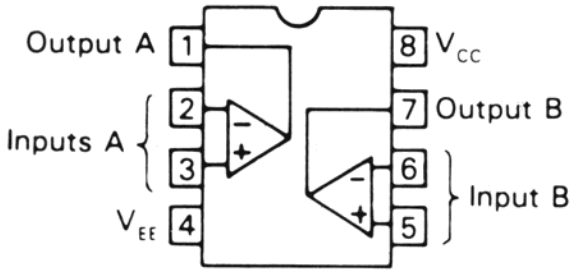
IC–1 LC7132



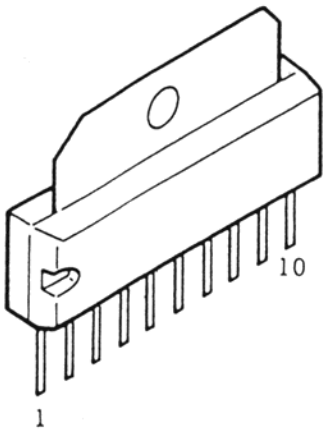


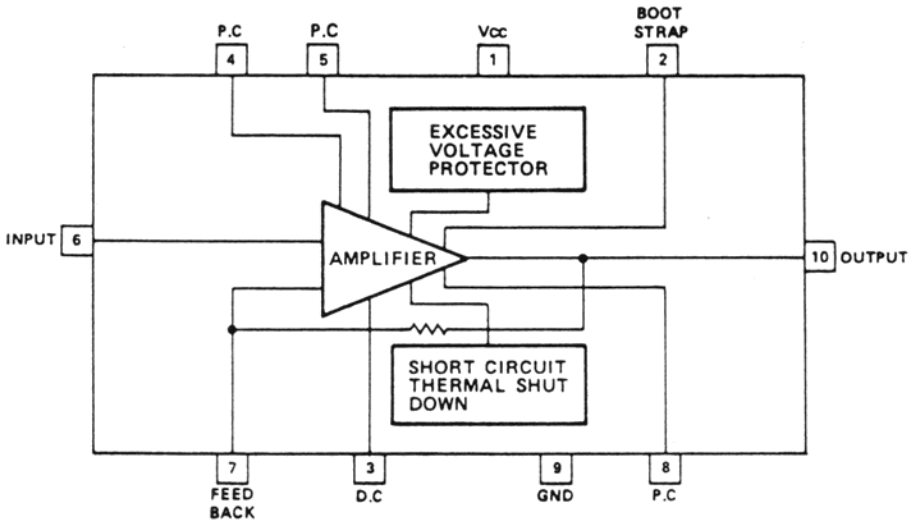
IC–2 NJM4558D



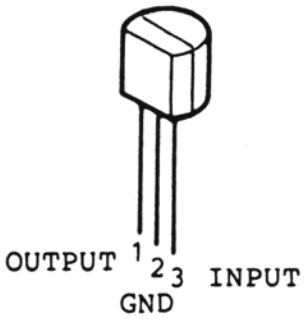


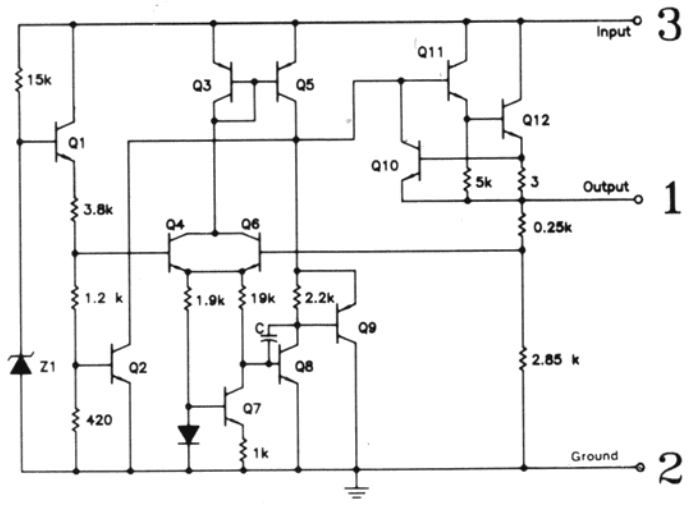
IC–3 KIA7217AP



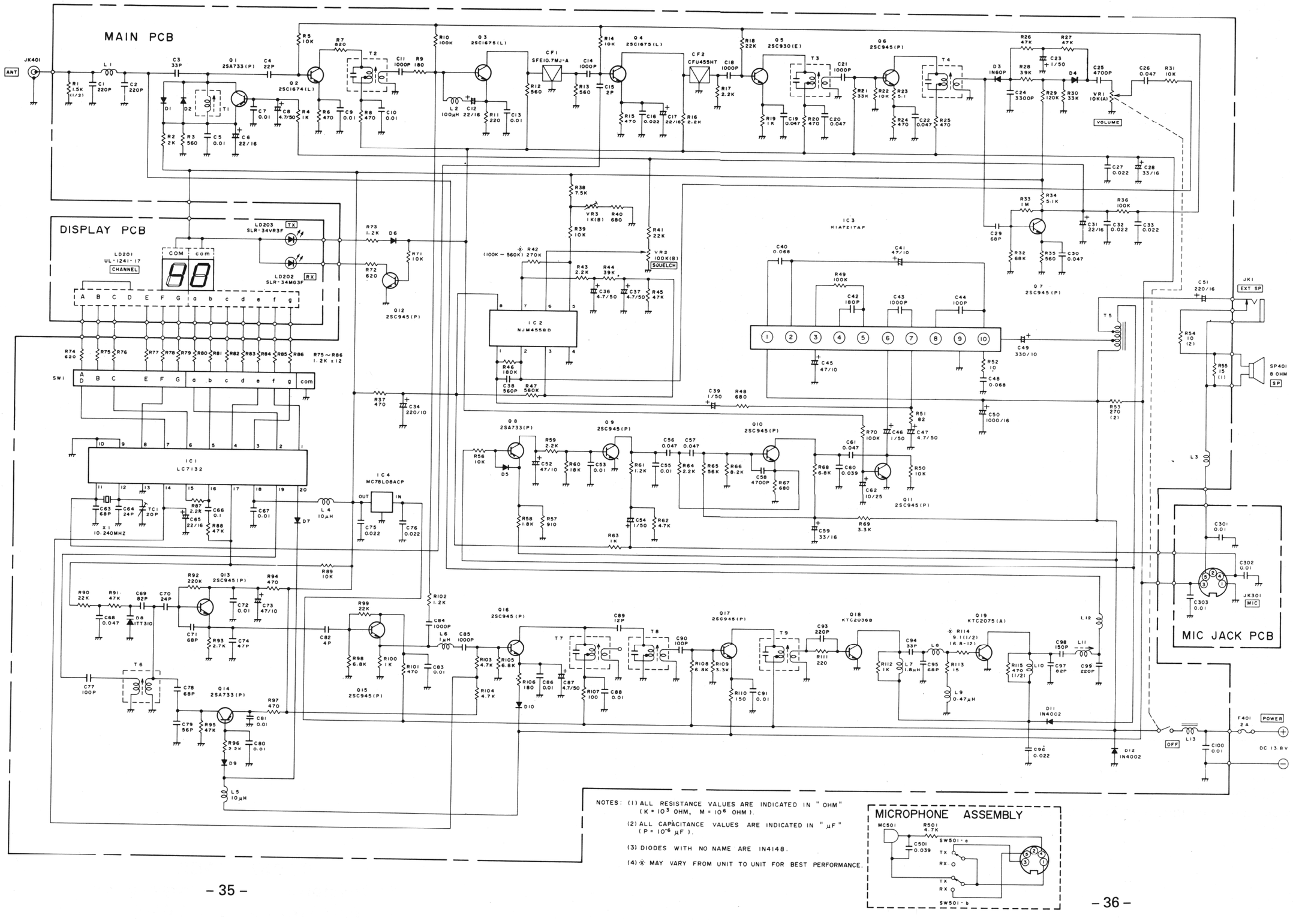


IC–4 MC78L08ACP





SCHEMATIC DIAGRAM



NOTES: (1) ALL RESISTANCE VALUES ARE INDICATED IN " OHM" ($K = 10^3$ OHM, $M = 10^6$ OHM).

(2) ALL CAPACITANCE VALUES ARE INDICATED IN "μF" ($P = 10^{-6}$ μF).

(3) DIODES WITH NO NAME ARE IN4148.

(4) ※ MAY VARY FROM UNIT TO UNIT FOR BEST PERFORMANCE.

IC AND TRANSISTOR VOLTAGE CHART

IC Voltage Chart

IC1	PIN NO. MODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	TX	0	0	0	6.6	0	0	6.6	6.6	0	0	3.9	4.1	0	5.6	1.5
	RX	0	0	0	6.6	0	0	6.6	6.6	0	0	4.0	4.1	0	5.7	1.5
	PIN NO. MODE	16	17	18	19	20										
	TX	1.5	4.2	8.1	4.0	0.5										
	RX	1.5	3.8	8.1	4.0	8.1										
IC2	PIN NO. MODE	1	2	3	4	5	6	7	8							
	TX	3.4	3.4	3.4	0	1.2	0	6.6	6.9							
	RX	1.2 / 3.5	1.2 / 3.5	0.9 / 3.5	0 / 0	1.1 / 1.2	6 / 0	1.3 / 6.3	6.6 / 7							
IC3	PIN NO. MODE	1	2	3	4	5	6	7	8	9	10					
	TX	13.4	12.1	3.8	7.7	1.5	3.2	3.2	1.3	0	6.5					
	RX	13.8	12.6	3.9	7.9	1.5	3.3	3.3	1.3	0	6.6					
IC4	PIN NO. MODE	1	2	3												
	TX	8.1	0	13.4												
	RX	8.1	0	13.8												

Notes :
- Channel : 19
- Digital Volt Meter : DC Range
- All voltage values are indicated in volts with no signal.
- IC2 (RX)

Squelch
OFF / ON

Transistor Voltage Chart

Transistor No.	PIN MODE	E	C	B	Transistor No.	PIN MODE	E	C	B
Q1	TX	1.7	1.8	7.4	Q11	TX	0	0	0
	RX	1.8	1.8	7.4		RX	0	0	0.6
Q2	TX	0.2	–0.2	0.2	Q12	TX	0	6.7	0
	RX	0.9	8.5	1.6		RX	0	0	0.7
Q3	TX	0	0	0	Q13	TX	5.2	7.2	5.6
	RX	0.2	10.4	0.9		RX	5.2	7.3	5.6
Q4	TX	0	0	0.4	Q14	TX	6.8	6.8	6.1
	RX	0.9	6.8	1.6		RX	8.1	0	7.5
Q5	TX	0	0	0.5	Q15	TX	2.2	12.1	2.8
	RX	1.0	10.4	1.7		RX	2.2	12.5	2.8
Q6	TX	0	0	0	Q16	TX	2.7	12.6	3.2
	RX	1.8	9.0	2.5		RX	3.5	13.8	3.4
Q7	TX	0	7.2	0.4	Q17	TX	3.6	13.2	4.1
	RX	0	7.4	0.5		RX	11.0	13.8	4.4
Q8	TX	5.0	0	5.6	Q18	TX	0	11.6	–0.2
	RX	5.2	0	5.7		RX	0	13.4	0
Q9	TX	0	0	0	Q19	TX	0	11.6	–0.3
	RX	0	0	0		RX	0	13.4	0
Q10	TX	0.5	3.4	1.2					
	RX	0.6	3.4	1.3					

Notes :
- Channel : 19
- Digital Volt Meter : DC Range
- All voltage values are indicated in volts with no signal.