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**Realistic TRC-438 Service Manual**

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**21-1552**

# Service Manual

**TRC-438**

**CB 40-Channel Transceiver**

**Catalog Number: 21-1552**

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# SPECIFICATIONS

## General

### Description

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

### Standard Test Conditions

Battery supply voltage .....	13.8V DC
Modulation .....	1000Hz, 30%
Receiver output power .....	500mW at external SP
Receiver output impedance .....	8 ohms, non-inductive
Ant. load impedance of transmitter .....	50 ohms, non-inductive
Ambient conditions	
Temperature .....	63°F ~ 73°F (17°C ~ 23°C)
Humidity .....	40% ~ 70%

### Transmitter

Description	Nominal	Limit
RF power output .....	4.0 watts	3.6 ~ 4.4 watts
Antenna spurious emission .....	70	50
Modulation capability (positive/negative) .....	+ 90%	+ 80% / - 80%
AMC Range at 1KHz .....	40dB	30dB
Frequency accuracy .....	0.002%	0.005%
Spurious radiation & harmonic		
signal radiation ratio from fundamental .....	- 65 dB	- 60 dB
Current consumption		
at no modulation .....	1000 mA	1200 mA
at 80% modulation .....	1500 mA	1700 mA
Envelope distortion .....	10% max. 1000 Hz, 50% mod.	
Stability against variation of		
antenna impedance .....	Satisfactory when dummy antenna is varied from 40 ohms to 200 ohms	

## Receiver

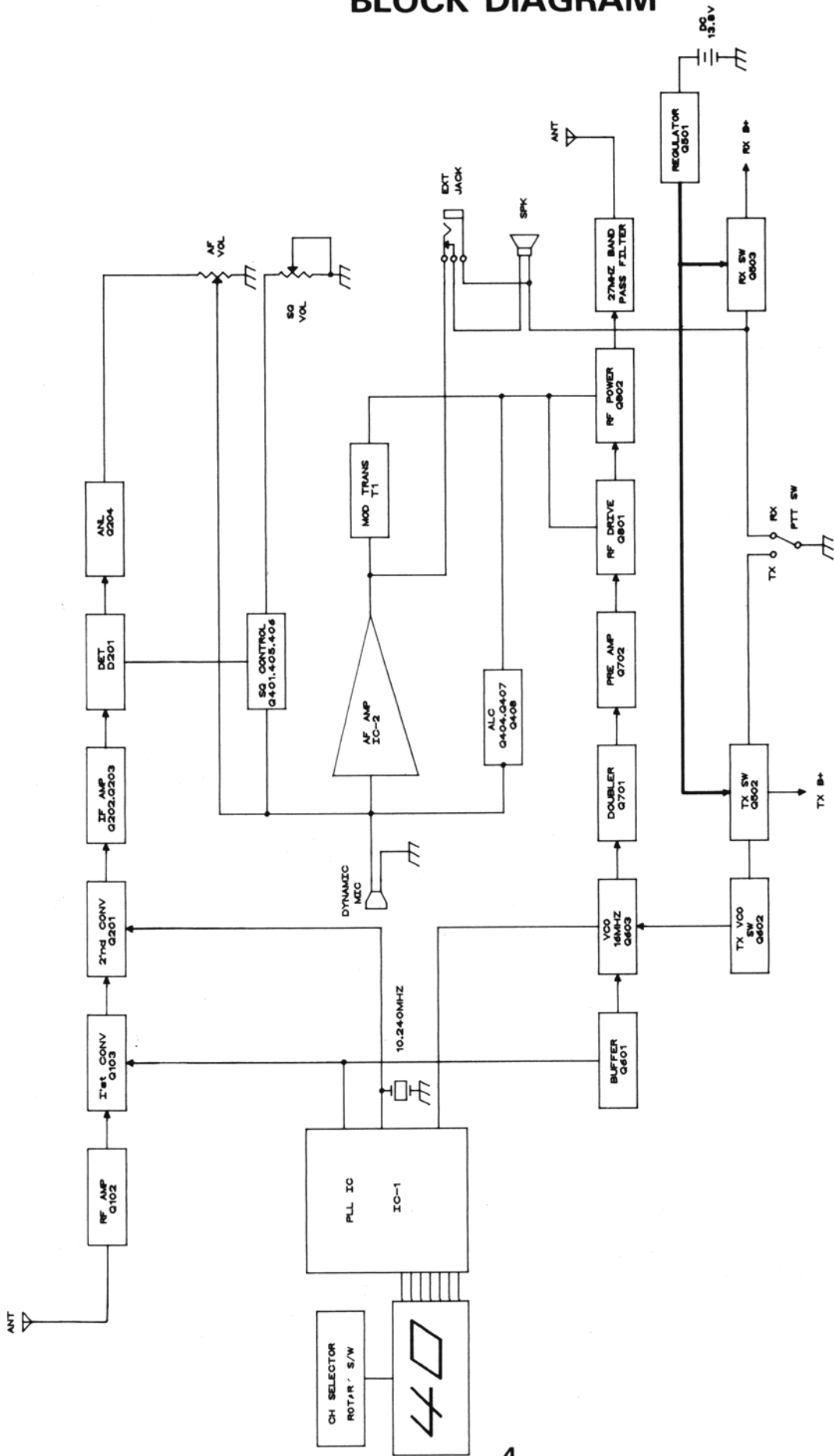
Description	Nominal	Limit
Intermediate frequency		
1st IF .....	10.695 MHz	
2nd IF .....	455 kHz	
Sensitivity for 500 mW output .....	0.3 $\mu$ V	1.0 $\mu$ V
Sensitivity at 10dB (S+N)/N .....	0.7 $\mu$ V	1.0 $\mu$ V
Adjacent channel rejection .....	65dB	55dB
Image rejection (1st IF/2nd IF) .....	70dB	60dB
IF rejection ratio (1st IF/2nd IF) .....	60dB	45dB
Signal-to-Noise ratio		
at 1 mV input .....	40dB	35dB
Distortion at 1mV input,		
30% mod. (500 mW output) .....	3%	5%
AGC figure of merit at 50mV input .....	80dB	70dB
Power output at 1mV input		
Undistorted (10% THD) .....	4.5W	4.0W
Maximum .....	5.0W	4.5W
Electrical fidelity compared to 1000 Hz		
450 Hz .....	-4dB	-4 $\pm$ 3dB
2500 Hz .....	-6dB	-6 $\pm$ 3dB
Cross modulation .....	50dB	40dB
Squelch .....	60dB	60 $\pm$ 6dB
Current consumption (no signal) .....	250 mA	300 mA
"S" meter sensitivity to light 3rd LED .....	40dB	40 $\pm$ 6dB

## Other Items

Fuse .....	2 Amp
General power requirement .....	12-16V DC
Dimensions .....	(W)4 <sup>7</sup> / <sub>8</sub> "(125mm) $\times$ (H)1 <sup>5</sup> / <sub>8</sub> "(40mm) $\times$ (D)8 <sup>1</sup> / <sub>8</sub> "(207mm)
Weight .....	2 lbs 10 ozs (1.2kg)

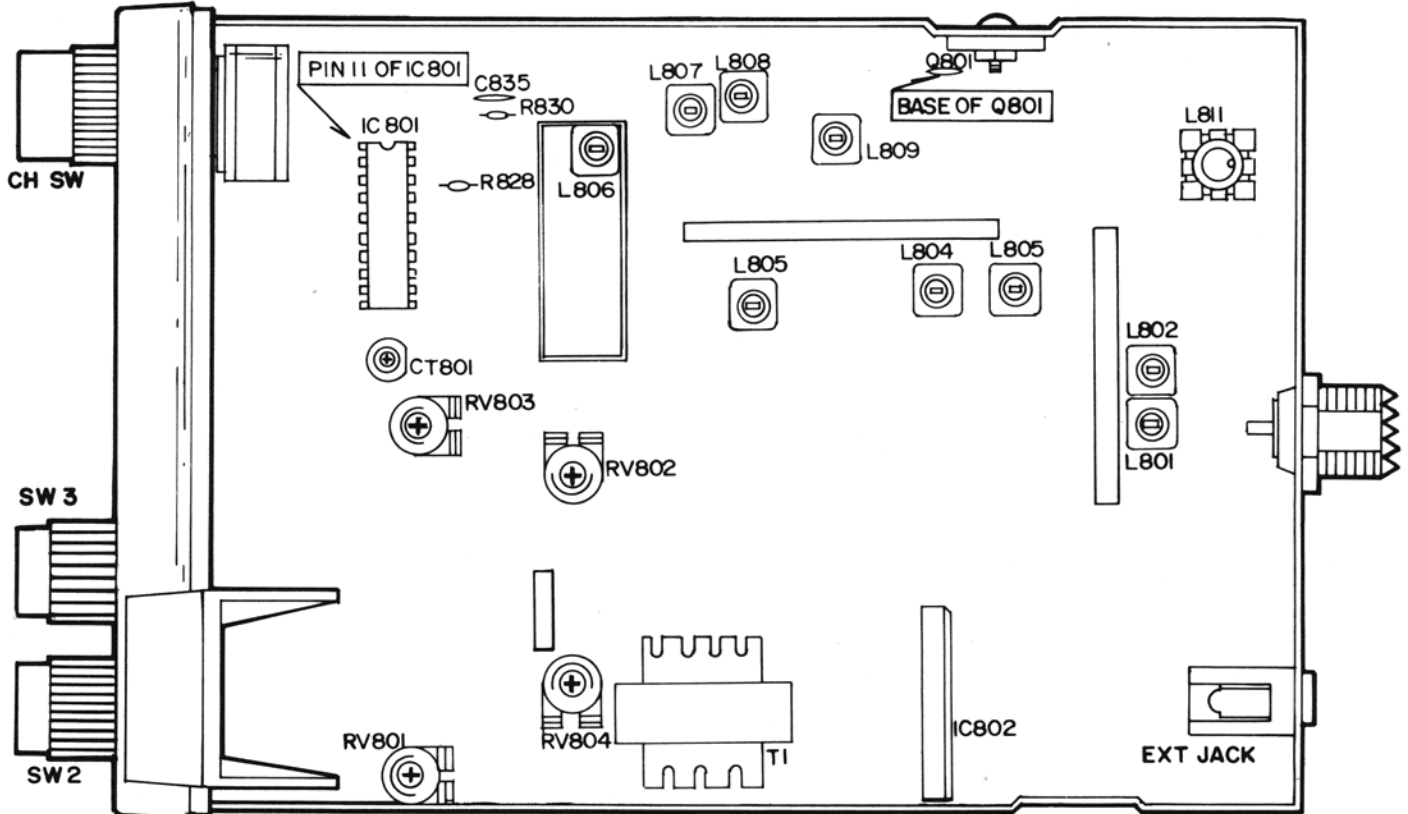
**Note:** Nominal specs represent the design specs. All units should be able to approximate these—some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; in no case should a unit fail to meet Limit specs.

# BLOCK DIAGRAM



# ALIGNMENT AND ADJUSTMENT

## 1. Alignment Test Points and Parts Locations



## 2. Phase Locked Loop and CPU Section

### A. Test Equipment Required

- a. Frequency Counter
- b. DC Power Supply
- c. DC Voltmeter
- d. Oscilloscope

## B. Alignment Procedure

Step	Setting	Connection	Adjust	Adjust for
1	Frequency adjustment- MIC: Receive Volume: Optional Squelch: Optional CH Selector: Optional	Frequency counter to output pin 11 of IC 801 (Figure 1).	CT801	10.240MHz $\pm$ 100Hz
2	TX VCO voltage adjustment- MIC: Receive Volume: Optional Squelch: Optional CH Selector: 1	Connect DC voltmeter between R828 and R830 (Figure 2).	L806	1.8V
3	RX VCO voltage adjustment- MIC: Transmit Volume: Optional Squelch: Turn Clockwise CH Selector: 1	Connect DC voltmeter between R828 and R830 (Figure 2).	L302	Indication on DC voltmeter must be 1.0-2.0 Volt. If DC voltmeter does not indicate 1.0-2.0 volt, readjust L806

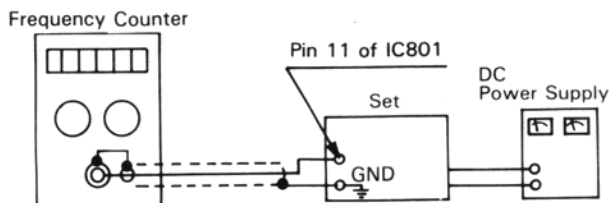


Figure 1

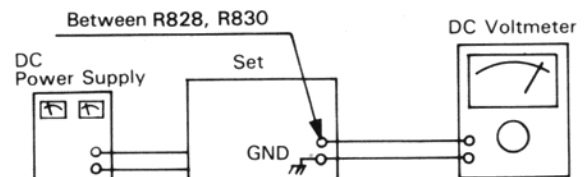


Figure 2

## 3. Transmitter Section

### A. Test Equipment Required

- a. RF Power Meter (RF SSVM)
- b. 50 Ohm Load (non-inductive)
- c. RF Attenuator
- d. Oscilloscope
- e. Audio Generator
- f. DC Power Supply
- g. Spectrum Analyzer
- h. Frequency Counter
- i. Coupler

## B. Alignment Procedure

Step	Setting	Connection	Adjust	Adjust for
1	RF driver stage- MIC: Transmit Volume: Optional Squelch: Optional CH Selector: 19	Connect RF power meter to base of Q801 (Figure 3).	L807 L808	Adjust for maximum indication on the RF power meter.
2	RF power stage- MIC: Transmit Squelch: Optional Volume: Optional CH Selector: 19	Connect dummy load and RF power meter to the EXT-ANT jack on the set (Figure 4).	L809 L811	Adjust for maximum indication on the RF power meter. (4 watts). If indication is not in 4 watts range, go back to step 1 and readjust L809 , L811.
3	Modulation adjustment- MIC: Transmit Volume: Optional Squelch: Optional CH Selector: 19	Connect audio generator (1kHz) to pin 4 of microphone connector (Figure 5). Connect dummy load and oscilloscope through coupler to RF power meter.  Connect RF power meter to EXT-ANT jack on the set. Adjust audio signal level to obtain 80% ~ 90% of the modulation level.	RV804	Check for proper modulation pattern on the oscilloscope.
4	Second harmonic check- MIC: Transmit Volume: Optional Squelch: Optional CH Selector: 19	Connect RF power meter with dummy load to spectrum analyzer through coupler/ - 40dB attenuator to EXT-ANT jack on the set (Figure 6).		At no modulation, compare the level of fundamental frequency to the level of harmonic frequency. Suppression of the 2nd harmonic frequency level must be lower than - 60dB. Check for the other channels.



Step	Setting	Connection	Adjust	Adjust for
5	Frequency check- MIC: Transmit Volume: Optional Squelch: Optional Channel Selector: 19	Connect dummy load and frequency counter through coupler to RF power meter. Connect RF power meter to EXT-ANT jack on the set (Figure 7).	CT801	Be sure that the indication of the transmitter frequency is $27.185\text{MHz} \pm 300\text{Hz}$ on the frequency counter.
6	TX power LED adjustment- MIC: Transmit Volume: Optional Squelch: Optional Channel Selector: 1	Connect dummy load and frequency counter through coupler to RF power meter. Connect RF power meter to EXT-ANT jack on the set (Figure 7).	RV803	Adjust so that 4th LED lights up at 4 watts RF output power.

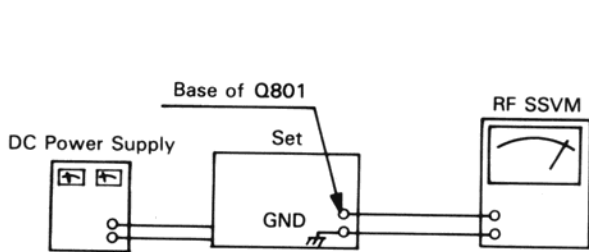


Figure 3

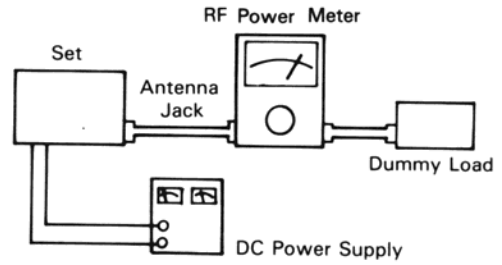


Figure 4

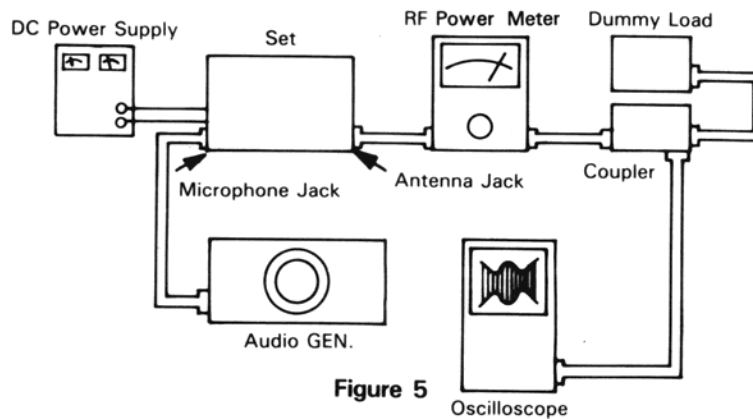


Figure 5

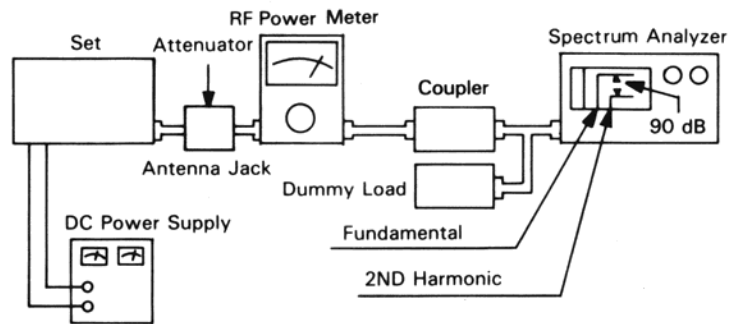


Figure 6

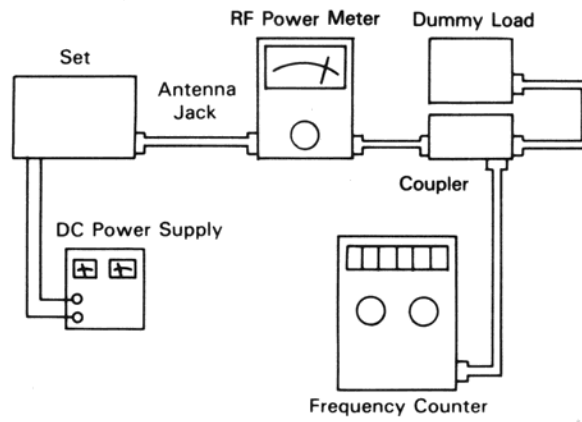


Figure 7

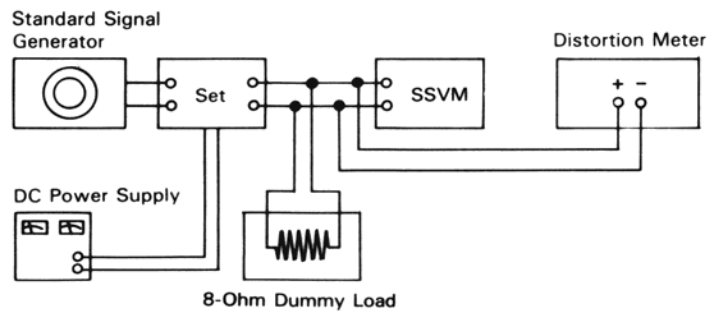


Figure 8



# CHANNEL FREQUENCY GENERATION TABLE

**Receive**

VCO Frequency =  $N \times 5$  (kHz)

**Transmit**

VCO Frequency =  $N \times 2.5$  (kHz)

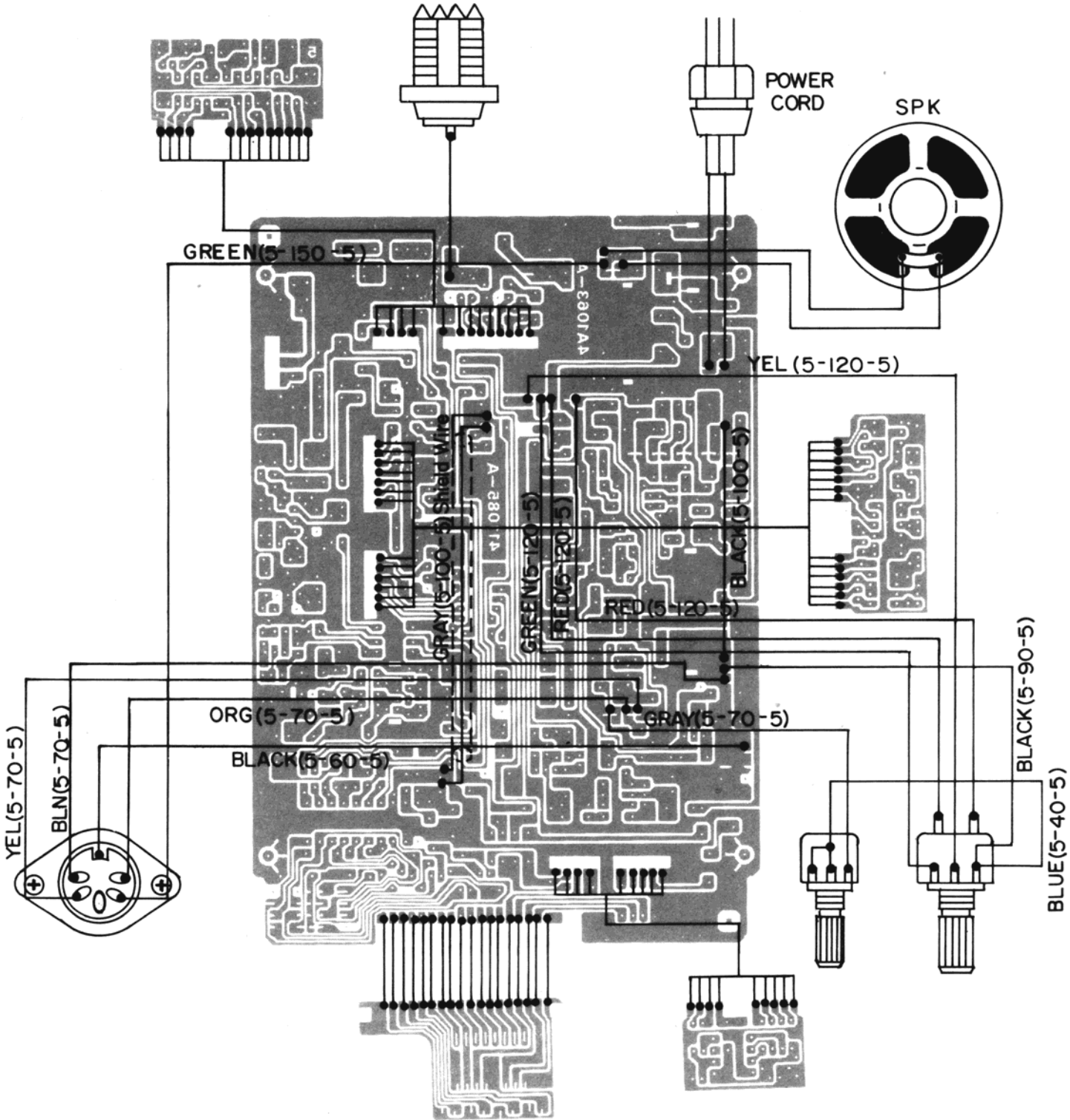
Transmit Frequency = VCO Frequency  $\times 2$

Channel	BDC Input to IC-1								Receive		Transmit		
	D1 (1F)	D2 (1A)	D3 (1G)	D4 (1E)	D5 (1B)	D6 (2C)	D7 (2N)	D8 (2F)	N	VCO Frequency (MHz)	N	VCO Frequency (MHz)	Transmit Frequency (MHz)
1	1	1	1	1	0	1	1	1	3254	16.27	5393	13.4825	26.965
2	1	0	0	0	0	1	1	1	3256	16.28	5395	13.4875	26.975
3	1	0	0	1	0	1	1	1	3258	16.29	5397	13.4925	26.985
4	0	1	0	1	0	1	1	1	3262	16.31	5401	13.5025	27.005
5	0	0	0	1	1	1	1	1	3264	16.32	5403	13.5075	27.015
6	0	0	0	0	1	1	1	1	3266	16.33	5405	13.5125	27.025
7	—	0	1	1	0	1	1	1	3268	16.34	5407	13.5175	27.035
8	0	0	0	0	0	1	1	1	3272	16.36	5411	13.5275	27.055
9	0	0	0	1	0	1	1	1	3274	16.37	5413	13.5325	27.065
10	0	0	1	0	0	0	1	1	3276	16.38	5415	13.5375	27.075
11	1	1	1	1	0	0	1	1	3278	16.39	5417	13.5425	27.085
12	1	0	0	0	0	0	1	1	3282	16.41	5421	13.5525	27.105
13	1	0	0	1	0	0	1	1	3284	16.42	5423	13.5575	27.115
14	0	1	0	1	0	0	1	1	3286	16.43	5425	13.5625	27.125
15	0	0	0	1	1	0	1	1	3288	16.44	5427	13.5675	27.135
16	0	0	0	0	1	0	1	1	3292	16.46	5431	13.5775	27.155
17	—	0	1	1	0	0	1	1	3294	16.47	5433	13.5825	27.165
18	0	0	0	0	0	0	1	1	3296	16.48	5435	13.5865	27.175
19	0	0	0	1	0	0	1	1	3298	16.49	5437	13.5925	27.185
20	0	0	1	0	0	1	0	1	3302	16.51	5441	13.6025	27.205
21	1	1	1	1	0	1	0	1	3304	16.52	5443	13.6075	27.215
22	1	0	0	0	0	1	0	1	3306	16.53	5445	13.6125	27.225
23	1	0	0	1	0	1	0	1	3312	16.56	5451	13.6275	27.255
24	0	1	0	1	0	1	0	1	3308	16.54	5447	13.6175	27.235
25	0	0	0	1	1	1	0	1	3310	16.55	5449	13.5225	27.245
26	0	0	0	0	1	1	0	1	3314	16.57	5453	13.6325	27.265
27	—	0	1	1	0	1	0	1	3316	16.58	5455	13.6375	27.275
28	0	0	0	0	0	0	1	0	3318	16.59	5457	13.6425	27.285
29	0	0	0	1	0	1	0	1	3320	16.60	5459	13.6476	27.295
30	0	0	1	0	0	0	0	1	3322	16.61	5461	13.6525	27.305
31	1	1	1	1	0	0	0	1	3324	16.62	5463	13.6575	27.315
32	1	0	0	0	0	0	0	1	3326	16.63	5465	13.6625	27.325
33	1	0	0	1	0	0	0	1	3328	16.64	5467	13.6675	27.335
34	0	1	0	1	0	0	0	1	3330	16.65	5469	13.6725	27.345
35	0	0	0	1	1	0	0	1	3332	16.66	5471	13.6775	27.355
36	0	0	0	0	1	0	0	1	3334	16.67	5473	13.6825	27.365
37	—	0	1	1	0	0	0	1	3336	16.68	5475	13.6875	27.375
38	0	0	0	0	0	0	0	1	3338	16.69	5477	13.6925	27.385
39	0	0	0	1	0	0	0	1	3340	16.70	5479	13.6975	27.395
40	0	0	1	0	0	0	1	0	3342	16.71	5481	13.7025	27.405

# TROUBLESHOOTING

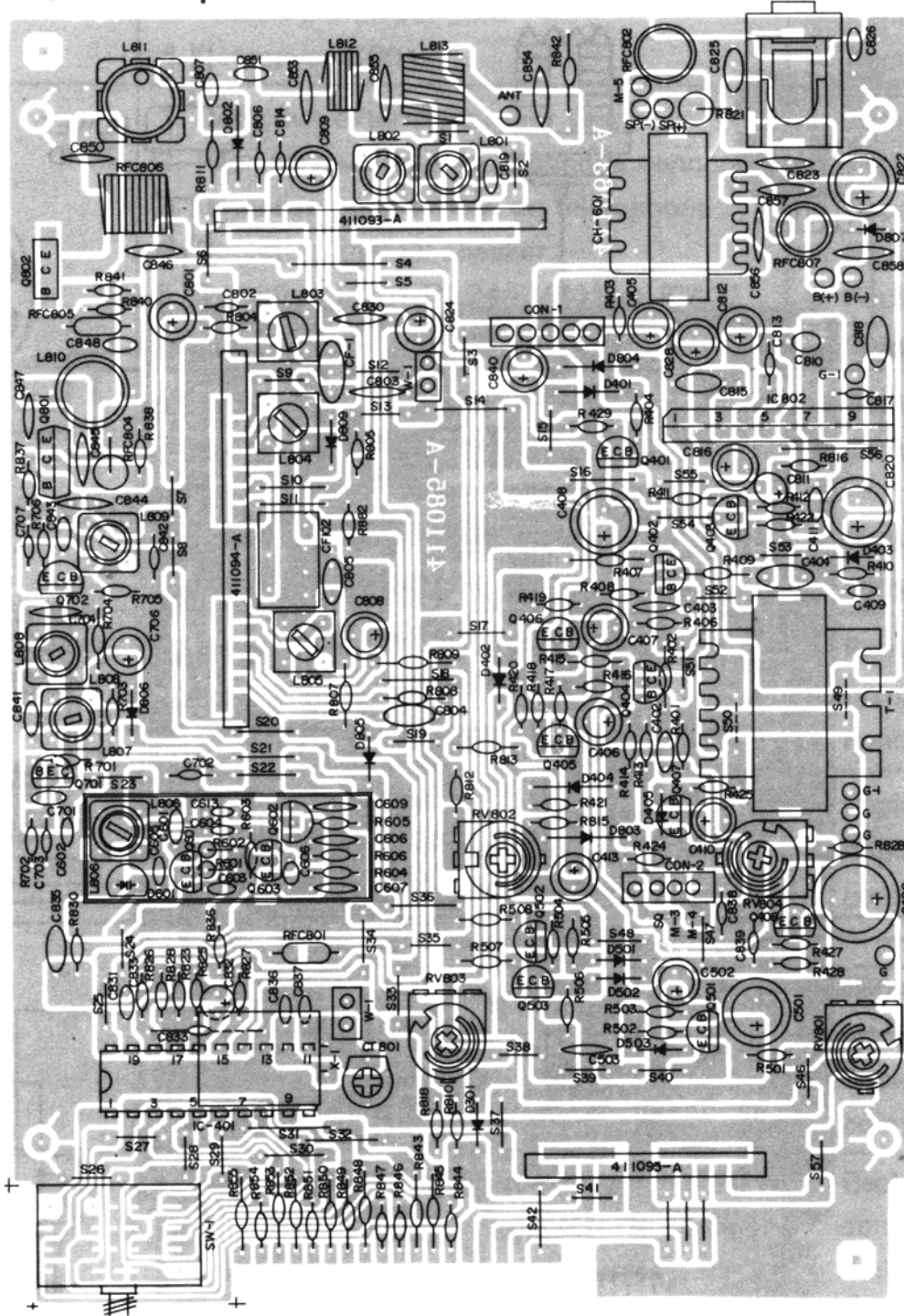
Symptom	Probable Cause	Remedy
Unit does not work at all	<ol style="list-style-type: none"> <li>1. Defective power switch SW2</li> <li>2. Blown fuse</li> <li>3. Broken DC power cord</li> <li>4. Defective IC801</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace</li> <li>2. Replace</li> <li>3. Replace</li> <li>4. Replace</li> </ol>
No output from speaker at all	<ol style="list-style-type: none"> <li>1. Defective external speaker jack</li> <li>2. Poor connection on microphone connector</li> <li>3. Defective push switch on microphone</li> <li>4. Defective internal speaker</li> <li>5. Defective D201/Q204/RV801 or IC802 or other components</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair or Replace</li> <li>2. Repair or Replace</li> <li>3. Repair or Replace</li> <li>4. Replace</li> <li>5. Replace the defective component(s).</li> </ol>
No noise on speaker	<ol style="list-style-type: none"> <li>1. Measure the voltages of Q102/Q103/Q201/Q203/Q204/Q403 and IC802. Refer to the voltage chart on pages 35-36.</li> <li>2. Defective squelch circuit components (RV802/SW3/IC802/Q405/Q406/Q401)</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the defective component(s).</li> <li>2. Replace the defective component(s).</li> </ol>
Squelch does not work	<ol style="list-style-type: none"> <li>1. Defective RV802/SW3/Q405/Q406/Q401</li> <li>2. Improperly adjusted RV802</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the defective component(s).</li> <li>2. Readjust</li> </ol>
No modulation	<ol style="list-style-type: none"> <li>1. Defective microphone</li> <li>2. Poor Audio output and defective modulation microphone amplifier components (Q402/D402/IC802)</li> <li>3. Defective microphone connector component</li> <li>4. Defective ALC circuit (Q408/Q407/Q404/D405)</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace</li> <li>2. Replace the defective component(s).</li> <li>3. Replace</li> <li>4. Replace the defective component(s).</li> </ol>
LED meter does not work	<ol style="list-style-type: none"> <li>1. Defective D2/D3/D4/D5</li> <li>2. Defective IC301</li> <li>3. Defective D301/D802/RV801/RV803</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the defective component(s).</li> <li>2. Replace</li> <li>3. Replace the defective component(s).</li> </ol>
LED display does not work	<ol style="list-style-type: none"> <li>1. Defective Red wire fuse (2A)</li> <li>2. Defective LED1/IC801</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace</li> <li>2. Replace the defective component(s).</li> </ol>
Channel selector does not work	Defective IC801/SW1	Replace the defective component(s).

# WIRING DIAGRAM

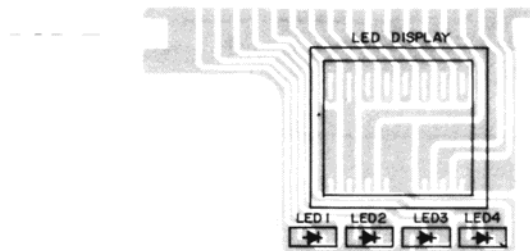


# PRINTED CIRCUIT BOARDS

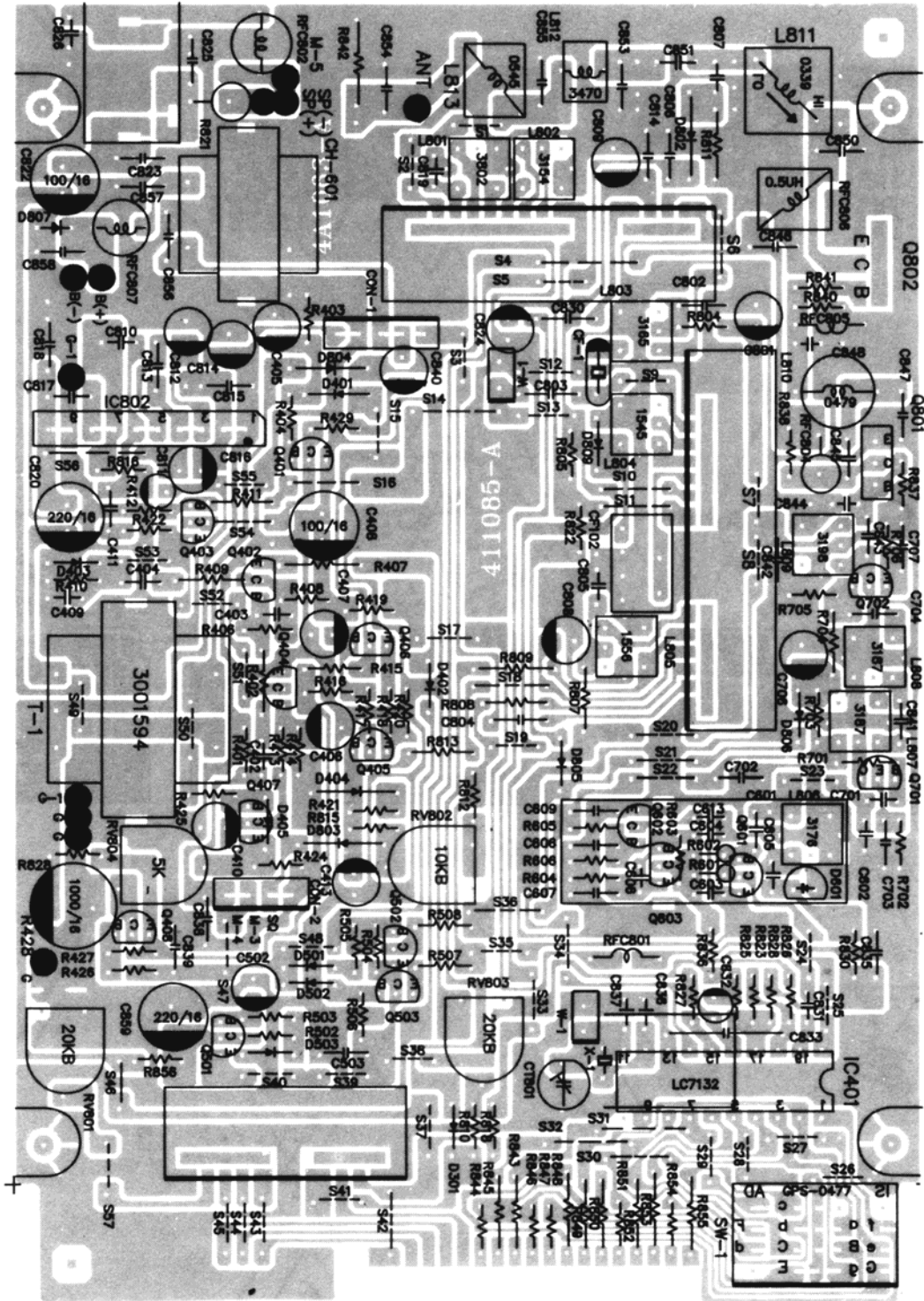
Main PCB-Top View



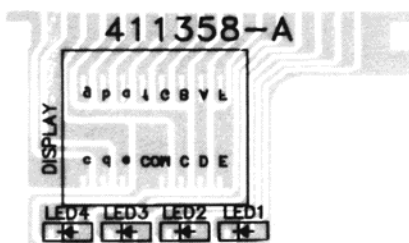
Display PCB-Top View



# Main PCB-Bottom View



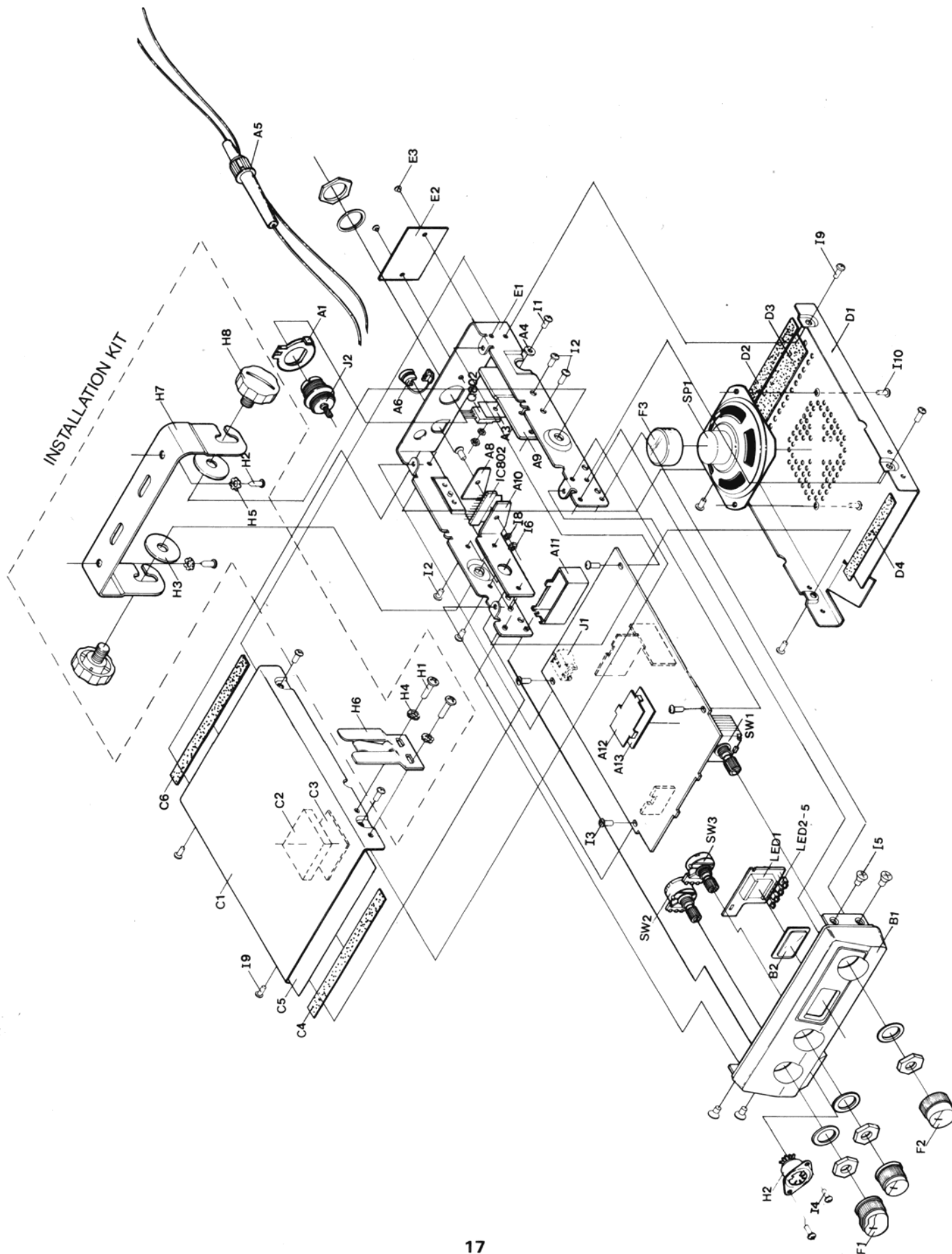
# Display PCB-Bottom View







# EXPLODED VIEW/DISASSEMBLY



## EXPLODED VIEW PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
A-1	Holder, ANT Mounting		731-791
A-2	Socket 5Pin TCS 2250 01 1011		421-529-7
A-3	Mica For TR Q802		440-004-0
A-4	Bushing For TR Q802		441-004-5
A-5	Power Cord, W/Fuse 250V 2A		504-055
A-6	Cord Stopper		750-039
A-8	Heatsink, Small, ALP 30×18×t2, IC802		760-704
A-9	Heatsink, ALP t2, TR802		760-741
A-10	Heatsink, Large IC, ALP 92×25×t2, IC802		760-870
A-11	Shield Housing, VCO, Spte t0.3		771-525
A-12	Shield Plate, VCO, Spte t0.3		771-530
A-13	Insulation Plate, VCO, Fiber t0.3 Stic		905-685
B-1	Escutcheon ABS 94HB Lucky 380-S82276		801-267
B-2	Lens Acryl 27×18×4 Red		812-730
C-1	Cover, Upper Secc+PVC T=0.8 BLK		718-160
C-2	Cushion 25×25×t5 Rubb. SPO. BLK		891-590
C-3	Insulation Plate 30×30×t0.3 Vinyl		900-054
C-4	Felt, Sticker 6×110×t0.3 BLK		901-031
C-5	Insulation Plate 105×146×t0.8 Fiber		901-721
C-6	Felt, Sticker 10×110×t1 BLK		901-767
D-1	Cover, Bottom Secc+PVC T=0.8 BLK		718-159
D-2	Felt, Sticker 10×110×t1 BLK		901-767
D-3	Felt, Sticker 20×90×t0.3 BLK		902-320
D-4	Felt, Sticker 6×72×t0.3 BLK		903-370
E-1	Main Body SPC 325×42×t1		700-930
E-2	Name Plate ALP3 40×27×t0.4		795-487
E-3	Rivet Blind ALB φ 3.2		670-025
F-1	Knob, Control, ABS 94HB Lucky 380-S82276 BLK		825-967
F-2	Knob, Channel, ABS 94HB Lucky 380-S82276 BLK		825-968
F-3	Cap, Speaker, Nylon 0.2G/PC		830-043
G-1	Mic Cartridge, FDM-600M		420-233-5
G-2	Cord, Curled		420-349-6
G-3	Plug, 5Pin		421-025-8
G-4	Push Switch		432-034-1
G-5	Screw (+)Tapping (F.H) 3×6–2S BLK		623-682
G-6	Screw (+)Tapping (O.H) 3×16–2S Ni-Plat		623-830
G-7	Cover, Bottom, MIC BLK		716-630
G-8	Cover, Upper, MIC BLK		716-640-A
G-9	Holder, MIC		731-940
G-10	Lever, MIC		740-483-A
G-11	Name Plate, MIC		794-481
G-12	Back Plate, MIC		794-882