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Realistic TRC-463 Service Manual

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Radio Shack®

Service Manual

21-1558

TRC-463
CB 40 - CHANNEL TRANSCEIVER
Catalog Number: 21-1558

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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 MHz–27.405 MHz)
 Voltage operation 12–16 V DC (negative only ground)
 Temperature and humidity range –22°F ~ +140°F (–30°C ~ +60°C) and 10% ~ 90%
 Transmitter/Receiver switching Electrical

STANDARD TEST CONDITIONS

Battery supply voltage 13.8 V DC
 Modulation 1000 Hz, 30%
 Receiver output power 50 mW at external SP
 Receiver output impedance 8 ohms, non-inductive
 ANT load impedance of transmitter 50 ohms, non-inductive
 Ambient conditions
 Temperature 60°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 dBm	50 dBm
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 and harmonic signal radiation ratio from fundamental	–65 dB	–60 dB
Current consumption		
at no modulation	850 mA	1100 mA
at 80% modulation	1200 mA	1500 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

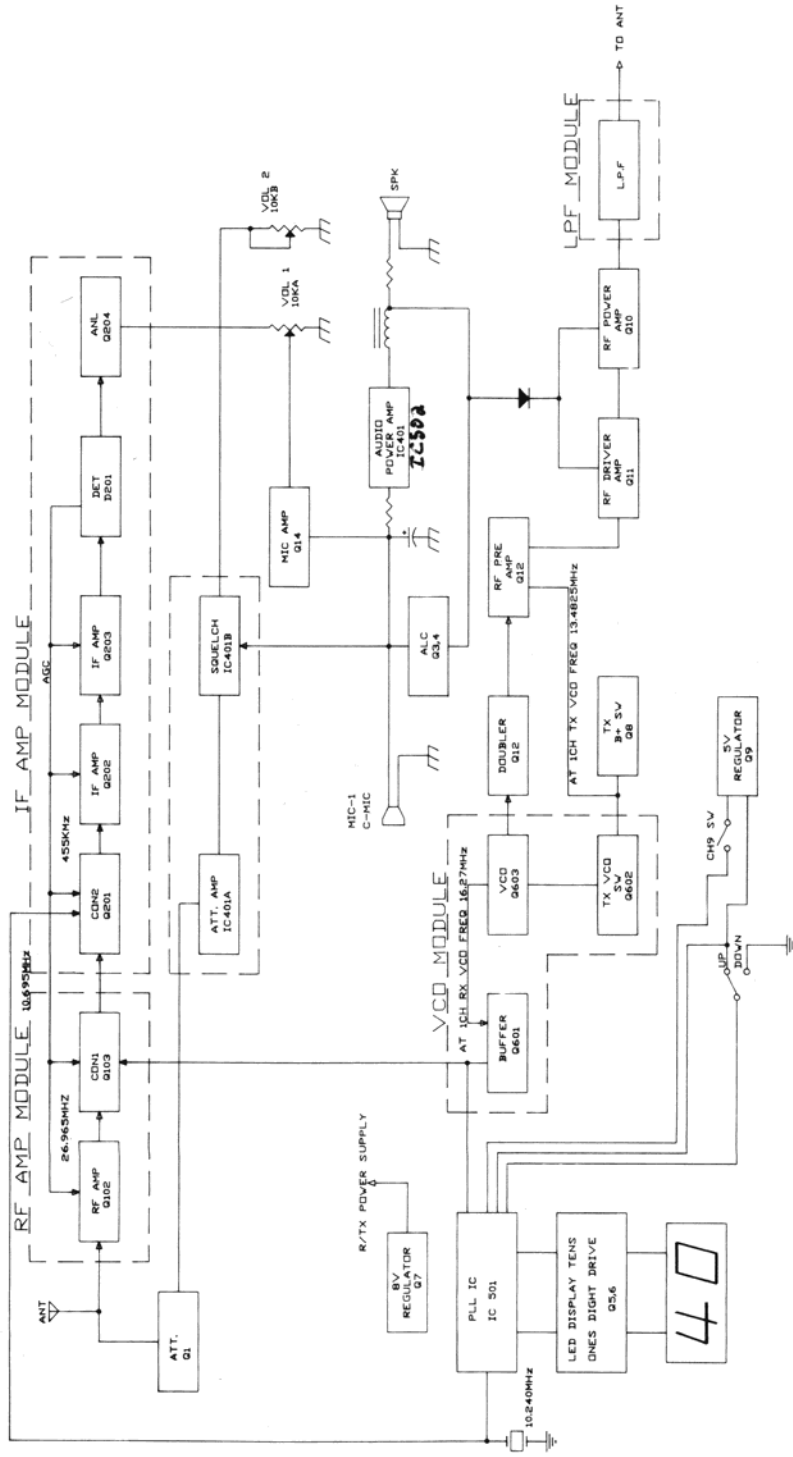
Description	Nominal	Limit
Intermediate frequency		
1st IF	10.695 MHz	
2nd IF	455 kHz	
Sensitivity for 50 mW output	0.5 μ V	1 μ V
Sensitivity at 10 dB (S+N)/N	0.75 μ V	1.0 μ V
Adjacent channel rejection	65 dB	55 dB
Image rejection ratio (1st IF/2nd IF)	70 dB	60 dB
IF rejection ratio (1st IF/2nd IF)	60/85 dB	45/75 dB
Signal-to-noise ratio at 1 mV input	40 dB	35 dB
Distortion at 1 mV input, 30% mod. (50 mW out)	3%	5%
AGC figure of merit at 50 mV input	80 dB	70 dB
Power output at 1 mV input		
Undistorted (10% THD) audio output	700 μ V	500 μ V
Maximum audio output	850 μ V	700 μ V
Electrical fidelity compared to 1000 Hz		
450 Hz	-6 dB	-6 \pm 5 dB
2500 Hz	-6 dB	-6 \pm 5 dB
Cross modulation	50 dB	40 dB
Squelch	60 dB	60 \pm 6 dB
Current consumption at no signal	250 mA	300 mA

OTHER ITEMS

Fuse	250 V, 2 A
General power requirement	12–16 V DC
Weight	12 oz (285 g)
Dimensions (HWD)	6 ⁵ / ₈ × 2 ¹¹ / ₁₆ × 1 ⁷ / ₁₆ inches (72 × 69 × 36 mm)

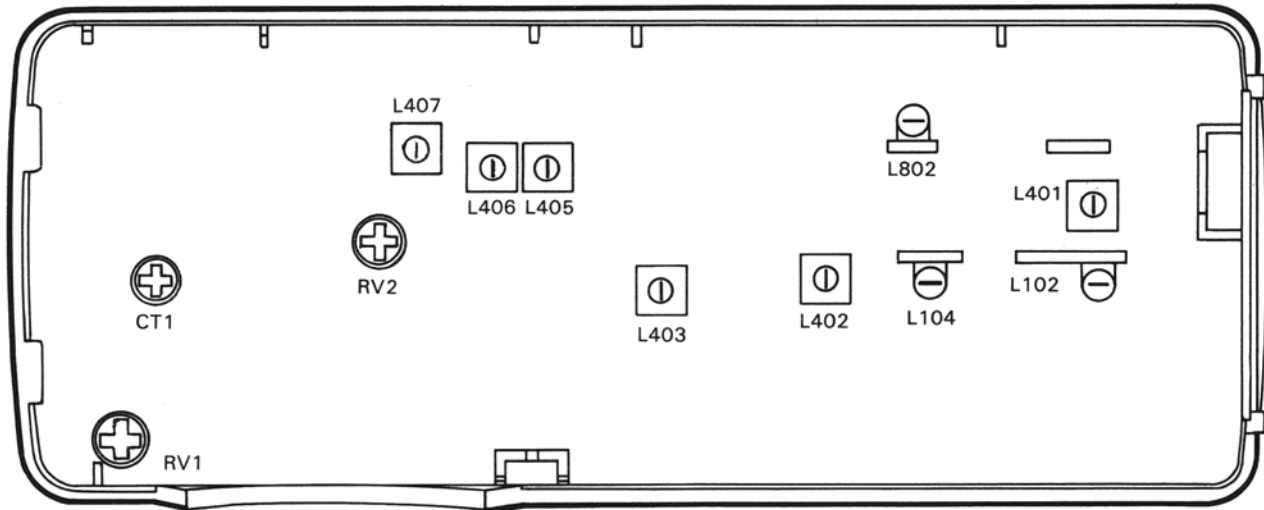
Note: Nominal specs represent the design specs. All units should be able to approximate these—some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst conditions, that still might be considered acceptable; in no case should a unit fail to meet limit specs.

BLOCK DIAGRAM



ALIGNMENT AND ADJUSTMENT

ALIGNMENT TEST POINTS AND PARTS LOCATION



PHASE-LOCKED LOOP AND CPU SECTION

Test Equipment Required

- Frequency counter
- DC power supply (13.8 volts 3 amps)
- DC voltmeter
- Oscilloscope

ALIGNMENT PROCEDURE

Step	Setting	Connection	Adjust	Adjust For
1	Frequency adjustment – PTT SW: Receive Volume: Optional Squelch: Optional CH selector: Optional CH9: OFF	Frequency counter to output pin 9 of IC501 (Figure 1).	CT1	10.240 MHz \pm 100 Hz
2	RX VCO voltage adjustment – PTT SW: Receive Squelch: Optional CH selector: 1 CH9: OFF	Connect DC voltmeter VCO module pin 3 (Figure 2).	L407	2.0 V
3	TX VCO voltage check – PTT SW: Transmit Volume: Optional Squelch: Optional CH selector: 1 CH9: OFF	Connect DC voltmeter VCO module pin 3 (Figure 2).	L407	1.8 ~ 2.2 V
4	CPU IC voltage check – PTT SW: Receive Volume: Optional Squelch: Optional CH selector: Optional CH9: OFF	Connect DC voltmeter to IC 501 pin 13.		Indication on DC voltmeter must be 5.4 ~ 6.2 V.

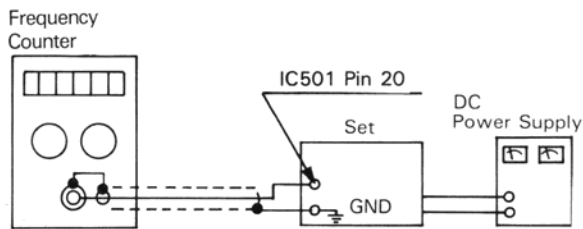


Figure 1

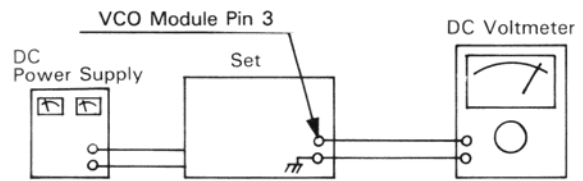


Figure 2

TRANSMITTER SECTION

Test Equipment Required

- RF powermeter (RF SSVM)
- 50 ohm load (non-inductive)
- RF attenuator
- Oscilloscope
- Audio generator
- DC power supply (13.8 volt, 3 amp)
- Spectrum analyzer
- Frequency counter
- Coupler

Alignment Procedure

Step	Setting	Connection	Adjust	Adjust For
1	RF driver stage— PTT SW: Transmit Volume: Optional Squelch: Optional CH selector: 19 RF gain: Optional CH9: OFF	Connect RF powermeter to base of Q12 (Figure 3).	L406 L405	Adjust for maximum indication on the RF powermeter.
2	RF power stage— PTT SW: Transmit Squelch: Optional Volume: Optional CH selector: 19 CH9: OFF	Connect dummy load and RF powermeter to the EXT-ANT jack on the set (Figure 4).	L802	Adjust for maximum indication on the RF powermeter (4 watts). If indication is not in 4 watt range, go back to step 1 and readjust L802.
3	Modulation adjustment— PTT SW: Transmit Volume: Optional Squelch: Optional CH selector: 19 CH9: OFF	Connect audio generator (1 kHz) to internal microphone connector (Figure 5). Connect dummy load and oscilloscope through coupler to RF powermeter. Connect RF powermeter to EXT-ANT jack on the set. Adjust audio signal level to obtain 80%-90% modulation level.	RV2	Adjust proper modulation pattern on the oscilloscope.

Step	Setting	Connection	Adjust	Adjust For
4	Second harmonic check— PTT SW: Transmit Volume: Optional Squelch: Optional CH selector: 19 CH9: OFF	Connect the input terminal of RF powermeter to the EXT-ANT jack on the set through the -40 dB 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 60 dB. Check for the other channels.
5	Frequency check— PTT SW: Transmit Volume: Optional Squelch: Optional CH selector: 9 CH9: OFF	Connect the input terminal of RF powermeter to the EXT-ANT jack on the set and the output terminal to the frequency counter through the dummy load/coupler (Figure 7).	CT1	Be sure that the indication of the transmitter frequency is $27.185 \text{ MHz} \pm 300 \text{ Hz}$ on the frequency counter.

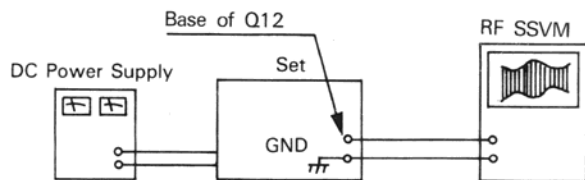


Figure 3

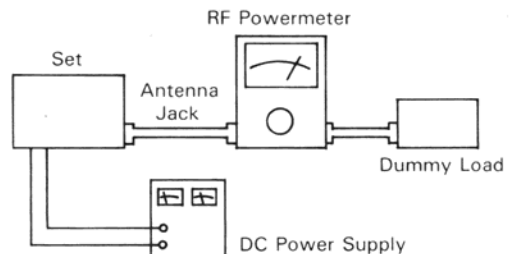


Figure 4

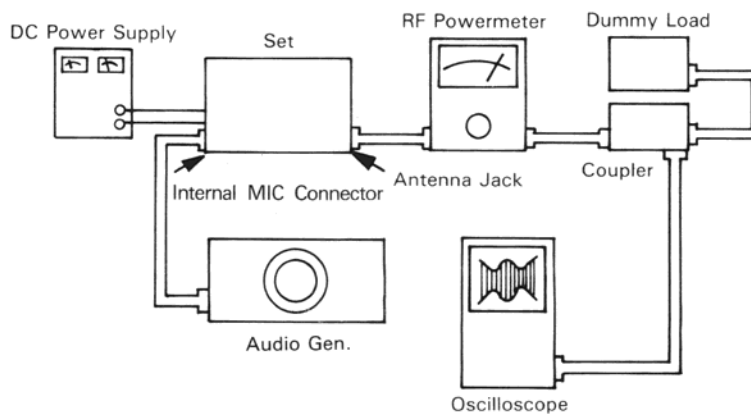


Figure 5

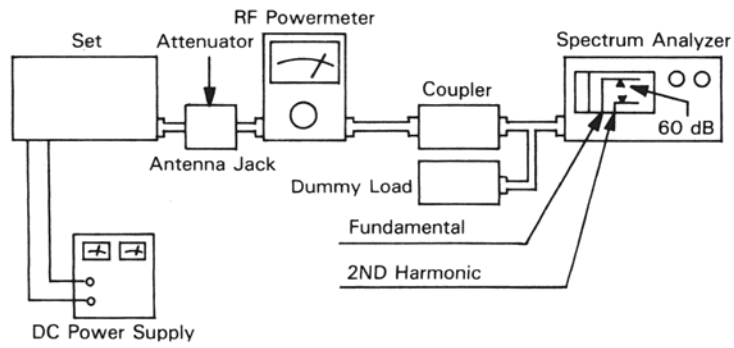


Figure 6

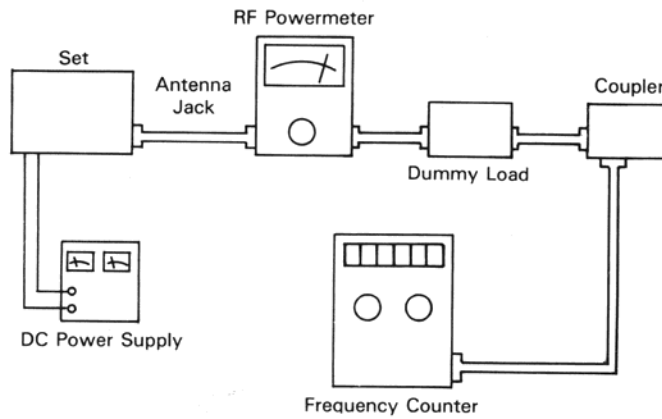


Figure 7

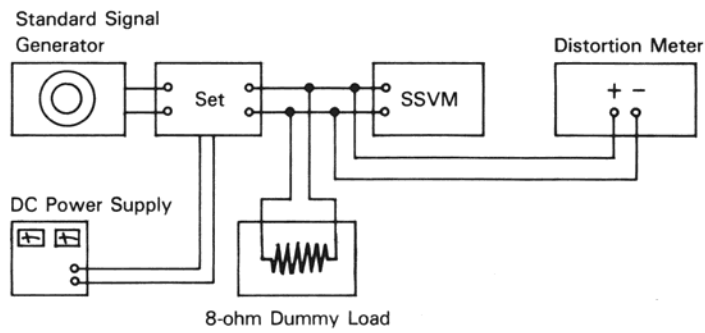


Figure 8

RECEIVER SECTION

Test Equipment Required

- Standard signal generator (SSG)
- SSVM
- Distortion meter
- Power supply

Alignment Procedure

Step	Setting	Connection	Adjust	Adjust For
1	RX output adjustment— PTT SW: Receive Volume: Fully clockwise Squelch: Fully clockwise CH selector: 19 CH9: OFF SSG: 27.185 MHz, 1 kHz 1 μ V 30% mod.	Connect standard signal generator to EXT-ANT jack. Connect SSVM and distortion meter across EXT speaker jack with 8 ohm dummy load (Figure 8).	L401 L102 L104 L402 L403	Adjust for maximum indication on SSVM. Reduce output from SSG until the audio output becomes about 50 mW (0.63 V).
2	Distortion adjustment— PTT SW: Receive SSG: 27.185 MHz 1 kHz 1 mV 80% mod. Squelch: Turn clockwise CH9: OFF CH selector: 19 Volume: 50 mW (0.63 V)	Connect standard signal generator to EXT-ANT jack. Connect SSVM and distortion meter across EXT speaker jack with 8 ohm dummy load (Figure 8).	L401	Adjust for minimum indication on distortion meter and maximum output on the SSVM.
3	Squelch adjustment— PTT SW: Receive SSG: 27.185 MHz 1 kHz 1 mV 30% mod. Squelch: Fully counter— clockwise CH selector: 19 Volume: 50 mW (0.63 V) CH9: OFF	Connect standard RF signal generator to EXT-ANT jack. Connect SSVM and distortion meter across EXT speaker jack with 8 ohm dummy load (Figure 8).	RV1	Adjust RV1 until the audio output just appears.

CHANNEL FREQUENCY GENERATION CHART

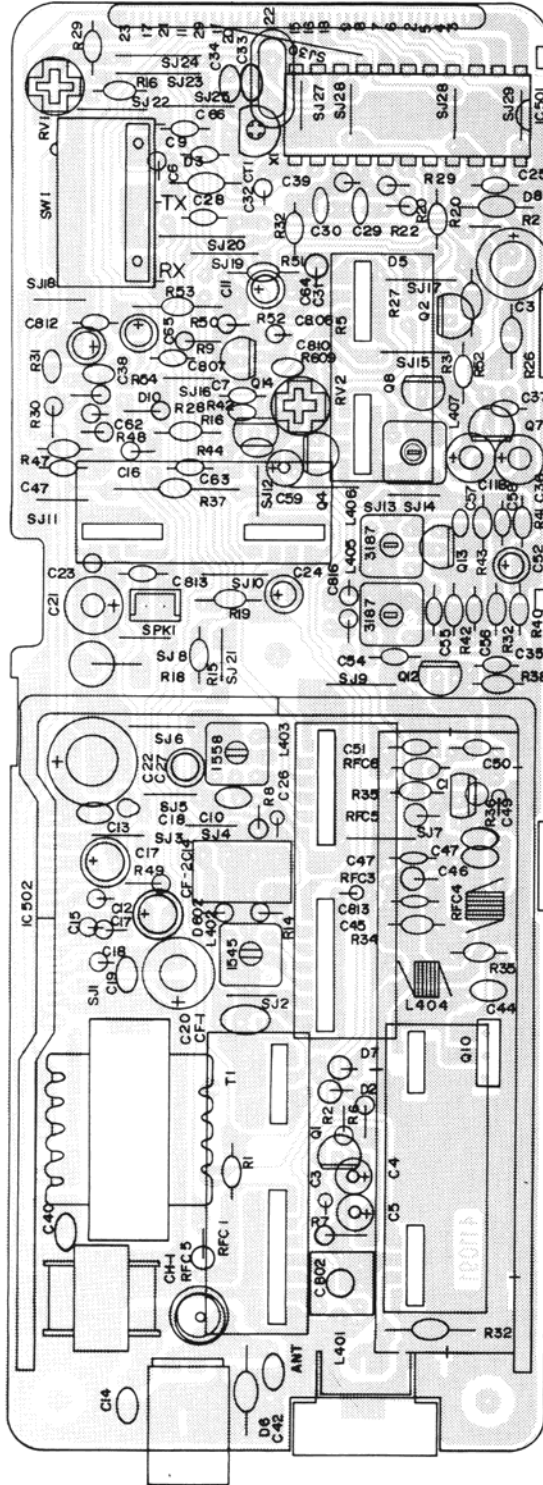
Channel	Frequency	TX VCO Frequency (TX F In)	RX VCO Frequency (RX F In)
1	26.965	13.4825	16.27
2	26.975	13.4875	16.28
3	26.985	13.4925	16.29
4	27.005	13.5025	16.31
5	27.015	13.5075	16.32
6	27.025	13.5125	16.33
7	27.035	13.5175	16.34
8	27.055	13.5275	16.36
9	27.065	13.5325	16.37
10	27.075	13.5375	16.38
11	27.085	13.5425	16.39
12	27.105	13.5525	16.41
13	27.115	13.5575	16.42
14	27.125	13.5625	16.43
15	27.135	13.5675	16.44
16	27.155	13.5775	16.46
17	27.165	13.5825	16.47
18	27.175	13.5875	16.48
19	27.185	13.5925	16.49
20	27.205	13.6025	16.51
21	27.215	13.6075	16.52
22	27.225	13.6125	16.53
23	27.255	13.6175	16.54
24	27.235	13.6225	16.55
25	27.245	13.6275	16.56
26	27.265	13.6325	16.57
27	27.275	13.6375	16.58
28	27.285	13.6425	16.59
29	27.295	13.6475	16.60
30	27.305	13.6525	16.61
31	27.315	13.6575	16.62
32	27.325	13.6625	16.63
33	27.335	13.6675	16.64
34	27.345	13.6725	16.65
35	27.355	13.6775	16.66
36	27.365	13.6825	16.67
37	27.375	13.6875	16.68
38	27.385	13.6925	16.69
39	27.395	13.6975	16.70
40	27.405	13.7025	16.71

TROUBLESHOOTING

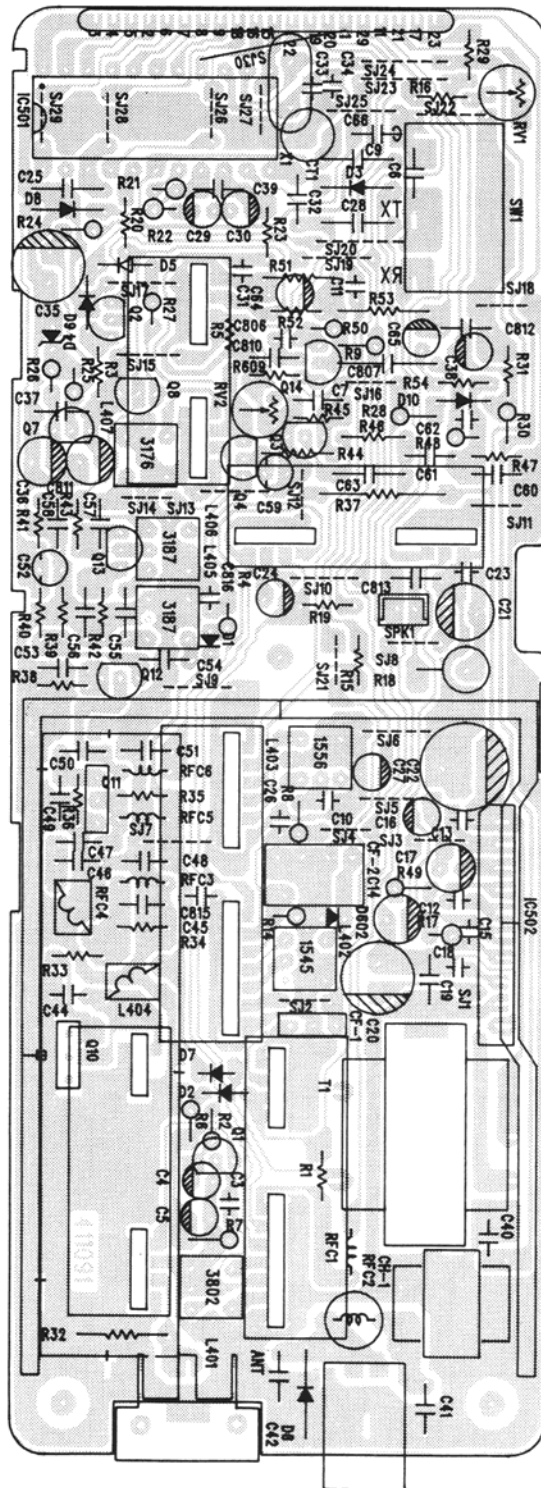
Symptom	Probable Cause	Remedy
Unit does not work at all	<ul style="list-style-type: none"> • Defective power switch SW5. • Open fuse. • Broken DC power cord. • Defective IC501 or IC502. 	<ul style="list-style-type: none"> • Replace. • Replace. • Replace. • Check the voltages or replace if defective.
No output from speaker at all	<ul style="list-style-type: none"> • Defective internal speaker. • Poor connection on microphone connector. • Defective PTT SW VOL1, VOL2, RV1 and IC502. • Defective or other components. • Defective IC502. 	<ul style="list-style-type: none"> • Replace. • Repair or replace. • Repair or replace. • Replace if defective. • Check the voltages or replace if defective.
No noise on speaker	<ul style="list-style-type: none"> • Measure all the voltages of Q1, RF - AMP module, IF AMP module, Q14, and IC502 with voltage chart on page 32. • Defective squelch circuit components, (OP AMP module, RV1, VOL2). 	<ul style="list-style-type: none"> • Replace if defective. • Replace.
Squelch does not work	<ul style="list-style-type: none"> • Defective OP AMP module RV1, VOL2. • Improperly adjusted RV1. 	<ul style="list-style-type: none"> • Replace if defective. • Readjust.
No modulation	<ul style="list-style-type: none"> • Defective microphone. • Poor audio output or defective components in the microphone modulation amplifier circuitry IC502. • Defective microphone connector component(s). • Defective ALC circuit (Q4, Q3). 	<ul style="list-style-type: none"> • Replace. • Replace the components if defective. • Replace. • Replace the defective component(s).
LED channel display does not work	<ul style="list-style-type: none"> • Defective ALC circuit (Q4, Q3). • Defective LED, IC501, Q6, and Q5. 	<ul style="list-style-type: none"> • Replace. • Replace.
Channel selector does not work	<ul style="list-style-type: none"> • Defective IC501. • Defective SW3, SW4. 	<ul style="list-style-type: none"> • Check the voltages or replace if defective. • Replace.
CH9 does not work	<ul style="list-style-type: none"> • Defective SW2. • Defective IC501. 	<ul style="list-style-type: none"> • Replace • Replace.
No transmitter output at antenna	<ul style="list-style-type: none"> • Open ANT jack. • Defective PTT SW. • Defective Q10. 	<ul style="list-style-type: none"> • Replace. • Replace. • Replace.

PRINTED CIRCUIT BOARDS

MAIN PCB

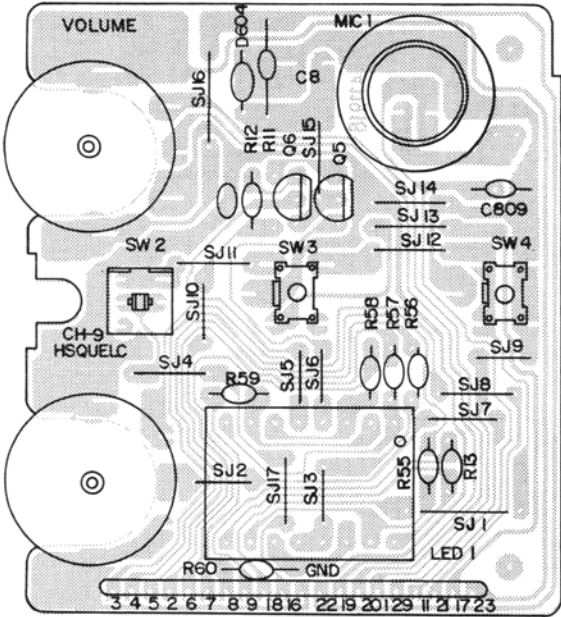


Top View

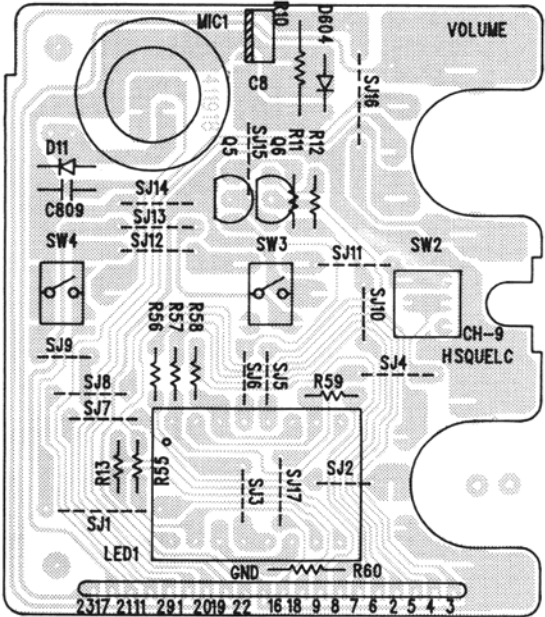


Bottom View

SUB PCB

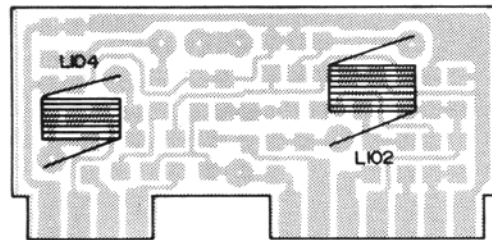
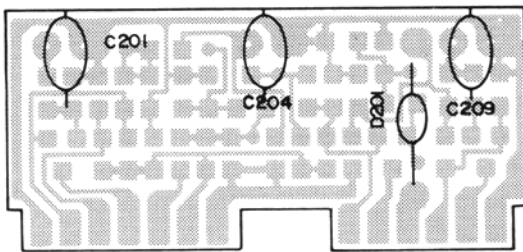
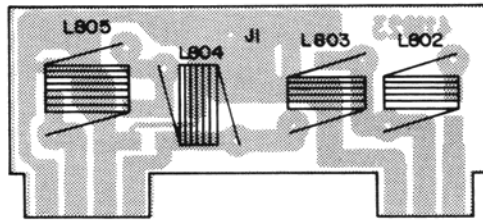
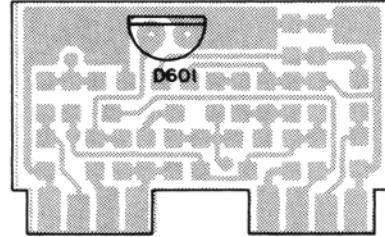
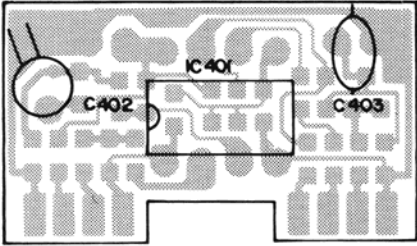


Top View

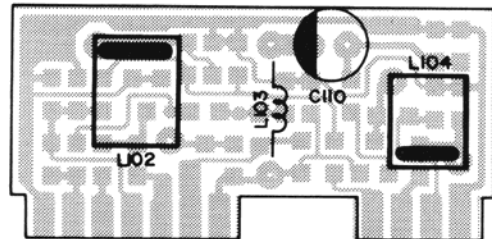
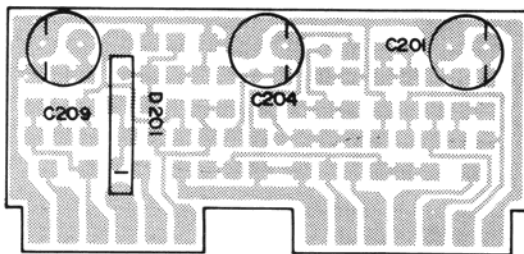
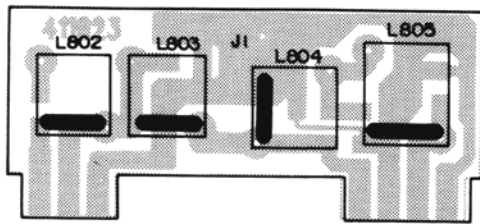
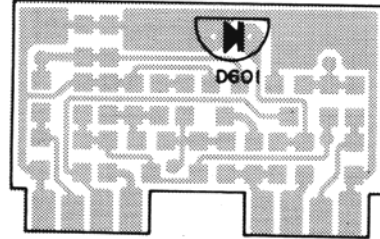
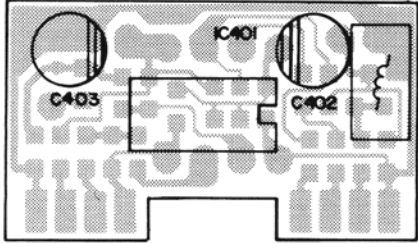


Bottom View

MODULE PCB

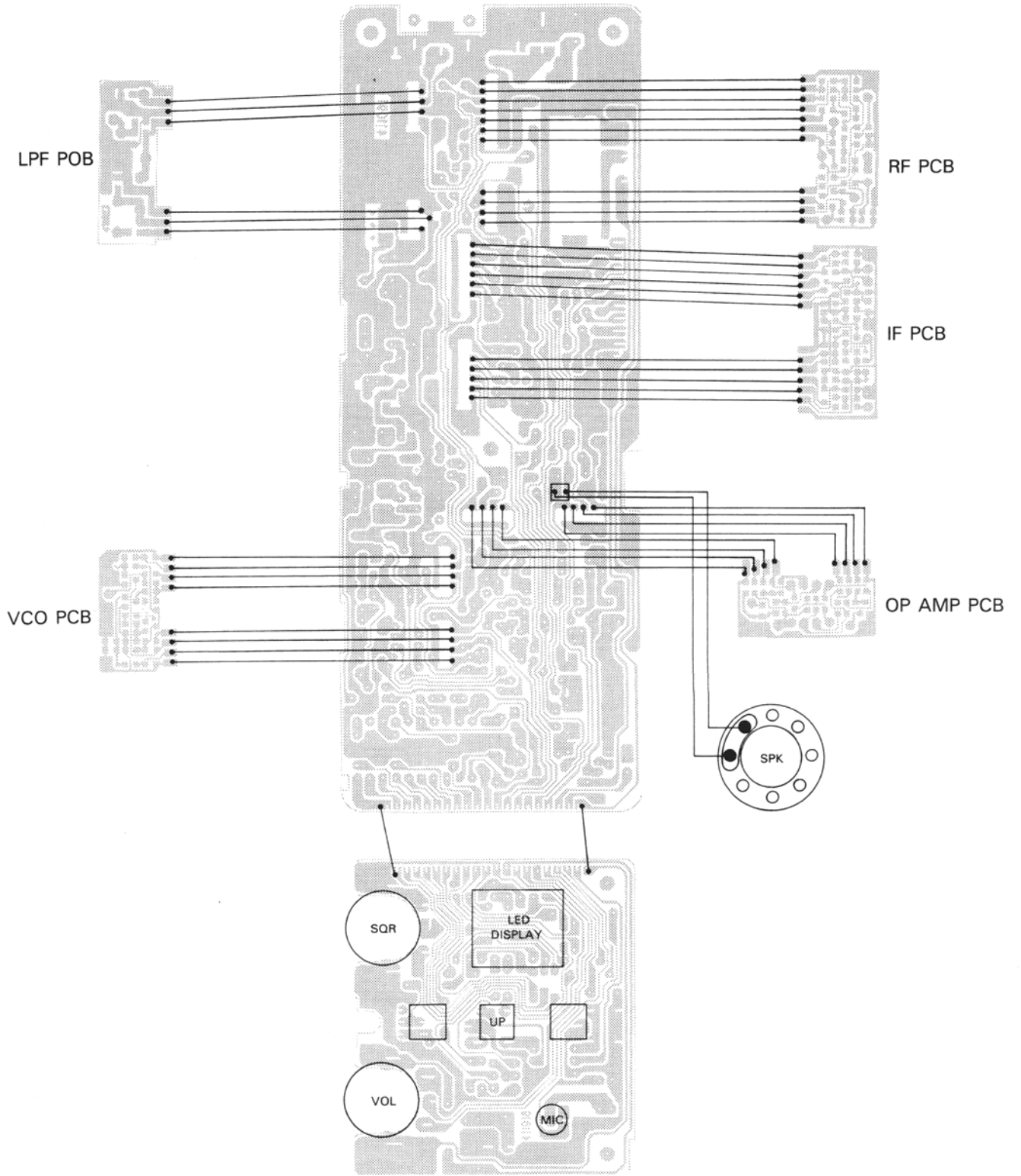


Top View

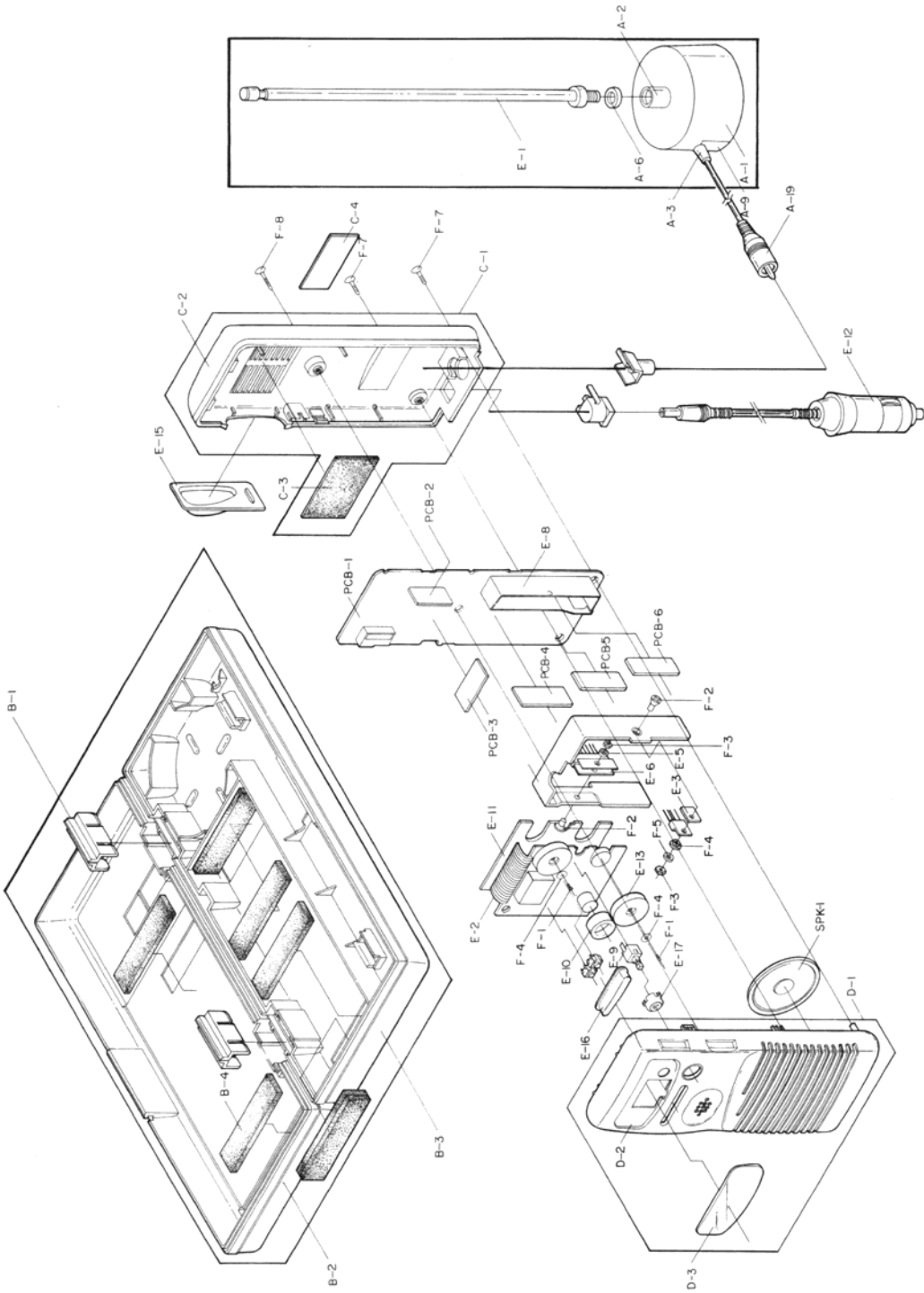


Bottom View

WIRING DIAGRAM



EXPLODED VIEW



EXPLODED VIEW PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
A-1	Ant. Stand Black ABS		840-301
A-2	Post Ant. Stand		850-261
A-3	Bushing Cord MTG. PVC		850-289
A-6	Nut M4 BSBM Ni-P		651-033
A-9	Cup Ant. Stand ABS Black		750-242
A-19	RCA Phone Jack With Cord Assembly		509-301
B-1	Hinge PE Dark Gray		825-300
B-2	Carring Case (UP) ABS C380-9192 Dark Gray		841-350-A
B-3	Carring Case (BO) ABS C380-9192 Dark Gray		841-356-A
B-4	Rubber Sponge Stic Black		894-175
C-1	Bottom Cover Assembly		514-82B-0
C-2	Bottom Cover		718-894
C-3	Felt 55 × 35 × 70.3		906-450
D-1	Upper Cover Assembly		514-82U-P
D-2	Upper Cover		718-893
D-3	Lens Acryl		813-864
E-1	Ant. Rod Assembly		420-403-1
E-2	Flat Wire 10 P 50 mm		429-206-5
E-3	Mica for TR		440-004-0
E-5	Bushing for TR		441-004-5
E-6	Heat Sink SPC 8 × 28 × 72		202-057-5
E-8	Shield Plate Spte 0.3 t		771-516-A
E-9	Shield Plate (TK) Spte 0.3 t		771-415-A
E-10	Sponge Black Stic Ring		893-010
E-11	P.C.B Sub		411-918
E-12	DC Car Adaptor		503-839
E-15	Knob Talk ABS 94HB		826-063
E-16	Knob Up/Down ABS 94HB		826-064
E-17	Knob Emergency ABS 94HB		826-065
F-1	Screw (+) Machine (BH) 1.7 × 4 Zn-P		610-050
F-2	Screw (+) Machine FH (+) 3 × 10 Ni-P		613-710
F-3	Nut M3-1S SS41 Zn-P		651-024
F-4	Washer Flat M2 Zn-P		661-212
F-5	Washer Spring M3 Zn-P		662-305
F-7	Screw (+) (R+FH) Wood Screw 2.7 × 14 Ni-P		642-026
F-8	Screw (+) (R+FH) Wood Screw 2.7 × 20 Ni-P		642-062
SPK-1	Speaker 45-8B-03 400 Hz		420-167-8
PCB-1	P.C.B Main 162.5 × 69.5 × 1.6 t XPC 94HB		411-091
PCB-2	P.C.B VCO 30.7 × 16.8 × 1.6 t XPC 94HB 1/1		411-925
PCB-3	P.C.B OP 29.25 × 21.2 × 1.6 t XPC 94HB 1/1		411-933
PCB-4	P.C.B HTF 36.25 × 21.2 × 1.6 t XPC 94HB 1/1		411-932
PCB-5	P.C.B RF 39.25 × 16.88 × 1.6 t XPC 94HB 1/1		411-921
PCB-6	P.C.B LPE 15.39 × 40.5 × 1.6 t XPC 94HB 1/1		411-923

ELECTRICAL PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
Assembly, PCB, Main			593-365
Capacitors			
C1-C2	Not Used		
C3	Ceramic 0.022 μ F 50 WV (AX)		130-227-9
C4	Electrolytic 10 μ F 16 WV		101-043-5
C5	Electrolytic 10 μ F 16 WV		101-043-5
C6	Ceramic 0.01 μ F 50 WV (AX)		130-188-8
C7	Ceramic 0.0047 μ F 50 WV (AX)		130-418-5
C8	Not Used		
C9	Ceramic 8.2 pF 50 WV (AX)		138-241-2
C10	Ceramic Disc 0.047 μ F 50 WV		130-405-3
C11	Ceramic 0.022 μ F 50 WV (AX)		130-227-9
C12	Ceramic 220 pF 50 WV (AX)		132-248-8
C13	Ceramic Disc 0.047 μ F 50 WV		130-405-3
C14	Electrolytic 47 μ F 16 WV		104-739-6
C15	Ceramic 0.001 μ F 50 WV (AX)		130-187-7
C16	Tantalum 3.3 μ F 16 WV		143-301-0
C17	Electrolytic 33 μ F 16 WV		103-340-3
C18	Ceramic 220 pF 50 WV (AX)		132-248-8
C19	Ceramic Disc 0.047 μ F 50 WV		130-405-3
C20	Electrolytic 220 μ F 16 WV		102-242-3
C21	Electrolytic 47 μ F 16 WV		104-739-6
C22	Electrolytic 1000 μ F 16 WV		101-048-0
C23	Ceramic 0.01 μ F 50 WV (AX)		130-188-8
C24	Electrolytic 10 μ F 16 WV		101-043-5
C25	Ceramic 0.01 μ F 50 WV (AX)		130-188-8
C26	Ceramic 0.022 μ F 50 WV (AX)		130-227-9
C27	Electrolytic 10 μ F 16 WV		101-043-5
C28	Ceramic 8.2 pF 50 WV (AX)		138-241-2
C29-C30	Tantalum 2.2 μ F 16 WV		142-201-8
C31	Ceramic 0.1 μ F 50 WV (AX)		130-164-6
C32	Ceramic 0.001 μ F 50 WV (AX)		130-187-7
C33	Ceramic Disc 20 pF 50 WV (NPO)		132-005-5
C34	Ceramic Disc 15 pF 50 WV (NPO)		131-502-2
C35	Electrolytic 220 μ F 16 WV		102-242-3
C36	Electrolytic 47 μ F 16 WV		104-739-6
C37	Ceramic 0.022 μ F 50 WV (AX)		130-227-9
C38	Electrolytic 470 μ F 10 WV		104-721-9
C39	Ceramic 0.001 μ F 50 WV (AX)		130-187-7
C40-C41	Ceramic Disc 0.01 μ F 50 WV		130-102-9
C42	Ceramic Disc 0.01 μ F 50 WV		130-102-9
C43	Not Used		

Ref. No.	Description	RS Part No.	Mfr's Part No.
C44	Ceramic Disc 47 pF 50 WV (NPO)		134-708-7
C45	Ceramic Disc 100 pF 50 WV		131-015-9
C46	Ceramic Disc 220 pF 50 WV		132-214-7
C47	Ceramic Disc 100 pF 50 WV		131-015-9
C48	Ceramic Disc 0.022 pF 50 WV		130-207-1
C49	Ceramic 470 pF 50 WV (AX)		134-749-4
C50	Ceramic 100 pF 50 WV (AX)		131-405-3
C51	Ceramic Disc 0.047 μ F 50 WV		130-405-3
C52	Electrolytic 2.2 μ F 50 WV		102-241-2
C53	Ceramic 0.01 μ F 50 WV (AX)		130-188-8
C54	Ceramic 100 pF 50 WV (AX)		131-043-4
C55	Ceramic Disc 4 pF 50 WV (NPO)		134-004-4
C56	Ceramic 0.01 μ F 50 WV (AX)		130-188-8
C57	Ceramic 39 pF 50 WV (AX)		133-926-2
C58	Ceramic 0.022 μ F 50 WV (AX)		130-227-9
C59	Electrolytic 47 μ F 16 WV		104-739-6
C60	Ceramic 0.001 μ F 50 WV (AX)		130-187-7
C61	Ceramic 0.01 μ F 50 WV (AX)		130-188-8
C62	Ceramic 0.0047 μ F 50 WV (AX)		130-418-5
C63	Ceramic 0.01 μ F 50 WV		130-188-8
C64	Electrolytic 2.2 μ F 50 WV		102-241-2
C65	Electrolytic 0.47 μ F 50 WV		110-415-3
C66	Ceramic 0.01 μ F 50 WV (AX)		130-188-8
C806-C807	Ceramic 0.022 μ F 50 WV (AX)		130-227-9
C808-C809	Not Used		
C810	Ceramic Disc 0.047 μ F 50 WV		130-405-3
C811	Electrolytic 100 μ F 10 WV		101-021-5
C812	Ceramic 0.022 μ F 50 WV (AX)		130-227-9
C813	Ceramic 0.01 μ F 50 WV (AX)		130-188-8
C814-C815	Ceramic 0.022 μ F 50 WV		130-207-1
C816	Ceramic 0.022 μ F 50 WV (AX)		130-227-9
Coils			
L401	IFT 27 MHz Receive ANT A		320-380-2
L402	IFT 455 KHz-A		320-154-5
L403	IFT 455 KHz-B		320-155-6
L404	Spring With Core 8.5T		310-818-9
L405-L406	IFT RF PRE AMP-A TX 27 MHz		320-318-7
L407	IFT VCO		320-317-6
RFC1	Axial Type 6.8 μ H (AX)		320-291-2
RFC2	RF Choke With Core 20 μ H		310-034-7
RFC3	Axial Type 6.8 μ H (AX)		310-291-2

Ref. No.	Description	RS Part No.	Mfr's Part No.
RFC4	Spring 9.5 T		310-812-3
RFC5	Axial Type 2.2 μ H (AX)		310-378-8
RFC6	Axial Type 0.39 μ H (AX)		310-655-8
Diodes			
D1-D3	Switching 1N4148		243-008-7
D4	Zener UZ9.1B		241-020-7
D5	Switching 1N4148		243-008-7
D6-D7	Rectifier IN4004		245-015-3
D8-D10	Switching 1N4148		243-008-7
D602	Switching 1N4148		243-008-7
Filters			
CF-1	Ceramic SFE10.7MJ-M		270-010-2
CF-2	Ceramic CFW455HT		270-007-0
Integrated Circuits			229-012-4
IC501	PLL IC C5121-00		229-01204
IC502	Audio Power KIA7217AP 1370		222-006-4
Jacks			
J1	Jack, DC, 2.1J CH-2P-2 DC		402-702-3
J2	Jack, Connector, RCA-B/J SW-1255 Jack, RCA		420-752-6
Resistors, Metal-Film			
R1	100 kohm 1/8 W J		002-104-1
R2	680 ohm 1/8 W J		002-681-5
R3	4.7 kohm 1/8 W J		002-472-3
R4	150 kohm 1/8 W J		002-154-6
R5	680 ohm 1/8 W J		002-681-5
R6	1 kohm 1/8 W J		002-102-9
R7	1.8 kohm 1/8 W J		002-182-1
R8	180 ohm 1/8 W J		002-181-0
R9	10 kohm 1/8 W J		002-103-0
R10-R13	Not used		
R14	2.2 kohm 1/8 W J		002-222-4
R15	330 kohm 1/8 W J		002-334-2
R16	2.2 kohm 1/8 W J		002-222-4
R17	100 ohm 1/8 W J		002-101-8
R18	Metaloxide 10 2 W J		019-100-6
R19	330 ohm 1/8 W J		002-331-9
R20	47 kohm 1/8 W J		002-473-4

Ref. No.	Description	RS Part No.	Mfr's Part No.
R21	2.2 kohm 1/8 W J		002-222-4
R22	22 kohm 1/8 W J		002-223-5
R23	82 kohm 1/8 W J		002-823-7
R24	22 ohm 1/8 W J		002-220-2
R25	470 ohm 1/8 W J		002-471-2
R26	100 ohm 1/8 W J		002-101-8
R27	10 kohm 1/8 W J		002-103-0
R28	270 ohm 1/8 W J		002-271-8
R29	1 kohm 1/8 W J		002-102-9
R30	10 kohm 1/8 W J		002-103-0
R31	100 kohm 1/8 W J		002-104-1
R32	4.7 kohm 1/2 W J		030-472-2
R33	2.2 ohm 1/8 W J		002-229-1
R34	100 ohm 1/8 W J		002-101-8
R35	1 kohm 1/8 W J		002-102-9
R36	100 ohm 1/8 W J		002-101-8
R37	47 ohm 1/8 W J		002-470-1
R38	68 ohm 1/8 W J		002-680-4
R39-R40	4.7 kohm 1/8 W J		002-472-3
R41	4.7 kohm 1/8 W J		002-472-3
R42	390 ohm 1/8 W J		002-391-3
R43	150 kohm 1/8 W J		002-154-6
R44	2.2 kohm 1/8 W J		002-222-4
R45	15 kohm 1/8 W J		002-153-5
R46	3.3 kohm 1/8 W J		002-332-0
R47	10 kohm 1/8 W J		002-103-0
R48	22 kohm 1/8 W J		002-223-5
R49	2.2 kohm 1/8 W J		002-222-4
R50	470 kohm 1/8 W J		002-474-5
R51	1 kohm 1/8 W J		002-102-9
R52	2.7 kohm 1/8 W J		002-272-9
R53	2.2 kohm 1/8 W J		002-222-4
R54	8.2 kohm 1/8 W J		002-822-6
R609	470 ohm 1/8 W J		002-471-2
Semi-Fixed Resistors			
RV1	4.7 kB RVM 083 H		071-472-9
RV2	1 kB RVM 083 H		061-102-3
Transformers			
CH-1	Choke E1-14 1208		300-120-8
T1	Power OPT E1-24 1594		300-159-4

Ref. No.	Description	RS Part No.	Mfr's Part No.
CT1 X1	Capacitor Trimmer CVN620 6 Dia 20 pF Crystal HC-49/U 10.240 MHz		172-015-6 260-003-3
Transistors			
Q1-Q2	KTC3198 (Green) TO-92		202-023-3
Q3	KTC3198 (Green) TO-92		202-023-3
Q4	KTA1266 (Green) TO-92		202-036-5
Q5-Q6	Not Used		
Q7	KTC3198 (Green) TO-92		202-023-3
Q8	KTA1266 (Green) TO-92		202-036-5
Q9	Not Used		
Q10	KTC2075 TO-220AB		202-057-5
Q11	KTC1006 TO-92L		202-124-1
Q12-Q13	KTC3194 (Orange) TO-92		202-017-8
Q14	KTC3198 (Green) TO-92		202-023-3
Assembly, IF Amp Module			594-014
Capacitors			
C201	Electrolytic 4.7 μ F 35 WV		104-745-1
C202	Chip 0.047 μ F 50 WV 0805		130-417-4
C203	Chip 0.01 μ F 50 WV 0805		130-172-2
C204	Electrolytic 10 μ F 16 WV		101-043-5
C205	Chip 0.047 μ F 50 WV 0805		130-417-4
C206	Chip 0.001 μ F 50 WV 0805		130-184-4
C207	Chip 0.047 μ F 50 WV 0805		130-417-4
C208	Chip 0.01 μ F 50 WV		130-172-2
C209	Electrolytic 1 μ F 50 WV		101-007-3
C210	Chip 0.022 μ F 50 WV 0805		130-234-5
C211	Chip 0.047 μ F 50 WV 0805		130-417-4
Diode			
D201	Germanium 1N60		244-001-5
Resistors			
R201	Chip 18 kohm 1/10 W J 0805		060-183-0
R202	Chip 330 kohm 1/10 W J 0805		060-334-0
R203-R204	Chip 470 ohm 1/10 W J 0805		060-471-0
R205	Chip 390 kohm 1/10 W J 0805		060-394-4
R206	Not Used		
R207	Chip 22 kohm 1/10 W J 0805		060-223-3
R208-R209	Chip 470 ohm 1/10 W J 0805		060-471-0
R210	Chip 1.2 kohm 1/10 W J 0805		060-122-5
R211	Chip 3.3 kohm 1/10 W J 0805		060-332-8

Ref. No.	Description	RS Part No.	Mfr's Part No.
R212	Chip 560 ohm 1/10 W J	0805	060-561-8Z
R213	Chip 27 kohm 1/10 W J	0805	060-273-8
R214	Chip 47 kohm 1/10 W J	0805	060-473-2
R215-R216	Chip 100 kohm 1/10 W J	0805	060-104-9Z
R217	Chip 33 kohm 1/10 W J	0805	060-333-9
R218	Chip 47 ohm 1/10 W J	0805	060-470-9Z
R219	Chip 330 ohm 1/10 W J	0805	060-331-7
R220-R222	Chip 0 ohm 1/10 W J	0805	060-000-8
Transistors			
Q201-Q203	KTC 3880ST1 (Yellow)	SOT236	202-108-7
Q204	KTA 1504SY	SOT236	202-106-5
Assembly, LPF Module			
Capacitors			594-013
C801	Chip 200 pF 50 WV	0805	132-228-0
C802-C803	Chip 470 pF 50 WV	0805	134-726-3
C804	Not Used		
C805	Chip 220 pF 50 WV	0805	132-228-0
Coils			
L801	Spring, 4.5 T : M11 3.7 × 0.16 μH +/- 3 % 4.5 T With Core		310-814-5
L802	Spring, 3.4 DIA × 0.55 DIA × 6.5 T: R 6.5 T		310-809-1
L803	Spring, 3.4 DIA × 0.55 DIA × 7.5 T: R 7.5 T		310-810-1
L804	Spring, 3.4 DIA × 0.55 DIA × 8.5 T: R 8.5 T		310-811-2
Assembly, Op Amp Module			594-015
Capacitors			
C401	Chip 0.1 μF 50 WV	0805	130-185-5
C402	Electrolytic 10 μF 16 WV		101-043-5
Diode			
D401	Diode Silicon Switching KDS184	SOT236	243-051-5
Integrated Circuit			
IC401A	Op Amp KIA358P DIP8P		222-038-3
Resistors			
R401-R402	Chip 68 kohm 1/10 W J	0805	060-683-5
R403	Chip 390 kohm 1/10 W J	0805	060-394-4
R404	Chip 10 kohm 1/10 W J	0805	060-103-8
R405-R406	Chip 4.7 kohm 1/10 W J	0805	060-472-1
R407	Chip 68 kohm 1/10 W J	0805	060-683-5
R408	Chip 10 Mohm 1/10 W J	0805	060-106-1

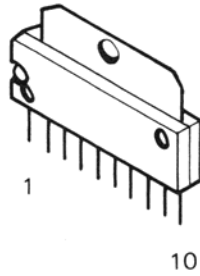
Ref. No.	Description	RS Part No.	Mfr's Part No.
R409	Chip 4.7 kohm 1/10 W J	0805	060-472-1
R410	Chip 10 Mohm 1/10 W J	0805	060-106-1
R411-R412	Chip 4.7 kohm 1/10 W J	0805	060-472-1
R413	Chip 10 kohm 1/10 W J	0805	060-103-8
R414-R419	Not Used		
R420-R423	Chip 0 ohm 1/10 W J	0805	060-000-8
Thermistor			
TH1	500 ohm ± 15%		098-501-3
Assembly, RF Amp Module			594-016
Capacitors			
C102	Chip 33 pF 50 WV M	0805	133-306-2
C103	Chip 0.022 μF 50 WV	0805	130-234-5
C104	Chip 0.022 μF 50 WV	0805	134-722-1
C105-C106	Chip 0.022 μF 50 WV	0805	130-234-5
C107	Chip 0.022 μF 50 WV	0805	130-234-5
C108	Chip 220 pF 50 WV M	0805	132-228-0
C109	Chip 150 pF 50 WV M	0805	131-529-7
C110	Not Used		
C111	Chip 0.022 μF 50 WV	0805	130-234-5
C112	Chip 0.001 μF 50 WV	0805	130-172-2
C113	Chip 0.022 μF 50 WV	0805	130-234-5
C114	Chip 680 pF 50 WV M	0805	136-811-6
Coils			
L102-L104	Spring 6.5 T With Core 6.5 T : M11 3.7 × 6 0.28		310-816-7
Diode			
D101	Silicon KDS226, Switching KEC SOT 236		243-049-4
Resistors			
R101-R102	Chip 0 ohm 1/10 W J		060-000-8
R103	Chip 330 ohm 1/10 W J	0805	060-331-7
R104	Chip 18 ohm 1/10 W J	0805	060-180-7
R105	Chip 33 kohm 1/10 W J	0805	060-333-9
R106	Chip 10 kohm 1/10 W J	0805	060-103-8
R107	Chip 100 ohm 1/10 W J	0805	060-101-6
R108	Chip 10 kohm 1/10 W J	0805	060-103-8
R109	Chip 470 ohm 1/10 W J	0805	060-471-0
R100	Chip 0 ohm 1/10 W J		060-000-8
Transistors			
Q102-Q103	C3880ST1 (Yellow) SOT236		202-108-7

Ref. No.	Description	RS Part No.	Mfr's Part No.
Assembly VCO Module			594-012
Capacitors			
C601	Chip 0.01 μ F 50 WV 0805		130-172-2
C602	Chip 18 pF 50 WV 0805		131-813-3
C603	Chip 22 μ F 50 WV 0805		132-223-5
C604	Not Used		
C605	Chip 47 pF 50 WV 0805		134-722-1
C606	Chip 33 pF 50 WV	0805	133-306-2
C607	Chip 220 pF 50 WV	0805	132-228-0
C608	Chip 120 pF 50 WV	0805	131-211-9
C609	Chip 27 pF 50 WV	0805	132-714-2
C610-C611	Chip 0.01 μ F 50 WV	0805	130-172-2
D601	Vari-Cap Diode MV2209	T092	242-006-0
Resistors			
R600	Chip 0 ohm 1/10 W J	0805	060-000-8
R601	Chip 47 ohm 1/10 W J	0805	060-470-9
R602	Chip 820 ohm 1/10 W J	0805	060-821-3
R603	Chip 120 kohm 1/10 W J	0805	060-124-6
R604	Chip 220 kohm 1/10 W J	0805	060-224-4
R605	Chip 2.7 kohm 1/10 W J	0805	060-272-7
R606-R607	Chip 10 kohm 1/10 W J	0805	060-103-8
R608	Chip 22 kohm 1/10 W J	0805	060-223-3
R609	Chip 0 ohm 1/10 W J		060-000-8
Q601	Transistor C3880ST1 (Yellow)	SOT236	202-108-7
Q602	Transistor C3875ST1 (Yellow)	SOT236	202-103-2
Q603	Transistor C3880ST1 (Yellow)	SOT236	202-108-7
Assembly PCB, LED Display			593-366
Capacitors			
C8	Electrolytic 470 μ F 10 WV		104-721-9
C809	Ceramic 0.01 μ F 50 WV	(AX)	130-188-8
D604	Zener UZ 5.1 B		241-046-1
D11	Switching Diode 1N4148		243-008-7
LED1	LED Display LTD-482LC		252-014-0
Resistor Metalfilm			
R11	1 kohm 1/8 W J		002-102-9Z
R12	4.7 kohm 1/8 W J		002-472-3

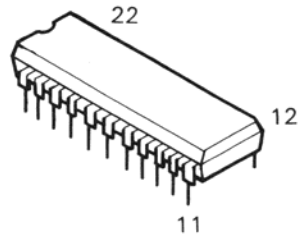
Ref. No.	Description	RS Part No.	Mfr's Part No.
R13	150 ohm 1/8 W J		002-151-3
R55-R60	150 ohm 1/8 W J		002-151-3
R10	Metaloxide 150 ohm 1 W J	"S"	018-151-6
Q5	KTC3198 (Green)	TO-92	202-047-5
Q6	KTA1266 (Green)	TO-92	202-048-6

SEMICONDUCTOR LEAD IDENTIFICATION AND IC INTERNAL CONNECTION

KIA7217AP



C5121



KTC 3198(GR)
KTA1266(GR)
KTC3199(GR)
KTC3194(O)



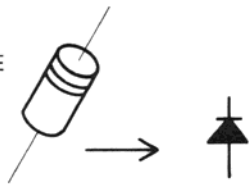
KTC1006



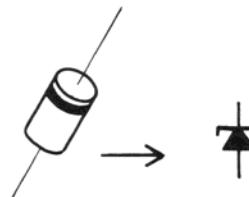
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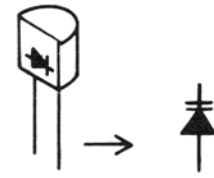
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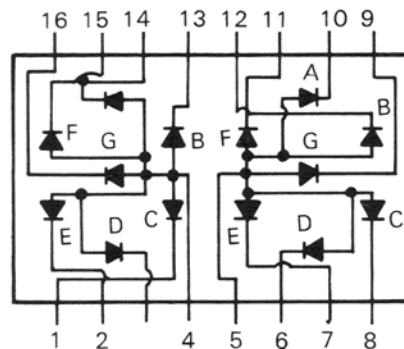
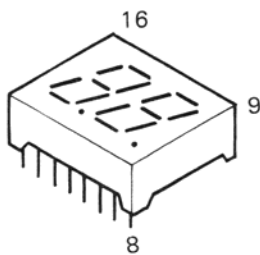
C6V2
UZ9.1B
UZ5.1B



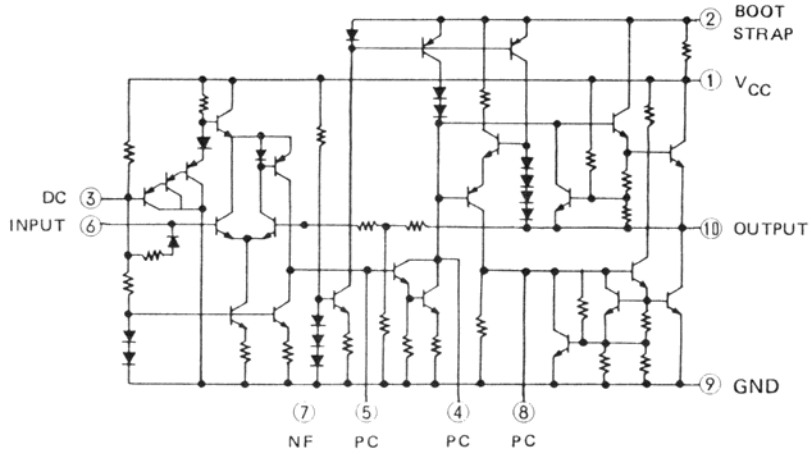
MV2209



LTD 4821GC

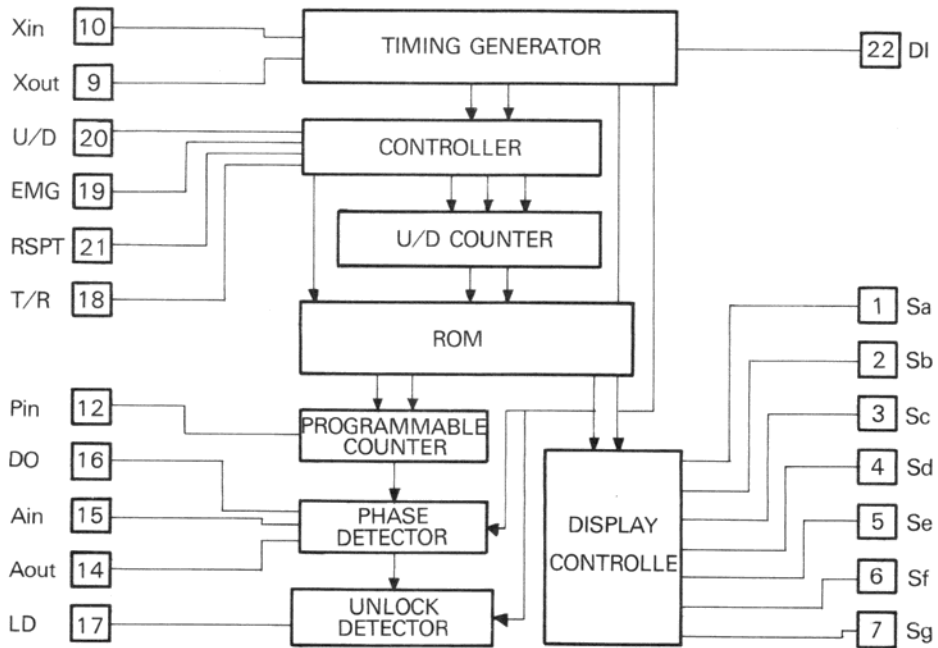


KIA7217AP



DC: Decoupling
 PC: Phase compensation
 NF: Negative feedback

C5121



SEMICONDUCTOR VOLTAGE CHART

Measured at

1. CH 9
2. No Signal
3. No Mod

TRANSISTORS

Unit : Volts

TR No. \ Pin	Emitter		Base		Collector	
	Receiver	Transmitter	Receiver	Transmitter	Receiver	Transmitter
Q1	4.53	4.45	1.39	5.18	1.38	4.45
Q2	7.63	0.09	8.33	0.60	8.58	8.55
Q3	0	0	0	0	0	0
Q4	0	4.28	0.21	3.69	0	0.00
Q5	3.28	3.27	2.65	2.65	4.71	4.69
Q6	4.71	4.69	4.63	4.62	3.22	3.21
Q7	8.62	8.52	9.34	9.26	12.88	12.21
Q8	8.57	8.54	7.99	7.81	0	8.47
Q10	0	0	0	-0.01	13.44	11.52
Q11	0	0	0	-0.02	13.44	11.94
Q12	0	1.02	0	1.78	13.78	12.98
Q13	0	1.61	0	2.38	0	8.51
Q14	0.23	0	0.85	0.08	2.49	0.09
Q102	0.43	0	1.21	0.30	7.5	0.09
Q103	1.04	0	1.73	0.31	6.58	0.09
Q201	0.78	0	1.41	0.30	6.83	0.09
Q202	0.65	0	1.36	0.30	6.96	0.09
Q203	1.29	0	2.01	0.02	7.24	0.09
Q204	0.68	0.04	0.20	0.05	0.68	0.00
Q601	0	0	0.75	0.76	1.35	1.08
Q602	0	0	0	0.68	0	0
Q603	5.05	5.05	5.74	5.73	8.09	8.06

ICs

IC 1 401	Pin No.	Receiver	Transmitter	Pin No.	Receiver	Transmitter
	1	1.39	6.84	5	1.42	6.81
	2	1.31	1.30	6	1.60	0.02
	3	1.30	1.30	7	0.10	7.14
	4	0	0	8	8.57	8.55

IC 2 C5121	Pin No.	Receiver	Transmitter	Pin No.	Receiver	Transmitter
	1	3.06	3.06	12	2.55	2.51
	2	0.67	0.67	13	5.45	5.44
	3	0.69	0.69	14	2.19	2.08
	4	3.06	3.05	15	2.81	2.81
	5	5.44	5.43	16	2.81	2.81
	6	3.05	3.05	17	4.88	1.2
	7	3.05	3.05	18	4.78	0.02
	8	0.01	0.01	19	0.05	0.05
	9	3.03	2.98	20	2.84	2.84
	10	3.06	2.99	21	0.05	0.05
	11	0.0	0.00	22	2.76	2.76

IC 3 KIA7217AP	Pin No.	Receiver	Transmitter	Pin No.	Receiver	Transmitter
	1	13.18	13.79	6	3.26	3.07
	2	11.94	12.76	7	3.28	2.02
	3	3.83	3.63	8	1.25	0.02
	4	7.88	11.64	9	0.00	0.00
5	1.47	0.20	10	6.63	10.46	