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Realistic TRC-222 Service Manual

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REALISTIC[®]

Service Manual

21-1646

TRC-222
5-Watt 40-Channel
Citizen's Band
Catalog Number: 21-1646

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SPECIFICATIONS

Measurement Conditions

Power supply voltage	12.0 V DC
Modulation frequency and modulation percentage	1000 Hz, 30%
Audio output power	100 mW
Audio output load	8 ohm (resistive)
Antenna impedance	50 ohm, non-inductive
Signal input level	1000 μ V
Measuring channel	18
Temperature	77°F (25°C)
Humidity	44 to 70%

TRANSMITTER

		Unit	Nominal	Limit	
Frequency tolerance at 77°F (25°C) (5 minutes after switch on)		Hz	± 100	± 1300	
Carrier power at no modulation	at High	W	2.5	2.5 ± 0.4	
	at Low	W	1.0	1.0 ± 0.4	
Modulation attack time		msecond	18	25	
Modulation release time		msecond	250	100–500	
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	at High	mA	650	800	
	at Low	mA	450	600	
Current drain at 80% modulation	at High	mA	950	1200	
	at Low	mA	650	900	
Modulation frequency response (1000 Hz 0dB reference)	450 Hz	dB	–6	-6 ± 3	
	2500 Hz	dB	–6	-6 ± 3	
Carrier power uniformity CH. to CH. at no modulation	at High	W	0.2	0.5	
	at Low	W	0.1	0.2	
Microphone sensitivity for 50% modulation		mV	2	4	
AMC range between 50 to 100% modulation		dB	40	30	
Occupied bandwidth	± 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	at High	dB	–65	–57
		at Low	dB	–65	–53
	at High	dB	–65	–57	
	at Low	dB	–65	–53	

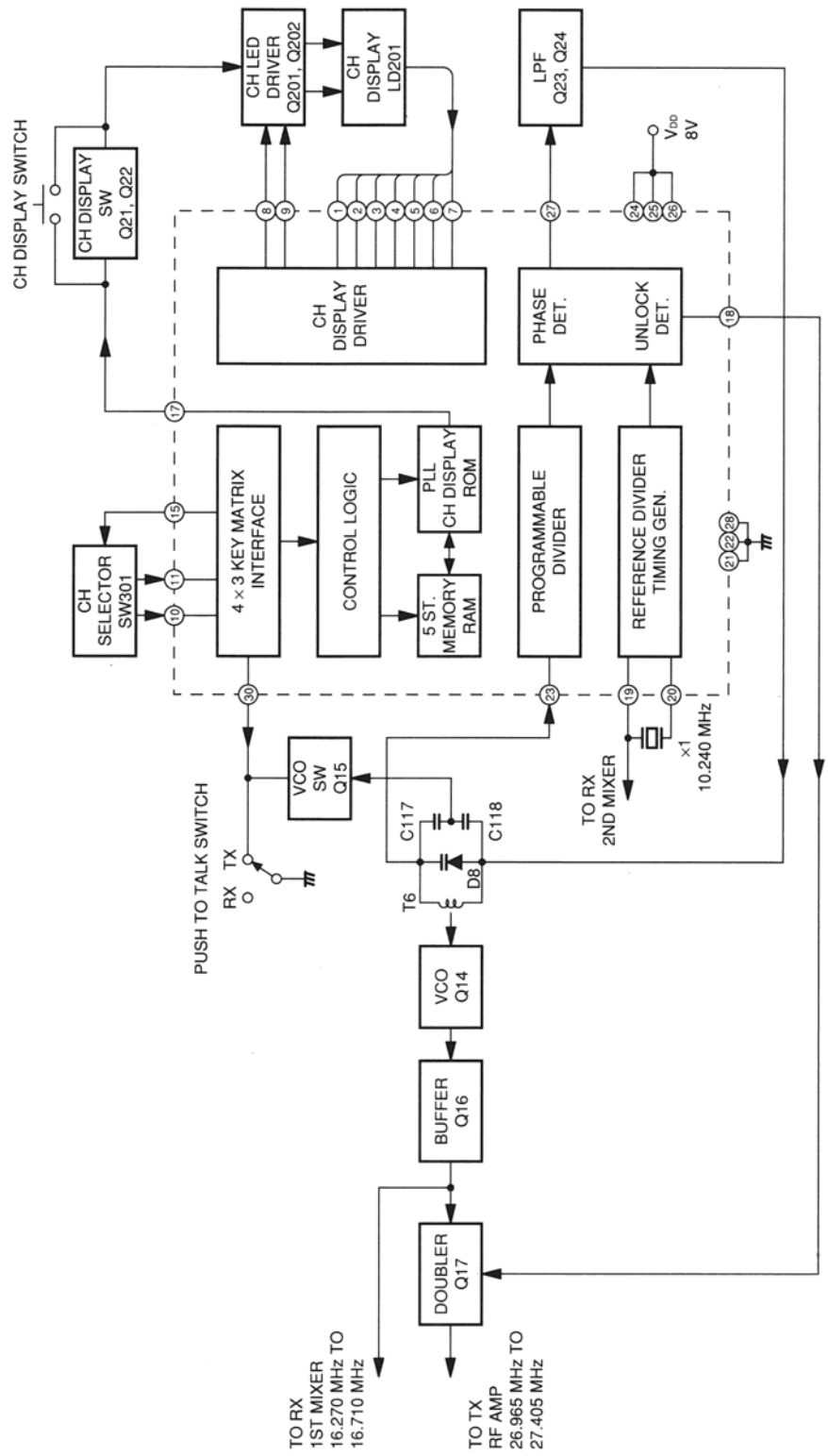
RECEIVER

		Unit	Nominal	Limit
Maximum sensitivity		μV	0.25	0.5
Sensitivity for 10 dB S/N		μV	0.5	1.0
Squelch Sensitivity	at threshold	μV	1.0	2.0
	at tight	μV	1000	316 – 3162
AGC fig. of merit 50 mV for 10 dB change in audio output		dB	90	70
Overload AGC characteristics from 50 mV to 1 V		dB	3	3 ± 5
Overall audio fidelity (1000 Hz 0dB reference)	450 Hz	dB	-6	-6 ± 3
	2500 Hz	dB	-6	-6 ± 3
Adjacent channel selectivity (± 10 kHz)		dB	60	55
Maximum audio output power		mW	600	450
Audio output power at 10% THD		mW	400	250
THD at 100 mW, 1000 μV input, 30% modulation		%	2.0	5.0
	50% modulation	%	3.0	6.0
	80% modulation	%	6.0	8.0
S/N ratio at 1000 μV input		dB	45	38
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 ratio (± 20 kHz)		dB	60	50
Cross modulation, RS standard		dB	50	40
Desensitvity at 100 μV desired		dB	50	40
	20 kHz away, 3 dB desensitvity			
Oscillator on voltage		V	8.0	9.0
Current drain at no signal		mA	85	100
Current drain at maximum power output		mA	300	450
Battery test LED on voltage		V	9.0	8.1 – 9.6
Battery charging current		mA	60	60 ± 20
Local OSC emission at antenna terminal		dBm	-73	-67

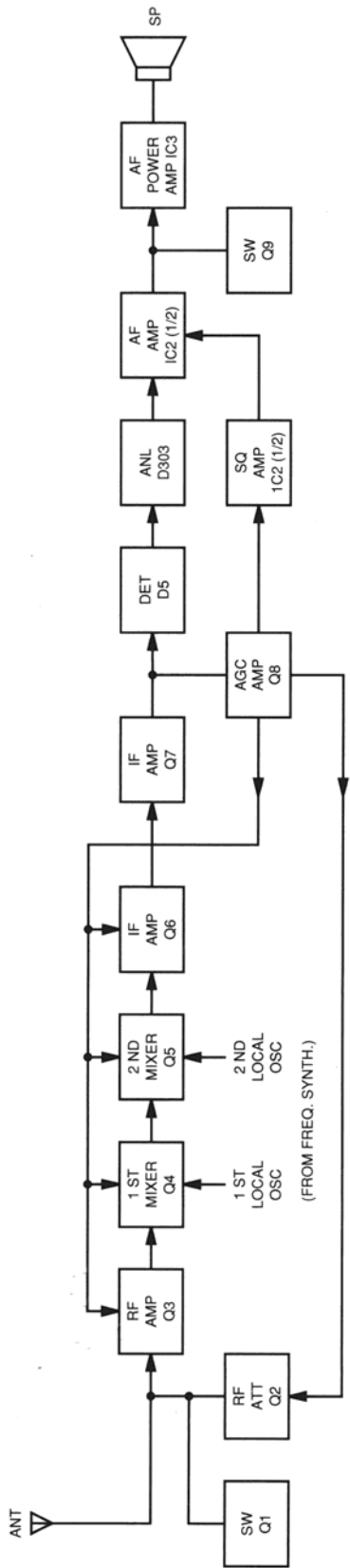
Note: Nominal specs represent the design specs. All units should be able to approximate these – some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; in no case should a unit fail to meet limit specs.

BLOCK DIAGRAMS

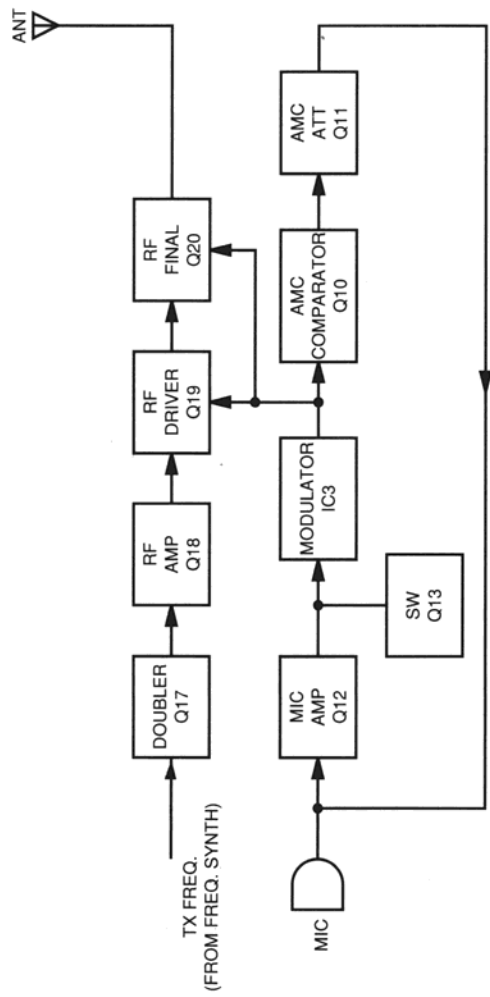
Frequency Synthesizer



Receiver



Transmitter



CIRCUIT DESCRIPTION

General

The TRC-222 is a 40-channel, crystal controlled handy transceiver which consists of a PLL-synthesizer circuit, a receiver circuit and a transmitter circuit. Power is supplied by 12 V DC (1.5 V "AA" alkaline battery × 8 pcs or 1.2 V "AA" Ni-cd battery × 10 pcs). Refer to the Block Diagram and the Schematic Diagram as you read the following descriptions.

PLL Synthesizer Section

The TRC-222 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) 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 pin 27 of IC1 and passes through the active LPF (low pass filter), where the error voltage is integrated and harmonics and noise are filtered out. The resulting DC voltage is applied to the varicap diode (D8). Its capacity varies with the applied DC voltage. Because of this capacity change, the output frequency of the VCO is corrected. With proper circuit design and precise adjustments, the VCO frequency is accurate and precise when the system is "locked".

This means that the phase detector senses no phase differences between the two 2.5 kHz signals, and the VCO generates a frequency that is as accurate and stable as the reference crystal oscillator. The VCO circuit consists of D8, Q14 and T6.

The circuit is connected in the form of a Hartley oscillator with varicap diode D8 as part of the tank circuit. The VCO circuit generates a signal ranging from 13.4825 to 16.710 MHz. The IC1 also includes an unlock-signal-detector circuit. Should the condition occur, the output at pin 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 circuit are inhibited.

Transmitter Circuit

RF Amplification

The output of doubler amp Q17 is fed through doubler tuning (27 MHz) T7 and T8 to the base of RF amp Q18. The output is then supplied through tuning circuit T9 to RF driver amp Q19. The Q19 output capacitance is divided by tuning circuit L8, C86 and C87 and passed through tuning circuit L9 to the base of final RF stage Q20.

Suppression of Spurious Radiation

The tuning circuit between frequency synthesizer and final amp Q20, and 3-stage "PI" network C89, L12, C91, L13, C3, L3 and C2 in the Q20 output circuit serve to suppress spurious radiation. This network serves to match Q20 impedance to the antenna and to reduce spurious content to acceptable levels. In-band spurious is reduced to acceptable levels by filtering.

Limiting Power

During factory alignment, the series base resistor of final Q20(R95) is selected to limit the available power. The tuning is adjusted so the actual power is 2.5 watts, and there are no other controls for adjusting power.

Modulation

The mic input is fed to mic amp Q12 and then to audio power IC3, which feeds the signal to the modulator transformer T5. The audio output at the step up of T5 is fed in series with the B+ voltage through diode D11 to the collectors of driver Q19 and final Q20 to collector-modulate both these stages.

Limiting Modulation

A portion of the modulating voltage is rectified by Q10 to turn on Q11, which attenuates the mic input to mic amp Q12. The resulting feedback loop keeps the modulation from exceeding 100 percent for inputs approximately 40 dB greater than required to produce 50 percent modulation. The attack time is about 18 ms and the release time is about 250 ms.

Receiver Circuit

Receiver

The receiver is a double conversion superheterodyne with the 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 Q7. The AGC voltage is also amplified by Q8 and used to drive RF attenuator Q2. Squelch amp and audio amp are included in IC2.

Indicators

Channel Indication

The channel is indicated by the 2 digits/7 segments LED (LD201) and it is selected by the channel selector (SW301). The LED (LD201) lights dynamically by the outputs from IC1.

The output from pin 8 of IC1 controls the lighting of the 1st digit through Q202, and the output from pin 9 of IC1 controls the lighting of the 2nd digit through Q201.

The outputs from pin 1 to pin 7 of IC1 control the lighting of each segment of each digit.

Battery Test Indication

When the battery test switch (SW201) is pressed, the battery test LED (LD202) lights through D201 if the battery voltage is *more than 9 volts*.

FREQUENCIES GENERATED AND MIXED TO OBTAIN EACH CHANNEL

RECEIVE

*VCO FREQUENCY = (N/4096) × REFERENCE FREQUENCY (10.240 MHz)

TRANSMIT

*VCO FREQUENCY = (N/4096) × REFERENCE FREQUENCY (10.240 MHz)

*TRANSMIT FREQUENCY = VCO FREQUENCY × 2

CHANNEL NUMBER	RECEIVE		TRANSMIT		
	N	VCO FREQUENCY (MHz)	N	VCO FREQUENCY (MHz)	TRANSMIT FREQUENCY (MHz)
1	6508	16.270	5393	13.4825	26.965
2	6512	16.280	5395	13.4875	26.975
3	6516	16.290	5397	13.4925	26.985
4	6524	16.310	5401	13.5025	27.005
5	6528	16.320	5403	13.5075	27.015
6	6532	16.330	5405	13.5125	27.025
7	6536	16.340	5407	13.5175	27.035
8	6544	16.360	5411	13.5275	27.055
9	6548	16.370	5413	13.5325	27.065
10	6552	16.380	5415	13.5375	27.075
11	6556	16.390	5417	13.5425	27.085
12	6564	16.410	5421	13.5525	27.105
13	6568	16.420	5423	13.5575	27.115
14	6572	16.430	5425	13.5625	27.125
15	6576	16.440	5427	13.5675	27.135
16	6584	16.460	5431	13.5775	27.155
17	6588	16.470	5433	13.5825	27.165
18	6592	16.480	5435	13.5875	27.175
19	6596	16.490	5437	13.5925	27.185
20	6604	16.510	5441	13.6025	27.205
21	6608	16.520	5443	13.6075	27.215
22	6612	16.530	5445	13.6125	27.225
23	6624	16.560	5451	13.6275	27.255
24	6616	16.540	5447	13.6175	27.235
25	6620	16.550	5449	13.6225	27.245
26	6628	16.570	5453	13.6325	27.265
27	6632	16.580	5455	13.6375	27.275
28	6636	16.590	5457	13.6425	27.285
29	6640	16.600	5459	13.6475	27.295
30	6644	16.610	5461	13.6525	27.305
31	6648	16.620	5463	13.6575	27.315
32	6652	16.630	5465	13.6625	27.325
33	6656	16.640	5467	13.6675	27.335
34	6660	16.650	5469	13.6725	27.345
35	6664	16.660	5471	13.6775	27.355
36	6668	16.670	5473	13.6825	27.365
37	6672	16.680	5475	13.6875	27.375
38	6676	16.690	5477	13.6925	27.385
39	6680	16.700	5479	13.6975	27.395
40	6684	16.710	5481	13.7025	27.405

ALIGNMENT PROCEDURES

PLL SECTION

Test Equipment Required

- Frequency counter
- DC voltmeter (about 100 kohm)
- DC power supply (12.0 V, 2 Amp)

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

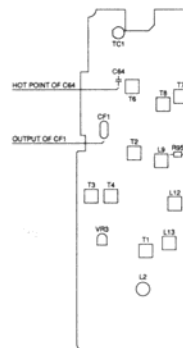


Figure 1

Test Set-up

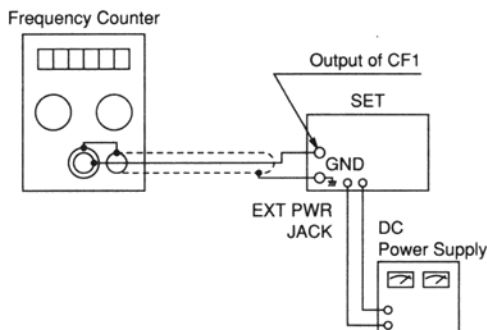


Figure 2

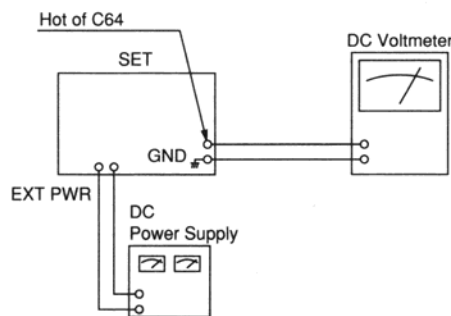


Figure 3

Alignment Procedure

STEP	CONTROL SETTING	OUTPUT INDICATOR CONNECTION	ADJUST	ADJUST FOR
1	Alignment of Ref. Osc.			
	PUSH TO TALK SW: Receive POWER: On VOLUME: Optional SQUELCH: Optional Channel Selector: Channel 19	Connect frequency counter to output of CF1. (Figure 2)	TC1	Adjust for 10.240 MHz \pm 100 Hz indication on frequency counter.
2	Alignment of VCO			
	PUSH TO TALK SW: Transmit POWER: On VOLUME: Optional SQUELCH: Optional Channel Selector: Channel 40	Connect DC voltmeter to hot of C64. (Figure 3)	T6	Adjust for 5.0 V indication on DC voltmeter.
3	PUSH TO TALK SW: 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 2.5–3.5 V, readjust T6 and return to Step 2.

TRANSMITTER SECTION

Test Equipment Required

- RF power meter
- 50 ohm load (non-inductive)
- DC power supply (12.0 V, 2 Amp)
- Field strength meter (or spectrum analyzer)
- Frequency counter
- Coupler
- RF attenuator

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

Test Set-up

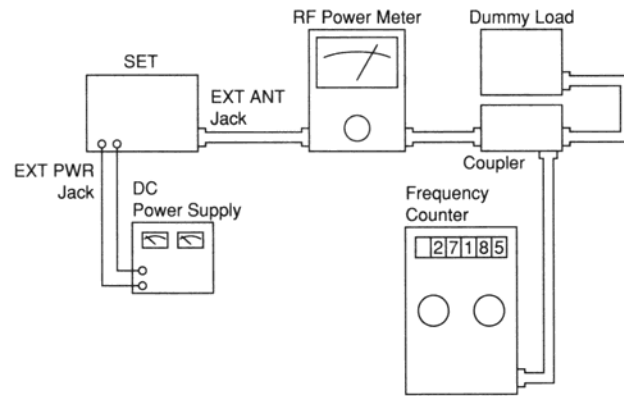


Figure 4

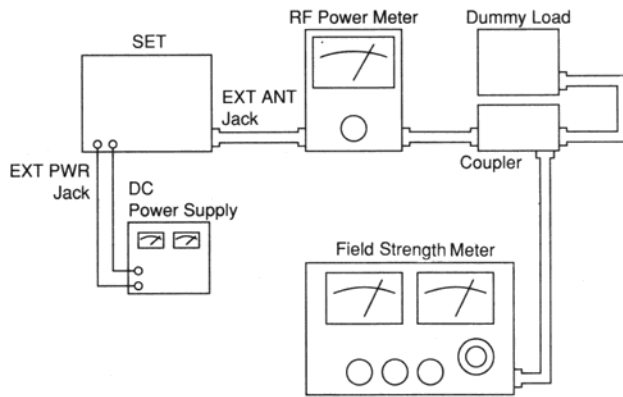


Figure 5

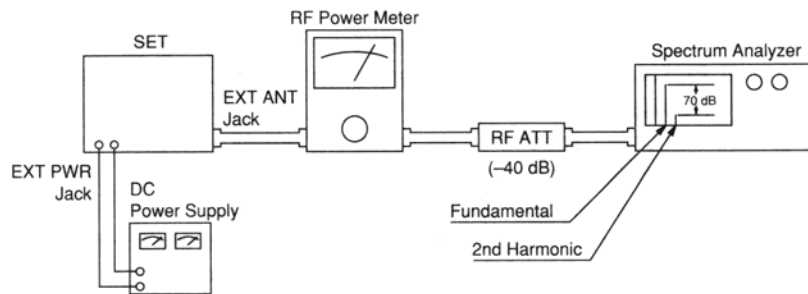


Figure 6

Alignment Procedure

STEP	CONTROL SETTING	OUTPUT INDICATOR CONNECTION	ADJUST	ADJUST FOR
1	Set power Hi/Lo switch to Hi position.			
2	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 EXT ANT jack on set. (Figure 4)	L13	Make the core top even with the mold top.
T7, T8 T9, L9 L12			Adjust for maximum indication on RF power meter.	
3	Repeat Step 2 twice or three times.			
4	Realignment of T9			
	Set channel selector to CH1.	Same as Step 2.	T9	Adjust for maximum indication on RF power meter.
5	Set channel selector from CH1 to CH19, then from CH19 to CH40.	Same as Step 2.	Check that difference in RF output power between channels is less than 0.2 W.	
6	Same as Step 5.	Same as Step 2.	Check that RF output power is 2.3 to 2.7W on all channels with no modulation. If it is not within the above range, go back to Steps 2 and 3 and readjust. If still improper, change R95 value.	
7	Alignment of Transmitter Frequency			
	Same as Step 2.	Same as Step 2.	TC1	Check that the transmitter frequency is 27.185 MHz \pm 300 Hz on frequency counter. If not, readjust TC1.
8	Alignment of 2nd Harmonics Spurious			
	Same as Step 2.	Connect dummy load and field strength meter through coupler to RF power meter. Connect RF power meter to EXT.ANT jack on set. (Figure 5) Tune to 2nd harmonic frequency (54.37MHz) on field strength meter. Or connect spectrum analyzer, RF attenuator and RF power meter to EXT.ANT jack on set. (Figure 6)	L2	Adjust for the minimum indication on field strength meter or spectrum analyzer. (Reference: -70 dB)

RECEIVER SECTION

Test Equipment Required

- RF signal generator
- Distortion meter
- SSVM
- Dummy load (8 ohm)
- DC power supply (12.0 V, 2 Amp)

General Alignment Conditions

- a. Signal input must be kept as low as possible, to avoid overload and clipping. (Use highest possible sensitivity of output indicator.)
- b. Standard modulation is 1000 Hz at 30% amplitude.
- c. A non-metallic alignment tool must be used for all adjustments.
- d. Power supply is adjusted for 12.0 V DC, 2 A.

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

Test Set-up

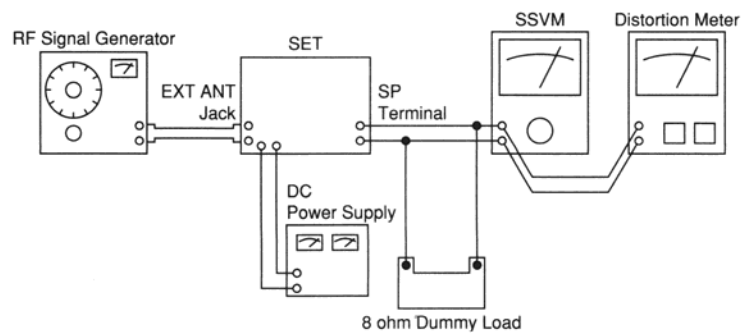


Figure 7

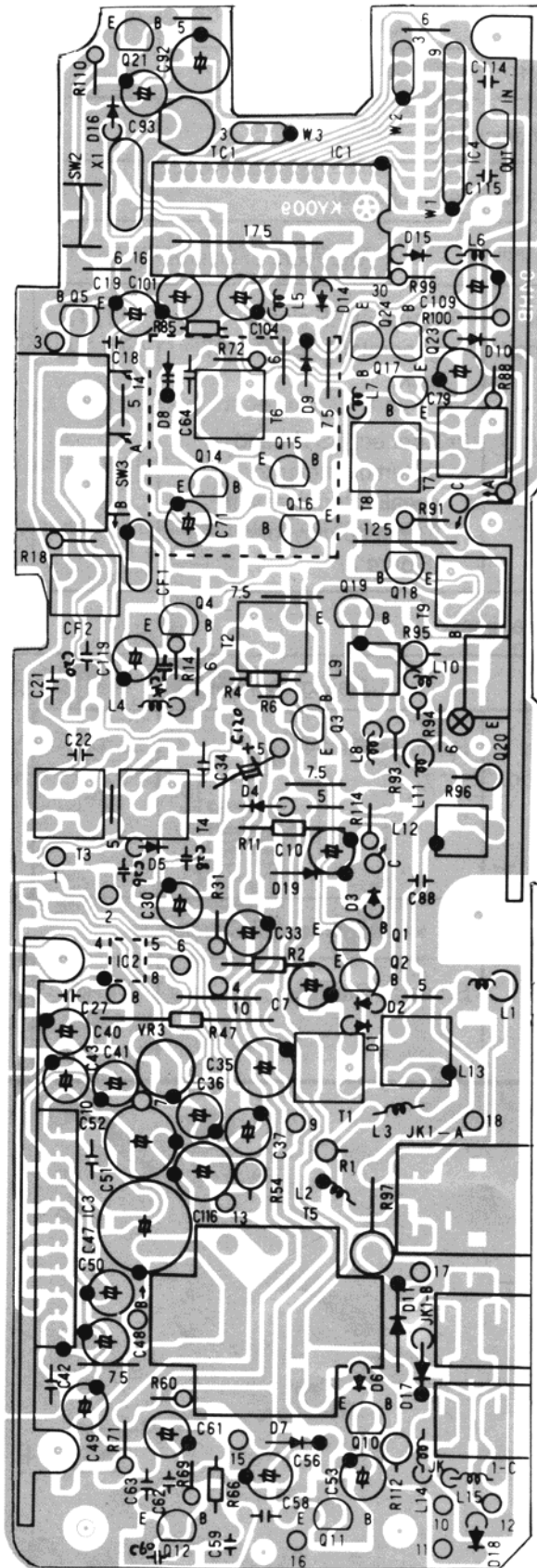
Alignment Procedure

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 1 kHz, 30% mod. 2) Audio output is 100mW (Ref.output power).	1) Connect RF signal generator to EXT. ANT. jack. 2) Connect SSVM and distortion meter to speaker terminal with 8 ohm dummy load. (Figure 7)	T1, T2 T3, T4	Adjust for maximum indication on SSVM.
5	Repeat Step 4 twice or three times.			
6	Realignment of T4			
	1) Set RF signal generator: 1 mV at 1 kHz, 80% mod. 2) Set VR1 so that audio output is 100 mW.	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.	VR3	Adjust VR3 so that audio output is turned on.

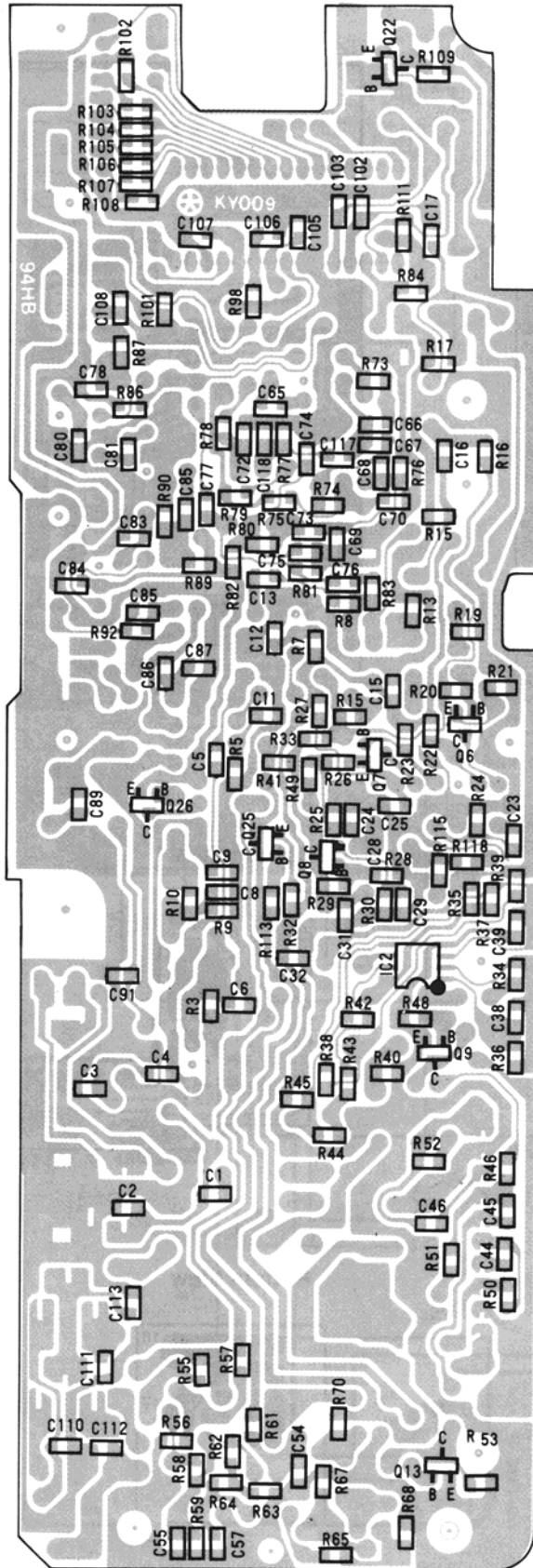
PRINTED CIRCUIT BOARD

Main PCB

Top View



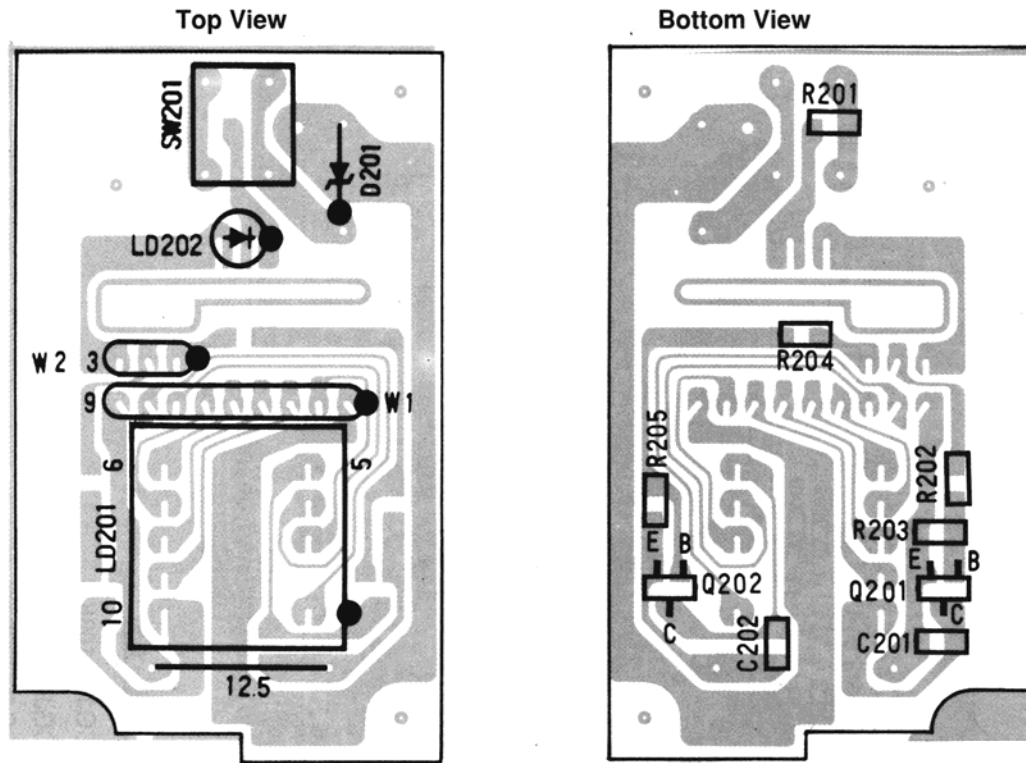
Bottom View



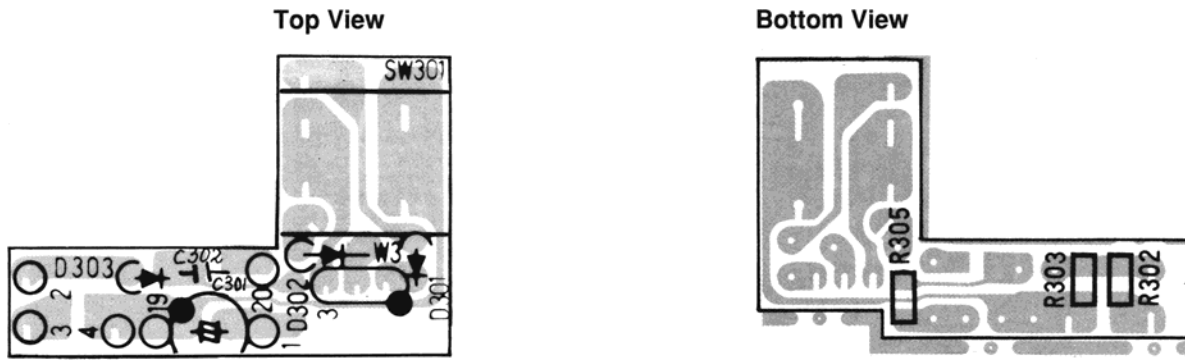
Note: Units of following serial nos. or after have the following capacitors changed from chip type to ordinary type and location moved from the solder side to the top side of the PCB.

Capacitors	Serial No.	Original P/N	New P/N
C14	001642	CJVEI103KM	CGJRG103KM
C20	001642	CJVEK102KM	CGJRG102KM
C26	022378	CJVEK332KM	CGJRG332KM
C28	022378	CBVAK330JM	CCJHK330J*
C60	022378	CJVEK472KM	CGJRG472KM

Display PCB



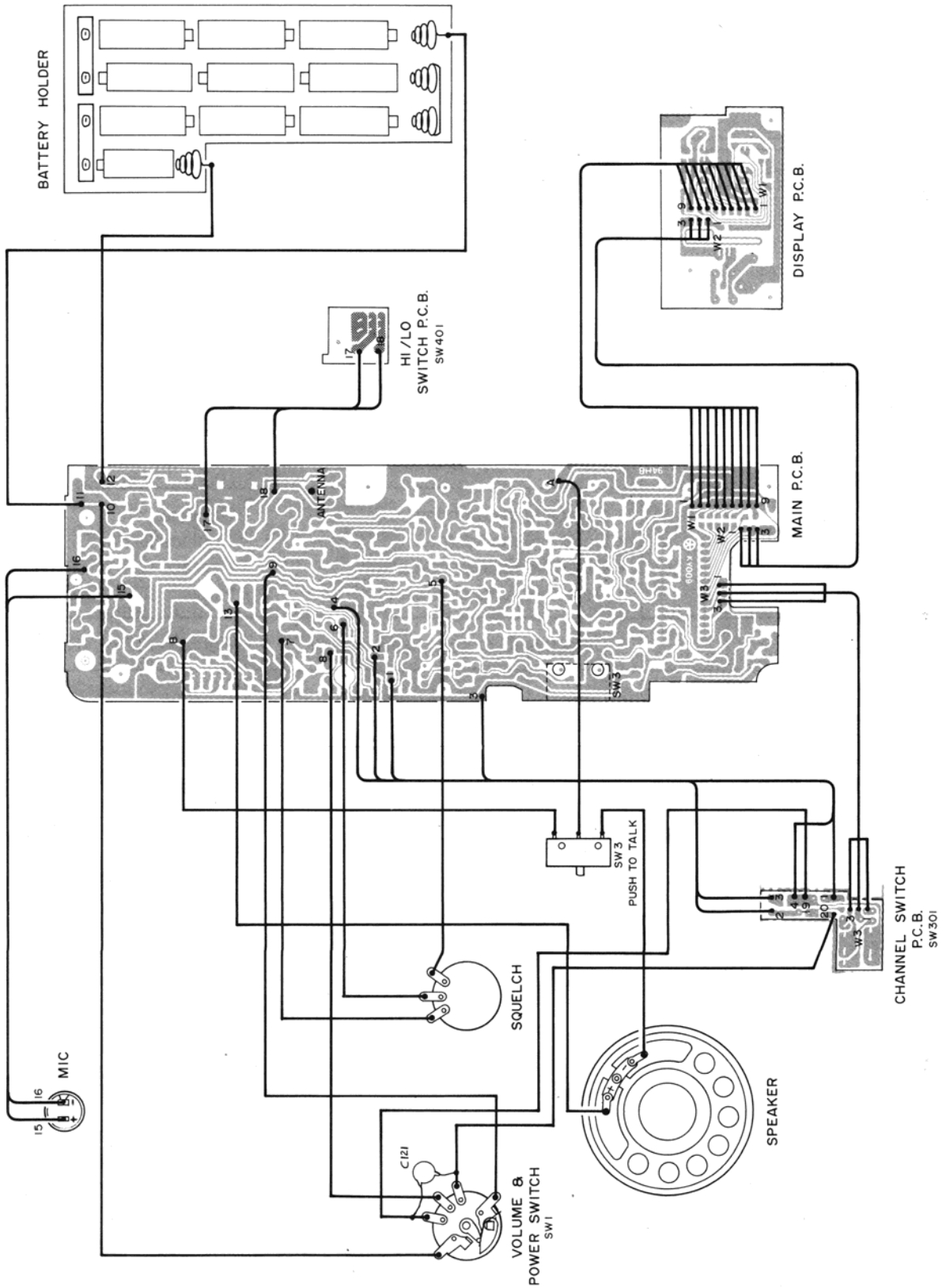
Channel PCB



Hi / Low SW PCB



WIRING DIAGRAM



TROUBLESHOOTING

Symptom	Cause	Remedy
Unit doesn't turn on.	<ul style="list-style-type: none"> • Defective power switch. • Broken battery contact. • Poor solder connection or other open connection in power circuit. 	<ul style="list-style-type: none"> • Replace. • Replace. • Repair or replace.
No receive sound.	<ul style="list-style-type: none"> • Defective push to talk switch. • Defective speaker. • Defective VCO circuit. • Defective AF amp. • Defective RF amp, mixer or IF amp. 	<ul style="list-style-type: none"> • Replace. • Replace. • Replace Q14, Q15, D8 or T6. • Replace IC2, IC3 or T5. • Replace Q3, Q4, Q5, Q6 or Q7.
No transmission.	<ul style="list-style-type: none"> • Defective push to talk switch. • Defective VCO circuit. • Defective doubler driver or final amp. • Defective external antenna jack. 	<ul style="list-style-type: none"> • Replace. • Replace Q14, Q15, D8 or T6. • Replace Q17, Q18, Q19, Q20 or D11. • Replace.
No modulation.	<ul style="list-style-type: none"> • Defective microphone. • Defective modulator. • Defective microphone amp. • Defective AMC circuit. 	<ul style="list-style-type: none"> • Replace. • Replace IC3 or T5. • Replace Q12 or Q13. • Replace Q10 or Q11.
No squelch.	<ul style="list-style-type: none"> • Defective IC or semi-fixed resistor. 	<ul style="list-style-type: none"> • Replace IC2 or VR3.
Battery test LED doesn't light.	<ul style="list-style-type: none"> • Defective LED, diode or switch. 	<ul style="list-style-type: none"> • Replace LD202, D201 or SW201.

ELECTRICAL PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
	Assembly, PCB, Main consists of the following:	US CA	MH00594 MH00744
CAPACITORS			
C1	Ceramic 27 pF 50 V ± 5%		CBVAK270JM
C2	Ceramic 100 pF 50 V ± 5%		CBVAK101JM
C3	Ceramic 220 pF 50 V ± 5%		CBVAK221JM
C4	Ceramic 33 pF 50 V ± 5%		CBVAK330JM
C5	Ceramic 22 pF 50 V ± 5%		CBVAK220JM
C6	Ceramic 0.01 μF 25 V ± 10%		CJVEI103KM
C7	Electrolytic 22 μF 16 V ± 20%		CEACG226M*
C8	Ceramic 0.01 μF 25 V ± 10%		CJVEI103KM
C9	Ceramic 0.01 μF 25 V ± 10%		CJVEI103KM
C10	Electrolytic 4.7 μF 50 V ± 20%		CEACK475M*
C11	Ceramic 0.01 μF 25 V ± 10%		CJVEI103KM
C12	Ceramic 0.01 μF 50 V ± 10%		CJWEK103KM
C13	Ceramic 1000 pF 50 V ± 10%		CJVEK102KM
C14	Ceramic 0.01 μF 16 V ± 10%		CGJRG103KM
C15	Ceramic 0.01 μF 50 V ± 10%		CJWEK103KM
C16	Ceramic 1000 pF 50 V ± 10%		CJVEK102KM
C17	Ceramic 2 pF 50 V ± 0.25 pF		CBVAK020CM
C18	Ceramic 0.022 μF 25 V ± 10%	or	CJVEI223KM or
	0.022 μF 50 V ± 10%		CJVEK223K*
C19	Electrolytic 22 μF 16 V ± 20%		CEACG226M*
C20	Ceramic 1000 pF 16 V ± 10%		CGJRG102KM
C21	Ceramic 0.047 μF 16 V ± 10%		CGJRG473KM
C22	Ceramic 0.047 μF 16 V ± 10%		CGJRG473KM
C23	Ceramic 1000 pF 50 V ± 10%		CJVEK102KM
C24	Ceramic 0.047 μF 25 V ± 10%		CJVEI473KM
C25	Ceramic 0.047 μF 25 V ± 10%		CJVEI473KM
C26	Ceramic 3300 pF 16 V ± 10%		CGJRG332KM
C27	Ceramic 0.047 μF 16 V ± 10%		CGJRG473KM
C28	Ceramic 33 pF 50 V ± 5%		CCJHK330J*
C29	Ceramic 0.047 μF 25 V ± 10%		CJVEI473KM
C30	Electrolytic 22 μF 16 V ± 20%		CEDCG226M*
C31	Ceramic 0.022 μF 25 V ± 10%	or	CJVEI223KM or
	0.022 μF 50 V ± 10%		CJVEK223K*
C32	Ceramic 0.022 μF 25 V ± 10%	or	CJVEI223KM or
	0.022 μF 50 V ± 10%		CJVEK223K*
C33	Electrolytic 33 μF 16 V ± 20%		CEDCG336M*
C34	Ceramic 0.022 μF 16 V ± 10%		CGJRG223KM
C35	Electrolytic 220 μF 10 V ± 20%		CECCE227M*
C36	Electrolytic 4.7 μF 50 V ± 20%		CEACK475M*
C37	Electrolytic 4.7 μF 50 V ± 20%		CEACK475M*
C38	Ceramic 560 pF 50 V ± 10%		CJVEK561KM
C39	Ceramic 0.01 μF 50 V ± 10%		CJWEK103KM

Ref. No.	Description				RS Part No.	Mfr's Part No.
C40	Electrolytic	1 μ F	50 V	$\pm 20\%$		CEACK105M*
C41	Electrolytic	0.47 μ F	50 V	$\pm 20\%$		CEACK474M*
C42	Ceramic	0.068 μ F	16 V	$\pm 10\%$	or	CGJRG683KM or
		0.068 μ F	25 V	$\pm 20\%$		CGJLI683MK
C43	Electrolytic	47 μ F	10 V	$\pm 20\%$		CEACE476M*
C44	Ceramic	180 pF	50 V	$\pm 5\%$		CBVAK181JM
C45	Ceramic	1000 pF	50 V	$\pm 10\%$		CJVEK102KM
C46	Ceramic	100 pF	50 V	$\pm 5\%$		CBVAK101JM
C47	Electrolytic	470 μ F	16 V	$\pm 20\%$		CECCG477M*
C48	Electrolytic	100 μ F	10 V	$\pm 20\%$		CEACE107M*
C49	Electrolytic	1 μ F	50 V	$\pm 20\%$		CEACK105M*
C50	Electrolytic	4.7 μ F	50 V	$\pm 20\%$		CEACK475M*
C51	Ceramic	0.068 μ F	16 V	$\pm 10\%$	or	CGJRG683KM or
		0.068 μ F	25 V	$\pm 20\%$		CGJLI683MK
C52	Electrolytic	330 μ F	10 V	$\pm 20\%$		CECCE337M*
C53	Electrolytic	47 μ F	10 V	$\pm 20\%$		CEACE476M*
C54	Ceramic	1000 pF	50 V	$\pm 10\%$		CJVEK102KM
C55	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C56	Electrolytic	1 μ F	50 V	$\pm 20\%$		CEACK105M*
C57	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C58	Ceramic	0.047 μ F	16 V	$\pm 10\%$		CGJRG473KM
C59	Ceramic	0.047 μ F	16 V	$\pm 10\%$		CGJRG473KM
C60	Ceramic	4700 pF	16 V	$\pm 10\%$		CGJRG472KM
C61	Electrolytic	33 μ F	16 V	$\pm 20\%$		CEACG336M*
C62	Ceramic	0.039 μ F	16 V	$\pm 10\%$		CGJRG393KM
C63	Ceramic	0.047 μ F	16 V	$\pm 10\%$		CGJRG473KM
C64	Ceramic	0.15 μ F	16 V	$\pm 10\%$		CGJRG154KM
C65	Ceramic	100 pF	50 V	$\pm 5\%$		CBVAK101JM
C66	Ceramic	82 pF	50 V	$\pm 5\%$		CBVAK820JM
C67	Ceramic	24 pF	50 V	$\pm 5\%$		CBVAK240JM
C68	Ceramic	68 pF	50 V	$\pm 5\%$		CBVAK680JM
C69	Ceramic	47 pF	50 V	$\pm 5\%$		CBVAK470JM
C70	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C71	Electrolytic	47 μ F	10 V	$\pm 20\%$		CEACE476M*
C72	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C73	Ceramic	4 pF	50 V	± 0.25 pF		CBVAK040CM
C74	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C75	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C76	Ceramic	1000 pF	50 V	$\pm 10\%$		CJVEK102KM
C77	Ceramic	1000 pF	50 V	$\pm 10\%$		CJVEK102KM
C78	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C79	Electrolytic	4.7 μ F	50 V	$\pm 20\%$		CEACK475M*
C80	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C81	Ceramic	7 pF	50 V	± 0.5 pF		CBVAK070DM
C82	Ceramic	100 pF	50 V	$\pm 5\%$		CBVAK101JM
C83	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C84	Ceramic	0.01 μ F	25 V	$\pm 10\%$		CJVEI103KM
C85	Ceramic	220 pF	50 V	$\pm 5\%$		CBVAK221JM
C86	Ceramic	33 pF	50 V	$\pm 5\%$		CBVAK330JM
C87	Ceramic	68 pF	50 V	$\pm 5\%$		CBVAK680JM
C88	Ceramic	0.022 μ F	16 V	$\pm 10\%$		CGJRG223KM
C89	Ceramic	150 pF	50 V	$\pm 5\%$		CBVAK151JM

Ref. No.	Description	RS Part No.	Mfr's Part No.
C90	Not used		
C91	Ceramic 330 pF 50 V ± 5%		CBVAK331JM
C92	Electrolytic 100 µF 10 V ± 20%		CEACE107M*
C93	Electrolytic 1 µF 50 V ± 20%		CEACK105M*
C94	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C95	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C96	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C97	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C98	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C99	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C100	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C101	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C102	Ceramic 68 pF 50 V ± 5%		CBVAK680JM
C103	Ceramic 24 pF 50 V ± 5%		CBVAK240JM
C104	Electrolytic 47 µF 10 V ± 20%		CEACE476M*
C105	Ceramic 0.047 µF 25 V ± 10%		CJVEI473KM
C106	Ceramic 0.047 µF 25 V ± 10%		CJVEI473KM
C107	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C108	Ceramic 1000 pF 50 V ± 10%		CJVEK102KM
C109	Tantalum 0.47 µF 6.3 V ± 20%		CSEED474M*
C110	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C111	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C112	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C113	Ceramic 0.01 µF 25 V ± 10%		CJVEI103KM
C114	Ceramic 0.022 µF 16 V ± 10%		CGJRG223KM
C115	Ceramic 0.022 µF 16 V ± 10%		CGJRG223KM
C116	Electrolytic 100 µF 16 V ± 20%		CECCG107M*
C117	Ceramic 68 pF 50 V ± 5%		CBVHK680JM
C118	Ceramic 56 pF 50 V ± 5%		CBVHK560JM
C119	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C120 #	Electrolytic 1 µF 50 V ± 20%		CEACK105M*
C121 *	Ceramic 220 pF 16 V ± 10% (C121 is mounted on VR1)		CG6RG221KM
FILTERS			
CF1	Ceramic SFE10.7MJ-A		392300560B
CF2	Ceramic CFU455HT		392100611A
DIODES			
D1	Silicon 1N4148		SDSI00062- or SDSI00064- or
D2	Silicon 1N4148		SDSI00149- or SDSI00062- or SDSI00064- or SDSI00149

Note: # Units with serial no.003191 and before use capacitor C120 with rating 3.3 µF 50 V ± 20% Part no. CEACK335M*.

* C121 (Part no. CG6RG221KM) is added to the unit from serial no.001012 onward and its part no. has been changed to CCJVK221J* from units with serial no. 018652 and after.

Ref. No.	Description	RS Part No.	Mfr's Part No.
D3/D4	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D5	Germanium 1N60P		SDGE00001P or SDGE00003P
D6	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D7	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D8	Varicap ITT310 1S2339B	or	SDVC00005- or SDVC09001A
D9	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D10	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D11	Silicon 1N4002		SDSI00007-
D12	Not Used		
D13	Not Used		
D14	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D15	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D16	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D17	Silicon 1N4002		SDSI00007-
D18	Silicon 1N4002		SDSI00007-
D19	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
CORES			
FB1 FB2 FB3	FS0H021RN19 FS0H021RN19 FS0H021RN19		588010190A 588010190A 588010190A
ICs			
IC1 IC2 IC3 IC4	LC7185 NJM4558M KIA7217AP NM78L08 (A) MC78L08ACP	or	SILC7185- - SINM4558M- SIKA7217A- SINM78L08A or SIMC78L08A

Ref. No.	Description	RS Part No.	Mfr's Part No.
JACK			
JK1	Combination		191610070C
COILS			
L1	Inductor 1 μ H K 1 μ H (4645-0048)	or	142310920A or 142390040A
L2	Coil 0.37 μ H		143200560A
L3	Air HL4-7T		141110460A
L4	Inductor 100 μ H LAL03NA		142011510A
L5	Inductor 10 μ H K LAL03NA M1CC-100K-01	or	142011150A or 142099110A
L6	Inductor 10 μ H K LAL03NA M1CC-100K-01	or	142011150A or 142099110A
L7	Inductor 1.0 μ HK LAL03NA		142012880A
L8	Inductor 1.8 μ HK LAL03NA		142012830A
L9	Coil 50 MHz S6 3C247		143302470A
L10	Inductor 0.47 μ H KLAL03NA		142012840A
L11	Inductor 1 μ H K 1 μ H (4645-0048)	or	142310920A or 142390040A
L12	Coil 50 MHz S6 3C247		143302470A
L13	Coil L-1S7-T GRN		143310360A
L14	Inductor 3.4 μ H K		142410420A
L15	Inductor 3.4 μ H K		142410420A
TRANSISTORS			
Q1	2SA733 (P) 2SA733 (Q)	or	ST2A733--P or ST2A733--Q
Q2	2SA733 (P) 2SA733 (Q)	or	ST2A733--P or ST2A733--Q
Q3	2SC1674 (L)		ST2C1674-L
Q4	2SC1675 (L)		ST2C1675-L
Q5	2SC1675 (L)		ST2C1675-L
Q6	KTC2712 GR KTC3875 (G)	or	STK12712-G or STKC3875-G
Q7	KTC2712 GR KTC3875 (G)	or	STK12712-G or STKC3875-G
Q8	KTC2712 GR KTC3875 (G)	or	STK12712-G or STKC3875-G
Q9	KTC2712 GR KTC3875 (G)	or	STK12712-G or STKC3875-G
Q10	2SA733 (P) 2SA733 (Q)	or	ST2A733--P or ST2A733-Q
Q11	2SC945 (P) 2SC945 (Q)	or	ST2C945--P or ST2C945--Q
Q12	2SC945 (P) 2SC945 (Q)	or	ST2C945--P or ST2C945--Q
Q13	KTC2712 GR KTC3875 (G)	or	STK12712-G or STKC3875-G
Q14	2SC945 (P) 2SC945 (Q)	or	ST2C945--P or ST2C945--Q

Ref. No.	Description	RS Part No.	Mfr's Part No.
Q15	2SA733 (P) or 2SA733 (Q)		ST2A733--P or ST2A733--Q
Q16	2SC945 (P) or 2SC945 (Q)		ST2C945--P or ST2C945--Q
Q17	2SC945 (P) or 2SC945 (Q)		ST2C945--P or ST2C945--Q
Q18	2SC945 (P) or 2SC945 (Q)		ST2C945--P or ST2C945--Q
Q19	KTC2036B or KTC1006		STKC2036B- or STKC1006--
Q20	KTC2075 (A)		STKC2075-A
Q21	2SA733 (P) or 2SA733 (Q)		ST2A733--P or ST2A733--Q
Q22	KTC2712 GR		STK12712-G
Q23	2SC945 (P) or 2SC945 (Q)		ST2C945--P or ST2C945--Q
Q24	2SC945 (P) or 2SC945 (Q)		ST2C945--P or ST2C945--Q
Q25	KTC2712 GR or KTC3875 (G)		STK12712-G or STKC3875-G
Q26	KTA1162 GR or 2SA1037K (Q)		STH11162-G or ST111037KQ

RESISTORS

R1	Carbon	1 kohm	1/4W	± 5%	RCSQP102J*
R2	Carbon	2 kohm	1/6W	± 5%	RC0XP202J*
R3	M-Glaze	560 ohm	1/10W	± 5%	RG0TV561J*
R4	Carbon	10 kohm	1/6W	± 5%	RC0XP103J*
R5	M-Glaze	470 ohm	1/10W	± 5%	RG0TV471J*
R6	Carbon	220 ohm	1/6W	± 5%	RC0XP221J*
R7	M-Glaze	470 ohm	1/10W	± 5%	RG0TV471J*
R8	M-Glaze	180 ohm	1/10W	± 5%	RG0TV181J*
R9	M-Glaze	1 M ohm	1/10W	± 5%	RG0TV105J*
R10	M-Glaze	1 M ohm	1/10W	± 5%	RG0TV105J*
R11	Carbon	1 kohm	1/6W	± 5%	RC0XP102J*
R12	M-Glaze	100 kohm	1/10W	± 5%	RG0TV104J*
R13	M-Glaze	220 ohm	1/10W	± 5%	RG0TV221J*
R14	Carbon	560 ohm	1/6W	± 5%	RC0XP561J*
R15	M-Glaze	560 ohm	1/10W	± 5%	RG0TV561J*
R16	M-Glaze	10 kohm	1/10W	± 5%	RG0TV103J*
R17	M-Glaze	470 ohm	1/10W	± 5%	RG0TV471J*
R18	Carbon	2.2 kohm	1/6W	± 5%	RC0XP222J*
R19	M-Glaze	2.2 kohm	1/10W	± 5%	RG0TV222J*
R20	M-Glaze	22 kohm	1/10W	± 5%	RG0TV223J*
R21	M-Glaze	1 kohm	1/10W	± 5%	RG0TV102J*
R22	M-Glaze	470 ohm	1/10W	± 5%	RG0TV471J*
R23	M-Glaze	33 kohm	1/10W	± 5%	RG0TV333J*
R24	M-Glaze	10 kohm	1/10W	± 5%	RG0TV103J*
R25	M-Glaze	470 ohm	1/10W	± 5%	RG0TV471J*
R26	M-Glaze	10 ohm	1/10W	± 5%	RG0TV100J*
R27	M-Glaze	470 ohm	1/10W	± 5%	RG0TV471J*

Ref. No.	Description					RS Part No.	Mfr's Part No.
R28	M-Glaze	68 kohm	1/10W	± 5%		RG0TV683J*	
R29	M-Glaze	1 M ohm	1/10W	± 5%		RG0TV105J*	
R30	M-Glaze	270 ohm	1/10W	± 5%		RG0TV271J*	
R31	Carbon	5.1 kohm	1/6W	± 5%		RC0XP512J*	
R32	M-Glaze	100 ohm	1/10W	± 5%		RG0TV101J*	
R33	M-Glaze	100 kohm	1/10W	± 5%		RG0TV104J*	
R34	M-Glaze	10 kohm	1/10W	± 5%		RG0TV103J*	
R35	M-Glaze	470 ohm	1/10W	± 5%		RG0TV471J*	
R36	M-Glaze	180 kohm	1/10W	± 5%		RG0TV184J*	
R37	M-Glaze	560 kohm	1/10W	± 5%		RG0TV564J*	
R38	M-Glaze	10 kohm	1/10W	± 5%		RG0TV103J*	
R39	M-Glaze	7.5 kohm	1/10W	± 5%		RG0TV752J*	
R40	M-Glaze	680 ohm	1/10W	± 5%		RG0TV681J*	
R41	M-Glaze	22 kohm	1/10W	± 5%		RG0TV223J*	
R42	M-Glaze	300 kohm	1/10W	± 5%		RG0TV304J*	
R43	M-Glaze	2.2 kohm	1/10W	± 5%		RG0TV222J*	
R44	M-Glaze	39 kohm	1/10W	± 5%		RG0TV393J*	
R45	M-Glaze	47 kohm	1/10W	± 5%		RG0TV473J*	
R46	M-Glaze	1.3 kohm	1/10W	± 5%		RG0TV132J*	
R47	Carbon	10 kohm	1/6W	± 5%		RC0XP103J*	
R48	M-Glaze	2.7 kohm	1/10W	± 5%		RG0TV272J*	
R49	M-Glaze	1.5 kohm	1/10W	± 5%		RG0TV152J*	
R50	M-Glaze	100 kohm	1/10W	± 5%		RG0TV104J*	
R51	M-Glaze	82 ohm	1/10W	± 5%		RG0TV820J*	
R52	M-Glaze	10 ohm	1/10W	± 5%		RG0TV100J*	
R53	M-Glaze	10 kohm	1/10W	± 5%		RG0TV103J*	
R54	M-Film	12 ohm	1W	± 5%		RM01P120J*	
R55	M-Glaze	10 kohm	1/10W	± 5%		RG0TV103J*	
R56	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*	
R57	M-Glaze	1.8 kohm	1/10W	± 5%		RG0TV182J*	
R58	M-Glaze	2.2 kohm	1/10W	± 5%		RG0TV222J*	
R59	M-Glaze	18 kohm	1/10W	± 5%		RG0TV183J*	
R60	Carbon	10 kohm	1/6W	± 5%		RC0XP103J*	
R61	M-Glaze	1 kohm	1/10W	± 5%		RG0TV102J*	
R62	M-Glaze	1.8 kohm	1/10W	± 5%		RG0TV182J*	
R63	M-Glaze	4.7 kohm	1/10W	± 5%		RG0TV472J*	
R64	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*	
R65	M-Glaze	2.2 kohm	1/10W	± 5%		RG0TV222J*	
R66	Carbon	56 kohm	1/6W	± 5%		RC0XP563J*	
R67	M-Glaze	8.2 kohm	1/10W	± 5%		RG0TV822J*	
R68	M-Glaze	680 ohm	1/10W	± 5%		RG0TV681J*	
R69	Carbon	6.8 kohm	1/6 W	± 5%		RC0XP682J*	
R70	M-Glaze	3.3 kohm	1/10W	± 5%		RG0TV332J*	
R71	Carbon	22 kohm	1/6W	± 5%		RC0XP223J*	
R72	Carbon	22 kohm	1/6W	± 5%		RC0XP223J*	
R73	M-Glaze	47 kohm	1/10W	± 5%		RG0TV473J*	
R74	M-Glaze	220 kohm	1/10W	± 5%		RG0TV224J*	
R75	M-Glaze	470 ohm	1/10W	± 5%		RG0TV471J*	
R76	M-Glaze	2.7 kohm	1/10W	± 5%		RG0TV272J*	

Ref. No.	Description				RS Part No.	Mfr's Part No.
R77	M-Glaze	47 kohm	1/10W	± 5%		RG0TV473J*
R78	M-Glaze	2.2 kohm	1/10W	± 5%		RG0TV222J*
R79	M-Glaze	470 ohm	1/10W	± 5%		RG0TV471J*
R80	M-Glaze	100 kohm	1/10W	± 5%		RG0TV104J*
R81	M-Glaze	1 kohm	1/10W	± 5%		RG0TV102J*
R82	M-Glaze	470 ohm	1/10W	± 5%		RG0TV471J*
R83	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*
R84	M-Glaze	4.7 kohm	1/10W	± 5%		RG0TV472J*
R85	Carbon	4.7 kohm	1/10W	± 5%		RC0XP472J*
R86	M-Glaze	6.8 kohm	1/10W	± 5%		RG0TV682J*
R87	M-Glaze	180 ohm	1/10W	± 5%		RG0TV181J*
R88	Carbon	100 ohm	1/6W	± 5%		RC0XP101J*
R89	M-Glaze	6.8 ohm	1/10W	± 5%		RG0TV682J*
R90	M-Glaze	3.3 ohm	1/10W	± 5%		RG0TV332J*
R91	Carbon	150 ohm	1/6W	± 5%		RC0XP151J*
R92	M-Glaze	220 ohm	1/10W	± 5%		RG0TV221J*
R93	Carbon	1 kohm	1/6W	± 5%		RC0XP102J*
R94	Carbon	15 ohm	1/6W	± 5%		RC0XP150J*
R95	Carbon	6.2 ohm	1/2W	± 5%		RC0XP62J*
	Carbon	6.8 ohm	1/2W	± 5%		RC0XP68J*
	Carbon	7.5 ohm	1/2W	± 5%		RC0XP75J*
	Carbon	8.2 ohm	1/2W	± 5%		RC0XP82J*
	Carbon	9.1 ohm	1/2W	± 5%		RC0XP91J*
	Carbon	10 ohm	1/2W	± 5%		RC0XP100J*
	Carbon	11 ohm	1/2W	± 5%		RC0XP110J*
R96	Carbon	470 ohm	1/2W	± 5%		RC0XP471J*
R97	M-Film	12 ohm	2W	± 5%		RM02P120J*
R98	M-Glaze	10 kohm	1/10W	± 5%		RG0TV103J*
R99	Carbon	2.2 kohm	1/6W	± 5%		RC0XP222J*
R100	Carbon	22 kohm	1/6W	± 5%		RC0XP223J*
R101	M-Glaze	10 kohm	1/10W	± 5%		RG0TV103J*
R102	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*
R103	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*
R104	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*
R105	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*
R106	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*
R107	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*
R108	M-Glaze	1.2 kohm	1/10W	± 5%		RG0TV122J*
R109	M-Glaze	100 kohm	1/10W	± 5%		RG0TV104J*
R110	Carbon	470 kohm	1/6W	± 5%		RC0XP474J*
R111	M-Glaze	100 kohm	1/10W	± 5%		RG0TV104J*
R112	M-Film	10 ohm	1W	± 5%		RM01P100J*
R113	M-Glaze	1 kohm	1/10W	± 5%		RG0TV102J*
R114	Carbon	22 kohm	1/6W	± 5%		RC0XP223J*
R115	M-Glaze	39 kohm	1/10W	± 5%		RG0TV393J*
R116	Not used					
R117	Not used					
R118	M-Glaze	47 kohm	1/10W	± 5%		RG0TV473J*
R119	M-Glaze	4.7 kohm	1/10W	± 5%		RG0TV472J*

Ref.No.	Description	RS Part No.	Mfr's Part No.
SWITCHES			
SW1	(Build in VR1. See P.27)		
SW2	Key SKHHLU L-5.85 M/M CH. Display		187010570A
SW3	Push JMS-012A PTT		182210180A
COILS / TRANSFORMER			
T1	Coil 27 MHz S7 1C038		143100381A
T2	Coil 27 MHz S7 1C258 or 2715-0153		143112580A or 143190300A
T3	IFT 455 kHz S7 11066		131000660A
T4	IFT 455 kHz S7 11027 or 1172-1015 or 1172-1014		131000270A or 131090110A or 131090120A
T5	Modulation EI24 HF1MC2219S or		10301005SA or 103390060A
T6	Coil 16 MHz S7 1C259 or 2075-0152		143112590A or 143190290A
T7	Coil 27 MHz S7 1C260 or 2175-0050		143112600A or 143190220A
T8	Coil 27 MHz S71C260 or 2175-0050		143112600A or 143190220A
T9	Coil 27 MHz S71C258 or 2715-0153		143112580A or 143190300A
TRIMMER			
TC1	TZ03T200FR or TZ037200FR169		154010220A or 154090050A
POTENTIOMETERS			
VR1	See EXPLODED VIEW PARTS LIST.		
VR2	See EXPLODED VIEW PARTS LIST.		
VR3	Semi-Fixed 1KB RVF6P01A-102 or KVSF637A		177310040A or 177390150A
CRYSTAL			
X1	10.240 MHz HC-18/U		391012040A or 391010310A
MISCELLANEOUS			
	Pin Terminal C770IP DAGR S1.08 × 5		194403140A
	Assembly, PCB, Display consists of the following:	US CA	MH00595 MH00745
CAPACITORS			
C201	Ceramic 0.01 μF 16 V ± 10%		CGJRG103KM
C202	Ceramic 0.01 μF 16 V ± 10%		CGJRG103KM

Ref. No.	Description	RS Part No.	Mfr's Part No.
DIODE			
D201	Zener μ Z-7.5 BC RANK: B		SZUZ7.5BCB
LEDS			
LD201 LD202	Module LTD323P LED SLR-34VR3F		555010170A SL-R00125-
TRANSISTORS			
Q201 Q202	KTA1162 GR KTA1162 GR		STH11162-G STH11162-G
RESISTORS			
R201 R202 R203 R204 R205	M-Glaze 470 ohm 1/10W \pm 5% M-Glaze 10 kohm 1/10W \pm 5% M-Glaze 2.2 kohm 1/10W \pm 5% M-Glaze 10 kohm 1/10W \pm 5% M-Glaze 2.2 kohm 1/10W \pm 5%		RG0TV471J* RG0TV103J* RG0TV222J* RG0TV103J* RG0TV222J*
SWITCH			
SW201	Key, KHH15902 BATT TEST or KSM0621A or JTP1232		187010090A or 187090130A or 187090100A

	Assembly, PCB, Channel consists of the following:	US CA	MH00596 MH00746
CAPACITORS			
C301 C302	Electrolytic 1 μ F 50 V \pm 20% Ceramic 6800 pF 16 V \pm 10% or 6800 pF 25 V \pm 20%		CEACK105M* CGJRG682KM or CGJLI682MK
DIODES			
D301	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D302	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-
D303	Silicon 1N4148		SDSI00062- or SDSI00064- or SDSI00149-

Ref. No.	Description	RS Part No.	Mfr's Part No.
RESISTORS			
R301	Not used		
R302	M-Glaze 160 kohm 1/10W ± 5%		RG0TV164J*
R303	M-Glaze 33 kohm 1/10W ± 5%		RG0TV333J*
R305	M-Glaze 47 kohm 1/10W ± 5%		RG0TV473J*
SWITCH			
SW301	Rotary, SRBM-S-036 CHANNEL		181110340A

	Assembly, PCB, HI/LO consists of the following:		MH00597
SWITCH			
SW401	Slide 1C-2P HI/LO or SS 22D11-G4 or 1C-2P		183111090A or 183190320A or 183190145A

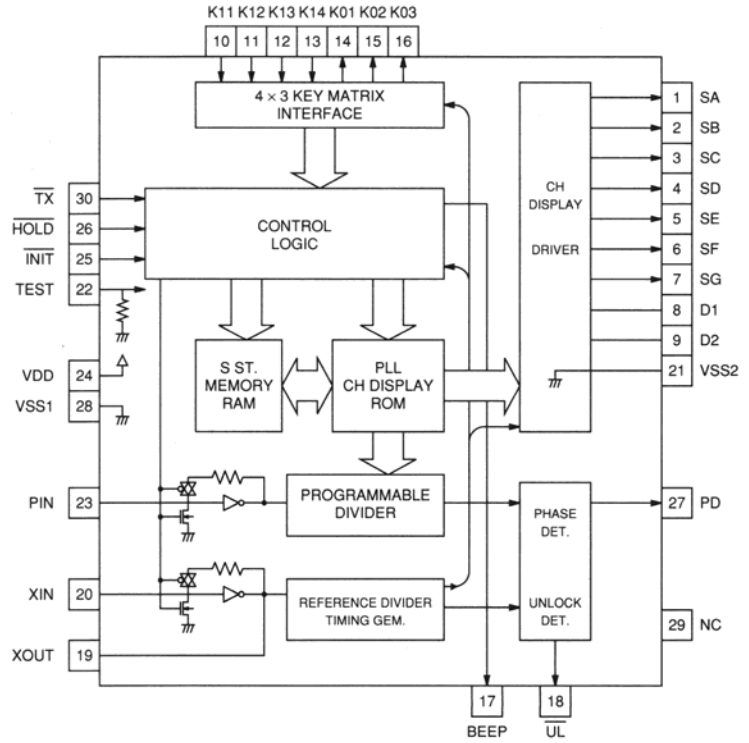
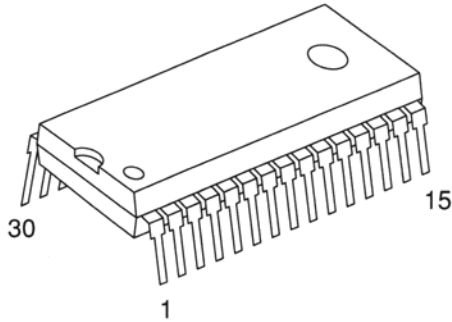
EXPLODED VIEW PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
1	Knob 95, PUSH TO TALK		659512990A
2	Assembly, Cover, Battery	US	MH00600
2-1	Cover, Battery		602110971A
2-2	Label, Battery, Sticker	US	737010140A
2-3	Cushion, Moltoplen Sponge		851099050A
3	Unit, Cabinet, Back	US	WU00041
		CA	WU00068
3-1	Assembly, Cabinet, Back (Non-repairable)	US	MH00599
		CA	MH00748
	Cabinet, Back		
	Strap, Hand		
	Holder, Handstrap		
	Plate, Rating		
	Holder, Battery		
	Spring, Conical, + -		
	Spring, Conical,+		
	Spring, Conical,-		
3-2	Contact, Battery, C2600P/Ni-3		198111390A
4	Cabinet, Sleeve		601410200A
5	Knob 25, Channel		652510950A
6	Antenna, Rod, D10 x 10 L1346		112010310A
7	Assembly, PCB, Channel	US	MH00596
		CA	MH00746
8	Holder, Microphone		413102400A
9	Unit, Microphone, EM-80X (MC1)		273100730A
10	Holder, Antenna		411117100A
11	Knob 95, DISPLAY		659513000A
12	Volume, Rotary, VOLUME (VR1) 10KD L15 or 17S1-D10K-L15KC		171310220A or 171290060A
13	Volume, Rotary, SQUELCH (VR2) 100KB L15 or 17N1-B100k-L15KC		171211270A or 171290050A
14	Assembly, PCB, Display	US	MH00595
		CA	MH00745
15	Knob 95, BATT		659513010A
16	Unit, Cabinet, Front	US	WU00040
		CA	WU00067
16-1	Assembly, Cabinet, Front (Non-repairable)	US	MH00598
		CA	MH00747
	Cabinet, Front		
	Net, Speaker		
	Window, PMMA 94HB		
	Window, Polyester		
16-2	Speaker D57 8 ohm 0.6W (SP1)		271011080A
17	Knob 25, VOLUME/SQUELCH		652510940A

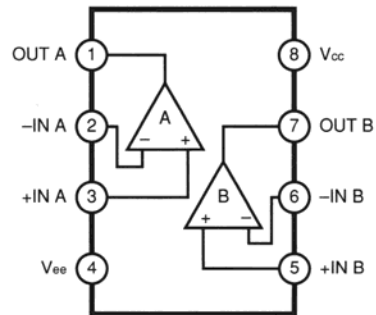
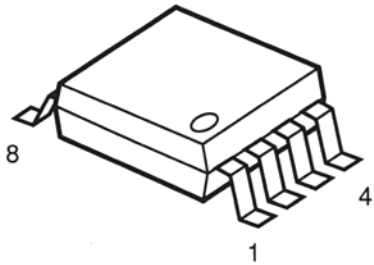
Ref. No.	Description	RS Part No.	Mfr's Part No.
18	Assembly, PCB, Main US CA With Shield plate Insulation Sheet Shield plate Insulation sheet		MH00594 MH00744 473211450A 483013370A 473211440A 483013360A
19	Heat Sink Upper Right		471011000A
20	Sheet, Insulation for Q20		483011470A
21	Grommet for Q2		481110120A
22	Lug, C2600p for Q20		HALB30133N
23	Blind for Hi/Lo Switch		851213030A
24	Assembly, PCB, Hi/Lo		MH00597
25	Heat sink, Lower left		471010990A
26	Plate, Shield		473211460A
27	Cushion, Moltoplen Sponge		851012210A
28	Not used		
29	Foot, Rubber		608090010A
30	Cushion, Moltoplen Sponge		851099030A
	Hardware Kit		HWK0211646
S1	Screw, Taptite, 2.6 × 12BT-B/ZnB		HCBB2612SB
S2	Screw, Taptite, 3 × 12BT-B/ZnB		HCBB3012SB
S3	Screw, 3 × 14B/ZnY		HMB03014SY
S4	Screw, Taptite, 2 × 8BT-B/ZnY		HCBB2008SY
S5	Screw, Taptite, 2 × 6BT-B/ZnY		HCBB2006SY
S6	Screw, 2.3 × 12P/ZnY		HMP02312SY
S7	Nut, 2.3N-3/ZnY		HANN233-SY
S8	Screw, 3 × 6P/ZnY		HMP03006SY
S9	Nut, Flange, 3FN/ZnY		HANF300-SY
S10	Screw, 3 × 8B/ZnY		HMB03008SY
S11	Screw, Taptite, 2.3 × 6BT-B/ZnY		HCBB2306SY
S12	Nut, 3N-3/ZnY		HANN303-SY
S13	Washer, Spring, 3SW/ZnY		HAWS30SSSY
S14	Screw, 3 × 10FC/ZnY		HMC03010SY
S15	Screw, Taptite 2 × 5BT-B/ZnY		HCBB2005SY
S16	Washer, FI-2.1 × 5 × 0.5		HAWP2055FT
	Accessory: Assembly, Battery, Dummy Holder, ABS 94HB Holder, SECC		MH00757 413102420A 411116760A

IC AND TRANSISTOR LEAD IDENTIFICATION AND IC INTERNAL DIAGRAM

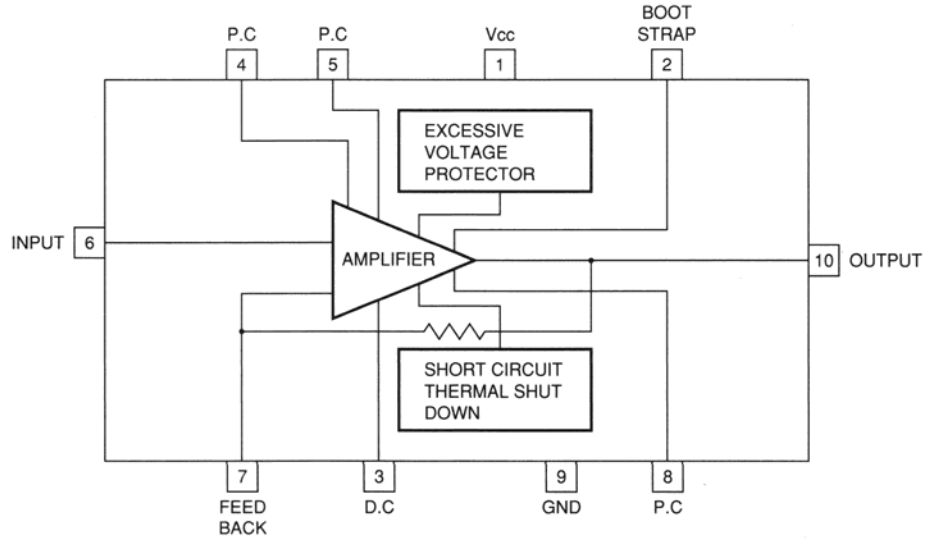
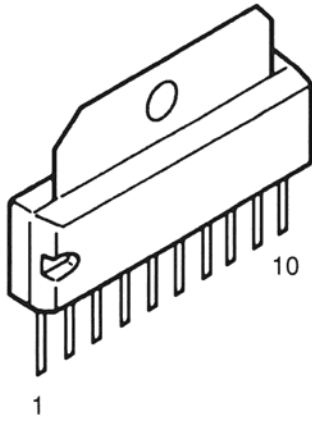
IC1: LC7185



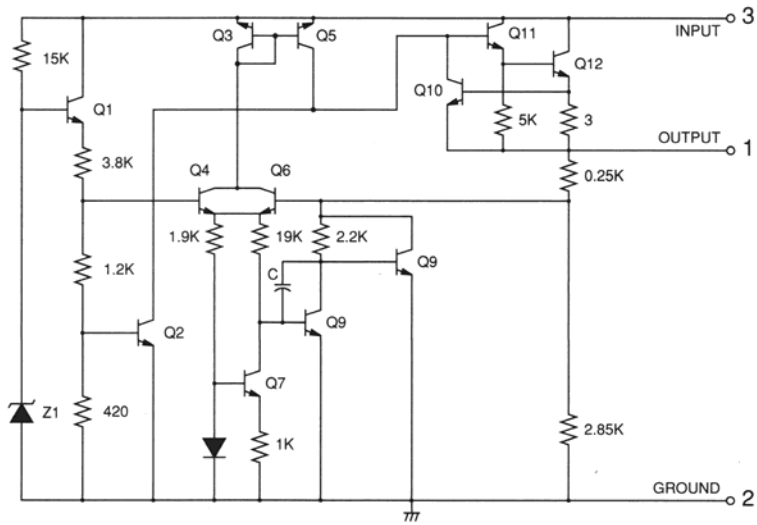
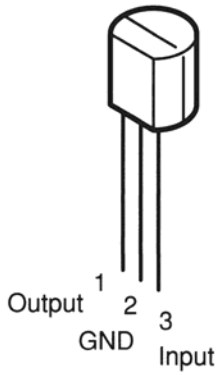
IC2: NJM4558M



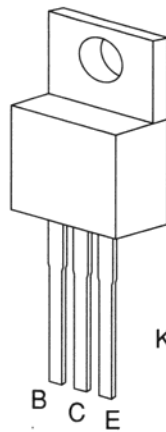
IC3: KIA7217AP



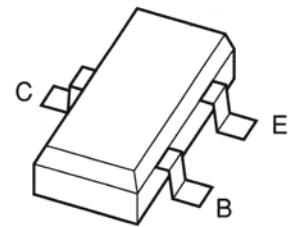
IC4: NM78L08 (A)
MC78L08ACP



- | | |
|-------------|------------|
| 2SA733 (P) | 2SC930 (E) |
| 2SA733 (Q) | 2SC945 (P) |
| 2SC1674 (L) | KTC2036B |
| 2SC1675 (L) | |



KTC2075 (A)



KTC2712 (GR)
KTC3875 (G)

IC AND TRANSISTOR VOLTAGE CHART

Measuring Conditions:

- Channel setting: 19
- TX power Hi/Lo switch: Hi position
- Power supply: 12.0 V DC
- Digital voltmeter: DC range
- All voltage values are indicated in volts with no signal.

IC2 (RX)

Squelch	
OFF	ON

IC Voltage chart

IC1	Pin No.	1	2	3	4	5	6	7	8	9	10	11
	Mode											
	TX	0	0	0	0	0	0	0	0	0	0	0
	RX	0	0	0	0	0	0	0	0	0	0	0
	Pin No.	12	13	14	15	16	17	18	19	20	21	22
	Mode											
	TX	0	0	0	0	0	0	5.8	3.8	3.4	0	0
	RX	0	0	0	0	0	0	5.8	3.8	3.4	0	0
	Pin No.	23	24	25	26	27	28	29	30			
Mode												
TX	3.6	7.6	7.5	8.2	1.0	0	0	0				
RX	3.6	7.5	7.5	8.2	1.1	0	0	0				
IC2	Pin No.	1	2	3	4	5	6	7	8			
	Mode											
	TX	3.5	3.5	3.5	0	1.3	0	6.3	6.9			
	RX	3.5 1.3	3.5 1.3	3.5 0.9	0 0	1.3 1.1	0 5.5	6.3 1.3	6.9 6.4			
IC3	Pin No.	1	2	3	4	5	6	7	8	9	10	
	Mode											
	TX	11.9	10.7	3.4	7.0	1.5	2.9	2.9	1.2	0	5.8	
	RX	12.0	10.8	3.4	7.1	1.5	2.9	2.9	1.2	0	5.8	
IC4	Pin No.	1	2	3								
	Mode											
	TX	11.9	0	8.2								
	RX	12.0	0	8.2								

Transistor Voltage Chart

Transistor No.		E	B	C	Transistor No.		E	B	C
Mode					Mode				
Q1	TX	0.9	0.2	0.9	Q15	TX	6.9	6.2	6.9
	RX	1.8	5.7	1.8		RX	8.2	7.6	0
Q2	TX	0.9	7.5	0.9	Q16	TX	6.1	6.8	9.0
	RX	1.8	7.5	1.8		RX	6.2	6.8	9.1
Q3	TX	^{1.02} 0.1	^{0.4} 0.7	^{1.07} 0.2	Q17	TX	2.8	3.3	10.8
	RX	^{1.77} 1.0	^{5.6} 1.7	^{1.77} 8.8		RX	3.6	3.4	12.0
Q4 <i>ok</i>	TX	^{0.05} 0.1	^{0.4} 0.6	^{0.8} 0.2	Q18	TX	3.1	3.6	12.0
	RX	^{0.15} 0.2	^{0.83} 0.9	^{0.9} 9.6		RX	11.8	3.9	12.0
Q5 <i>ok</i>	TX	0.1	0.7	0.1	Q19	TX	0	-0.1	11.3
	RX	1.0	1.7	5.7		RX	0	0	11.7
Q6	TX	0.2	0.8	0.3	Q20	TX	0	-0.1	11.5
	RX	1.2	1.8	9.6		RX	0	0	11.7
Q7	TX	2.7	0.1	0.4	Q21	TX	8.2	8.1	0
	RX	1.7 ✓	2.3 ✓	8.5		RX	8.2	8.1	0
Q8	TX	0	0.5	7.5	Q22	TX	0	0	8.1
	RX	0	0.5	7.5		RX	0	0	8.1
Q9	TX	0	0.7	0	Q23	TX	0.6	1.0	4.2
	RX	0	0.2	0		RX	0.6	1.0	3.6
Q10	TX	5.1	5.7	0	Q24	TX	0	0.6	4.2
	RX	1.1	1.7	0.7		RX	0	0.6	3.6
Q11	TX	0	0	0	Q25	TX	0.6	0.7	11.8
	RX	0	0.7	0		RX	11.3	11.9	12.0
Q12	TX	0.5	1.1	4.0	Q26	TX	11.8	11.1	11.8
	RX	0.5	1.1	4.0		RX	12.0	11.9	1.0
Q13	TX	0	0.4	0	Q201	TX	0	0	0
	RX	0	0.7	0		RX	0	0	0
Q14	TX	5.1	5.6	7.3	Q202	TX	0	0	0
	RX	5.1	5.6	7.3		RX	0	0	0