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Realistic TRC-437 (21-1553)

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REALISTIC[®]

Service Manual

21-1553

TRC-437

CB 40-Channel Transceiver

Catalog Number: 21-1553

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SPECIFICATIONS

General

Transmitter Crystal controlled PLL synthesizer, amplitude modulation
 Receiver Crystal controlled double conversion, superheterodyne system
 Communicating frequencies 40 CB channels (26.965 to 27.405 MHz)
 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 1000 Hz, 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 dB	50 dB
Modulation capability (positive/negative)	+90%/-90%	+80%/-80%
AMC Range at 1 kHz	40 dB	30 dB
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 variation against antenna impedance	Satisfactory when dummy antenna is varied from 40 ohms to 200 ohms.	

Receiver

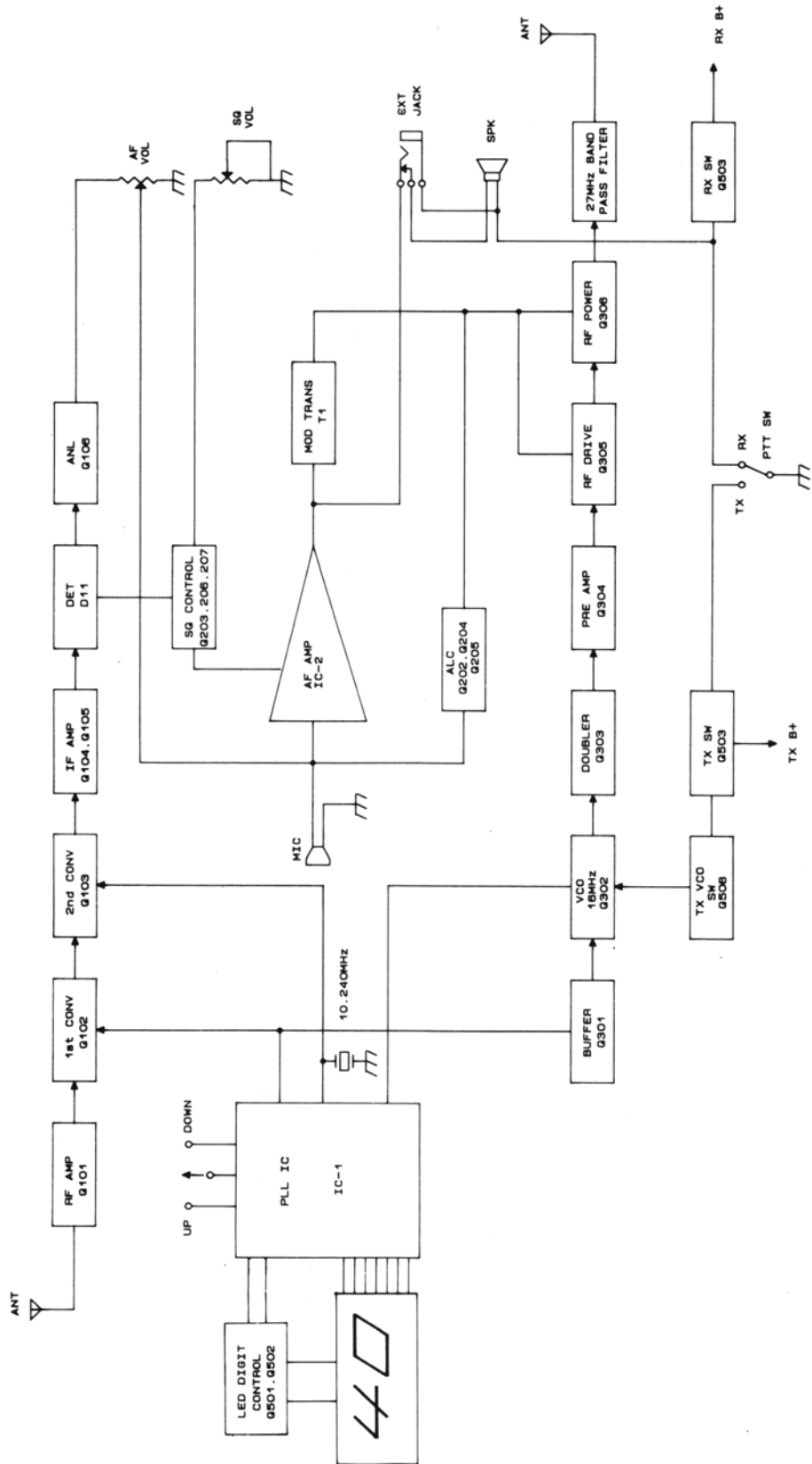
Description	Nominal	Limit
Intermediate frequency		
1st IF	10.695 MHz	
2nd IF	455 kHz	
Sensitivity for 500 mW output	0.3 μ V	1.0 μ V
Sensitivity at 10dB (S+N)/N	0.7 μ V	1.0 μ V
Adjacent channel rejection	65dB	55dB
Image rejection (1st IF/2nd IF)	70dB	60dB
IF rejection ratio (1st IF/2nd IF)	60dB	45dB
Signal-to-Noise ratio at 1mV 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	-6dB	-6 \pm 3dB
2500 Hz	-6dB	-6 \pm 3dB
Cross modulation	50dB	40dB
Squelch	60dB	60 \pm 6dB
Current consumption at no signal	250mA	300mA

Other Items

Fuse	2 Amps/250V
General power requirement	12-16V DC
Dimensions	(W) 4 $\frac{1}{3}$ " (109mm) \times (H) 1 $\frac{1}{3}$ " (33mm) \times (D) 6 $\frac{1}{3}$ " (162mm)
Weight	1 lbs 7 ozs (0.65 kg)

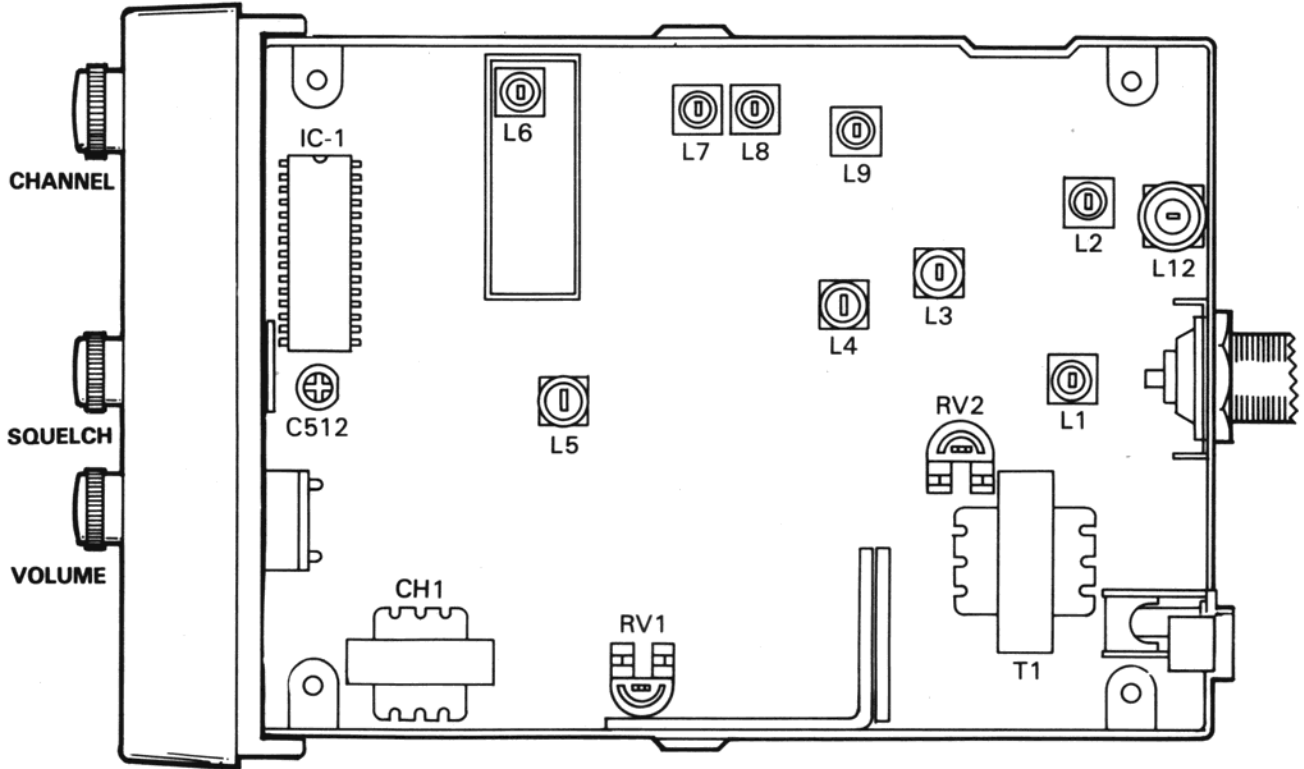
Note: Nominal specs represent the design specs. All units should be able to approximate these—some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; in no case should a unit fail to meet limit specs.

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 19 of IC1 (Figure 1).	C512	10.240MHz \pm 100Hz
2	RX VCO voltage adjustment- MIC: Receive Volume: Optional Squelch: Turn Clockwise CH Selector: 1	Connect DC voltmeter between R514 and R516 (Figure 2).	L6	2.5V
3	TX VCO voltage adjustment- MIC: Transmit Volume: Optional Squelch: Optional CH Selector: 1	Connect DC voltmeter between R514 and R516 (Figure 2).	L6	Indication on DC voltmeter must be 2-2.5 Volt. If DC voltmeter does not indicate 2-2.5 volt, readjust L6

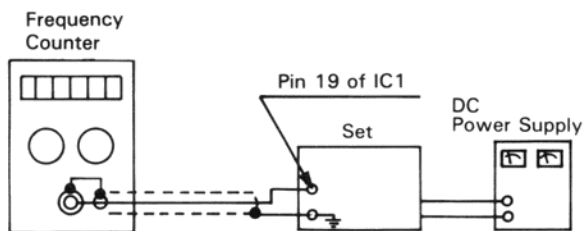


Figure 1

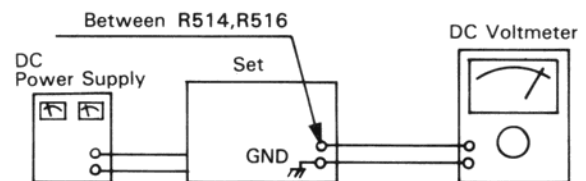


Figure 2

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 Q304 (Figure 3).	L7 L8	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).	L9 L12	Maximum indication on the RF power meter (4 watts). If indication is not in 4 watts range, go back to step 1 and readjust L9, L12.
3	Modulation adjustment- MIC: Transmit Volume: Optional Squelch: Optional CH Selector: 19	Connect audio generator (1kHz) to pin 4 of microphone jack (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.	RV2	Proper modulation pattern on the oscilloscope.
4	Second harmonic check- MIC: Transmit Volume: Optional Squelch: Optional CH Selector: 19	Connect the input terminal of RF power meter to the EXT-ANT jack on the set through the -40dB attenuator and the output terminal to the spectrum analyzer through the dummy load/coupler (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 CH 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).	C512	Be sure that the indication of the transmitter frequency is $27.185\text{MHz} \pm 300\text{Hz}$ on the frequency counter.

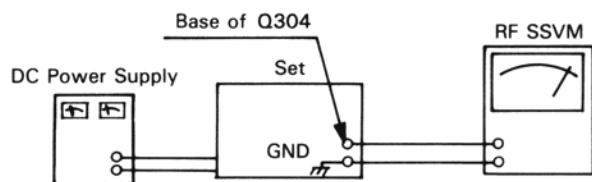


Figure 3

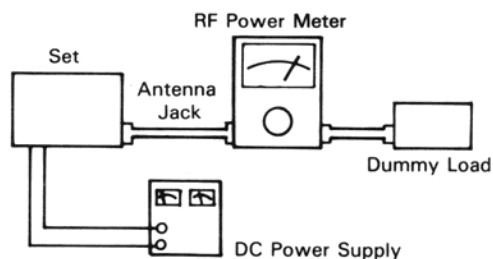


Figure 4

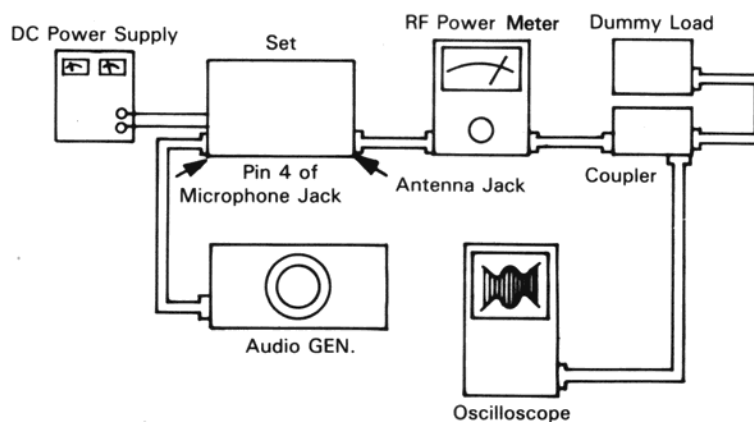


Figure 5

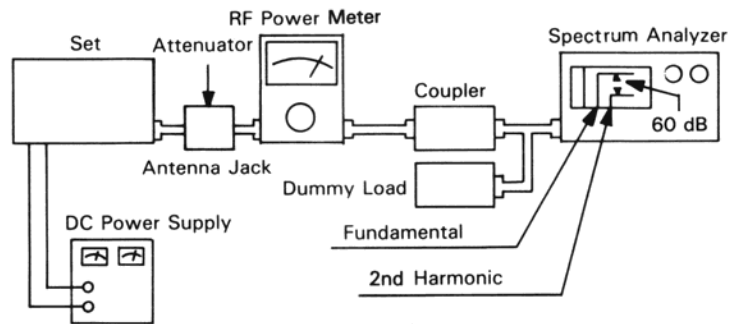


Figure 6

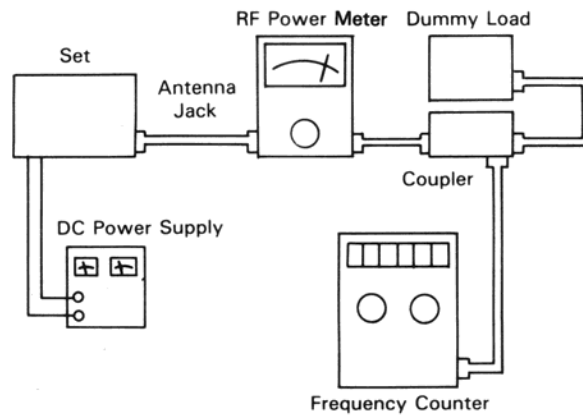


Figure 7

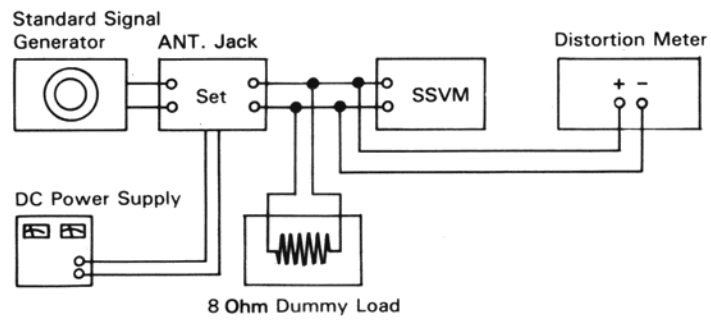


Figure 8

CHANNEL FREQUENCY GENERATION TABLE

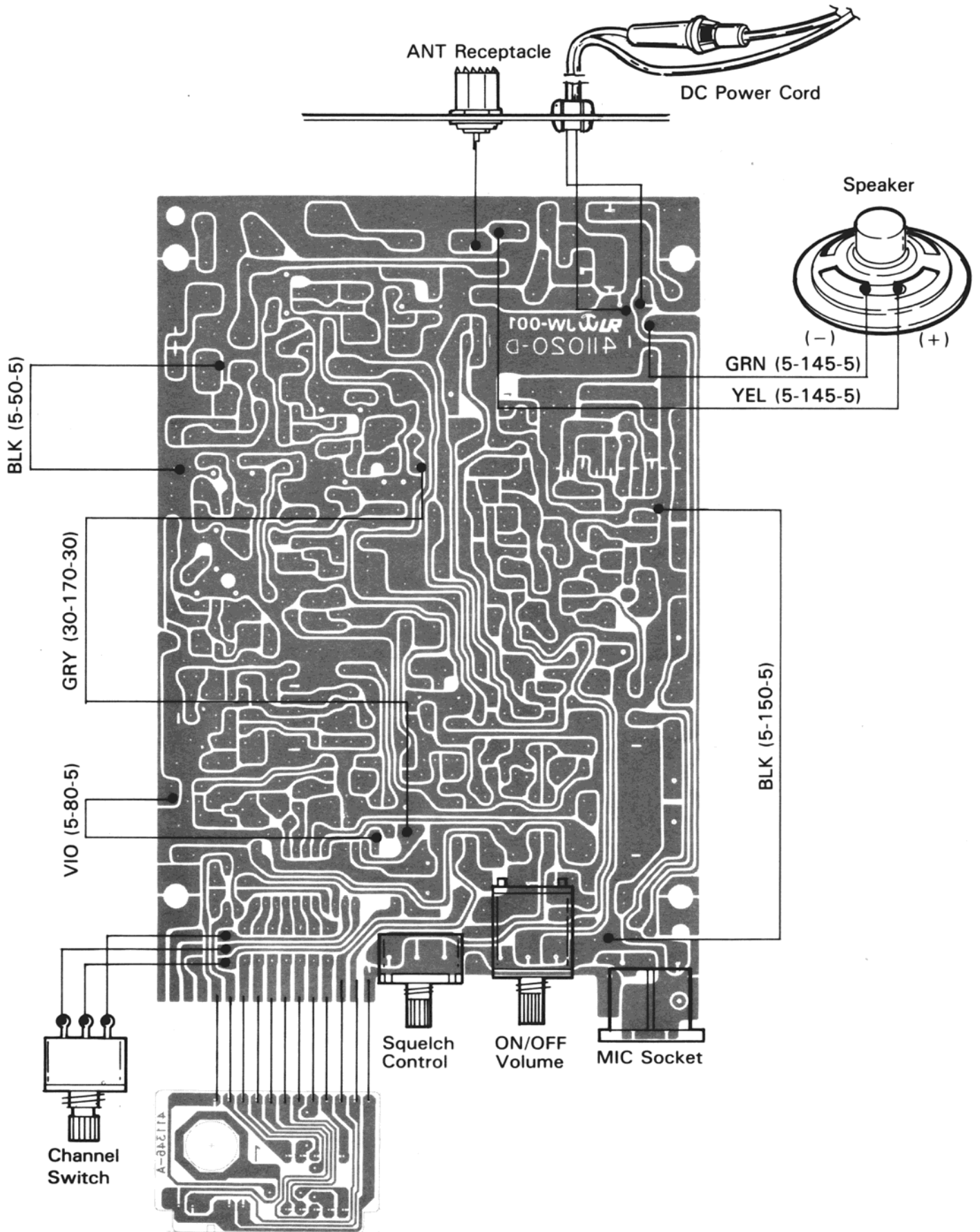
Receive Vco Frequency = $N \times 2$ (KHz)
 Transmit Vco Frequency = $N \times 2.5$ (KHz)

Channel	Frequency (MHz)	RX (TX = 1)		TX (TX = 0)	
		N	VCO Frequency(MHz)	N	VCO Frequency(MHz)
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

TROUBLESHOOTING

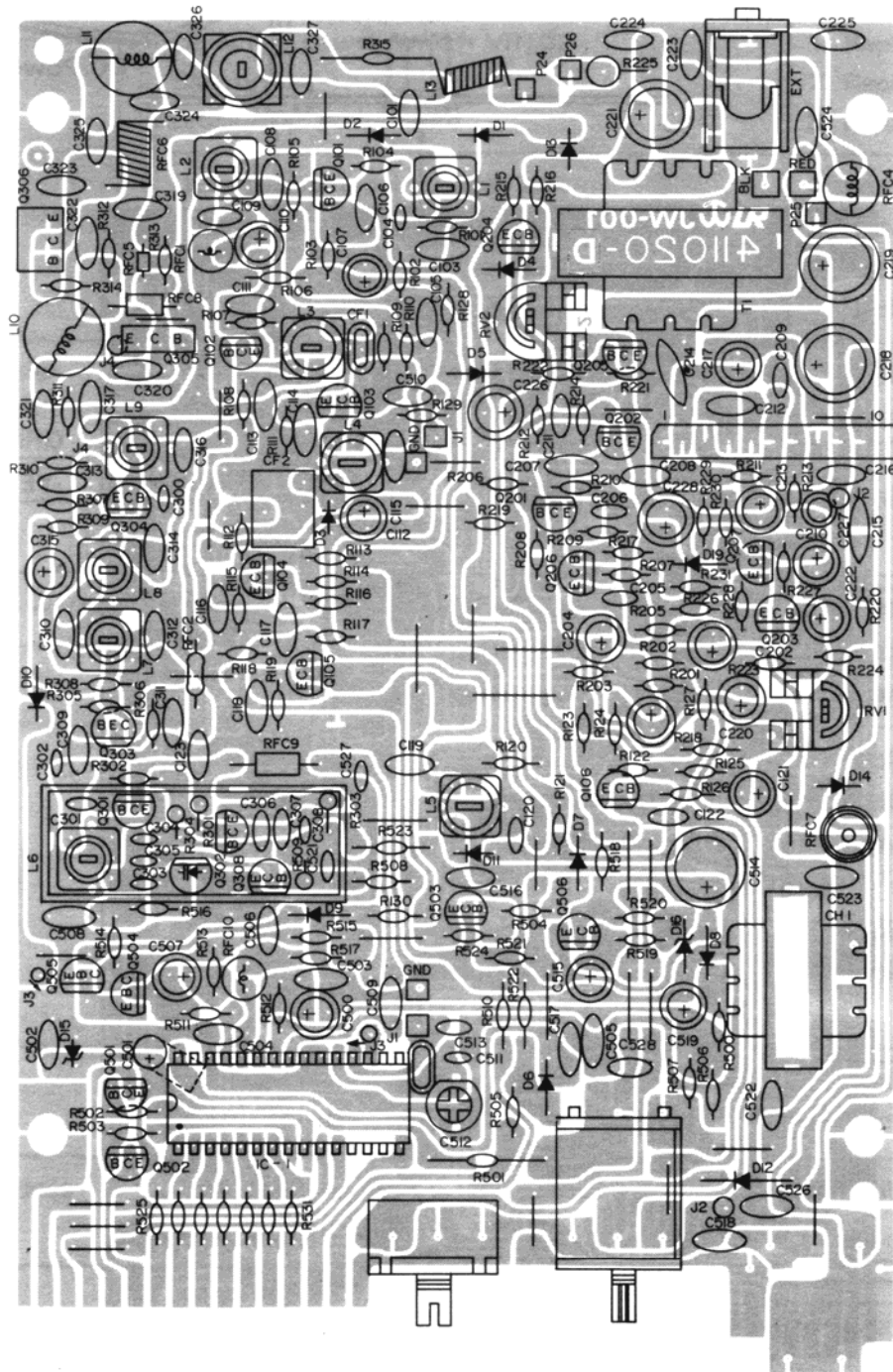
Symptom	Probable Cause	Remedy
Unit does not work at all	<ol style="list-style-type: none"> 1. Defective power switch VR102 2. Blown fuse 3. Broken DC power cord 	<ol style="list-style-type: none"> 1. Replace 2. Replace 3. Replace
No output from speaker at all	<ol style="list-style-type: none"> 1. Defective external speaker jack 2. Poor connection on microphone connector 3. Defective push switch on microphone 4. Defective internal speaker 	<ol style="list-style-type: none"> 1. Repair or Replace 2. Repair or Replace 3. Replace 4. Replace
No noise on speaker	<ol style="list-style-type: none"> 1. Measure all the voltages of Q101, Q102, Q103, Q104, Q105, Q106, and IC2. Compare with the voltage chart on pages 30-31. 2. Defective squelch circuit components (RV1, VR2, IC2, Q203, Q206, Q207) 	<ol style="list-style-type: none"> 1. Replace defective component(s) 2. Replace if defective
Squelch does not work	<ol style="list-style-type: none"> 1. Defective VR2, VR2, Q203, Q206 or Q207. 2. Improperly adjusted RV2 	<ol style="list-style-type: none"> 1. Replace defective component(s) 2. Readjust
No modulation	<ol style="list-style-type: none"> 1. Defective microphone 2. Poor audio output and defective modulation microphone amplifier components (Q201, Q202, IC2) 3. Defective microphone connector component 4. Defective ALC/Circuit (Q202, Q204, Q205, D4) 	<ol style="list-style-type: none"> 1. Replace 2. Replace the defective component(s) 3. Replace 4. Replace the defective component(s)
LED display does not work	<ol style="list-style-type: none"> 1. Defective orange wire fuse 2. Defective LED display IC1, Q501, Q502 	<ol style="list-style-type: none"> 1. Replace 2. Replace
Channel selector does not work	<ol style="list-style-type: none"> 1. Defective IC1, SW1 	<ol style="list-style-type: none"> 1. Replace

WIRING DIAGRAM

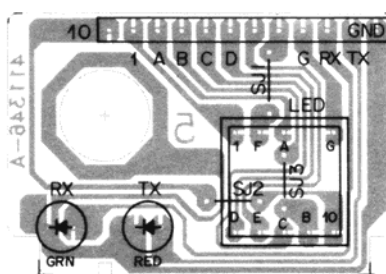


PRINTED CIRCUIT BOARDS

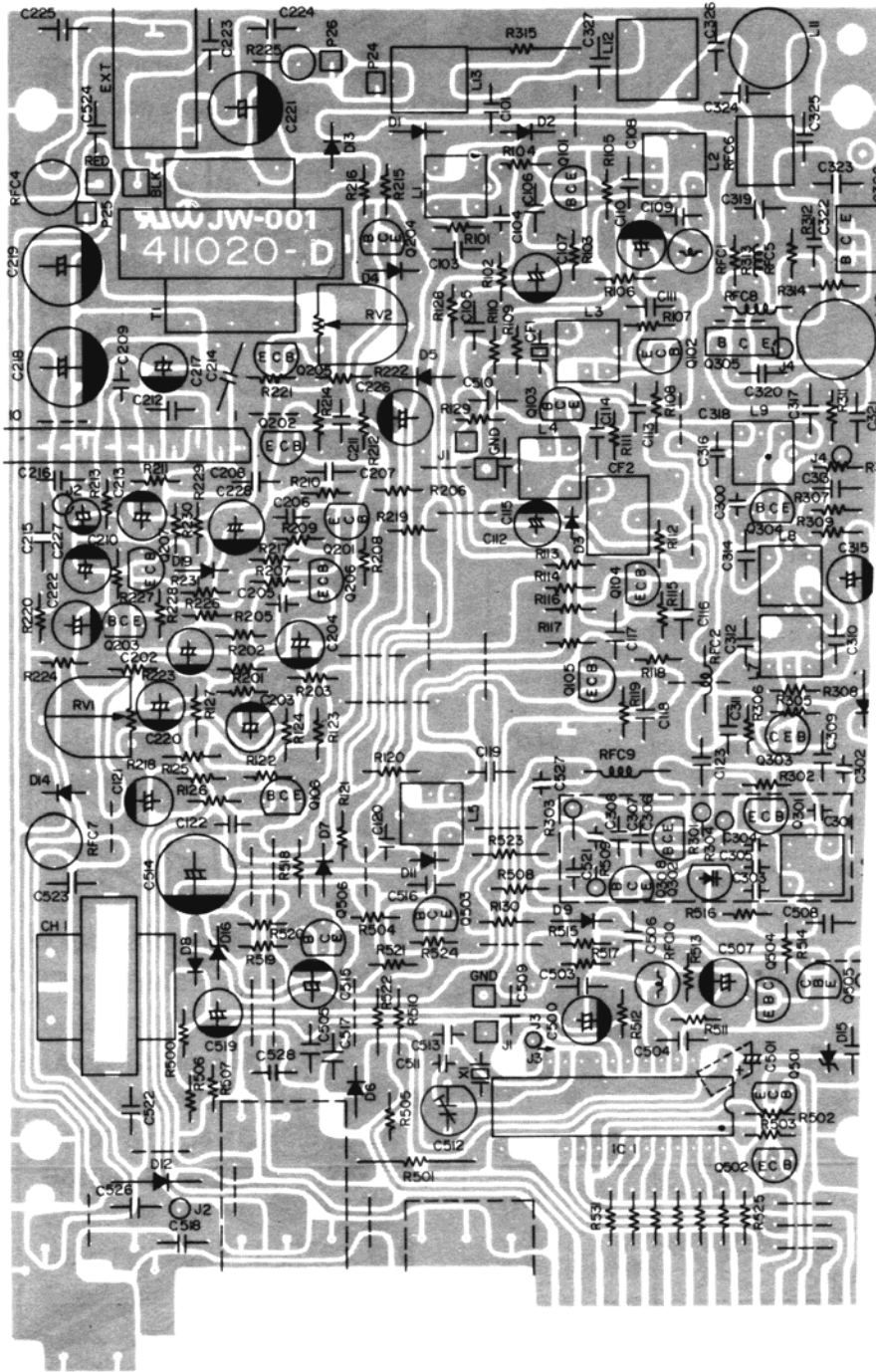
Main PCB-Top View



Display PCB-Top View



Main PCB-Bottom View



Display PCB-Bottom View

