

REALISTIC[®]

Service Manual

21-1550

TRC-481 40-CHANNEL CLASS D C.B. MOBILE TRANSCEIVER Catalog Number: 21-1550

CONTENTS

	Page
Specifications-----	2
Block Diagrams-----	4
Circuit Description-----	6
Frequencies Generated and Mixed to Obtain Each Channel-----	8
Alignment-----	9
PCB Top and Bottom Views / Wiring Diagram-----	15
Troubleshooting-----	18
Electrical Parts List-----	20
Exploded View/Disassembly Instructions-----	30
Exploded View Parts List-----	31
Hand Mic Unit Exploded View Parts List-----	32
Hand Mic Unit Exploded View-----	33
IC and Transistor Lead Identification and IC Internal Diagram-----	34
Voltage Chart-----	36
Schematic Diagram-----	40

©1991 Tandy Corporation.
All Rights Reserved.

Realistic and Navaho are the registered trademarks used by Tandy Corporation.



This file is for information only

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

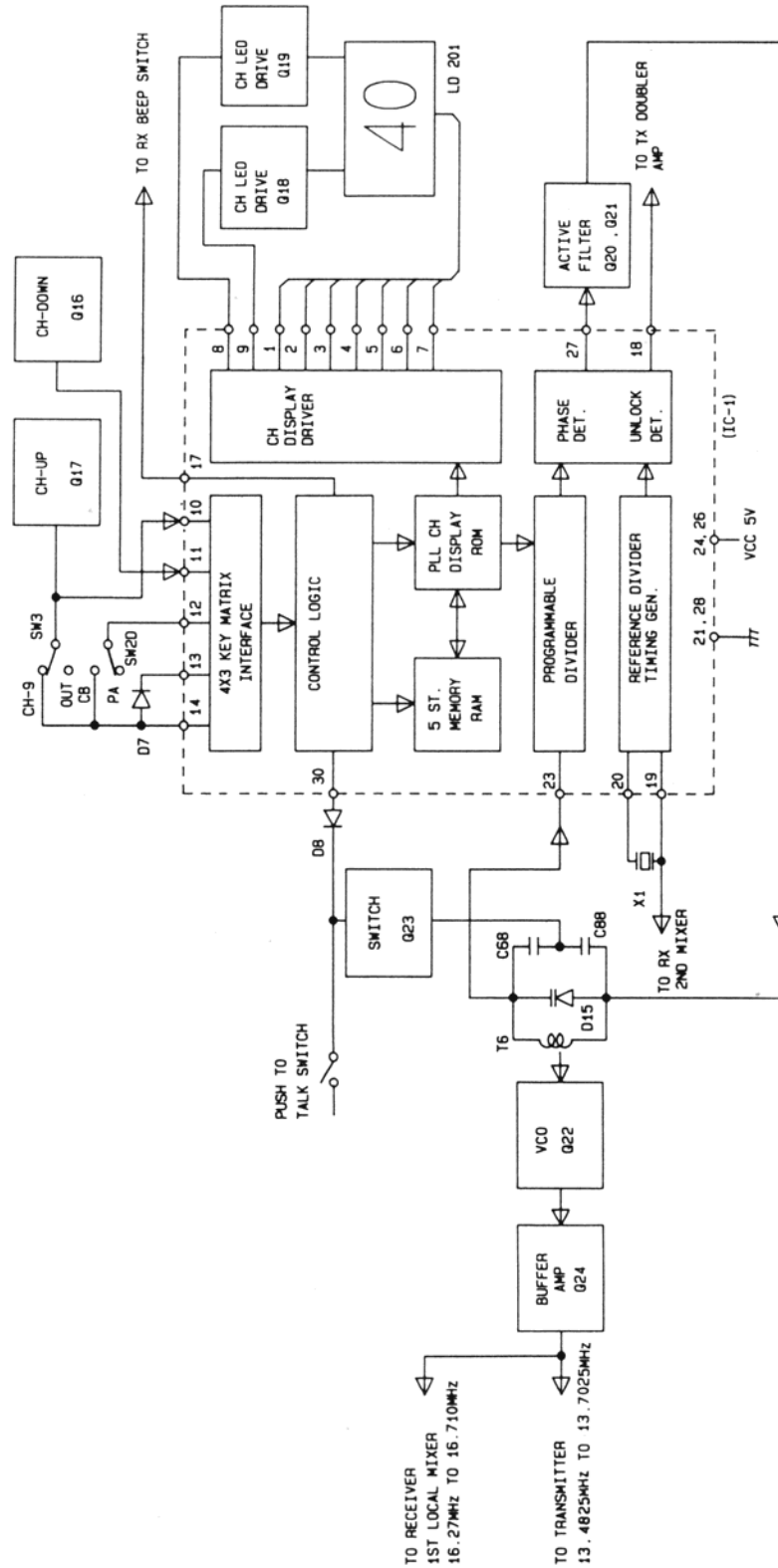
Transmitter

	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)			
450 Hz, EIA	dB	- 6	- 6 ± 3
2.5 kHz, EIA	dB	- 6	- 6 ± 3
Carrier power uniformity CH to CH at no modulation	W	0.2	0.5
Microphone sensitivity for AM 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

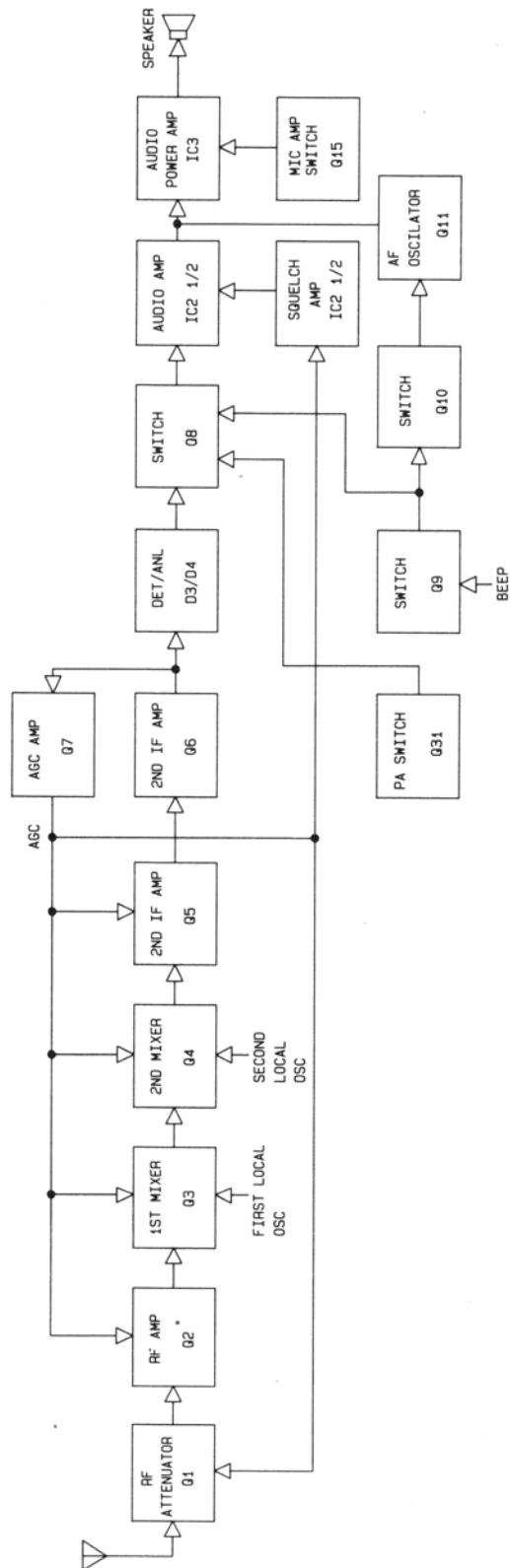
Receiver	Unit	Nominal	Limit
Maximum sensitivity	μV	0.3	0.6
Sensitivity for S/N 10 dB	μV	0.5	1.0
Squelch sensitivity at threshold	μV	0.7	1.4
at tight	μV	1000	355 – 2820
AGC figure of merit for – 10 dB audio output (Reference RF input 50 mV)	dB	90	70
Overload AGC characteristics from 50 mV to 1V	dB	3	3 ± 6
Overall audio fidelity (1 kHz 0 dB reference)			
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
Public Address			
	Unit	Nominal	Limit
Maximum output power	W	6.0	4.5
10% THD output power	W	5.0	3.5
Microphone sensitivity for PA 4W output at 1 kHz	mV	3	10
Frequency response			
upper frequency 2500 Hz	dB	– 6	– 6 ± 3
lower frequency 450 Hz	dB	– 6	– 6 ± 3
Current drain at maximum power	mA	1200	1500

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.

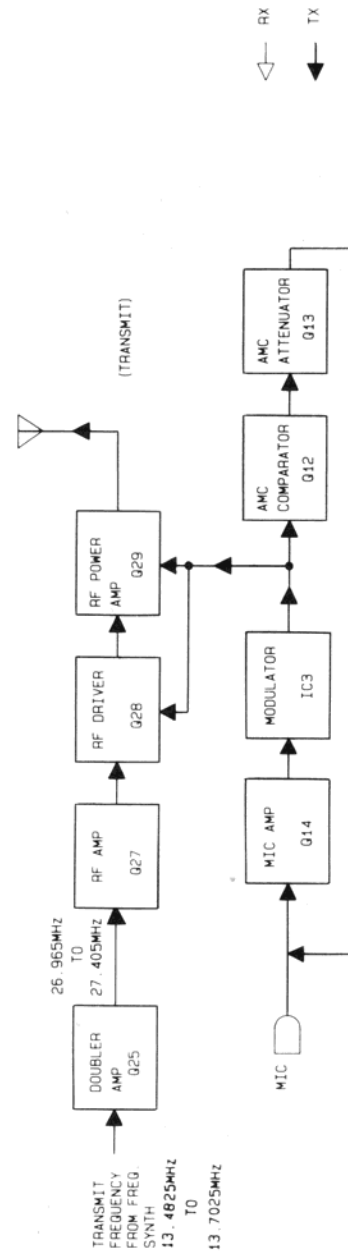
Frequency Synthesizer



Receive



Transmit



CIRCUIT DESCRIPTION

General

The TRC-481 is a 40-channel, crystal controlled mobile transceiver which consists of a PLL-synthesizer circuit, a receiver circuit and a transmitter circuit. Diode D14 is a polarity-protector. Power is supplied by a car battery (13.8 VDC). Refer to the Block Diagram and the Schematic Diagram as you read the following descriptions.

PLL Synthesizer Section

The TRC-481 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 and receive) and a programmable divider.

The programmable divider directly divides the output of the VCO (voltage controlled oscillator) down to a 2.5 kHz 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 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 signals.

This error voltage appears at collector of Q20, Q21 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 D15. 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 signals, and the VCO generates a frequency that is as accurate and stable as the reference crystal oscillator. The VCO circuit consists of D15, Q22 and T6.

The circuit is connected in the form of a hartley oscillator with varicap diode D15 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 18 of IC1, which is normally open, will be shorted to ground. This means that VCO frequency (1/2 carrier for transmitting) is "sunk" to pin 18 of IC1 and the transmitter circuits are inhibited.

Transmitter Circuit

RF Amplification

The output of doubler amp Q25 is fed through doubler tuning (27 MHz) T7 and T8 to the base of buffer amp Q27. The output is then supplied through tuning circuit T9 to RF driver amp Q28. The Q28 output capacitance is divided by tuning circuit L7, C103 and passed through tuning circuit L8 and C104 to the base of final RF stage Q29. The Q29 output is supplied to the antenna through L-C turning circuit.

Suppression of Spurious Radiation

The tuning circuit between frequency synthesizer and final amp Q29 and 3-stage "PI" network C107, L11, C108, C2, L13 and C1 in the Q29 output circuit serve to suppress spurious radiation. This network serves to impedance match Q29 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 Q29 (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 Q14 and then to audio power IC3, which feeds the signal to the modulation transformer T5. The audio output at the set-up transformer of T5 is fed in series with the B+ voltage through diode D13 to the collectors of Q28 and final Q29 to collector modulate both these stages.

Limiting Modulation

A portion of the modulating voltage is fed through base of Q12 which turns on Q13 which attenuates the mic input to mic amp Q14. The resulting feedback loop keeps the modulation from exceeding 100 percent for inputs approximately 40 dB greater than that required to produce 50 percent modulation. The attack time is about 18 milli seconds, and the release time is about 350 milli seconds.

Receiver Circuit

Receiver

The receiver is a double conversion superheterodyne with first IF at 10.695 MHz and the second IF at 455 kHz. The synthesizer supplies the first local oscillator 10.695 MHz below the received frequency and the second local oscillator at 10.240 MHz.

The detector output provides reverse AGC to all previous stages except Q6. The detect and AGC voltage is also amplified by Q7, used to feed RF attenuator Q1, and squelch amp IC2 (2/2). The channel key-in tone circuit is Q9, Q10, Q11, Q8, and Q31.

Indicators

Channel Indication

Indicates the selected channel by 2-digit segment LEDs. The LEDs light dynamically by the outputs from IC1.

The output from pin 8 (D1) of IC1 controls the lighting of the 1st digit through Q19, and the output from pin 9 (D2) of IC1 controls the lighting of the 2nd digit through Q18.

The output ports of IC1; from pin 1 (SA) to pin 7 (SG), control the lighting of each segment of each digit.

TX / RX Indication

TX Mode Indication:

When the PTT switch is pressed, Q26 turns on and LD203 lights.

RX Mode Indication:

When the unit is in the receiver mode by turning-on of the power switch (VR1-SW), Q32 turns on and LD202 lights.

CH9 / PA Indication

When the CH9 / OUT switch on the front panel is set to CH9, LD201 flashes and displays "9."

When the PA / CB switch is set to PA, LD201 displays "PA."

FREQUENCIES GENERATED AND MIXED TO OBTAIN EACH CHANNEL

CHANNEL	FREQUENCY (MHz)	RX (TX = 1)		TX (TX = 0)	
		N	FVCO	N	FVCO
1	26.965	6508	16.27	5393	13.4825
2	26.975	6512	16.28	5395	13.4875
3	26.985	6516	16.29	5397	13.4925
4	27.005	6524	16.31	5401	13.5025
5	27.015	6528	16.32	5403	13.5075
6	27.025	6532	16.33	5405	13.5125
7	27.035	6536	16.34	5407	13.5175
8	27.055	6544	16.36	5411	13.5275
9	27.065	6548	16.37	5413	13.5325
10	27.075	6552	16.38	5415	13.5375
11	27.085	6556	16.39	5417	13.5425
12	27.105	6564	16.41	5421	13.5525
13	27.115	6568	16.42	5423	13.5575
14	27.125	6572	16.43	5425	13.5625
15	27.135	6576	16.44	5427	13.5675
16	27.155	6584	16.46	5431	13.5775
17	27.165	6588	16.47	5433	13.5825
18	27.175	6592	16.48	5435	13.5875
19	27.185	6596	16.49	5437	13.5925
20	27.205	6604	16.51	5441	13.6025
21	27.215	6608	16.52	5443	13.6075
22	27.225	6612	16.53	5445	13.6125
23	27.255	6624	16.56	5451	13.6275
24	27.235	6616	16.54	5447	13.6175
25	27.245	6620	16.55	5449	13.6225
26	27.265	6628	16.57	5453	13.6325
27	27.275	6632	16.58	5455	13.6375
28	27.285	6636	16.59	5457	13.6425
29	27.295	6640	16.60	5459	13.6475
30	27.305	6644	16.61	5461	13.6525
31	27.315	6648	16.62	5463	13.6575
32	27.325	6652	16.63	5465	13.6625
33	27.335	6656	16.64	5467	13.6675
34	27.345	6660	16.65	5469	13.6725
35	27.355	6664	16.66	5471	13.6775
36	27.365	6668	16.67	5473	13.6825
37	27.375	6672	16.68	5475	13.6875
38	27.385	6676	16.69	5477	13.6925
39	27.395	6680	16.70	5479	13.6975
40	27.405	6684	16.71	5481	13.7025

VCO (TX) = FREQUENCY $\div$ 2

VCO (RX) = FREQUENCY – 10.695MHz (IF)

CH 1: VCO (TX) = 26.965 $\div$ 2 = 13.4825

VCO (RX) = 26.965 – 10.695 = 16.27

ALIGNMENT

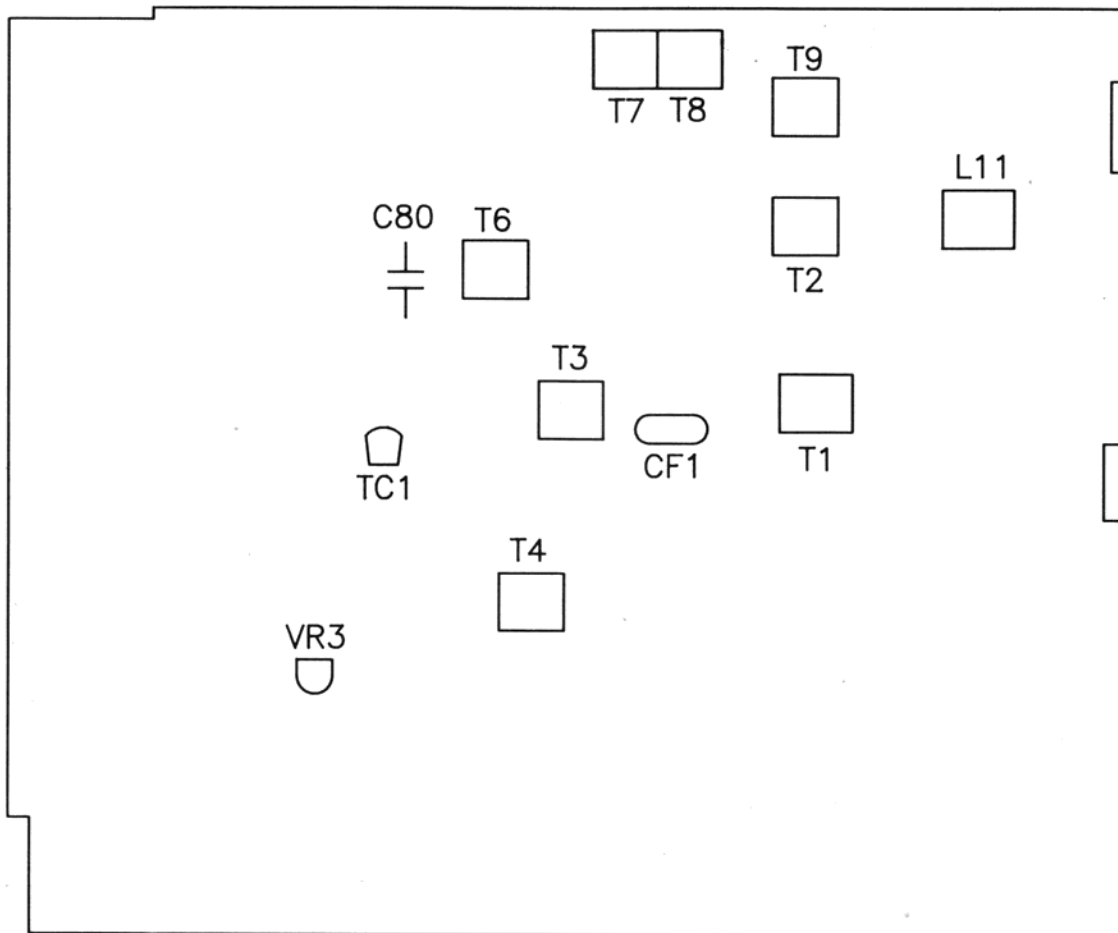


Figure 1

PLL SECTION

Test Equipment Required

- Frequency counter
- DC voltmeter (about 100k ohm)
- DC power supply (13.8V, 3 Amp)

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

Test Set-up

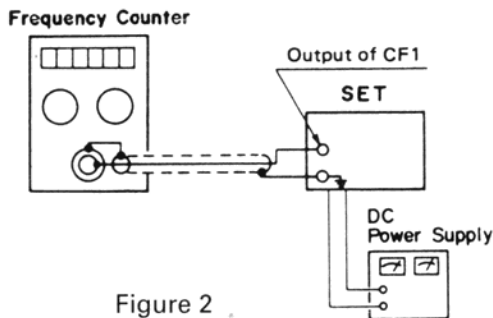


Figure 2

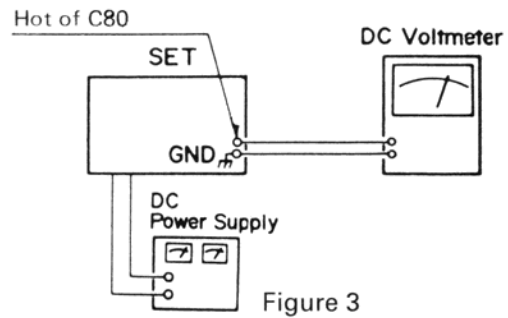


Figure 3

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 ± 100 Hz 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 C80. (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 return to step 2.	

TRANSMITTER SECTION

Test Equipment Required

- RF power meter
- 50 ohm load (non-inductive)
- DC power supply (13.8V, 3 Amp)
- Field strength meter
- (or spectrum analyzer with RF attenuator)
- Frequency counter
- Coupler

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

Test Set-up

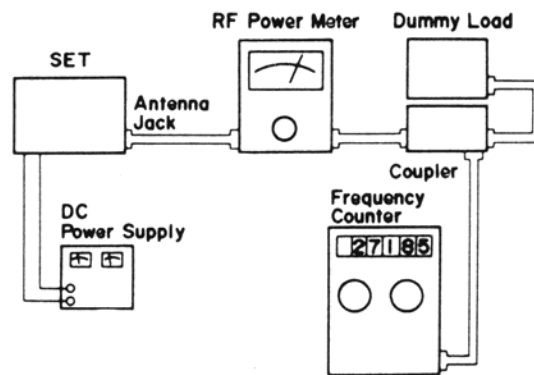


Figure 5

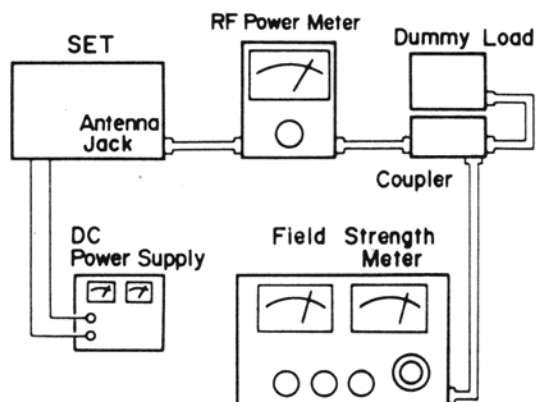


Figure 6

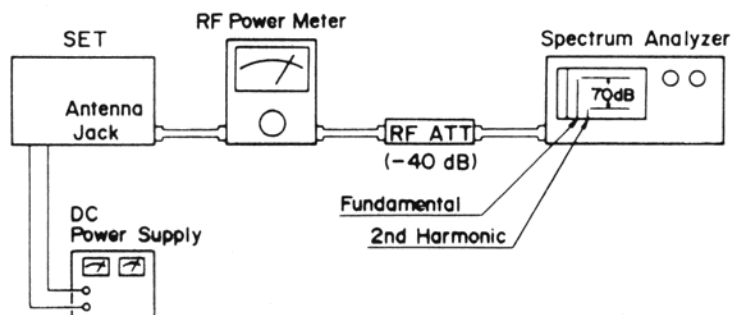


Figure 7

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 5)	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 6) 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 7)	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 -63dB on all channels with no modulation. (Reference : -70dB)	

RECEIVER SECTION

Test Equipment Required

- RF signal generator
- Distortion meter
- SSVM
- Dummy load (8 ohm)
- DC power supply (13.8V, 3 Amp)

General Alignment Conditions

- Signal input must be kept as low as possible, to avoid overload and clipping. (Use highest possible sensitivity of output indicator.)
- Standard modulation is 1000Hz at 30% amplitude.
- A non-metallic alignment tool must be used for all adjustments.
- Power supply is adjusted for 13.8V DC, 3A.

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

Test Set-up

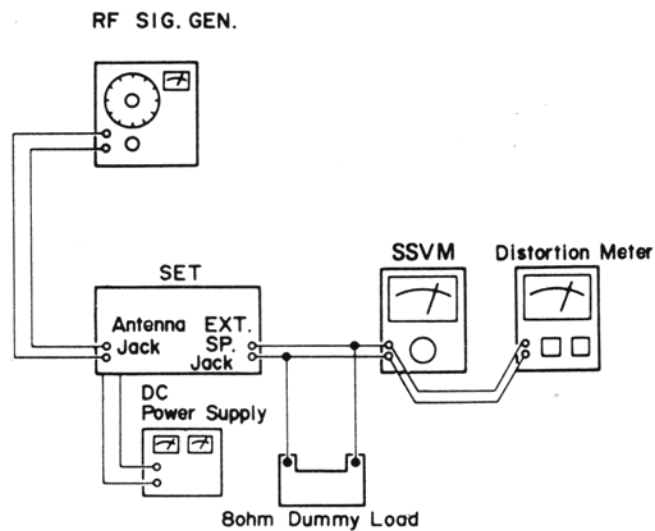


Figure 10

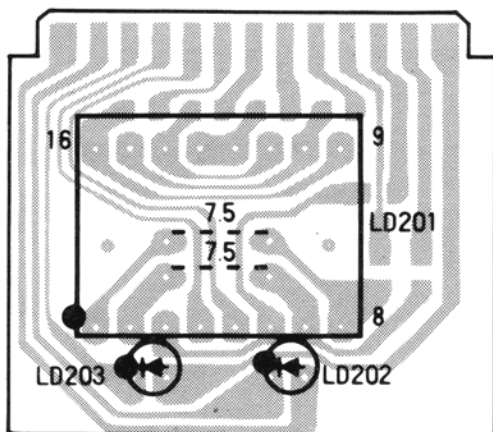
Alignment Procedure

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: 0.3 μ V at 1kHz, 30% mod. 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 10)	T1, T2 T3, T4 L1	Adjust for maximum indication on SSVM.
5	Repeat Step 4 twice or three times.			
6	Realignment of T4			
	1) Set RF signal generator: 1mV at 1kHz, 80% mod. 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 1 mV at 1 kHz, 30% mod. SQUELCH : FULLY clockwise.	Same as Step 4.		Adjust VR3 so that audio output is turned on.

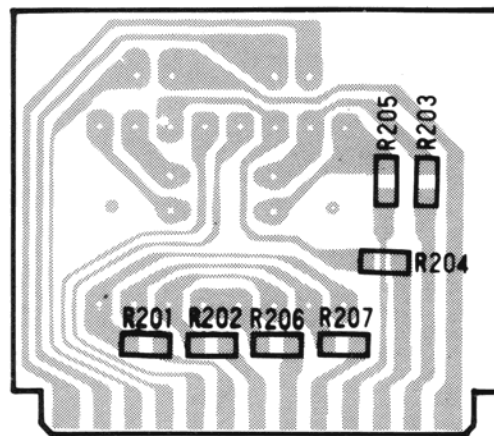
PCB TOP AND BOTTOM VIEW / WIRING DIAGRAM

DISPLAY PCB

Top View

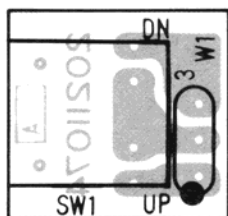


Bottom View

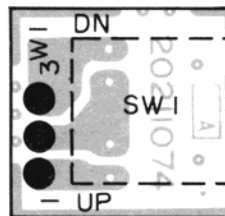


CHANNEL SWITCH PCB

Top View

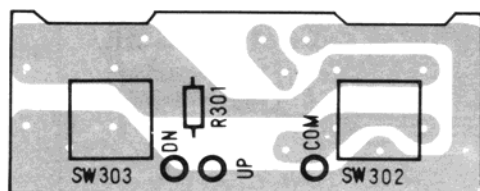


Bottom View

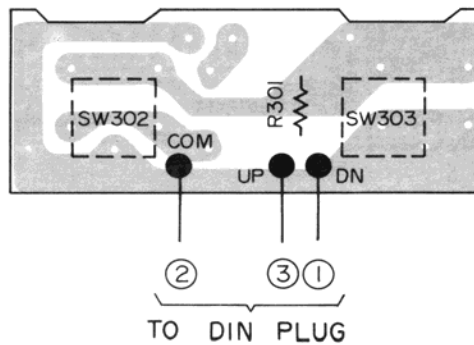


HAND MIC PCB

Top View

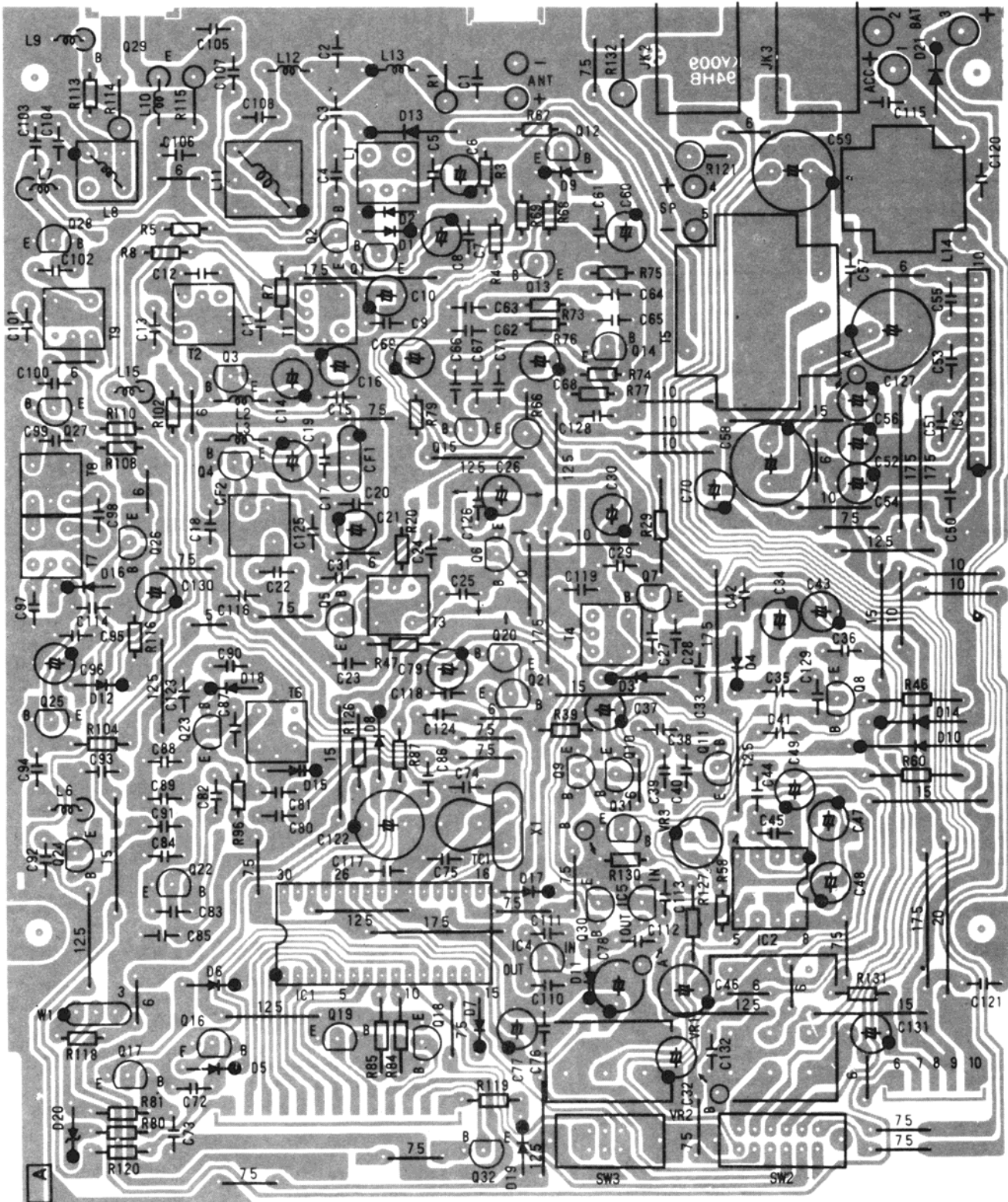


Bottom View



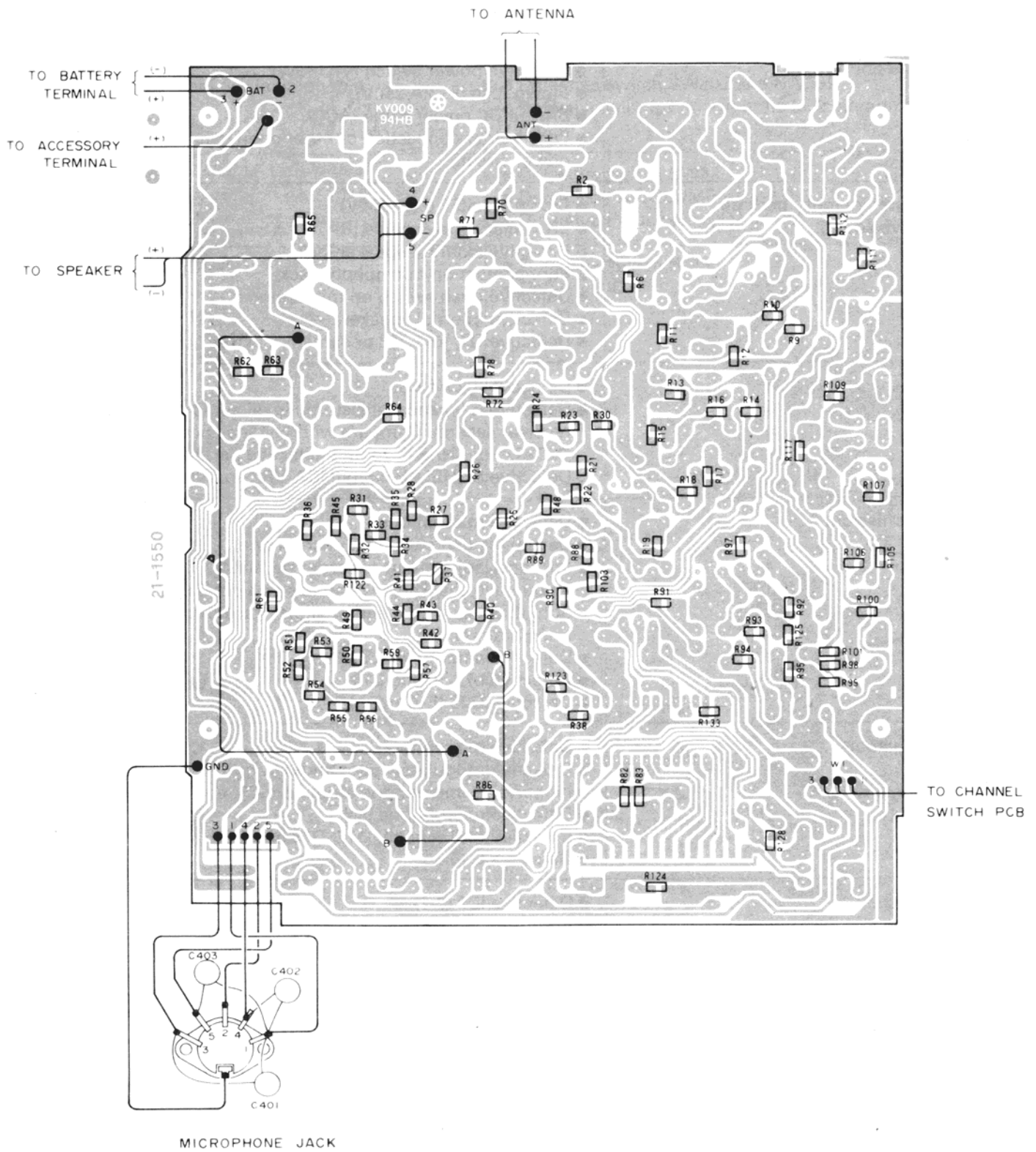
MAIN PCB

Top View

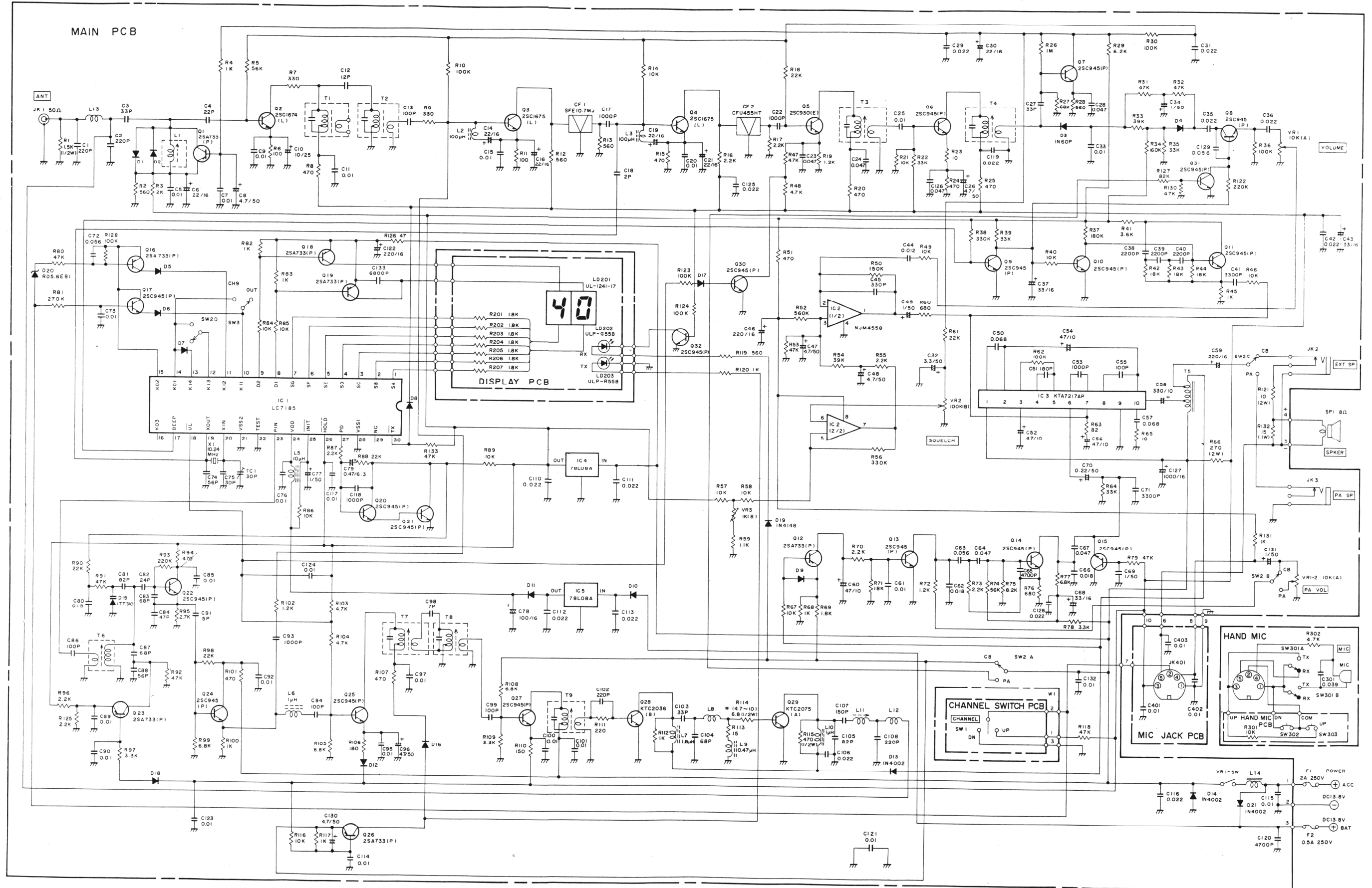


SJ-1220

Bottom View



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) THE VALUE OF THE PARTS WITH * MARK MAY VARY FROM UNIT TO UNIT FOR BEST PERFORMANCE.
(4) ALL DIODES WITH NO NAMES ARE IN4148

TROUBLESHOOTING

Note: For remedy, replace or repair defective part(s) or component(s).

Symptom	Cause
Unit does not turn on.	● Defective power switch (VR1–SW). ● Blown fuse (F1 2A 250V). ● Broken DC power cable (ACC). ● Poor solder connection or other open connection in power circuit.
No channel memory back up. No receive sound.	● Blown fuse (F2 0.5A 250V). ● Broken DC power cable (BAT). ● Defective external speaker jack. ● Poor contact on microphone jack. ● Defective push switch on microphone. ● Defective internal speaker. ● Defective D3, VR1, Q8 or semiconductors in RX circuit.
No noise.	● Defective IC2 or IC3. ● Defective IC(s) and transistor(s) in all audio stages in receiver section. Compare with voltages noted on "VOLTAGE CHART" to find defective part(s). ● Defective SQUELCH circuit: IC2, VR2 and VR3.
No transmission.	● Defective microphone. ● Defective push switch on microphone. ● Improper adjustment of carrier oscillator. If you have checked all channels and obtain no RF output, check V.C.O. and/or signal trace through transmitter circuit. ● Defective antenna jack JK1. ● Defective L7, L9, and L10. ● Defective Q23 (E–C open).
No modulation.	● Defective microphone. ● Defective modulator (poor audio output). ● Inoperative microphone amplifier: IC3, and Q14. ● Defective microphone jack. ● Defective AMC circuit: Q12, Q13 and D9. ● Defective Q15.
No squelch.	● Defective IC2 (2/2). ● Improper adjustment of VR3. (For remedy, readjust VR3. See "ALIGNMENT").
RX indicator does not light.	● Defective LD202 or Q32.
TX indicator does not light.	● Defective LD203 or R120.

Symptom	Cause
No channel up/down on unit.	● Defective CHANNEL switch SW 1. ● Defective channel up/down circuitry: D20, Q16, D5, Q17, D6 and IC1. ● Defective wire (W1).
No channel up/down on mic.	● Defective switch SW302 and SW303. ● Defective wire for microphone jack pin number of 2 (open).
No PA	● Defective switch SW2. ● Defective PA VOLUME VR1-2. ● Defective PA speaker jack JK-3.
No CH9/OUT.	● Defective switch SW3. ● Defective IC1.

ELECTRICAL PARTS LIST

CB Unit

Ref. No.	Description	RS Part No.	Mfr's Part No.
	PCB Assembly, Main consists of the following:	US CA	MH00553 MH00743
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
C6	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C7	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
C8	Electrolytic 4.7 µF 50 V ± 20%		CEACK475M*
C9	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
C10	Electrolytic 10 µF 25 V ± 20%		CEACI106M*
C11	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
C12	Ceramic NPO 12 pF 50 V ± 5%		CCJBK120J*
C13	Ceramic NPO 100 pF 50 V ± 5%		CCJBK101J*
C14	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C15	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
C16	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C17	Ceramic 1000 pF 16 V ± 10%		CGJRG102KM
C18	Ceramic SL 2 pF 50 V ± 0.25pF		CCJVK2R0C*
C19	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C20	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
C21	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C22	Ceramic 1000 pF 16 V ± 10%		CGJRG102KM
C23	Ceramic 0.047 µF 16 V ± 10%		CGJRG473KM
C24	Ceramic 0.047 µF 16 V ± 10%		CGJRG473KM
C25	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
C26	Electrolytic 4.7 µF 50 V ± 20%		CEACK475M*
C27	Ceramic SL 33 pF 50 V ± 5%		CCJVK330J*
C28	Ceramic 0.047 µF 16 V ± 10%		CGJRG473KM
C29	Ceramic 0.022 µF 16 V ± 10%		CGJRG223KM
C30	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C31	Ceramic 0.022 µF 16 V ± 10%		CGJRG223KM
C32	Electrolytic 3.3 µF 50 V ± 20%		CEACK335M*
C33	Ceramic 0.01 µF 16 V ± 10%		CGJRG103KM
C34	Electrolytic 1 µF 50 V ± 20%		CEACK105M*
C35	Ceramic 0.022 µF 16 V ± 10%		CGJRG223KM
C36	Ceramic 0.022 µF 16 V ± 10%		CGJRG223KM
C37	Electrolytic 33 µF 16 V ± 20%		CEACG336M*
C38	Ceramic 2200 pF 16 V ± 10%		CGJRG222KM
C39	Ceramic 2200 pF 16 V ± 10%		CGJRG222KM
C40	Ceramic 2200 pF 16 V ± 10%		CGJRG222KM

Ref. No.	Description				RS Part No.	Mfr's Part No.
C41	Ceramic	3000 pF	16 V	± 10%		CGJRG332KM
C42	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C43	Electrolytic	33 µF	16 V	± 20%		CEACG336M*
C44	Ceramic	0.012 µF	16 V	± 10%		CGJRG123KM
C45	Ceramic	330 pF	50 V	± 10%		CKJEK331K*
C46	Electrolytic	220 µF	16 V	± 20%		CEACG227M*
C47	Electrolytic	4.7 µF	50 V	± 20%		CEACK475M*
C48	Electrolytic	4.7 µF	50 V	± 20%		CEACK475M*
C49	Electrolytic	1 µF	50 V	± 20%		CEACK105M*
C50	Ceramic	0.068 µF	16 V	± 10%		CGJRG683KM
C51	Ceramic SL	180 pF	50 V	± 5%		CCJVK181J*
C52	Electrolytic	47 µF	10 V	± 20%		CEACE476M*
C53	Ceramic	1000 pF	16 V	± 10%		CGJRG102KM
C54	Electrolytic	47 µF	10 V	± 20%		CEACE476M*
C55	Ceramic SL	100 pF	50 V	± 5%		CCJVK101J*
C56	Electrolytic	47 µF	10 V	± 20%		CEACE476M*
C57	Ceramic	0.068 µF	16 V	± 10%		CGJRG683KM
C58	Electrolytic	330 µF	10 V	± 20%		CEACE337M*
C59	Electrolytic	220 µF	16 V	± 20%		CEACG227M*
C60	Electrolytic	47 µF	10 V	± 20%		CEACE476M*
C61	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C62	Ceramic	0.018 µF	16 V	± 10%		CGJRG183KM
C63	Ceramic	0.056 µF	16 V	± 10%		CGJRG563KM
C64	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM
C65	Ceramic	4700 pF	16 V	± 10%		CGJRG472KM
C66	Ceramic	0.018 µF	16 V	± 10%		CGJRG183KM
C67	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM
C68	Electrolytic	33 µF	16 V	± 20%		CEACG336M*
C69	Electrolytic	1 µF	50 V	± 20%		CEACK105M*
C70	Electrolytic	0.22 µF	50 V	± 20%		CEACK224M*
C71	Ceramic	3300 pF	16 V	± 10%		CGJRG332KM
C72	Ceramic	0.056 µF	16 V	± 10%		CGJRG563KM
C73	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C74	Ceramic NPO	56 pF	50 V	± 5%		CCJBK560J*
C75	Ceramic NPO	30 pF	50 V	± 5%		CCJBK300J*
C76	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C77	Electrolytic	1 µF	50 V	± 20%		CEACK105M*
C78	Electrolytic	100 µF	16 V	± 20%		CEACG107M*
C79	Tantalum	0.47 µF	16 V	± 20%		CSEED474M*
C80	Ceramic	0.15 µF	16 V	± 10%		CGJRG154KM
C81	Ceramic N220	82 pF	50 V	± 5%		CCJHK820J*
C82	Ceramic N220	24 pF	50 V	± 5%		CCJHK240J*
C83	Ceramic N220	68 pF	50 V	± 5%		CCJHK680J*
C84	Ceramic N220	47 pF	50 V	± 5%		CCJHK470J*
C85	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C86	Ceramic SL	100 pF	50 V	± 5%		CCJVK101J*
C87	Ceramic N220	68 pF	50 V	± 5%		CCJHK680J*
C88	Ceramic N220	56 pF	50 V	± 5%		CCJHK560J*
C89	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C90	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM

Ref. No.	Description				RS Part No.	Mfr's Part No.
C91	Ceramic NPO	5 pF	50 V	± 0.25pF		CCJBK5R0C*
C92	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C93	Ceramic	1000 pF	16 V	± 10%		CGJRG102KM
C94	Ceramic NPO	100 pF	50 V	± 5%		CCJBK101J*
C95	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C96	Electrolytic	4.7 µF	50 V	± 20%		CEACK475M*
C97	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C98	Ceramic NPO	7 pF	50 V	± 5%		CCJBK7R0J*
C99	Ceramic NPO	100 pF	50 V	± 5%		CCJBK101J*
C100	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C101	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C102	Ceramic NPO	220 pF	50 V	± 5%		CCJBK221J*
C103	Ceramic NPO	33 pF	50 V	± 5%		CCJBK330J*
C104	Ceramic NPO	68 pF	50 V	± 5%		CCJBK680J*
C105	Ceramic NPO	82 pF	50 V	± 5%		CCJBK820J*
C106	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C107	Ceramic NPO	150 pF	50 V	± 5%		CCJBK151J*
C108	Ceramic NPO	220 pF	50 V	± 5%		CCJBK221J*
C109	Not used					
C110	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C111	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C112	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C113	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C114	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C115	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C116	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C117	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C118	Ceramic	1000 pF	16 V	± 10%		CGJRG102KM
C119	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C120	Ceramic	4700 pF	16 V	± 10%		CGJRG472KM
C121	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C122	Electrolytic	220 µF	16 V	± 20%		CEACG227M*
C123	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C124	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C125	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C126	Ceramic	0.047 µF	16 V	± 10%		CGJRG473KM
C127	Electrolytic	1000 µF	16 V	± 20%		CECCG108M*
C128	Ceramic	0.022 µF	16 V	± 10%		CGJRG223KM
C129	Ceramic	0.056 µF	16 V	± 10%		CGJRG563KM
C130	Electrolytic	4.7 µF	50 V	± 20%		CEACK475M*
C131	Electrolytic	1 µF	50 V	± 20%		CEACK105M*
C132	Ceramic	0.01 µF	16 V	± 10%		CGJRG103KM
C133	Ceramic	6800 pF	50 V	± 10%		CJVEK682KM
FILTERS						
CF1	Ceramic	SFE10.7MJ-A	or			392300560B or
		10.7MJ-A				392390010A
CF2	Ceramic	CFU455HT				392100611A
DIODES						
D1	Silicon	1N4148				SDSI00062- or SDSI00064- or SDSI00149-

Ref. No.	Description			RS Part No.	Mfr's Part No.
D2	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
D3	Germanium	1N60P			SDGE00001P or SDGE00003P
D4	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
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	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
D9	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
D10	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
D11	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
D12	Silicon	1N4149			SDSI00062- or SDSI00064- or SDSI00149-
D13	Silicon	1N4002			SDSI00007-
D14	Silicon	1N4002			SDSI00007-
D15	Varicap	ITT310			SDVC00005-
D16	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
D17	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
D18	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
D19	Silicon	1N4148			SDSI00062- or SDSI00064- or SDSI00149-
D20	Zener	RD5.6E	RANK:B1		SZRD5.6EB1
D21	Silicon	1N4002			SDSI00007-

Ref. No.	Description	RS Part No.	Mfr's Part No.
ICs			
IC1 IC2 IC3 IC4 IC5	LC7185 NJM4558D KIA7217AP MC78L08ACP MC78L08ACP		SILC7185- - SINM4558D- SIKA7217A- SIMC78L08A SIMC78L08A
JACKS			
JK1 JK2 JK3	M-Type 3.5mm 3.5mm	81116 HSJ0615-01-010 HSJ0615-01-010	193010011A 191201330A 191201330A
COILS			
L1 L2 L3 L4 L5 L6 L7 L8 L9 L10 L11 L12 L13 L14	Coil Inductor Inductor Not used Inductor Inductor Inductor Air Inductor Inductor Coil Air Air Choke	27MHz S7 1C038 100μH LAL03NA 100μH LAL03NA 10μH K LAL03NA 1.0μH K LAL03NA 1.8μH K LAL03NA VR5.5-9.5T or 5.5 × 9.5T × 0.6 0.47μH K LAL03NA 1μH K or 1μH K 27MHz S10 3C054 or 27MHz D10 3C053 HR5.5-9T or 5.5 × 9T × 0.6 VR5-7.5T or VR5-7.5T 0.2mH EI19 CH020 or EI - 19 HF/C2220R-V	143100381A 142011510A 142011510A 142011150A 142012880A 142012830A 141010100A or 141090030A 142012840A 142310920A or 142310921A 143310540A or 143310530A 141110710A or 141190200A 141002080A or 141010090A 144010200A or 144090030A
TRANSISTORS			
Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17	2SA733(P) 2SC1674(L) 2SC1675(L) 2SC1675(L) 2SC930(E) 2SC945(P) 2SC945(P) 2SC945(P) 2SC945(P) 2SC945(P) 2SC945(P) 2SA733(P) 2SC945(P) 2SC945(P) 2SC945(P) 2SA733(P) 2SC945(P)		ST2A733- -P ST2C1674-L ST2C1675-L ST2C1675-L ST2C930- -E ST2C945- -P ST2C945- -P ST2C945- -P ST2C945- -P ST2C945- -P ST2C945- -P ST2A733- -P ST2C945- -P ST2C945- -P ST2C945- -P ST2A733- -P ST2C945- -P

Ref. No.	Description	RS Part No.	Mfr's Part No.
Q18	2SA733(P)		ST2A733- -P
Q19	2SA733(P)		ST2A733- -P
Q20	2SC945(P)		ST2C945- -P
Q21	2SC945(P)		ST2C945- -P
Q22	2SC945(P)		ST2C945- -P
Q23	2SA733(P)		ST2A733- -P
Q24	2SC945(P)		ST2C945- -P
Q25	2SC945(P)		ST2C945- -P
Q26	2SA733(P)		ST2A733- -P
Q27	2SC945(P)		ST2C945- -P
Q28	KTC 2036(B)		STKC2036-B
Q29	KTC 2075(A)		STKC2075-A
Q30	2SC945(P)		ST2C945- -P
Q31	2SC945(P)		ST2C945- -P
Q32	2SC945(P)		ST2C945- -P
RESISTORS			
R1	Carbon 1.5 k ohm 1/2W $\pm 5\%$		RCSHP152J*
R2	M-Glaze 560 ohm 1/10W $\pm 5\%$		RG0TV561J*
R3	Carbon 2 k ohm 1/6W $\pm 5\%$		RC0XP202J*
R4	Carbon 1 k ohm 1/6W $\pm 5\%$		RC0XP102J*
R5	Carbon 56 K ohm 1/6W $\pm 5\%$		RC0XP563J*
R6	M-Glaze 100 ohm 1/10W $\pm 5\%$		RG0TV101J*
R7	Carbon 330 ohm 1/6W $\pm 5\%$		RC0XP331J*
R8	Carbon 470 ohm 1/6W $\pm 5\%$		RC0XP471J*
R9	M-Glaze 330 ohm 1/10W $\pm 5\%$		RG0TV331J*
R10	M-Glaze 100 k ohm 1/10W $\pm 5\%$		RG0TV104J*
R11	M-Glaze 100 ohm 1/10W $\pm 5\%$		RG0TV101J*
R12	M-Glaze 560 ohm 1/10W $\pm 5\%$		RG0TV561J*
R13	M-Glaze 560 ohm 1/10W $\pm 5\%$		RG0TV561J*
R14	M-Glaze 10 k ohm 1/10W $\pm 5\%$		RG0TV103J*
R15	M-Glaze 470 ohm 1/10W $\pm 5\%$		RG0TV471J*
R16	M-Glaze 2.2 k ohm 1/10W $\pm 5\%$		RG0TV222J*
R17	M-Glaze 2.2 k ohm 1/10W $\pm 5\%$		RG0TV222J*
R18	M-Glaze 22 k ohm 1/10W $\pm 5\%$		RG0TV223J*
R19	M-Glaze 1.2k ohm 1/10W $\pm 5\%$		RG0TV122J*
R20	Carbon 470 ohm 1/6W $\pm 10\%$		RC0XP471J*
R21	M-Glaze 10 k ohm 1/10W $\pm 5\%$		RG0TV103J*
R22	M-Glaze 33 k ohm 1/10W $\pm 5\%$		RG0TV333J*
R23	M-Glaze 10 ohm 1/10W $\pm 5\%$		RG0TV100J*
R24	M-Glaze 470 ohm 1/10W $\pm 5\%$		RG0TV471J*
R25	M-Glaze 470 ohm 1/10W $\pm 5\%$		RG0TV471J*
R26	M-Glaze 1 M ohm 1/10W $\pm 5\%$		RG0TV105J*
R27	M-Glaze 68 k ohm 1/10W $\pm 5\%$		RG0TV683J*
R28	M-Glaze 560 ohm 1/10W $\pm 5\%$		RG0TV561J*
R29	Carbon 6.2 k ohm 1/6W $\pm 5\%$		RC0XP622J*
R30	M-Glaze 100 k ohm 1/10W $\pm 5\%$		RG0TV104J*
R31	M-Glaze 47 k ohm 1/10W $\pm 5\%$		RG0TV473J*
R32	M-Glaze 47 k ohm 1/10W $\pm 5\%$		RG0TV473J*
R33	M-Glaze 39 k ohm 1/10W $\pm 5\%$		RG0TV393J*
R34	M-Glaze 160 k ohm 1/10W $\pm 5\%$		RG0TV164J*
R35	M-Glaze 33 k ohm 1/10W $\pm 5\%$		RG0TV333J*

Ref. No.	Description					RS Part No.	Mfr's Part No.
R36	M-Glaze	100 k	ohm	1/10W	± 5%		RG0TV104J*
R37	M-Glaze	180 k	ohm	1/10W	± 5%		RG0TV184J*
R38	M-Glaze	330 k	ohm	1/10W	± 5%		RG0TV334J*
R39	Carbon	33 k	ohm	1/6W	± 5%		RC0XP333J*
R40	M-Glaze	10 k	ohm	1/10W	± 5%		RG0TV103J*
R41	M-Glaze	3.6 k	ohm	1/10W	± 5%		RG0TV362J*
R42	M-Glaze	18 k	ohm	1/10W	± 5%		RG0TV183J*
R43	M-Glaze	18 k	ohm	1/10W	± 5%		RG0TV183J*
R44	M-Glaze	18 k	ohm	1/10W	± 5%		RG0TV183J*
R45	M-Glaze	1 k	ohm	1/10W	± 5%		RG0TV102J*
R46	Carbon	10 k	ohm	1/6W	± 5%		RC0XP103J*
R47	Carbon	4.7 k	ohm	1/6W	± 5%		RC0XP472J*
R48	M-Glaze	4.7 k	ohm	1/10W	± 5%		RG0TV472J*
R49	M-Glaze	10 k	ohm	1/10W	± 5%		RG0TV103J*
R50	M-Glaze	150 k	ohm	1/10W	± 5%		RG0TV154J*
R51	M-Glaze	470	ohm	1/10W	± 5%		RG0TV471J*
R52	M-Glaze	560 k	ohm	1/10W	± 5%		RG0TV564J*
R53	M-Glaze	47 k	ohm	1/10W	± 5%		RG0TV473J*
R54	M-Glaze	39 k	ohm	1/10W	± 5%		RG0TV393J*
R55	M-Glaze	2.2 k	ohm	1/10W	± 5%		RG0TV222J*
R56	M-Glaze	330 k	ohm	1/10W	± 5%		RG0TV334J*
R57	M-Glaze	10 k	ohm	1/10W	± 5%		RG0TV103J*
R58	Carbon	10 k	ohm	1/6W	± 5%		RC0XP103J*
R59	M-Glaze	1.1 k	ohm	1/10W	± 5%		RG0TV112J*
R60	Carbon	680	ohm	1/6W	± 5%		RC0XP681J*
R61	M-Glaze	22 k	ohm	1/10W	± 5%		RG0TV223J*
R62	M-Glaze	100 k	ohm	1/10W	± 5%		RG0TV104J*
R63	M-Glaze	82	ohm	1/10W	± 5%		RG0TV820J*
R64	M-Glaze	33 k	ohm	1/10W	± 5%		RG0TV333J*
R65	M-Glaze	10	ohm	1/10W	± 5%		RG0TV100J*
R66	M-Oxide	270	ohm	2W	± 5%		RX0 2P271J*
R67	Carbon	10 k	ohm	1/6W	± 5%		RC0XP103J*
R68	Carbon	1 k	ohm	1/6W	± 5%		RC0XP102J*
R69	Carbon	1.8 k	ohm	1/6W	± 5%		RC0XP182J*
R70	M-Glaze	2.2 k	ohm	1/10W	± 5%		RG0VT222J*
R71	M-Glaze	18 k	ohm	1/10W	± 5%		RG0TV183J*
R72	M-Glaze	1.2 k	ohm	1/10W	± 5%		RG0TV122J*
R73	Carbon	2.2 k	ohm	1/6W	± 5%		RC0XP222J*
R74	Carbon	56 k	ohm	1/6W	± 5%		RC0XP563J*
R75	Carbon	8.2 k	ohm	1/6W	± 5%		RC0XP822J*
R76	Carbon	680	ohm	1/6W	± 5%		RC0XP681J*
R77	Carbon	6.8 k	ohm	1/6W	± 5%		RC0XP682J*
R78	M-Glaze	3.3 k	ohm	1/10W	± 5%		RG0TV332J*
R79	Carbon	47 k	ohm	1/6W	± 5%		RC0XP473J*
R80	Carbon	47 k	ohm	1/6W	± 5%		RC0XP473J*
R81	Carbon	270 k	ohm	1/6W	± 5%		RC0XP274J*
R82	M-Glaze	1 k	ohm	1/10W	± 5%		RG0TV102J*
R83	M-Glaze	1 k	ohm	1/10W	± 5%		RG0TV102J*
R84	Carbon	10 k	ohm	1/6W	± 5%		RC0XP103J*
R85	Carbon	10 k	ohm	1/6W	± 5%		RC0XP103J*
R86	M-Glaze	10 k	ohm	1/10W	± 5%		RG0TV103J*
R87	Carbon	2.2 k	ohm	1/6W	± 5%		RC0XP222J*
R88	M-Glaze	22 k	ohm	1/10W	± 5%		RG0TV223J*

Ref. No.	Description					RS Part No.	Mfr's Part No.
R89	M-Glaze	10 k	ohm	1/10W	± 5%		RG0TV103J*
R90	M-Glaze	22 k	ohm	1/10W	± 5%		RG0TV223J*
R91	M-Glaze	47 k	ohm	1/10W	± 5%		RG0TV473J*
R92	M-Glaze	47 k	ohm	1/10W	± 5%		RG0TV473J*
R93	M-Glaze	220 k	ohm	1/10W	± 5%		RG0TV224J*
R94	M-Glaze	470	ohm	1/10W	± 5%		RG0TV471J*
R95	M-Glaze	2.7 k	ohm	1/10W	± 5%		RG0TV272J*
R96	Carbon	2.2 k	ohm	1/6W	± 5%		RC0XP222J*
R97	M-Glaze	3.3 k	ohm	1/10W	± 5%		RG0TV332J*
R98	M-Glaze	22 k	ohm	1/10W	± 5%		RG0TV223J*
R99	M-Glaze	6.8 k	ohm	1/10W	± 5%		RG0TV682J*
R100	M-Glaze	1 k	ohm	1/10W	± 5%		RG0TV102J*
R101	M-Glaze	470	ohm	1/10W	± 5%		RG0TV471J*
R102	Carbon	1.2 k	ohm	1/6W	± 5%		RC0XP122J*
R103	M-Glaze	4.7 k	ohm	1/10W	± 5%		RG0TV472J*
R104	Carbon	4.7 k	ohm	1/6W	± 5%		RC0XP472J*
R105	M-Glaze	6.8 k	ohm	1/10W	± 5%		RG0TV682J*
R106	M-Glaze	180	ohm	1/10W	± 5%		RG0TV181J*
R107	M-Glaze	470	ohm	1/10W	± 5%		RG0TV471J*
R108	Carbon	6.8 k	ohm	1/6W	± 5%		RC0XP682J*
R109	M-Glaze	3.3 k	ohm	1/10W	± 5%		RG0TV332J*
R110	Carbon	150	ohm	1/6W	± 5%		RC0XP151J*
R111	M-Glaze	220	ohm	1/10W	± 5%		RG0TV221J*
R112	M-Glaze	1 k	ohm	1/10W	± 5%		RG0TV102J*
R113	Carbon	15	ohm	1/6W	± 5%		RC0XP150J*
★ R114	Carbon	6.8	ohm	1/2W	± 5%		RCSHP6R8J*
	Carbon	5.1	ohm	1/2W	± 5%		RCSHP5R1J*
	Carbon	5.6	ohm	1/2W	± 5%		RSCHP5R6J*
	Carbon	6.2	ohm	1/2W	± 5%		RCSHP6R2J*
	Carbon	7.5	ohm	1/2W	± 5%		RCSHP7R5J*
	Carbon	8.2	ohm	1/2W	± 5%		RCSHP8R2J*
	Carbon	9.1	ohm	1/2W	± 5%		RCSHP9R1J*
R115	Carbon	470	ohm	1/2W	± 5%		RCSHP471J*
R116	Carbon	10 k	ohm	1/6W	± 5%		RC0XP103J*
R117	M-Glaze	1 k	ohm	1/10W	± 5%		RG0TV102J*
R118	Carbon	47 k	ohm	1/6W	± 5%		RC0XP473J*
R119	Carbon	560 k	ohm	1/6W	± 5%		RC0XP561J*
R120	Carbon	1 k	ohm	1/6W	± 5%		RC0XP102J*
R121	M-Film	10	ohm	2W	± 5%		RM02P100J*
R122	M-Glaze	220 k	ohm	1/10W	± 5%		RG0TV224J*
R123	M-Glaze	100 k	ohm	1/10W	± 5%		RG0TV104J*
R124	M-Glaze	100 k	ohm	1/10W	± 5%		RG0TV104J*
R125	M-Glaze	2.2 k	ohm	1/10W	± 5%		RG0TV222J*
R126	Carbon	47	ohm	1/6W	± 5%		RC0XP470J*
R127	Carbon	82 k	ohm	1/6W	± 5%		RC0XP823J*
R128	M-Glaze	100 k	ohm	1/10W	± 5%		RG0TV104J*
R129	Not used						
R130	Carbon	47 k	ohm	1/6W	± 5%		RC0XP473J*
R131	Carbon	1 k	ohm	1/6W	± 5%		RC0XP102J*
R132	M-Film	15	ohm	1W	± 5%		RM01P150J*
R133	M-Glaze	47 k	ohm	1/10W	± 5%		RG0TV473J*

Note: The values of the resistors with ★ mark may vary from unit to unit for best performance.

Ref. No.	Description	RS Part No.	Mfr's Part No.
SWITCHES			
SW1	See PCB. Assembly, Channel SW.		
SW2	Slide SSSF-14002A		183112120A
SW3	Slide SSSF-12002A		183112110A
COILS / TRANSFORMER			
T1	Coil 27 MHz S7 IC258		143112580A
T2	Coil 27 MHz S7 IC258		143112580A
T3	IFT 455 kHz S7 11066		131000660A
T4	IFT 455 kHz S7 11027		131000270A
T5	Modulation EI 24 HF1M 2219S		10301005SA or 103390060A
T6	Coil 16 MHz S7 1C259		143112590A
T7	Coil 27 MHz S7 1C260		143112600A
T8	Coil 27 MHz S7 1C260		143112600A
T9	Coil 27 MHz S7 1C258		143112580A
TRIMMER			
TC1	TZ03T200FR or TZ037200FR169		154010220A or 154090050A
POTENTIOMETERS			
VR1	Rotary 10KAX2 L20		171610690A
VR2	Rotary 100KB L20		171211240A
VR3	Semi-Fixed 1KB RVFR6P01A or 1KB T T24R100 or 1KB KVSF637A		177310040A or 175206162A or 177390150A
CRYSTAL			
X1	10.240 MHz HC-18/U		391012040A or 391010310A

	PCB Assembly, Display consists of the following:		MH00554
LEDs			
LD201	UL-1241-17, Module, CHANNEL		555010111A
LD202	ULP-G55B, RX, Green or SLP-255B-81		SL-G00025- or SL-G90019-
LD203	ULP-R55B, TX, Red or SLP-155B, TX		SL-R00056- or SL-R00021-
RESISTORS			
R201	M-Glaze 1.8 k ohm 1/10W ± 5%		RG0TV182J*
R202	M-Glaze 1.8 k ohm 1/10W ± 5%		RG0TV182J*
R203	M-Glaze 1.8 k ohm 1/10W ± 5%		RG0TV182J*

Ref. No.	Description	RS Part No.	Mfr's Part No.
R204	M-Glaze 1.8 k ohm 1/10W $\pm$ 5%		RG0TV182J*
R205	M-Glaze 1.8 k ohm 1/10W $\pm$ 5%		RG0TV182J*
R206	M-Glaze 1.8 k ohm 1/10W $\pm$ 5%		RG0TV182J*
R207	M-Glaze 1.8 k ohm 1/10W $\pm$ 5%		RG0TV182J*
MISCELLANEOUS			
	Holder for LED Pin Terminal C7701P DEGR S1-08X15		413102370A 194403140A or 194403142A

	PCB Assembly, Channel SW consists of the following:		MH00555
SW1	Switch, Rotary SRBM-S-036		181110340A

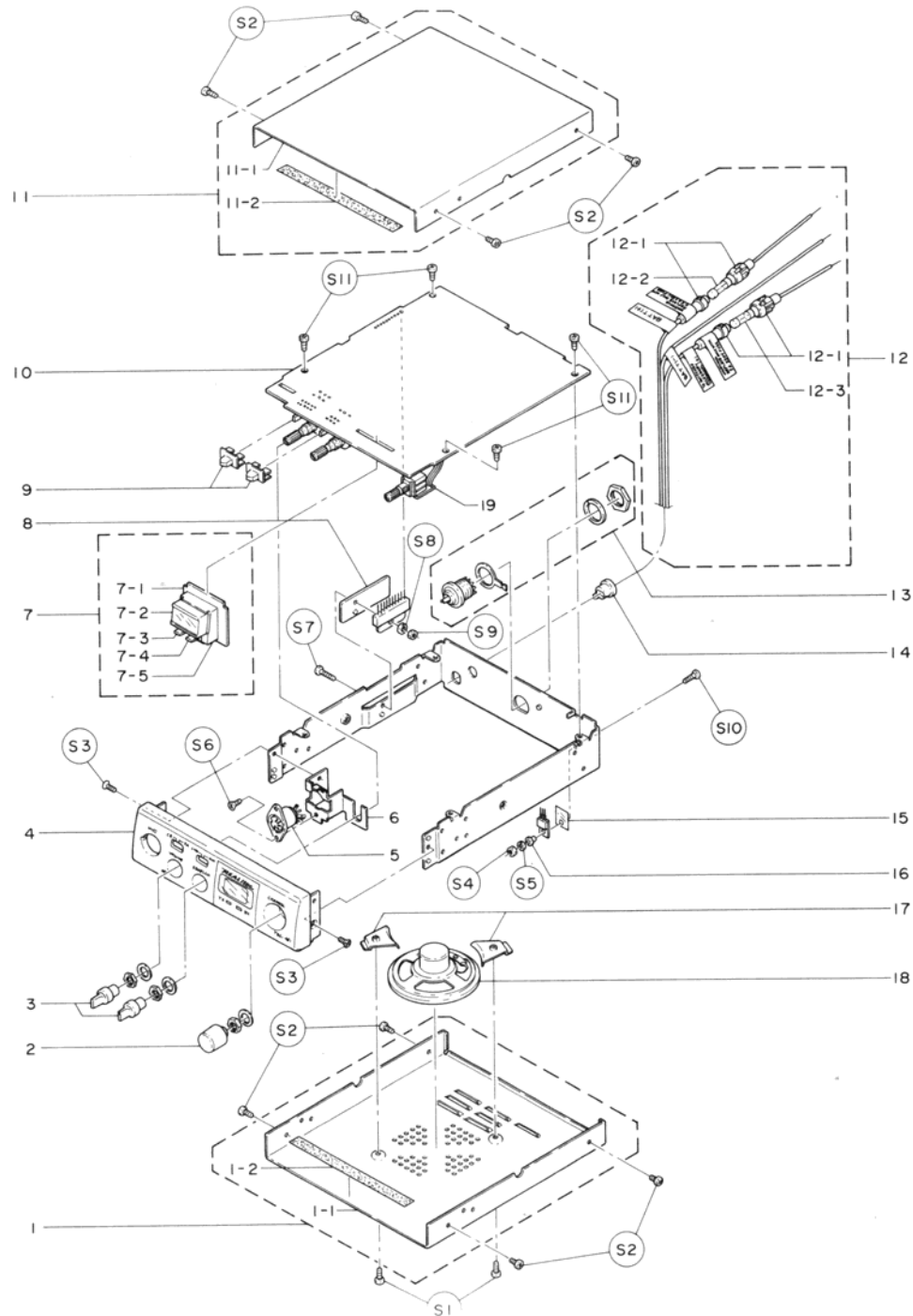
Ref. No.	Description	RS Part No.	Mfr's Part No.
ELECTRICAL PARTS NOT ON PCB			
C401	Capacitor, Ceramic 0.01 μ F 16 V $\pm$ 10%		CGJRG103KM
C402	Capacitor, Ceramic 0.01 μ F 16 V $\pm$ 10%		CGJRG103KM
C403	Capacitor, Ceramic 0.01 μ F 16 V $\pm$ 10%		CGJRG103KM
F1	Fuse, 250V 2A or 250V 2A 3AG		251010040A or 251090060A
F2	Fuse, 250V 0.5A or 250V 0.5A 3AG		251010030A or 251090050A
JK1	Connector, M-Type 81116		193010011A
JK401	Jack, Din TCS2250-01-1011		193401310B
SP1	Speaker, D66 8ohm 0.7W		271011050A

Hand Mic Unit

Ref. No.	Description	RS Part No.	Mfr's Part No.
	PCB Assembly, Hand Mic consist of the following:		MH00560
SW302	Switch, Key KHH15902 or KSM0621A		187010090A or 187090130A
SW303	Switch, Key KHH15902 or KSM0621A		187010090A or 187090130A
R301	Resistor, Carbon 10k ohm 1/6W $\pm$ 5%		RC0XP103J*

Ref. No.	Description	RS Part No.	Mfr's Part No.
ELECTRICAL PARTS NOT ON PCB			
C301	Capacitor, Ceramic 0.039 μ F 16 V $\pm$ 10%		CGJRG393KM
MC301	Microphone Unit EM-80X		273100730A
R302	Resistor, Carbon 4.7 k ohm 1/6W $\pm$ 5%		RC0XP472J*
SW301	Switch, Push PZF22-16		182210310A

EXPLODED VIEW / DISASSEMBLY INSTRUCTIONS



Disassembly Instructions :

1. Remove four screws S2 from top cover assembly 11.
2. Remove four screws S2 from bottom cover assembly 1.
3. Remove two screws S3 from front cabinet assembly 4.
4. Remove two knobs 3 and one knob 2 from front cabinet assembly 4.
5. Remove the nuts from the knobs 3 and 2 above.
6. Remove four screws S11 from main PCB assembly 10.

EXPLODED VIEW PARTS LIST

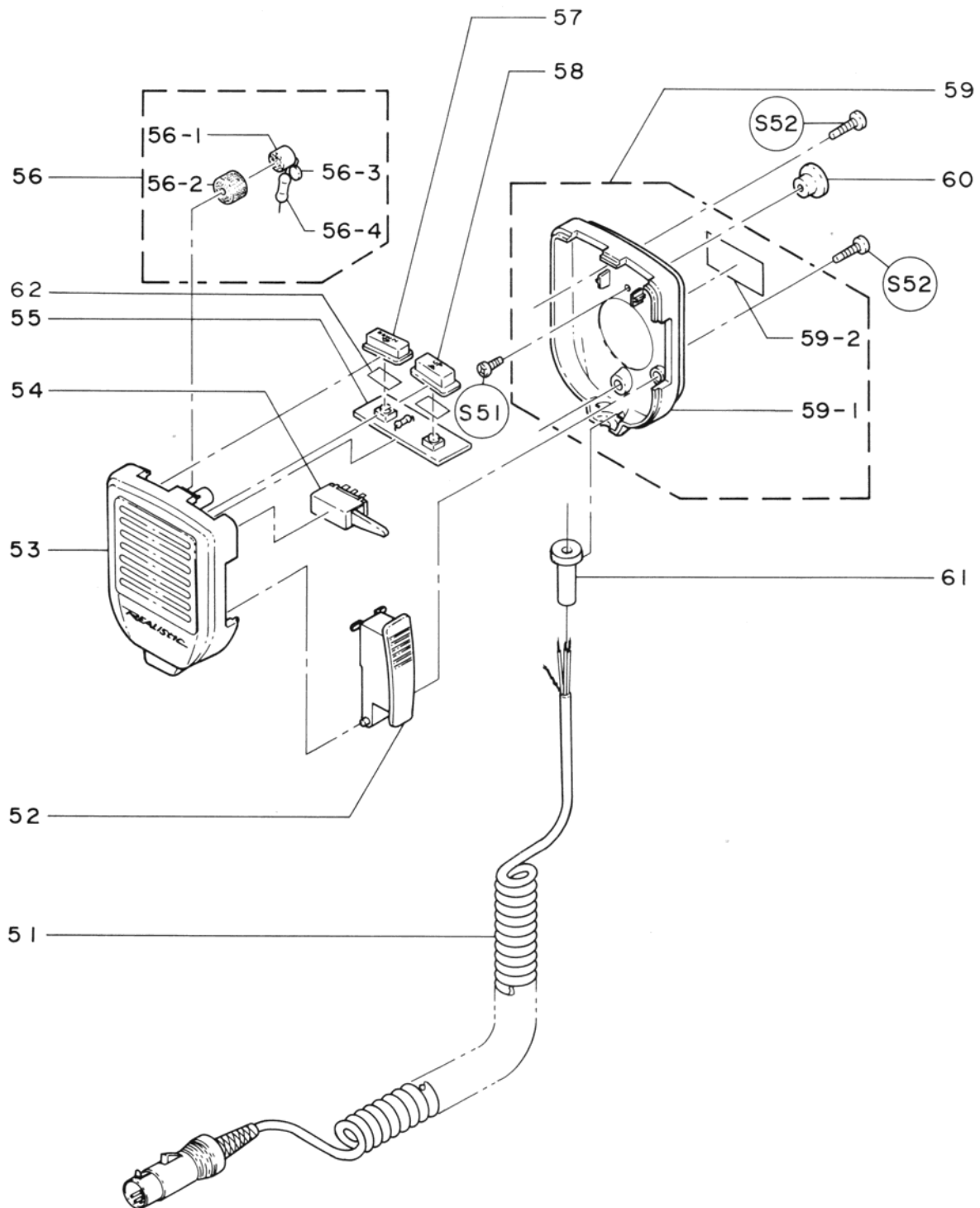
Ref. No.	Description	RS Part No.	Mfr's Part No.
1	Assembly, Cover, Bottom		MH00559
1-1	Cover, Bottom		602210150A
1-2	Blind, Himelon for Bottom Cover		851211370A
2	Knob 25, CHANNEL		652510910A
3	Knob 25, SQUELCH / VOLUME		652510870A
4	Assembly, Cabinet, Front (Non-repairable)		MH00557
	Cabinet, Front		
	Plate, Front		
5	Jack, DIN for Microphone (JK401)		193401310B
6	Holder for Microphone		411116620A
7	Assembly, PCB, Display		MH00554
7-1	PCB 21 for Display PCB		20211072*A
7-2	Module, LED, UL-1241-17, CHANNEL (LD201)		555010111A
7-3	LED, ULP-G55B, TX, Red (LD203 SLP-155B)		SL-R00056- or SL-R00021
7-4	LED, ULP-G55B, RX, Green (LD202) SLP-255B-81		SL-G00025- or SL-G90019
7-5	Holder for LED		413102370A
8	Heat Sink		471010960A
9	Knob 95, CB/CH9		659512920A
10	Assembly, PCB, Main	US CA	MH00553 MH00743
11	Assembly, Cover, Top		MH00558
11-1	Cover, Top		602410110A
11-2	Blind for Top Cover		851211370A
12	Assembly, Holder, Fuse		MH00556
12-1	Holder, Fuse with Lead Wire		197210090A
12-2	Fuse, 250V, 0.5A		251010030A or
	250V, 0.5A 3AG		251090050A
23-3	Fuse, 250V, 2A (F1)		251010040A or
	250V, 2A 3AG		251090060A
13	Connector, M-type (JK1)		193010011A
14	Bushing, Cord		481000800A
15	Sheet, Insulation for Q29		483011470A
16	Grommet for Q29		481110120A
17	Holder for Speaker		411012400A
18	Speaker, D66 8ohm 0.7W		271011050A
19	Assembly, PCB, Channel SW		MH00555
	Hardware Kit		HWK211550B
S1	Screw, 3x6P/ZnB for SP Holder		HMP03006SB
S2	Screw, Taptite, 3x6BT-C/ZnB for Top/Bottom Cover		HCBC3006SB
S3	Screw, Taptite, 2.6x6FCT-B/ZnY for Front Cabinet		HCCB2606SY
S4	Nut, 3N-1/Ni-3		HANN301-SN
S5	Washer, Spring, 3SW/Ni-3		HAWS30SSSN
S6	Screw, Taptite, 2x6FCT-B/ZnY for Microphone		HCCB2006SY
S7	Screw, 3x8B/ZnY		HMB03008SY
S8	Washer, Spring, 3SW/ZnY		HAWS30SSSY
S9	Nut, 3N-1/ZnY		HANN301-SY
S10	Screw, 3x10B/Ni-3		HMB03010SN
S11	Screw, Taptite, 3x8BT-B/ZnY for Main PCB		HCBB3008SY

Ref. No.	Description	RS Part No.	Mfr's Part No.
	Accessories:		
	Shaft, handle (2 pcs)		432201700A
	Holder for Hanger		411116630A
	Spacer, NEOP Rubber (2 pcs)		852013230A
	Holder for Hand Microphone		411102900A
	Screw, 3 x10B/ZnY (2 pcs)		HMB03010SY
	Washer, Spring, 3SW/ZnY (2 pcs)		HAWS30SSSY
	Washer, 3W/ZnY (2 pcs)		HAWP30SSSY
	Screw, Tapping, 3x8BT-B/ZnY (2 pcs)		HCB03008SY
	Nut, 3N-1/ZnY (2 pcs)		HANN301-SY
	Bolt, 6x16H/ZnY (2 pcs)		HBH06016SY
	Nut, 6N-1/ZnY (2 pcs)		HANN601-SY
	Washer, 6W/ZnY (2 pcs)		HAWP60SSSY
	Washer, Spring, 6SW/ZnY (2 pcs)		HAWS60SSSY
	Screw, Tapping, 6x20PT-2/ZnY (2 pcs)		HTP56020SY

HAND MIC UNIT EXPLODED VIEW PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
	Unit, Hand Mic	US	WU00037
		CA	WU00071
51	Assembly, Cord (Non-repairable)		MH00563
	Plug, DIN		
	Cord		
52	Knob 95, Push		659512890A
53	Cabinet, Front		601010630A
54	Switch, Push (SW301)		182210310A
55	Assembly, PCB, Hand Microphone		MH00560
56	Assembly, Microphone		MH00562
56-1	Unit, Microphone, EM-80X (MC301)		273100730A
56-2	Holder, NEOP Rubber for Microphone		413102330A
56-3	Capacitor, Ceramic (C301)		CGJRG393KM
56-4	Resistor, Carbon (R302)		RCOXP472J*
57	Knob 95, DOWN		659512910A
58	Knob 95, UP		659512900A
59	Assembly, Cabinet, Back	US	MH00561
		CA	MH00793
59-1	Cabinet, Back		601110320A
59-2	Label, Rating	US	738013950A
		CA	738013951A
60	Piece, Mounting		604010470A
61	Bushing, Cord		481818190A
62	Spacer Himelon t 0.6		851290019A
	Hardware Kit		HWK211550M
S51	Screw, Taptite, 2.6x6PT-B/ZnY for Mounting Piece		HCPB2606SY
S52	Screw, Taptite, 3x14PT-B/ZnB for Front/Back Cabinet		HCPB3014SB

HAND MIC UNIT EXPLODED VIEW



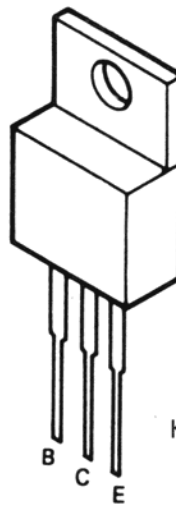
Disassembly Instruction:

Remove two screws S52 from back cabinet assembly 59.

IC AND TRANSISTOR LEAD IDENTIFICATION AND IC INTERNAL DIAGRAM

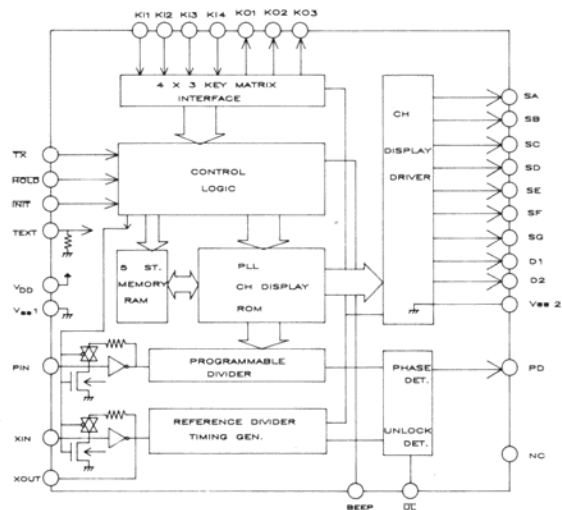
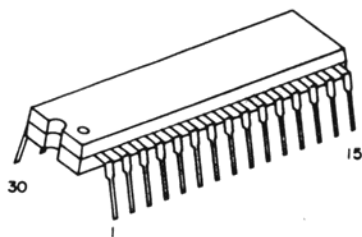


2SC930
2SC945
KTC2036B
2SA733
2SC1675
2SC1674

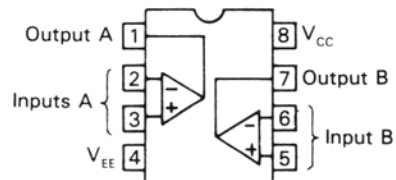
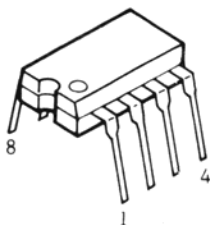


KTC2075

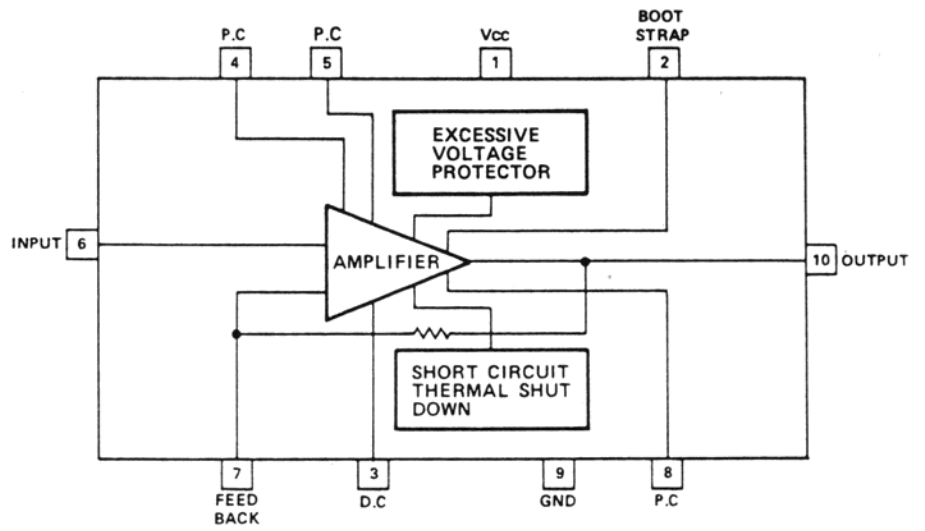
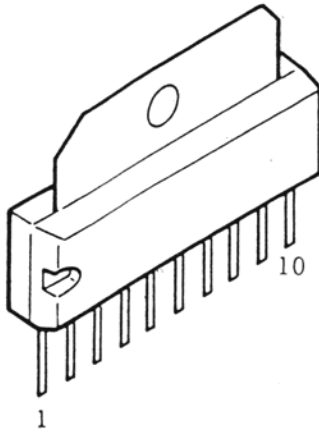
IC : LC7185



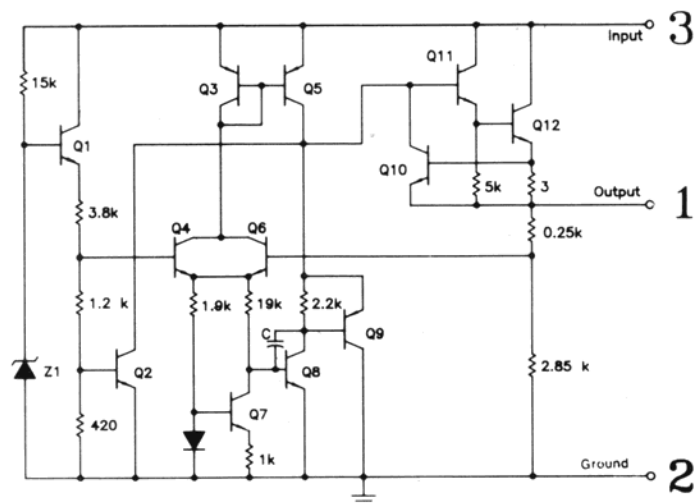
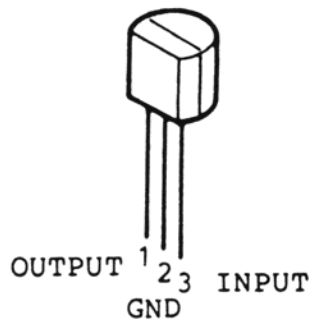
IC2 : NJM4558D



IC3 : KIA7217AP



IC4 / 5 : MC78L08ACP



VOLTAGE CHART

Measuring Conditions:

- Channel Setting : 18
- TX : No modulation
- RX/Public Address : No signal input
- Power Supply : 13.8V DC
- Unit : Volt (DC)

IC1

Pin No.	Mode		
	TX	RX	Public Address
1	4.6	4.6	0.3
2	0.5	0.5	0.1
3	0.5	0.5	4.8
4	4.5	4.5	9.4
5	4.5	4.5	0.2
6	4.5	4.5	0.2
7	4.5	4.5	0.2
8	6.5	6.5	6.8
9	6.5	6.5	6.8
10	0.5	0.5	0.4
11	0	0	0
12	0	0	1.8
13	1.6	1.6	1.6
14	1.8	1.8	1.8
15	2	2	1.8
16	1.8	1.8	1.8
17	0	0	0
18	5	5	0.1
19	3.5	3.5	3.5
20	2	2	1.8
21	0	0	0
22	0	0	0
23	2.5	2.5	2.5
24	7	7	7
25	0	0	7
26	1	1	8
27	1.2	1.2	0
28	0	0	0
29	0	0	0
30	0.6	6.5	0.5

IC2

Pin No.	Mode		
	TX	RX	Public Address
1	3.4 1.5	2.2 1.5	3.4 1.5
2	3.4 1	2.2 1	3.4 1
3	3.2 1	2 0.8	3 1
4	0 0	0 0	0 0
5	1.3 1.1	1 1	1.3 1
6	0 5	0 5	0 5
7	6 1.5	4 1.4	6 1.4
8	6.6 6	4.5 4.2	6.6 6

Note: Squelch Maximum / Minimum

IC3

Pin No.	Mode		
	TX	RX	Public Address
1	13.8	13.8	13.8
2	12	12	13.8
3	3.8	3.8	3.8
4	7.5	8	8
5	1.5	1.5	1.5
6	2.8	2.8	0
7	3.2	3.2	3.3
8	1.2	1.2	1.2
9	0	0	0
10	6.2	6.4	6.8

IC4

Pin No.	Mode		
	TX	RX	Public Address
IN	13.8	13.8	13.8
GND	0	0	0
OUT	8	8	8

IC5

Pin No.	Mode		
	TX	RX	Public Address
IN	13.8	13.8	13.8
GND	0	0	0
OUT	8	8	8

Transistor NO.	Pin Mode	E	C	B	Transistor NO.	Pin Mode	E	C	B
Q1	TX	1.8	6.8	0.3	Q10	TX	0	0	0.6
	RX	1.8	6.8	0		RX	0	0	0.6
	Public Address	1.8	6.8	0		Public Address	0	0	0.6
Q2	TX	0	0	0	Q11	TX	0	7.6	0
	RX	0.1	9.3	1		RX	0	7.6	0
	Public Address	0	0.2	0.7		Public Address	0	7.6	0
Q3	TX	0	0	0.5	Q12	TX	5	0	5.5
	RX	0.1	10	1		RX	5.2	0	6
	Public Address	0	0	0.5		Public Address	1	0	1.6
Q4	TX	0	0	0.7	Q13	TX	0	0.1	0
	RX	1	6.6	1.6		RX	0	0	0
	Public Address	0	0	0.7		Public Address	0	0	0
Q5	TX	0	0	0.7	Q14	TX	0.6	3.5	1.2
	RX	1	10	1.5		RX	0.6	3.5	1.2
	Public Address	0	0	0.7		Public Address	0.7	3.2	1.2
Q6	TX	0	0	0	Q15	TX	0	0	0
	RX	1.6	8.6	2.2		RX	0	0	0.6
	Public Address	0	0	0		Public Address	0	0	0
Q7	TX	0	6.8	0.6	Q16	TX	2	0	1.6
	RX	0	6.8	0.6		RX	2	0	1.6
	Public Address	0	6.8	0.6		Public Address	2	0	1.6
Q8	TX	0.5	0.5	0.9	Q17	TX	0.5	2	0.5
	RX	0.5	0.5	0.9		RX	0.5	2	0.5
	Public Address	0	0	0		Public Address	0.5	2	0.5
Q9	TX	0	2.2	0	Q18	TX	13	5.3	13
	RX	0	2.2	0		RX	13	5.4	12.3
	Public Address	0	2.2	0		Public Address	13	5.4	13

Transistor NO.	Pin Mode	E	C	B	Transistor NO.	Pin Mode	E	C	B
Q19	TX	13	6	13	Q28	TX	0	12	0
	RX	13	6	13		RX	0	0	0
	Public Address	13	6	13		Public Address	0	12	0
Q20	TX	0.5	4	1	Q29	TX	0	12	0
	RX	0.5	4	1		RX	0	0	0
	Public Address	0	7.5	0		Public Address	0	12	0
Q21	TX	4	4	0.6	Q30	TX	0	0	0.5
	RX	4	4	0.6		RX	0	0.1	0.6
	Public Address	7.5	7.5	0		Public Address	0	0	0
Q22	TX	5	7	3.6	Q31	TX	0	0.5	0
	RX	5	7	3.5		RX	0	1	0
	Public Address	5	7	3.6		Public Address	0	0.5	0
Q23	TX	3.2	3.2	2.8	Q32	TX	0	12	0.1
	RX	4	0	3.2		RX	0	0.2	0.7
	Public Address	3.2	3.2	2.8		Public Address	0	0	0
Q24	TX	2.2	12	3					
	RX	0	0	0					
	Public Address	2.2	12	3					
Q25	TX	2.5	7.5	3					
	RX	0	0	0					
	Public Address	2.5	7.5	3					
Q26	TX	13.8	13	13					
	RX	0	0	0					
	Public Address	13.8	13	13					
Q27	TX	0.35	13	4					
	RX	0	20	0					
	Public Address	0.35	13	4					