SHARP SERVICE MANUAL

OUTSTANDING RECEPTION THE WORLD OVER

23 Channel CB Transceiver

MODEL CB-750A

"WARNING"
It is unlawful for the user to make any replacement or substitution of parts, adjustments or to service the transmitter by any one other than a person holding a commercial 1st or 2nd class radio operator's license. Any change in the circuitry that would change or violate the technical regulations or type acceptance is prohibited.

SPECIFICATIONS

Transmitter section

Collector power input ..... 5W (maximum)
Frequency range .... 27MHz Citizens Band
Channels .... 23 chs. P.L.L. (Phase Locked Loop) circuit Synthesizer
Type of crystal .... HC-18U ± 0.005% tolerance (at −22°F ~ +140°F)
Transmitter modulation ... 100% (maximum)
Modulation limiter .... Yields high average modulation at average voice levels
Antenna matching .... Nominal 50 ohms
Carrier deviation .... Not greater than ± 800Hz nominal on (exceeds F.C.C., D.O.C., etc. requirements)
Harmonic suppression ...... Exceeds 50dB

Receiver section

Audio power output ...... 3 Watts maximum power output
Sensitivity .... 0.7μV/m for 10dB S + N/N ratio at 30% at 1000Hz modulation
Channels .... 23 chs. P.L.L. (Phase Locked Loop) circuit Synthesizer
Type of crystal .... HC-18U ± 0.005% tolerance (at −22°F ~ +140°F)
Selectivity .... 6dB down at ±3kHz; 50dB down at ± 10kHz.
Intermediate frequency 1st-IF: 11.275MHz, 2nd-IF: 455kHz
Circuit type .... Dual conversion superheterodyne: P.L.L. circuit frequency synthesizer provides 23 transmit and receive channels. Delta tuning of ±1.0kHz on each channels plus ceramic filter.
Auxiliary circuits .... Automatic noise limiter (ANL), Variable squelch, Public Address System (P.A.)

General

Power source .... DC 12.0V Nominal (DC 10.8 to 15.6V) negative or positive ground
Antenna .... 50 ohm external antenna for car or base operation
Speaker .... 3-1/8" P.D.S. 8-ohm Imp.
Microphone .... Press talk dynamic microphone (500 ohm)
Accessories .... Microphone hanger
Mobile mounting bracket
Mounting screws
Microphone with plug and cord.
Power supply cord with fuse holder and socket.
Spare fuse (2.3A)
Dimensions .... 2-1/4"(H) x 5-3/4"(W) x 7-7/8"(D)
Weight .... 3.6 lbs. with microphone
Cabinet .... Metal body with plastic front

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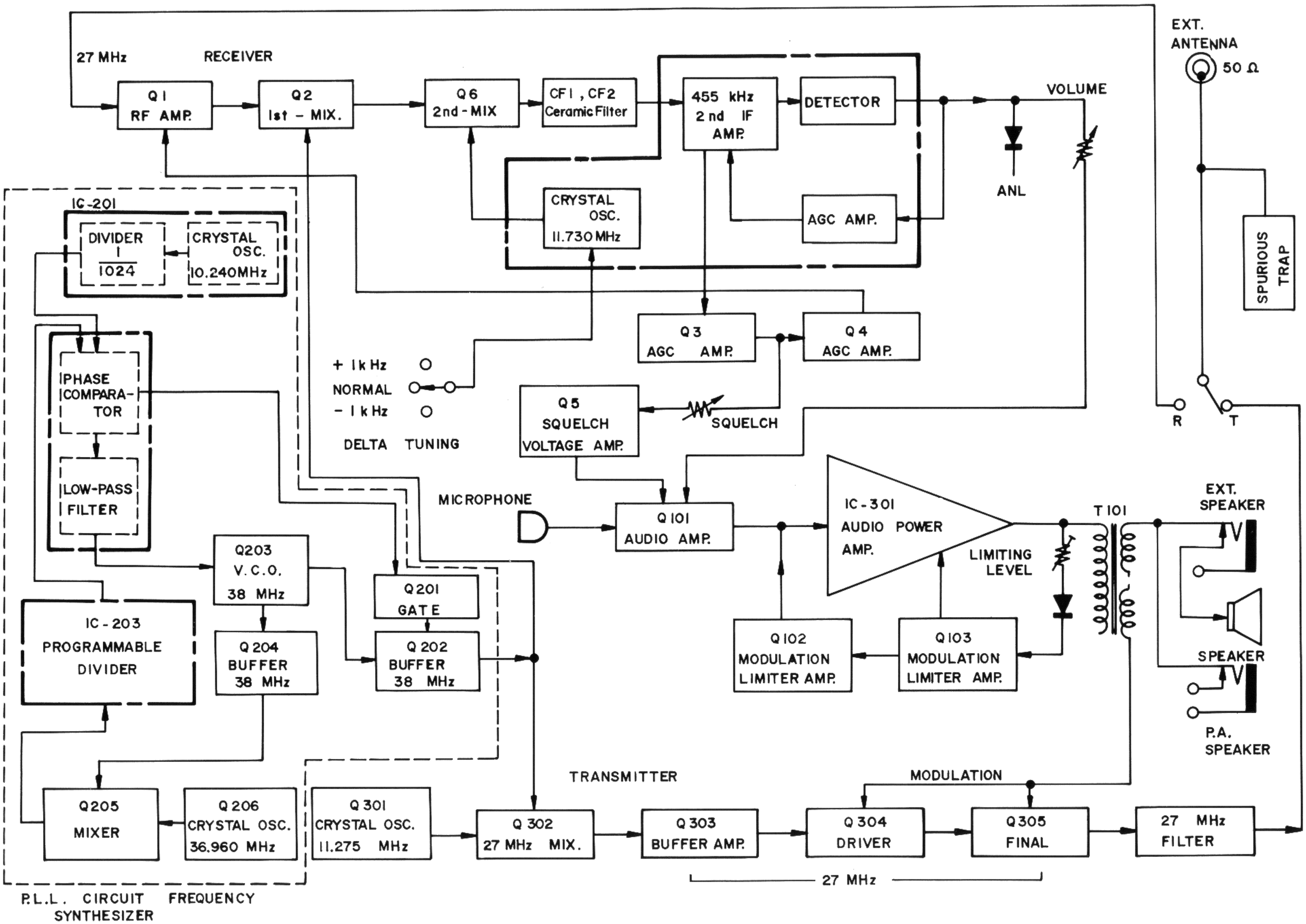


Figure 1 BLOCK DIAGRAM

GENERAL DESCRIPTION (Refer to Figure 1)

RECEIVER SECTION

An input signal sent from the antenna is applied to the 1st-mixer of transistor Q2 via the RF amplifier of transistor Q1, and an oscillator signal sent from transistor Q202 is also applied to the 1st-mixer of transistor Q2. In this stage the above-mentioned input signal is converted to 1st-IF signal of 11.275 MHz.

The 1st-IF signal (11.275 MHz) is applied to the 2nd-mixer of transistor Q6 via the transformers T3 and T4 to be converted to 2nd-IF signal of 455 kHz. The 2nd-IF signal is applied to the pin⑦of IC-1 via the transformer T5 and ceramic filters CF1 and CF2. (The 2nd-IF signal is amplified between the pin⑦and pin⑧of IC-1 and it is also detected between the pin ⑫and pin ⑪).

The detected output signal developed at the pin ⑪ of IC-1 is further applied to IC-301 consisting of drive circuit and power amplifier via audio amplifier of transistor Q101.

TRANSMITTER SECTION

The audio signal from the microphone is applied through the audio amplifier Q101 and the output of IC-301 to the final stage Q305 and the drive stage Q304.

The carrier signal synthesized in the P.L.L. circuit, the oscillator Q301 and mixer Q302 is supplied to the final amplifier Q305 where it is modulated with the audio signal and applied to the antenna for transmission.

A DESCRIPTION OF PHASE-LOCKED-LOOP (P.L.L.) CIRCUIT (Figure 2)

1) What is P.L.L. ?

P.L.L. is abbreviation of Phase-Locked-Loop which synchronizes with frequency and phase of the stable standard input (crystal oscillation) given from the outside, namely working not only as automatic frequency control but also as automatic phase control.

The P.L.L. is now used to realize a synthesizer. Consisting of two crystals, the synthesizer serves as an oscillator to oscillate step by step (10 kHz) in the range of 38.240 MHz ~ 38.530 MHz.

Therefore, this synthesizer can be said to be on the same level in the connection with the accuracy and stability of oscillation as the crystal oscillator.

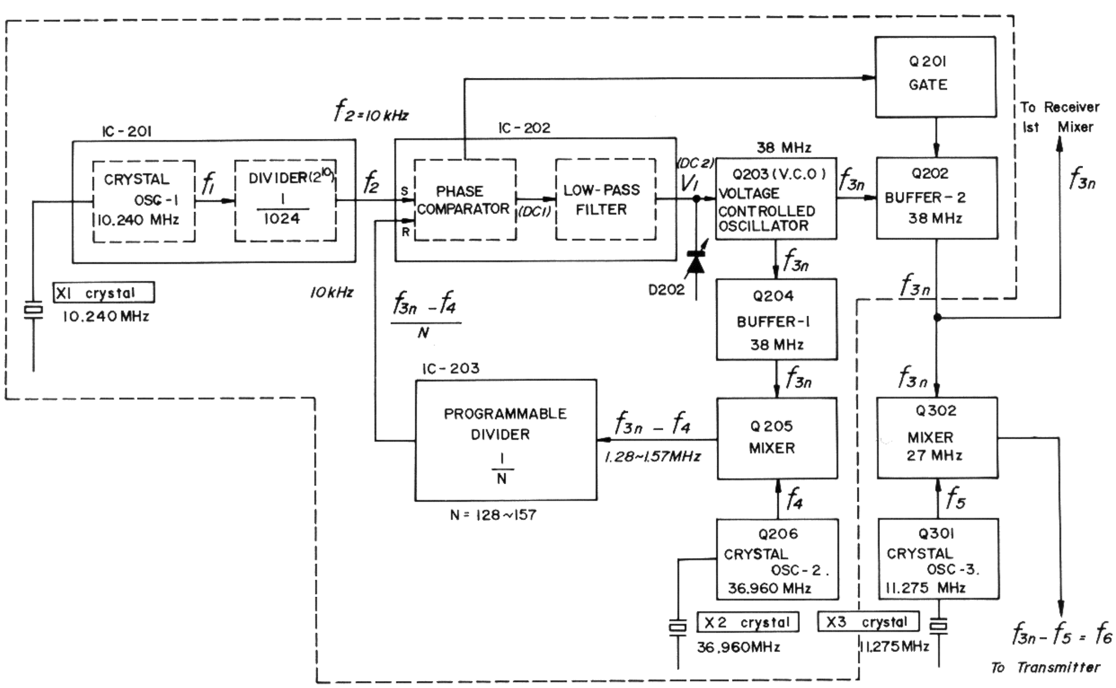


Figure 2 P.L.L. CIRCUIT FREQUENCY SYNTHESIZER

2) Frequency Synthesizer

The frequencies for both transmitter and receiver are synthesized by three crystal controlled oscillators and the Phase-Locked-Loop (or P.L.L.) consisting of six basic building blocks: the phase detector (phase comparator) IC-202, the low-pass filter the voltage controlled oscillator (or V.C.O.) Q203, the buffer amplifier Q204, the mixer Q205 and the programmable r IC-203 as shown in Figure 2.

3) **Frequency Determining** (Refer to Figure 2)

– 1 – A crystal oscillator consisting of a crystal X 1 (10.240MHz) and IC-201 generates a basic frequency f_1 (=10.240MHz) and it is divided down through a fixed divided network (a portion of IC-201) to 10kHz frequency (f_2). The frequency 10kHz is applied to the input of a phase comparator IC-202.

– 2 – A second oscillator Q203 is a voltage controlled oscillator (V.C.O.) and its frequency (f_{3n}) is determined with a DC voltage (V_1) from IC-202. The output frequency (f_{3n}) is applied to a mixer (Q205) through a buffer amplifier (Q204).

– 3 – A third oscillator consisting of a crystal X 2 (36.960MHz) and a transistor Q206 generates a frequency f_4 (=36.960 MHz) and feed its frequency to the mixer Q205 also.

– 4 – Although the mixer Q205 produces two frequency signals $f_{3n} + f_4$ and $f_{3n} - f_4$, the frequency $f_{3n} - f_4$ only is applied to a programmable divider IC-203 through a low-pass filter consisting of a coil L201 and capacitors C214 and C216.

– 5 – The programmable divider IC-203 divides the frequency $f_{3n} - f_4$ by the frequency divider number N, which is programmable by the switch position of the channel selector connected to the terminal pins 1 ~ 5 and 8 of IC-203. The assigned number is shown in Table 1. The output frequency $(f_{3n} - f_4)/N$ is close to 10kHz and is fed back to the phase comparator of IC-202.

– 6 – The phase comparator of IC-202 compares the frequency f_2 (= 10kHz) and the other frequency $(f_{3n} - f_4)/N$ from the programmable divider and generates a D.C. voltage V_1 proportional to the phase differences of both frequencies.
The voltage V_1 goes back to the V.C.O. Q203 through a low-pass filter.

– 7 – In this method, a closed-loop frequency-feedback system, which is so called P.L.L., is formed and the frequency f_{3n} of V.C.O. Q203 is locked.

– 8 – When the P.L.L. is in lock, two frequencies to phase comparator input are the same and therefore the frequency f_{3n} is determined as follows:

$f_{3n} = Nf_2 + f_4$

Where f_2 = 10kHz

f_4 = 36.960MHz

N = 128 to 157 . . . . . . Determined by channel selector as shown in Table 1.

For example, the frequency f_{3n} of channel 1 is calculated as follows:

f_{3n} = 128 x 0.01 + 36.960 (MHz)

= 38.240 (MHz)

Where "N = 128" is assigned for channel 1 by channel selector.

This frequency f_{3n} is applied to the first mixer of receiver and a mixer Q302 of transmitter through a buffer amplifier Q202 and a filter block T202.

– 9 – DC voltage condition may vary according to the frequencies as tabulated below.
Lock frequency condition: $f_2 = \frac{f_{3n} - f_4}{N}$

f_{3n}	$f_{3n}-f_4$	$\frac{f_{3n}-f_4}{N}$	$f_2 . \frac{f_{3n}-f_4}{N}$	Voltage DC_1	Voltage DC_2	f_{3n}	Final frequency
Rise (↑)	Rise (↑)	Rise (↑)	$<$	Rise (↑)	Drop (↓)	Drop (↓)	Lock
Drop (↓)	Drop (↓)	Drop (↓)	$>$	Drop (↓)	Rise (↑)	Rise (↑)	Lock
Lock	Still	Still	$=$	Still	Still	Still	Lock

– 10 – The Transmitter Frequency

The transmitter frequency f_6 is determined by mixing f_{3n} and f_5 signal which is generated by a crystal oscillator consisting of Q301 and crystal X 3. (= 11.275 MHz) and

$f_6 = f_{3n} - f_5$

$= (Nf_2 + f_4) - f_5$

Where f_5 = 11.275MHz

Consequently, the transmitter frequency f_6 is all crystal controlled. Table 1 shows the synthesized frequencies for each channel.

–11– Gate (transistor Q201) shown in the block diagram works to detect a lock condition of the P.L.L. circuit and to take out an output only at the lock condition, controlling the buffer-2 (transistor Q202) amplifier --- it is thus prevented that an unstable signal is emitted when the P.L.L. circuit can not be locked for some reason.

***** FREQUENCY OF SYNTHESIS CHART *****

CHANNEL	N	f_1 (MHz)	f_2 (kHz)	f_4 (MHz)	$f_{3n} - f_4$ (MHz)	f_{3n} (MHz)	$f_{3n} - f_5$ (MHz)
1	128	10.240	10	36.960	1.280	38.240	26.965
2	129	10.240	10	36.960	1.290	38.250	26.975
3	130	10.240	10	36.960	1.300	38.260	26.985
4	132	10.240	10	36.960	1.320	38.280	27.005
5	133	10.240	10	36.960	1.330	38.290	27.015
6	134	10.240	10	36.960	1.340	38.300	27.025
7	135	10.240	10	36.960	1.350	38.310	27.035
8	137	10.240	10	36.960	1.370	38.330	27.055
9	138	10.240	10	36.960	1.380	38.340	27.065
10	139	10.240	10	36.960	1.390	38.350	27.075
11	140	10.240	10	36.960	1.400	38.360	27.085
12	142	10.240	10	36.960	1.420	38.380	27.105
13	143	10.240	10	36.960	1.430	38.390	27.115
14	144	10.240	10	36.960	1.440	38.400	27.125
15	145	10.240	10	36.960	1.450	38.410	27.135
16	147	10.240	10	36.960	1.470	38.430	27.155
17	148	10.240	10	36.960	1.480	38.440	27.165
18	149	10.240	10	36.960	1.490	38.450	27.175
19	150	10.240	10	36.960	1.500	38.460	27.185
20	152	10.240	10	36.960	1.520	38.480	27.205
21	153	10.240	10	36.960	1.530	38.490	27.215
22	154	10.240	10	36.960	1.540	38.500	27.225
23	157	10.240	10	36.960	1.570	38.530	27.255

CRYSTAL

X1 crystal 10.240MHz= f_1
X2 crystal 36.960MHz= f_4
X3 crystal 11.275MHz= f_5

Table 1 FREQUENCY OF SYNTHESIS CHART

ALIGNMENT

EQUIPMENT REQUIRED

Signal Generator:	400kHz to 500kHz and 25MHz to 30MHz band 1000Hz mod. AM
DC Milliammeter:	0 to 500mA DC with π-network, RF filter
Audio Outputmeter:	0 to 5000mW, with 8 ohm dummy load
RF V.T.V.M.:	0 to 100MHz, 0 to 800mV
RF Outputmeter:	0 to 5W at 27MHz, 50 ohm
DC Voltmeter:	0 to 3/15V DC
Synchroscope:	0 to 30MHz
Audio Signal Generator:	1kHz (sine wave)
AC V.T.V.M.:	0 to 100mV (1kHz)
Frequency Counter:	0 to 40MHz
Field Strength Meter:	25MHz to 30MHz band, 52MHz to 56MHz band, 79MHz to 83MHz band

PHASE LOCKED LOOP (P.L.L.) CIRCUIT ALIGNMENT

Adjust the power supply voltage to 13.8 V DC.

1. Crystal Oscillator 1. (Terminal No. ② and ③ of IC201) f_1 = 10.240MHz
   1) Connect the frequency counter to the test point 201 (TP201) through the capacitor 5PF.
   2) Adjust the trimmer (C202) so that the frequency counter read is within 10.240MHz ± 300Hz.
2. Crystal Oscillator 2. (Q206) f_4 = 36.960MHz
   1) Connect the RF V.T.V.M. and the frequency counter to the test point 207 (TP207) through the capacitor 5PF.
   2) Adjust the (T203) to get the maximum RF output, then turn the core of (T203) 180 degree counter clockwise.
   3) Adjust the trimmer (C222) so that the frequency counter read is within 36.960MHz ± 600Hz.
3. Voltage Controlled Oscillator (V.C.O.) (Q203)
   1) Connect the D.C. V.T.V.M. to the terminal number ① of the IC202.
   2) Set the channel selector switch to the position of channel 12.
   3) Adjust the (T201) so that the read of the D.C. V.T.V.M. is just 3.0V.
4. Check Obtaining the Locked Condition.
   1) Connect the D.C. volt meter to the test point 206 (TP206).
   2) Set the channel selector switch to the position of channel 12.
   3) Check the voltage if it is approximately 2.7V.
   If the voltage is zero, the P.L.L. circuit is not locked.

RECEIVER ALIGNMENT

Should it become necessary at any time to check the receiver alignment of this set proceed as follows:

1) Connect a 50 ohm signal generator to the external antenna socket.
2) The power supply should be 13.8V DC.

1. Second Local Oscillator Alignment
   1) Connect the frequency counter to the test point 4 (TP4) through the 5PF capacitor.
   2) Adjust the second oscillator coil (T6) so that the frequency on TP4 is just 11.730MHz (150 ~ 250mV).
2. First IF and Second IF Alignment
   1) Connect the audio output meter across the speaker voice coil lugs.
   2) Set the signal generator to 11.275MHz modulated 30% at 1000Hz, and connect it to the base of Q2 1st mixer transistor through the dummy (0.01MFD).
   3) The ground lead of the generator should be connected to the ground of external antenna socket.
   4) Adjust the 1st IF transformer T4 and T3 and 2nd IF transformer T5 for maximum indication on the audio output meter.
3. RF Alignment
   1) Connect the audio output meter across the speaker voice coil lugs.
   2) Set the signal generator to 27.105MHz, modulated 30% at 1000Hz, and connect it to the external antenna socket.
   3) Set the channel selector switch to the position CHANNEL 12.
   4) Adjust RF coil T2 and antenna coil T1 for maximum indication on the audio output meter.
4. After these adjustments repeat steps 1, 2 and 3 until the best results are obtained.

TRANSMITTER ALIGNMENT

Should it become necessary at any time to check the transmitter alignment of this set, proceed as follows:

1) Connect DC milliammeter through RF filter (27MHz) to test point Ⓐ and Ⓑ.
2) The power supply should be 13.8V DC.
3) Connect a 50 ohm RF wattmeter to the external antenna socket.
4) Before adjusting the surface of core should be identical with the top of the bobbin.

1. Oscillator (11.275MHz) Alignment
   1) Connect the frequency counter to the test point 2 (TP2) through the 5PF capacitor.
   2) Adjust the 11.275MHz oscillator coil T301 so that the frequency on the TP2 is just 11.275MHz. (0.8 ~ 1.5V) (then the channel selector switch is blank position.)
   3) After adjustment, leave frequency counter and set the channel selector switch "13" position.
2. Mixer Alignment
   Adjust the 27MHz filter coil (T302) so that the driver current is at maximum.
3. Buffer Amplifier Alignment
   Adjust the buffer coil (T303) so that the driver current is at maximum.
4. Driver Alignment
   Adjust the driver coil (T304) so that the driver current is at the dip point.
5. Matching Alignment
   Adjust the matching coil (L302) so that the collector current should be 370mA.
6. π-Filter Alignment
   Adjust the π-filter coil (L303) to obtain the maximum RF output.
7. After these adjustments repeat steps 3, 4, 5 and 6 until the best results are obtained.
8. Trap Coil Alignment
   1) Set the field strength meter to about 54MHz, and connect it to the external antenna socket through the dummy.
   2) Adjust the trap coil L305 so that the 2nd harmonic spurious response (54MHz) is at minimum.
   3) Set the field strength meter to about 81MHz, and connect it to the external antenna socket through the dummy.
   4) Adjust the trap coil L304 so that the 3rd harmonic spurious response (81MHz) is at minimum.
9. Modulation Alignment
   1) Connect a dummy resistor (50 ohm, 5W) across the external antenna socket.
   2) Connect a loop (1 ~ 2 turn) across the synchroscope and allow the loop to come near the dummy resistor.
   3) Connect the audio signal generator (1000Hz, 6mV) to the microphone socket.
   4) Depress the PRESS-TO-TALK switch on the microphone and adjust the variable resistor (R112) so that the wave form on the synchroscope becomes as illustrated in Figure ③.

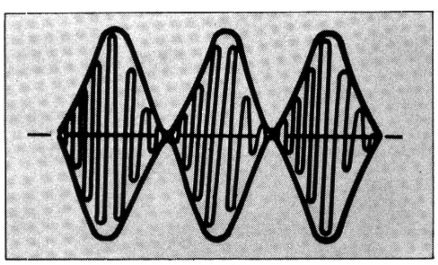


Figure ③

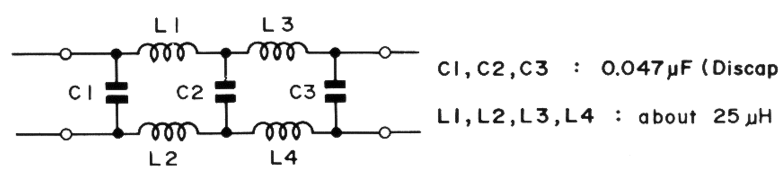


Figure 4 RF FILTER

SIGNAL/RF POWER METER ADJUSTMENT

1. Signal meter
   1) Adjust the channel selector switch of the set to channel 13.
   2) Connect the signal generator to external antenna socket directly.
   3) Adjust the attenuator of signal generator to approx. 0dB, and oscillation frequency of signal generator to 27.115MHz for tuning to frequency of the set. Next, adjust the attenuator of signal generator to 40dB. In this case rotate volume control counter-clockwise until sound volume reaches appropriate level, if AF output is large.
   4) Adjust variable resistor (R19) so that the meter reads S9.
2. RF Power Meter
   1) Connect the RF wattmeter (5W, 50 ohms) to external antenna socket.
   2) Depress the PRESS-TO-TALK switch of microphone to allow transmission, and make sure transmitted power reaches 3 watts or so.
   3) Adjust variable resistor (R27) so that the meter reads 3 in RF graduation.

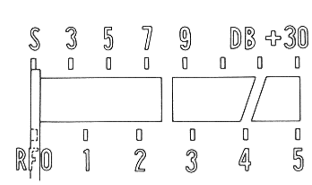
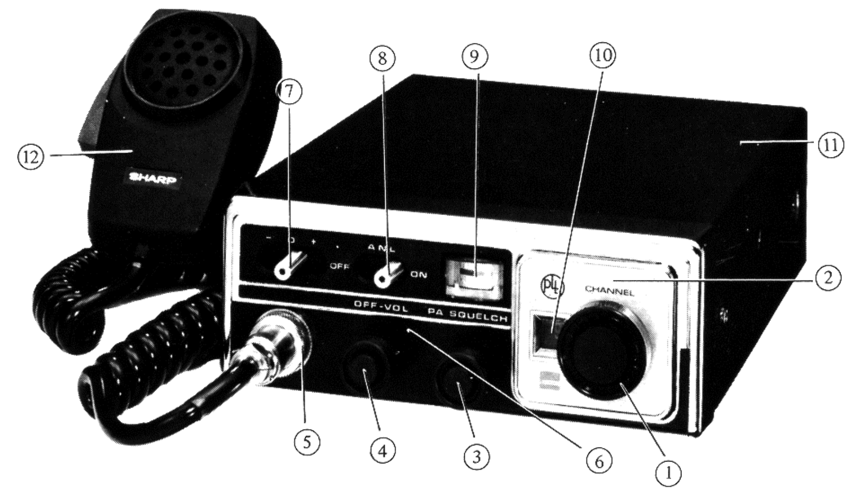


Figure 5 S/RF POWER METER (ME601)

FRONT PARTS LAYOUT



① Channel Selector Knob (JKNBN0097AFSA)
② Indication Metal, Channel (HINDM1090AFSA)
③ Squelch/P.A. Switch Knob (JKNBN0098AFSA)
④ Off-On/Volume Knob (JKNBN0098AFSA)
⑤ Microphone Socket (QSOCZ2456 AFZZ)
⑥ Front Panel (GWAKP1059AFSA)
⑦ Delta Fine Tuning Switch Knob (JKNBM0236AFSA)
⑧ A.N.L. Switch Knob (JKNBM0236AFSA)
⑨ S/RF Power Meter (RMTRE0057AFZZ)
⑩ Lens, Channel Indicator (PLNS-0008AFSA)
⑪ Cabinet (GCAB-3016AFSA)
⑫ Microphone Assembly (RMICD0206AFZZ)

Figure 6 FRONT PARTS LAYOUT

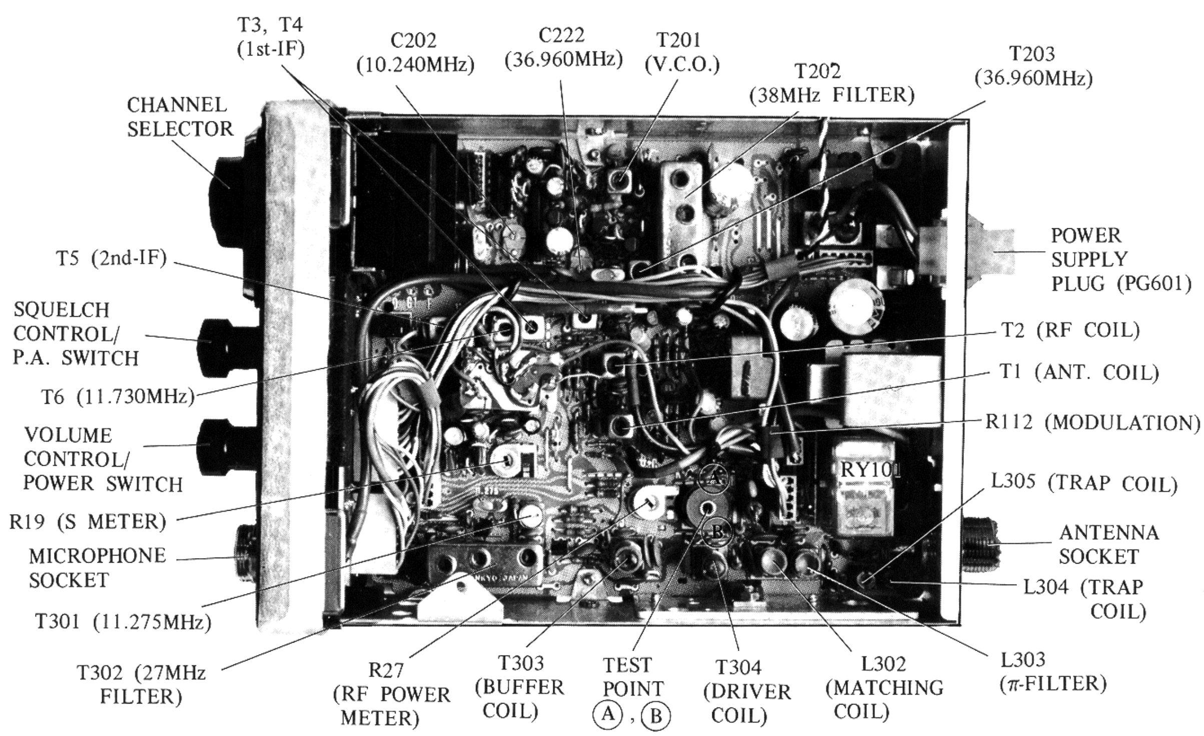


Figure 7 ALIGNMENT POINTS

CONNECTION TABLE OF CHANNEL SELECTOR SWITCH (SW4) FOR EACH CHANNEL.

TERMINAL NO. OF THE SW4	1	2	3	4	5	6	7	8	9	10
CHANNEL / TERMINAL NO. OF IC-203	1	2	3	4	5	6	7	8	9	10
1								◎		
2	○							◎		
3		○						◎		
4			○					◎		
5	○		○					◎		
6		○	○					◎		
7	○	○	○					◎		
8	○			○				◎		
9		○		○				◎		
10	○	○		○				◎		
11			○	○				◎		
12		○	○	○				◎		
13	○	○	○	○				◎		
14					◎			◎		
15	○				◎			◎		
16	○	○			◎			◎		
17			○		◎			◎		
18	○		○		◎			◎		
19		○	○		◎			◎		
20				○	◎			◎		
21	○			○	◎			◎		
22		○		○	◎			◎		
23	○		○	○	◎			◎		
Blank										◎

NOTES:

1) Terminals marked ○ are connected with the terminal C1.
2) Terminals marked ◎ are connected with the terminal C2.

Table 2 CHANNEL SELECTOR SWITCH

CAUTIONS ON HANDLING MOS IC

MOS IC is to control the electric conductivity between the source and drain by using the voltage at the gate electrode through insulating oxide film (SiO_2). If overvoltage is applied to the gate electrode, the insulator at the gate electrode undergoes dielectric breakdown. Once such dielectric breakdown occurs, the junction between the gate and other terminals is shortcircuited and MOS IC is so damaged that its quality will not be recovered again.

And, MOS IC is highly sensitive to static charge because its gate oxide film is as thin as 1000Å to 1500Å . Input protective circuit is provided to protect MOS IC but this circuit can not always play its role according to the conditions of using MOS IC.

Therefore, pay due attention to the following when handling it.

1. Cautions on Transportation and Preservation

As for MOS IC, either the input or output terminal has remarkably high impedance in comparison with ordinary semiconductor IC. Therefore, MOS IC is liable to be affected by the induction of neary-by high-tension power source or A.C. power source and it may be given a larger voltage unexpectedly due to body discharged possibly causing dielectric breakdown of the gate. To eliminate this, during transportation and preservation of MOS IC all the terminals shoule be kept at the same potential in the following methods (to shortcircuit all the terminals).

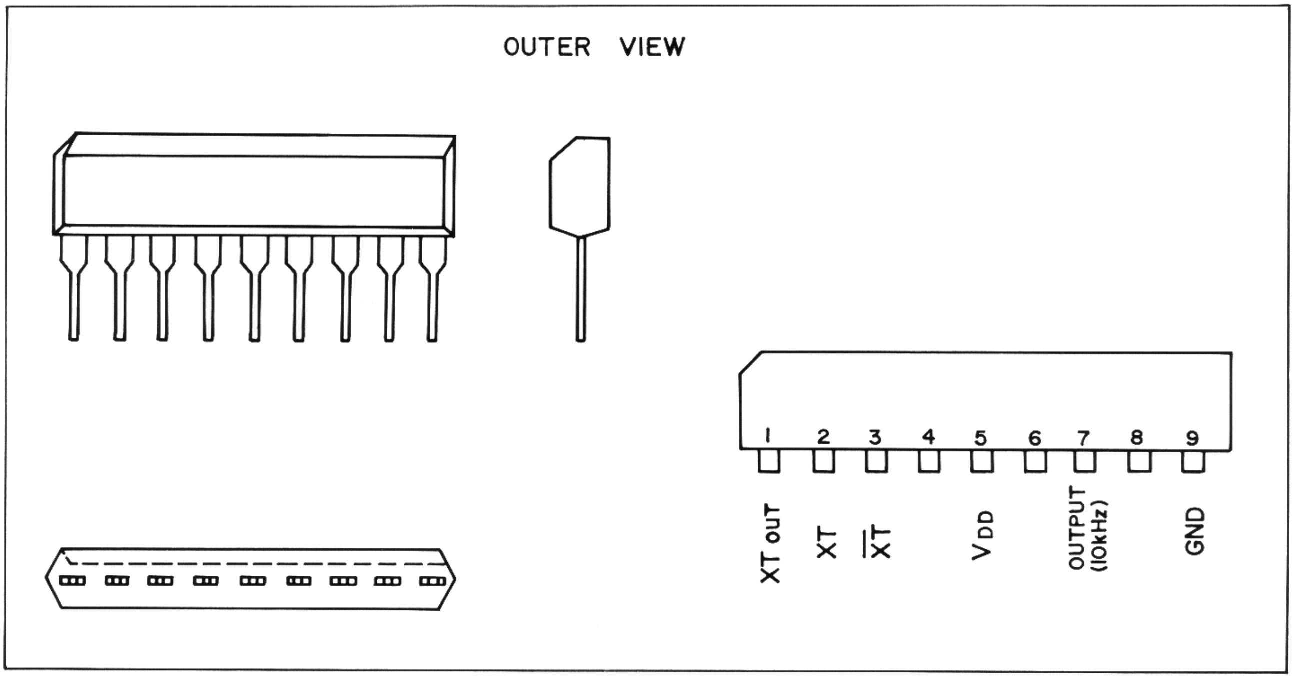
① Wind thin wire around MOS IC.
② Fit metallic ring on it.
③ Pack it with aluminum foil.
④ Hold it by electric conductive jig.
⑤ Put it in a special case for LSI.

Note: Never put MOS IC in a mal-conductive container such as made of polystyrene.

2. Cautions on Servicing

① A soldering tool to be used should be the less-leak one (more than 100K ohm of leak resistance – there may be a soldering tool of more than 1 Meg. ohm to be used for semiconductor). Otherwise, ground the soldering tool when using it.
② Ground the earth terminal of a measuring instrument.
③ Ground a bench.
④ Before insertion or removal of LSI to or from P.W.B., be sure to turn off the power switch.
⑤ When inserting LSI to P.W.B., ground the earth terminal of P.W.B.
⑥ Never touch the terminals of LSI by hand.
⑦ Be sure to ground the earth terminal of D.C. power source.
⑧ To prevent LSI from being broken due to human body discharge, it is necessary to ground the human body. But this requires the greatest care as otherwise the body encounters large current (absolutely avoid touching A.C. power source).

RH-IX1039AFZZ (IC-201) OSCILLATOR AND DIVIDER



LOGIC DIAGRAM

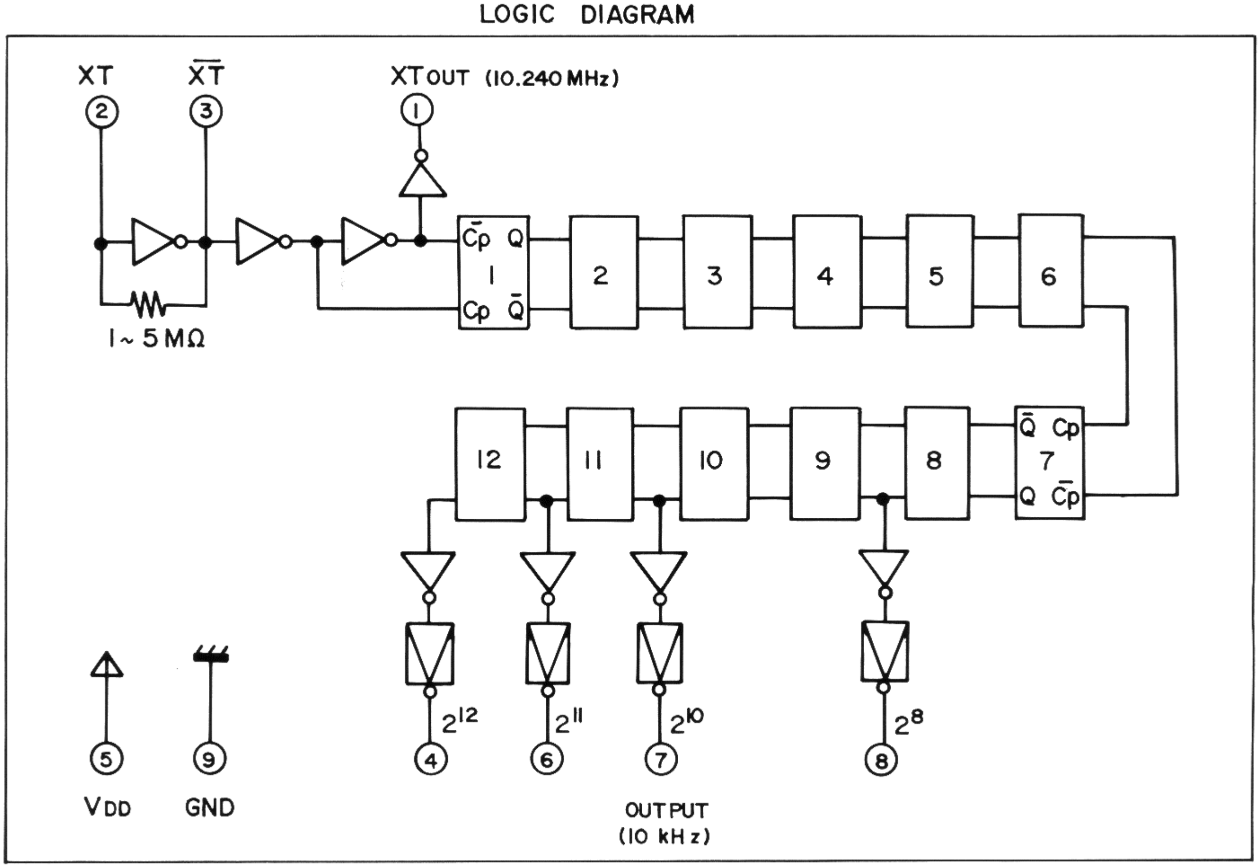
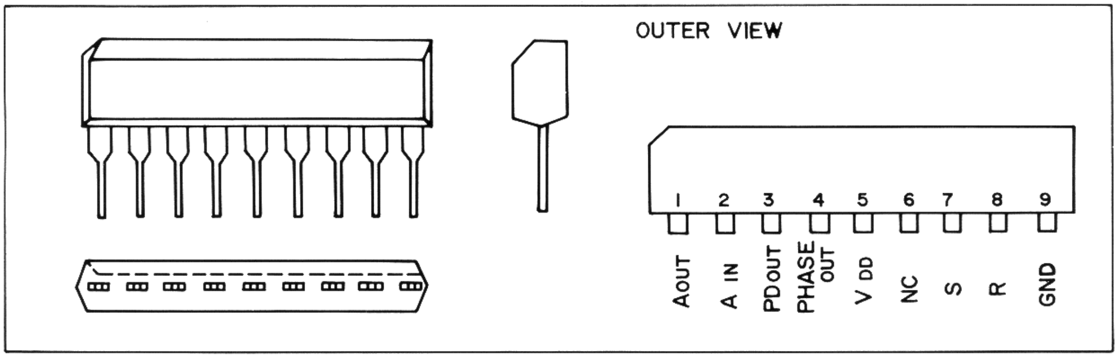
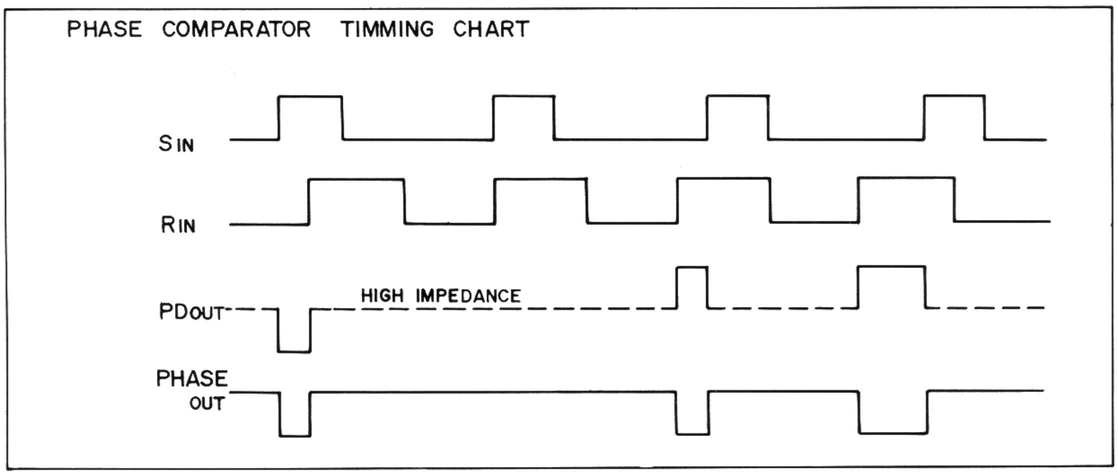


Figure 8 EQUIVALENT CIRCUIT OF IC-201

RH-IX1038AFZZ (IC-202) PHASE COMPARATOR





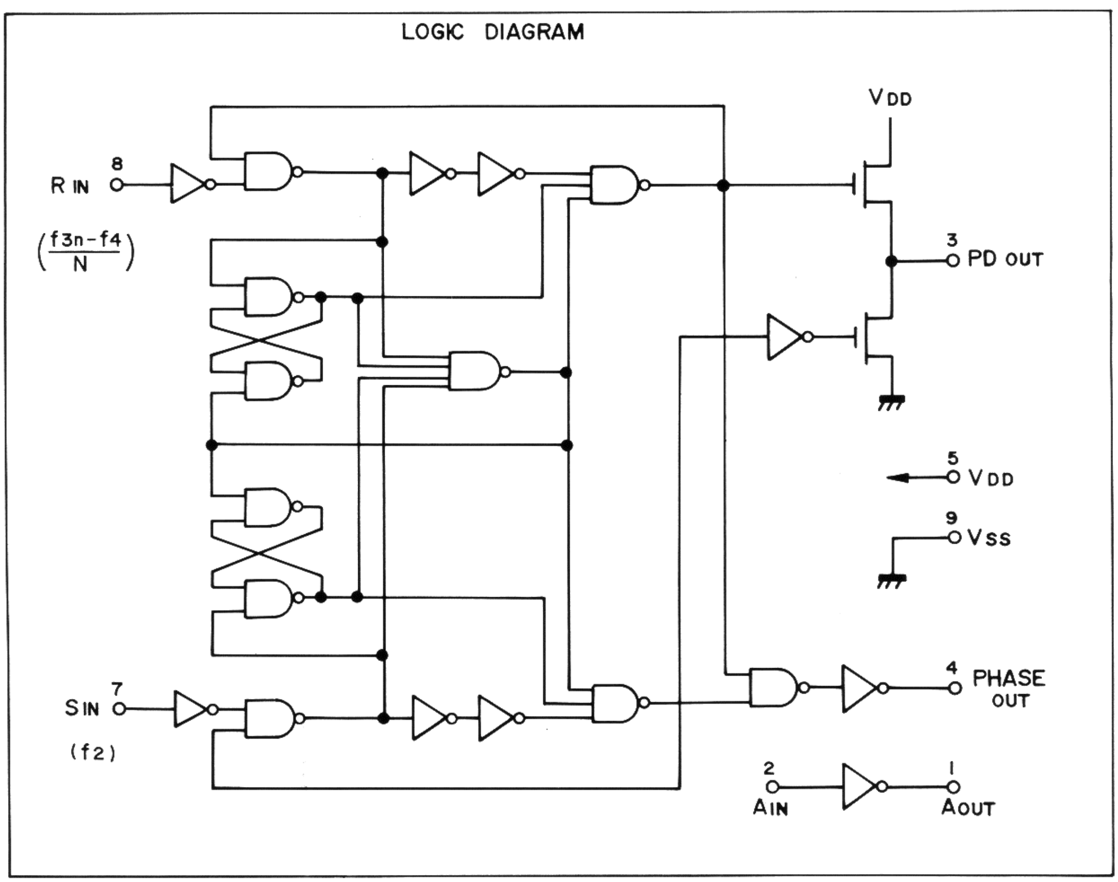


Figure 9 EQUIVALENT CIRCUIT OF IC-202

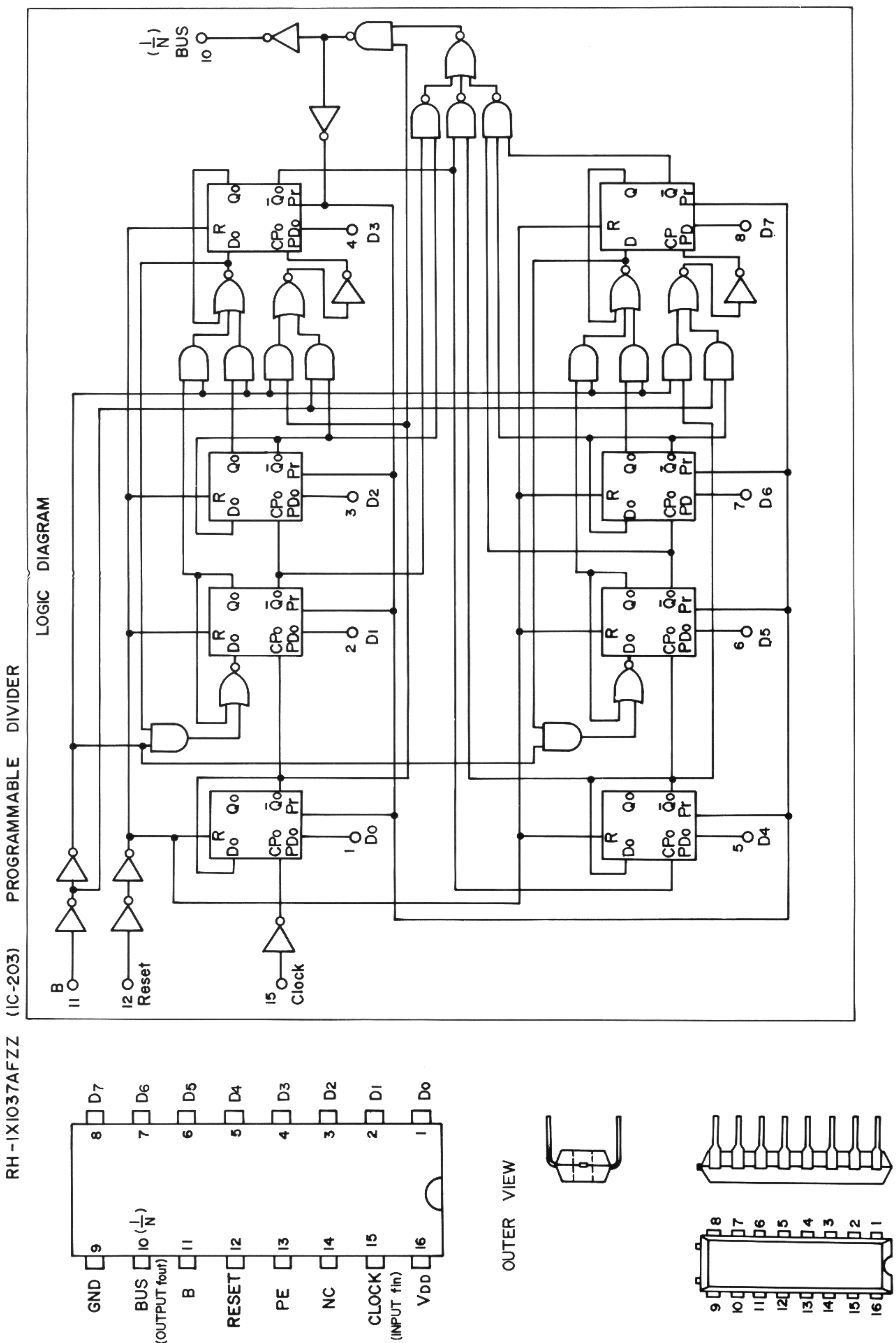


Figure 10 EQUIVALENT CIRCUIT OF IC-203

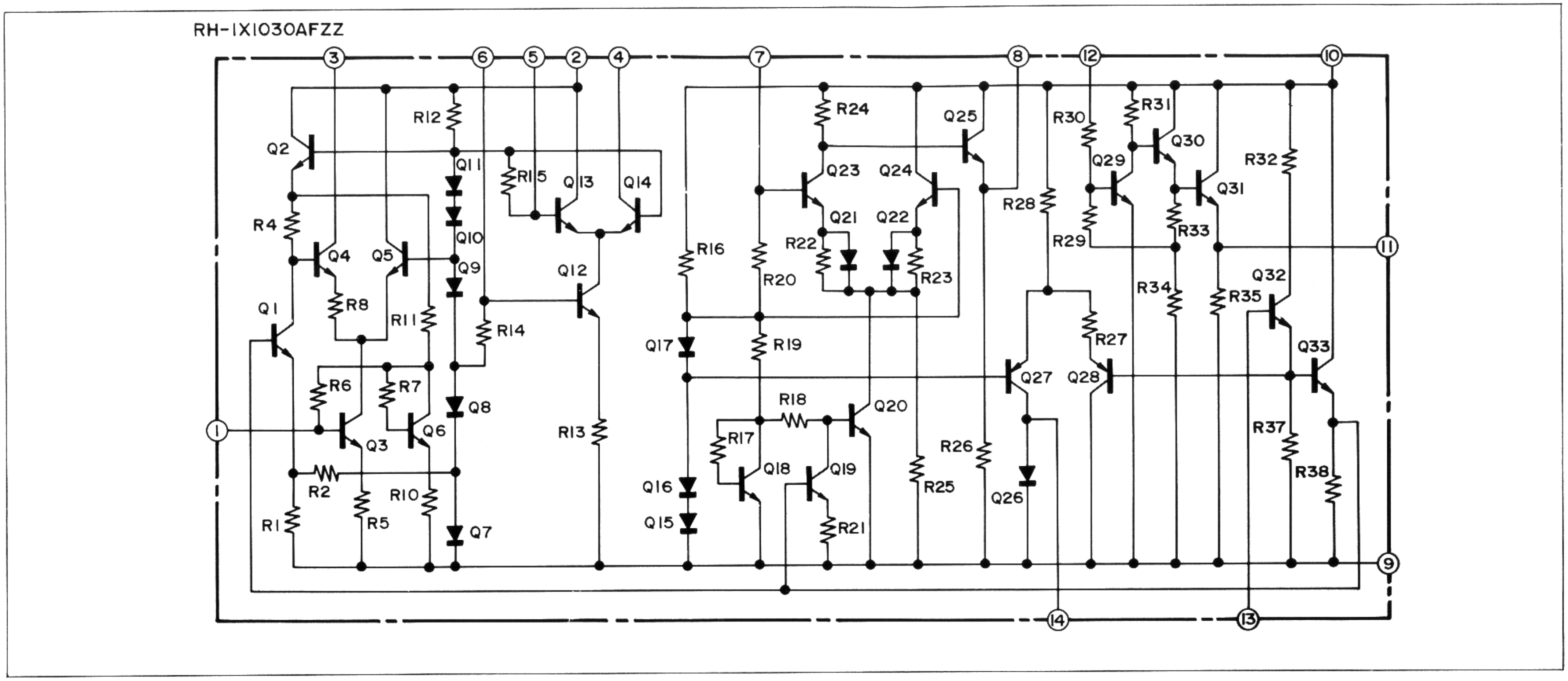


Figure 11 EQUIVALENT CIRCUIT OF IC-1

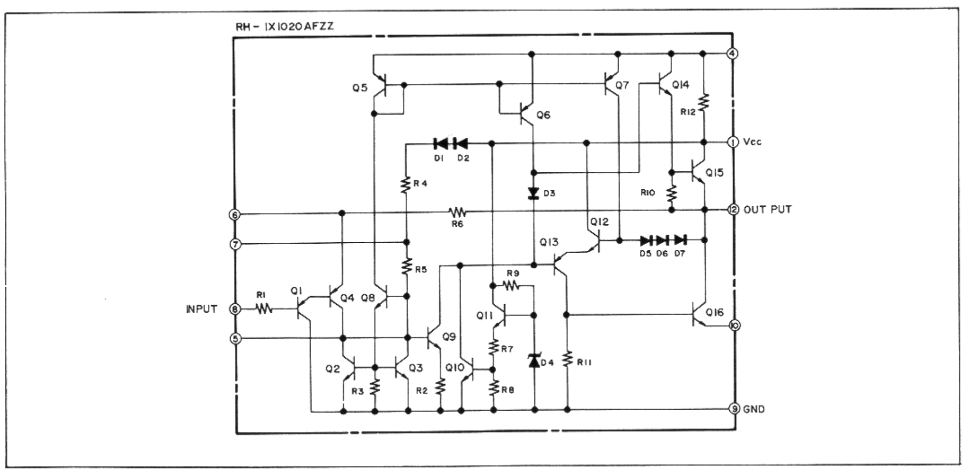


Figure 12 EQUIVALENT CIRCUIT OF IC-301

RH-IX1030AFZZ (IC-1)

RH-IX1020AFZZ (IC-301)

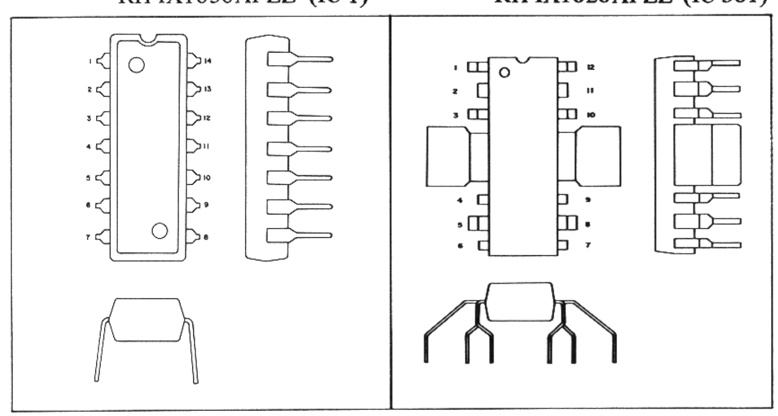


Figure 13 IC BASING

TROUBLE SHOOTING GUIDE (1)

(1) ALL OPERATIONAL MODES

SYMPTOM		MAIN CAUSE	TROUBLE SHOOTING HINT
No sound	Power supply is normal	Broken or shorted speaker cord, cross-over network or voice coil.	Check speaker cord and voice coil
	No power, lamp is off.	Defective power switch	Check power switch (SW1)
		Defective choke transformer	Check choke transformer (T102)
		Defective fuse	Check fuse (F1)
		Defective capacitor	C120, C121, C122, C119, C116
	Lamp is on, but no sound	Defective power supply circuit	Check voltage
		Defective audio amplifier	Check voltage
		– Defective transistor and IC301	Q101, Q102, Q103, IC301
		– Defective capacitor	C101 ~ C118, C123 ~ C128
		– Defective transformer	T101
		Defective squelch circuit	Check voltage
		– Defective transistor	Q5
		– Defective squelch volume	R28
		– Defective zener diode	D3
		– Defective capacitor	C28, C27, C25, C10
Weak sound		Defective power supply circuit	Check power switch (SW1)
		Defective audio amplifier circuit	Check and compare voltages of each transistor and IC301
		Capacitor off value, leaky or shorted	
		Weak transistor and IC301	Q101, IC301
Sound distortion		Defective speaker	Replace speaker
		Insufficient voltage of power circuit	Check voltage
		Defective audio amplifier circuit	
		Weak transistor and IC301	Q101, IC301
Noise	Resonant speaker	Defective speaker	Replace speaker
	Volume noise	Defective volume control circuit	R101, C20, C101
Control has no effect	Volume control	Defective R101 or circuit	
	Squelch control	Defective R28 or squelch circuit	

TROUBLE SHOOTING GUIDE (2)

(2) RECEIVER SECTION

SYMPTOM		MAIN CAUSE	TROUBLE SHOOTING HINT
No sound	No sound in all modes		See "No sound" all modes
	No sound in receiver mode	No supply voltage to receiver circuit	Check power supply circuit.
		Defective receiver circuit component	Check voltage
		Defective transistor and IC1	Q1, Q2, Q3, Q4, Q5, Q6, IC1.
		Defective 1st IF transformer	T3, T4
		Defective RF coil	T2
		Defective antenna coil	T1
		Defective 2nd IF transformer	T5
		Defective ceramic filter	CF1, CF2, CF3
		Defective 2nd IF coil	L1
		Inoperative P.L.L. circuit	See P.L.L. section
		Inoperative 2nd oscillator stage	Check T6, 11.730MHz X'-tal
		Channel selector switch does not properly make contact.	Check "channel selector switch"
		Defective resistors	
		Defective capacitors	
Weak sound		Weak incoming station signal	Adjust the antenna coil (T1) best reception
		Defective receiver component	Check voltage
		Q-factor of 1st IF transformer is too low	T3, T4
		Q-factor of 2nd IF transformer is too low	T5, L1
		Defective capacitors	
		Defective transistor and IC1	Q1, Q2, Q6, IC1
		Misalignment of 2nd IF transformer	T5
	2nd IF is normal	Misalignment of 1st IF transformer	T3, T4
		Misalignment of RF coil	T2
		Misalignment of antenna coil	T1
		Voltage drop in P.L.L. circuit	Q201, Q202, Q203, Q204, Q205, Q206, Q207, IC201, IC202, IC203, 10.240MHz X'-tal, 36.960MHz X'-tal, L201, T201, T202, T203 and capacitors.
		Voltage drop in 2nd local oscillator	T6, 11.730MHz X'-tal, C21, C30, C31,
Sound distortion	Amplifier is normal	Capacitor off value	C17, C16, C20, C101, C107, C19, C33
	Sound distortion on receiving signal from close station	Defective AGC circuit	Q3, Q4, D5, D6, C29, C10, R20, R21, R22, R23, R24, R25, R2, R3
		Defective overload diode	D9

TROUBLE SHOOTING GUIDE (3)

(3) TRANSMITTER SECTION

SYMPTOM	MAIN CAUSE		TROUBLE SHOOTING HINT
Does not transmit	Does not produce 38MHz		Defective P.L.L. circuit (See P.L.L. section)
	Defective R/T selector switch (Relay)		Check R/T selector switch SW6-A ~ D
	Does not oscillate 11.275MHz		Check voltage
		Defective FET transistor	Q301
		Defective X'-tal	11.275MHz X'-tal
		Defective capacitors	C301, C302, C304
	Does not produce 27MHz		Check voltage
		Defective transistor	Q302, Q303
		Defective 27MHz filter	T302
		Defective buffer coil	T303
		Defective capacitors	C305, C308, C309, C310, C311, C312, C313
	Does not operate driving stage		Check collector current (test point Ⓑ) with current meter (DC 150mA)
			Check voltage
		Defective transistor	Q304
		Defective driver coil	T304
		Misalignment coil	T304 (Current should be minimum)
		Defective capacitors	C314, C315, C316, C317, C411, C307
	Does not operate RF output stage		Check collector current (test point Ⓐ) with current meter (DC 500mA)
			Check voltage
		Defective transistor	Q305
		Defective tank coil	L302
		Defective filter coil	L303
		Defective trap coil	L304, L305
		Misalignment coil	L302, L303 Adjust L302 and L303 so that the collector current should be 370mA.
		Defective capacitor	C318, C320, C321, C322, C319, C324, C325, C326
No modulation or poor modulation	Defective audio circuit		Check voltage
		Defective transistor and IC301	Q101, IC301
		Defective transformer	T101
		Defective microphone	Microphone
		Defective modulation limiter circuit	Q102, Q103, D101, R113, R112, C117
		Defective capacitor	C101 ~ 118, C123 ~ C128

TROUBLE SHOOTING GUIDE (4)

(4) PHASE LOCKED LOOP (P.L.L.) SECTION

SYMPTOM	MAIN CAUSE	TROUBLE SHOOTING HINT
Does not produce 38MHz	Does not oscillate 10.240MHz	Check voltage
	Defective X'-tal	X'-tal 10.240MHz
	Defective IC or diode	IC201 or D201, Q207
	Defective capacitors	C201, C202, C203
	Does not oscillate 36.960MHz	Check voltage
	Defective X'-tal	X'-tal 36.960MHz
	Defective FET	Q206
	Defective or misalignment oscillator coil	T203
	Defective capacitors	C222, C221, C220
	Does not oscillate V.C.O. (Voltage Controlled Oscillator)	Check voltage
	Defective FET or diode	Q203, D202
	Defective or misalignment oscillator coil	T201
	Defective capacitors	
	Does not produce f_2 (= 10kHz). Test point TP202	Check voltage
	Defective IC	IC201
	Does not produce $\frac{f_{3n} - f_4}{N}$ (= 10kHz) (Test point TP 203)	Check voltage
	Defective transistors or IC	Q204, Q205, IC203
	Defective channel selector switch	SW4
	Defective capacitors	
	Does not produce 38MHz (Test point TP2)	Check voltage
	Defective transistor or IC	Q201, Q202, IC202
	Defective 38MHz filter	T202
	Defective capacitors	

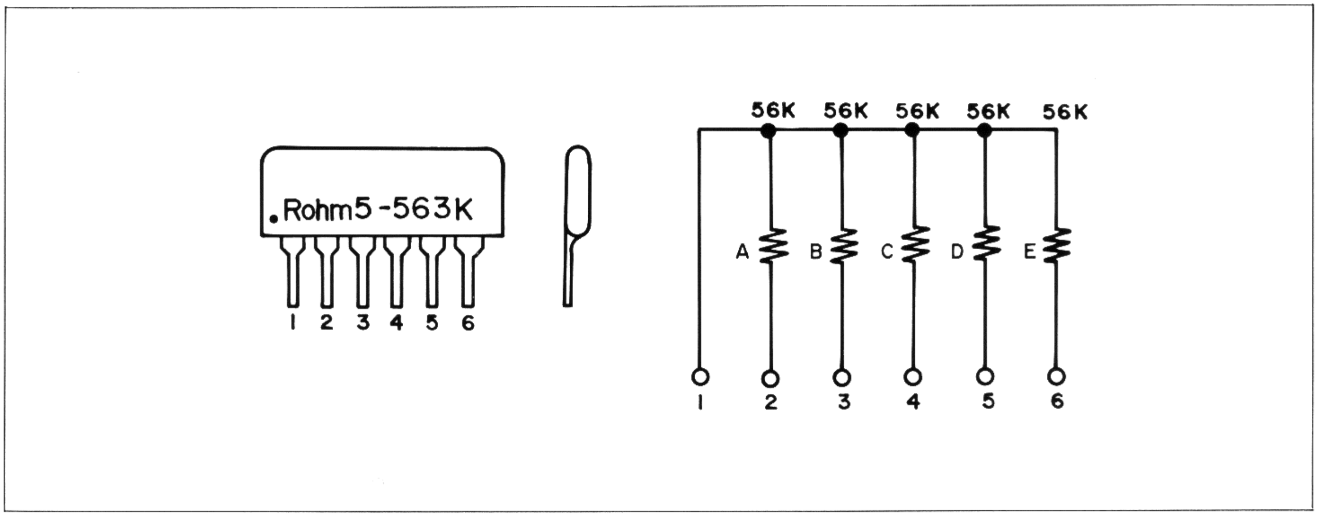


Figure 14 RESISTOR ARRAY

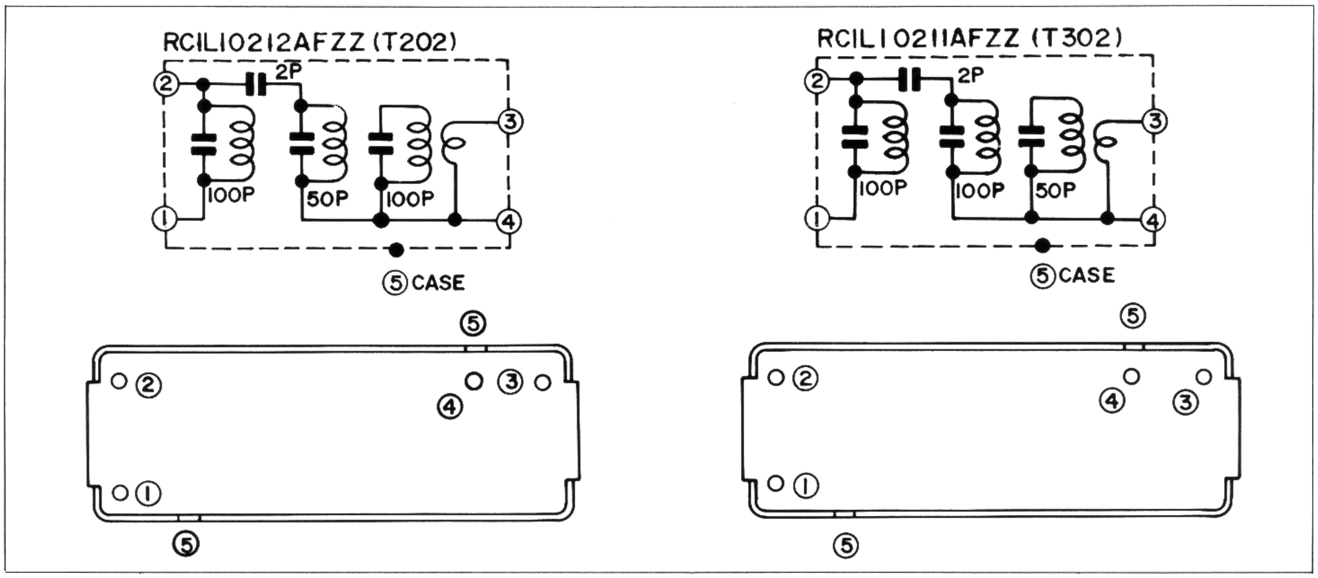


Figure 15 TRANSFORMERS (T202 and T302) BASING

CAUTIONS FOR SERVICING

The transistors Q303, Q304 and Q305 should be of the same type (the same maker) because they are to be used in a pair. The transistors of different makers should not be used in a pair.
The values of some capacitors and the setting position (at heat sink) of transistor Q305 are to be varied according to the groups A and B (maker-wise) of transistors, as tabulated below. Rememeber this.

GROUP \ REF. NO.	Q303	Q304	Q305	C328	C314	C315	C316
A	2SC815 Ⓘ P	2SC1957	2SC1909	22PF	390PF	330PF	10PF
B	2SC1166 Ⓨ or Ⓞ	2SC495 Ⓣ	2SC1237	10PF	220PF	470PF	39PF

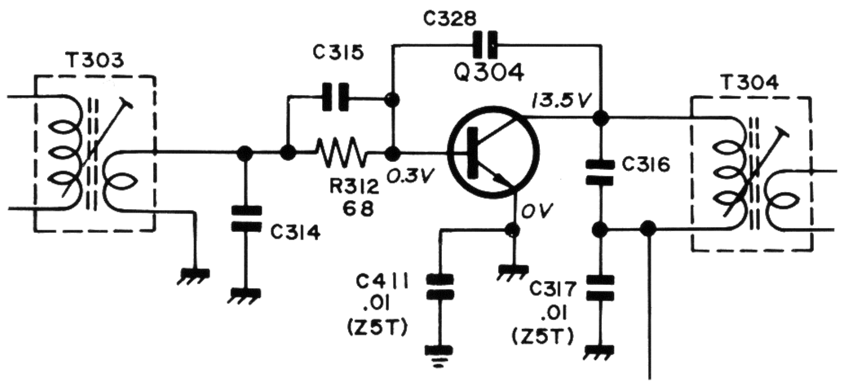
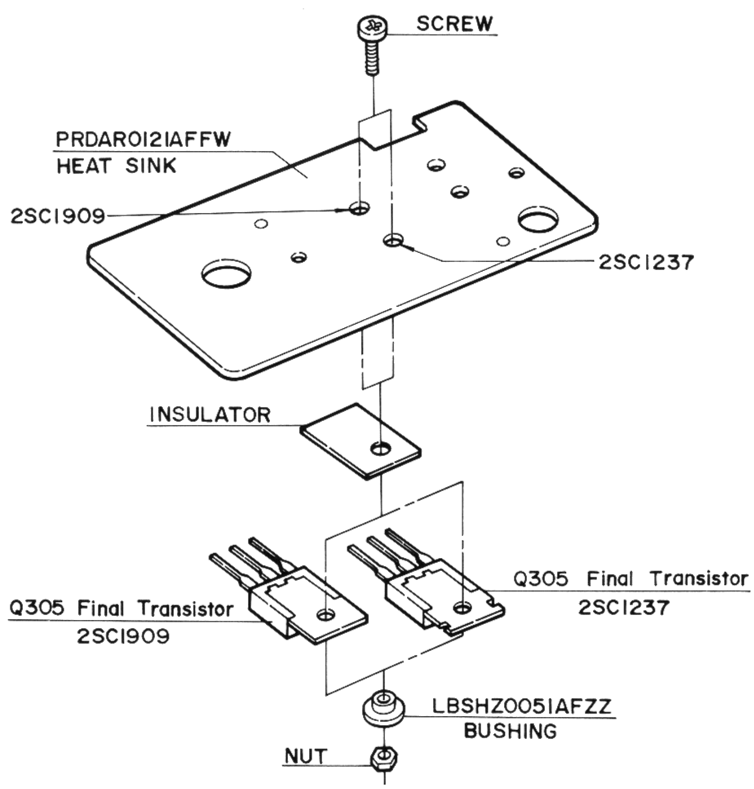


Figure 16



There are available different transistor fitting holes.

Figure 17 HOW TO SET THE TRANSISTOR Q305

REPLACEMENT PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER 2. REF. NO.
3. PART NO. 4. DESCRIPTION

INTEGRATED CIRCUITS

REF. NO.	PART NO.	DESCRIPTION	PRICE
IC1	RH-IX1030AFZZ	2nd IF Amplifier and Detector	
IC201	RH-IX1039AFZZ	Oscillator and Divider	
IC202	RH-IX1038AFZZ	Phase Comparator and Low Pass Filter	
IC203	RH-IX1037AFZZ	Programmable Divider	
IC301	RH-IX1020AFZZ	Driver and Audio Amplifier	

TRANSISTORS

REF. NO.	PART NO.	DESCRIPTION	PRICE
Q1	VS2SC1675M/-1 or VS2SC784-R/-1	RF Amplifier (2SC1675 (M) or 2SC784 (R))	
Q2	VS2SC1675M/-1 or VS2SC394-Y/-1	1st-Mixer (2SC1675 (M) or 2SC394 (Y))	
Q3	VS2SC945LK/-1 or VS2SC373-G/-1	AGC Amplifier (2SC945 (L) K or 2SC373)	
Q4	VS2SC945LP/-1 or VS2SC373-G/-1	AGC Amplifier (2SC945 (L) P or 2SC373)	
Q5	VS2SC900-U/-1 or VS2SC733-B/-1	Squelch Voltage Amplifier (2SC900 (U) or 2SC733 (BL))	
Q6	VS2SC460-B/-1	2nd-Mixer (2SC460 (B))	
Q101	VS2SC945LP/-1	AF Amplifier (2SC945 (L) P)	
Q102	VS2SD227-V/-1 or VS2SC735-Y/-1	Modulation Limiter Amplifier (2SD227 (V) or 2SC735 (Y))	
Q103	VS2SC945LP/-1 or VS2SC373-G/-1	Modulation Limiter Amplifier (2SC945 (L) P or 2SC373)	
Q201	VS2SC945LP/-1 or VS2SC373-G/-1	P.L.L. Synthesizer, Gate (2SC945 (L) P or 2SC373)	
Q202	VS2SC945LP/-1 or VS2SC394-Y/-1	P.L.L. Synthesizer, Buffer (2SC945 (L) P or 2SC394 (Y))	
Q203	VS2SK49-F//-1	P.L.L. Synthesizer, FET, V.C.O. (Voltage Controlled Oscillator) (2SK49 (F))	
Q204	VS2SC945LP/-1 or VS2SC373-G/-1	P.L.L. Synthesizer, Buffer (2SC945 (L) P or 2SC373)	
Q205	VS2SC945LP/-1 or VS2SC373-G/-1	P.L.L. Synthesizer, Mixer (2SC945 (L) P or 2SC373)	
Q206	VS2SK49-F//-1	P.L.L. Synthesizer, FET, 36.960MHz Oscillator (2SK49 (F))	
Q207	VS2SD471-S/-1 or VS2SC1741//-1	P.L.L. Synthesizer, Voltage Regulator (2SD471 (S) or 2SC1741)	
Q301	VS2SK49-F//-1	Transmitter, FET, Crystal (11.275MHz) Oscillator (2SK49 (F))	
Q302	VS2SC945LP/-1 or VS2SC735-Y/-1	Transmitter, 27MHz Mixer (2SC945 (L) P or 2SC735 (Y))	
* Q303	RH-TX1008AFZZ	Transmitter, Buffer Amplifier (2SC815 (I) P)	
* Q304	VS2SC1957//-1	Transmitter, Driver (2SC1957)	
* Q305	VS2SC1909//-1	Transmitter, Final (2SC1909)	
* Q303	VS2SC1166-Y-1 or VS2SC1166-O-1	Transmitter, Buffer Amplifier (2SC1166 (Y) or (O))	
* Q304	VS2SC495-T/-1	Transmitter, Driver (2SC495 (T))	
* Q305	VS2SC1237-/1F	Transmitter, Final (2SC1237)	

* See the descriptions in page 20.

DIODES

REF. NO.	PART NO.	DESCRIPTION	PRICE
D1	VHD1S2076//-1	Static Protector (1S2076)	
D2	VHD1S2076//-1	Static Protector (1S2076)	
D3	VHEWZ-100//1F	Zener Diode, Voltage Regulator (10V± 0.5V)	
D4	VHD1N60////-1	A.N.L. (Automatic Noise Limiter) (1N60)	
D5	VHD1N60////-1	AGC Detector (1N60)	
D6	VHD1N60////-1	AGC Detector (1N60)	
D7	VHD1S2076//-1	Static Protector (1S2076)	
D8	VHD1N60////-1	S (Signal) Meter (1N60)	
D9	VHD1N60////-1	Overload (1N60)	
D101	VHD1N60////-1	Modulation Detector (1N60)	
D201	VHEXZ-090//-1	Zener Diode, Voltage Regulator (9V±0.25V)	
D202	VHCBB109G//-1	Varicap, V.C.O.	
D301	VHD1S2076//-1	RF Power Meter (1S2076)	

CRYSTALS

REF. NO.	PART NO.	DESCRIPTION	PRICE
X3	RCRSB0015AFZZ	11.275MHz	
X4	RCRSB0016AFZZ	11.730MHz	
X1	RCRSB0051AFZZ	10.240MHz	
X2	RCRSB0052AFZZ	36.960MHz	

CERAMIC FILTER

REF. NO.	PART NO.	DESCRIPTION	PRICE
CF1	RFILA0050AFZZ	455kHz, 2nd-IF	
CF2	RFILA0050AFZZ	455kHz, 2nd-IF	
CF3	RFILA0001AFZZ	455kHz	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PRICE
		COILS	
L1	RCILZ0014AGZZ	2nd-IF, 1mH	
L101	RCILC0023AFZZ	AF Choke	
L201	RCILC0024AFZZ	Low Pass Filter	
L301	RCILC0011AFZZ	RF Choke	
L302	RCILR0135AFZZ	Transmitter, Matching (Loading)	
L303	RCILR0055AFZZ	Transmitter, π-Filter	
L304	RCILC0055AFZZ	Trap, 81MHz	
L305	RCILC0055AFZZ	Trap, 54MHz	
		TRANSFORMERS	
T1	RCILA0377AFZZ	Antenna	
T2	RCILR0304AFZZ	RF	
T3	RCILI0210AFZZ	1st-IF (11.275MHz)	
T4	RCILI0210AFZZ	1st-IF (11.275MHz)	
T5	RCILI0154AFZZ	2nd-IF (455kHz)	
T6	RCILI0210AFZZ	2nd Local Oscillator (11.730MHz)	
T101	RTRNM0050AFZZ	Output and Modulation	
T102	RTRNC0003AFZZ	Power Choke	
T201	RCILB0384AFZZ	Voltage Controlled Oscillator	
T202	RCILI0212AFZZ	38MHz Filter	
T203	RCILB0383AFZZ	36.960MHz Oscillator	
T301	RCILB0378AFZZ	Transmitter, 11.275MHz Oscillator	
T302	RCILI0211AFZZ	Transmitter, 27MHz Filter	
T303	RCILB0221AFZZ	Transmitter, Buffer	
T304	RCILR0037AFZZ	Transmitter, Driver	
		CAPACITORS (Unless otherwise specified capacitors are 50V, +80 −20%, Ceramic Type)	
C1	VCKZPU1HF103Z	.01MFD	
C2	VCKZPU1HF103Z	.01MFD	
C3	VCKZPU1HF103Z	.01MFD	
C4	VCKZPU1HF103Z	.01MFD	
C5	VCKZPU1HF223Z	.022MFD	
C6	VCKYPU1HB472M	.0047MFD, 50V, ±20%, Ceramic	
C7	VCKZPU1HF223Z	.022MFD	
C8	VCKZPU1HF103Z	.01MFD	
C9	VCCSPU1HL2R0C	2PF, 50V, ±0.25PF, Ceramic	
C10	VCCSPU1HL220J	22PF, 50V, ±5%, Ceramic	
C11	VCKYPU1HB472M	.0047MFD, 50V, ±20%, Ceramic	
C12	VCCSPU1HL330J	33PF, 50V, ±5%, Ceramic	
C13	VCKZPU1HF103Z	.01MFD	
C15	VCKZPU1HF103Z	.01MFD	
C16	VCKZPU1HF103Z	.01MFD	
C17	VCQYKU1HM103M	.01MFD, 50V, ±20%, Mylar	
C19	VCQYKU1HM153M	.015MFD, 50V, ±20%, Mylar	
C20	VCQYKU1HM223M	.022MFD, 50V, ±20%, Mylar	
C21	VCCSPU1HL680J	68PF, 50V, ±5%, Ceramic	
C22	VCCSPU1HL131J	130PF, 50V, ±5%, Ceramic	
C23	VCKYPU1HB102M	.001MFD, 50V, ±20%, Ceramic	
C25	VCKZPU1HF103Z	.01MFD	
C26	VCKZPU1HF103Z	.01MFD	

REF. NO.	PART NO.	DESCRIPTION	PRICE
C30	VCCSPU1HL270J	27PF, 50V, ±5%, Ceramic	
C31	VCCSPU1HL470J	47PF, 50V, ±5%, Ceramic	
C32	VCKZPU1HF103Z	.01MFD	
C33	VCQYKU1HM333M	.033MFD, 50V, ±20%, Mylar	
C35	VCCSPU1HL120J	12PF, 50V, ±5%, Ceramic	
C36	VCCSPU1HL330J	33PF, 50V, ±5%, Ceramic	
C37	VCCSPU1HL681J	680PF, 50V, ±5%, Ceramic	
C101	VCQYKU1HM333M	.033MFD, 50V, ±20%, Mylar	
C102	VCQYKU1HM102M	.001MFD, 50V, ±20%, Mylar	
C104	VCQYKU1HM103M	.01MFD, 50V, ±20%, Mylar	
C106	VCQYKU1HM223M	.022MFD, 50V, ±20%, Mylar	
C107	VCQYKU1HM222M	.0022MFD, 50V, ±20%, Mylar	
C108	VCQYKU1HM103M	.01MFD, 50V, ±20%, Mylar	
C109	VCQYKU1HM222M	.0022MFD, 50V, ±20%, Mylar	
C119	VCKZPU1HF104Z	.1MFD	
C122	VCKZPU1HF104Z	.1MFD	
C123	VCKZPU1HF103Z	.01MFD	
C124	VCKZPU1HF103Z	.01MFD	
C125	VCQYKU1HM222M	.0022MFD, 50V, ±20%, Mylar	
C126	VCQYKU1HM333M	.033MFD, 50V, ±20%, Mylar	
C127	VCKYPU1HB103M	.01MFD, 50V, ±20%, Ceramic	
C128	VCKZPU1HF223Z	.022MFD	
C201	VCCSPU1HL470J	47PF, 50V, ±5%, Ceramic	
C202	RTO-H1009AFZZ	Trimmer Capacitor, 10.240MHz Oscillator	
C203	VCCSPU1HL470J	47PF, 50V, ±5%, Ceramic	
C205	VCKZPU1HF103Z	.01MFD	
C206	VCKZPU1HF103Z	.01MFD	
C207	VCKZPU1HF103Z	.01MFD	
C208	VCCCPU1HH180J	18PF (CH), 50V, ±5%, Ceramic	
C209	VCCCPU1HH100F	10PF (CH), 50V, ±1PF, Ceramic	
C210	VCKZPU1HF103Z	.01MFD	
C211	VCCUPU1HJ150J	15PF (UJ), 50V, ±5%, Ceramic	
C213	VCCCPU1HH220J	22PF (CH), 50V, ±5%, Ceramic	
C214	VCCSPU1HL220J	22PF, 50V, ±5%, Ceramic	
C215	VCQYKU1HM223M	.022MFD, 50V, ±20%, Mylar	
C216	VCCSPU1HL331J	330PF, 50V, ±5%, Ceramic	
C218	VCCCPU1HH5R0C	5PF (CH), 50V, ±0.25PF, Ceramic	
C219	VCKZPU1HF103Z	.01MFD	
C220	VCCCPU1HH5R0C	5PF (CH), 50V, ±0.25PF, Ceramic	
C221	VCCUPU1HJ100J	10PF (UJ), 50V, ±5%, Ceramic	
C222	RTO-H1009AFZZ	Trimmer Capacitor, 36.960MHz Oscillator	
C223	VCKZPU1HF103Z	.01MFD	
C224	VCKZPU1HF103Z	.01MFD	
C227	VCKYPU1HB102M	.001MFD, 50V, ±20%, Ceramic	
C228	VCCCPU1HH5R0C	5PF (CH), 50V, ±0.25PF, Ceramic	
C230	VCCUPU1HJ180J	18PF (UJ), 50V, ±5%, Ceramic	
C232	VCKZPU1HF103Z	.01MFD	
C233	VCCSPU1HL680J	68PF, 50V, ±5%, Ceramic	
C301	VCCSPU1HL560J	56PF, 50V, ±5%, Ceramic	
C302	VCKZPU1HF103Z	.01MFD	
C304	VCCSPU1HL330J	33PF, 50V, ±5%, Ceramic	
C305	VCCSPU1HL101J	100PF, 50V, ±5%, Ceramic	
C308	VCKZPU1HF103Z	.01MFD	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PRICE
C309	VCKZPU1HF103Z	.01MFD	
C310	VCKZPU1HF103Z	.01MFD	
C311	VCCSPU1HL180J	18PF, 50V, ±5%, Ceramic	
C312	VCKZPU1HF103Z	.01MFD	
C313	VCKZPU1HF103Z	.01MFD	
C314	VCCSPU1HL221J	220PF, 50V, ±5%, Ceramic	
C314	VCCSPU1HL391J	390PF, 50V, ±5%, Ceramic	
C315	VCCSPU1HL471J	470PF, 50V, ±5%, Ceramic	
C315	VCCSPU1HL331J	330PF, 50V, ±5%, Ceramic	
C316	VCCSPU1HL390J	39PF, 50V, ±5%, Ceramic	
C316	VCCSPU1HL100F	10PF, 50V, ±1PF, Ceramic	
C317	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 −20%, Ceramic	
C318	VCCSPU1HL511J	510PF, 50V, ±5%, Ceramic	
C319	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 −20%, Ceramic	
C320	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 −20%, Ceramic	
C321	VCCSBU1HL181J	180PF, 50V, ±5%, Ceramic	
C322	VCCSPU1HL680J	68PF, 50V, ±5%, Ceramic	
C324	VCCSPU1HL220J	22PF, 50V, ±5%, Ceramic	
C325	VCCSPU1HL680J	68PF, 50V, ±5%, Ceramic	
C326	VCKZPU1HF103Z	.01MFD	
C328	VCCSPU1HL220J	22PF, 50V, ±5%, Ceramic	
C328	VCCSPU1HL100F	10PF, 50V, ±1PF, Ceramic	
C401	VCKZPU1HF103Z	.01MFD	
C402	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 −20%, Ceramic	
C404	VCKZPU1HF103Z	.01MFD	
C405	VCKZPU1HF103Z	.01MFD	
C406	VCKZPU1HF103Z	.01MFD	
C407	VCKZPU1HF103Z	.01MFD	
C408	VCKZPU1HF103Z	.01MFD	
C409	VCKZPU1HF103Z	.01MFD	
C410	VCKYPU1HB103M	.01MFD, 50V, ±20%, Ceramic	
C411	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 −20%, Ceramic	
C412	VCKZPU1HF103Z	.01MFD	

ELECTROLYTIC CAPACITORS

REF. NO.	PART NO.	DESCRIPTION	PRICE
C14	VCEAAU1AW107Y	100MFD, 10V, +50 −10%	
C18	VCEAAU1EW335Y	3.3MFD, 25V, +50 −10%	
C27	VCEAAU1HW105Y	1MFD, 50V, +50 −10%	
C28	VCEAAU1EW475Y	4.7MFD, 25V, +50 −10%	
C29	VCEAAU1CW106Y	10MFD, 16V, +50 −10%	
C34	VCEAAU1CW106Y	10MFD, 16V, +50 −10%	
C103	VCEAAU1EW475Y	4.7MFD, 25V, +50 −10%	
C105	VCEAAU1CW106Y	10MFD, 16V, +50 −10%	
C110	VCEAAU1CW476Y	47MFD, 16V, +50 −10%	
C111	VCEAAU1AW336Y	33MFD, 10V, +50 −10%	
C112	VCEALU1HW104M	.1MFD, 50V, ± 20%,	
C113	VCEAAU1CW476Y	47MFD, 16V, +50 −10%	
C114	VCEALU1HW104M	.1MFD, 50V, ±20%,	
C115	VCEAAU1AW477Y	470MFD, 10V, +50 −10%	
C116	VCEAAU1CW108Y	1000MFD, 16V, +50 −10%	
C117	VCEAAU1EW335Y	3.3MFD, 25V, +50 −10%	
C118	VCEAAU1CW106Y	10MFD, 16V, +50 −10%	
C204	VCEAAU1HW105Y	1MFD, 50V, +50 −10%	

REF. NO.	PART NO.	DESCRIPTION	PRICE
C212	VCEALU1HW104M	.1MFD, 50V, ±20%,	
C217	VCEAAU1CW106Y	10MFD, 16V, +50 −10%	
C225	VCEAAU1AW107Y	100MFD, 10V, +50 −10%	
C229	VCEAAU1AW477Y	470MFD, 10V, +50 −10%	
C323	VCAAKU0XA474M	.47MFD, 6.3V, ±20%, Aluminum	

RESISTORS

(Unless otherwise specified resistors are 1/4W, ±5%, Carbon Type)

REF. NO.	PART NO.	DESCRIPTION	PRICE
R1	VRD-ST2EE562J	5.6K ohm	
R2	VRD-ST2EE152J	1.5K ohm	
R3	VRD-ST2EE102J	1K ohm	
R5	VRD-ST2EE333J	33K ohm	
R6	VRD-ST2EE472J	4.7K ohm	
R7	VRD-ST2EE102J	1K ohm	
R9	VRD-SU2EY273K	27K ohm, 1/4W, ±10%, Carbon	
R10	VRD-ST2EE102J	1K ohm	
R12	VRD-SU2EY151K	150 ohm, 1/4W, ±10%, Carbon	
R13	VRD-SU2EY472K	4.7K ohm, 1/4W, ±10%, Carbon	
R14	VRD-SU2EY333K	33K ohm, 1/4W, ±10%, Carbon	
R15	VRD-SU2EY153K	15K ohm, 1/4W, ±10%, Carbon	
R16	VRD-SU2EY223K	22K ohm, 1/4W, ±10%, Carbon	
R17	VRD-SU2EY124K	120K ohm, 1/4W, ±10%, Carbon	
R19	RVR-M0119AFZZ	5K (B) ohm, Pot., S (Signal) Meter Adjust	
R20	VRD-ST2EE224J	220K ohm	
R21	VRD-ST2EE223J	22K ohm	
R22	VRD-ST2EE272J	2.7K ohm	
R23	VRD-ST2EE471J	470 ohm	
R24	VRD-ST2EE224J	220K ohm	
R25	VRD-ST2EE333J	33K ohm	
R27	RVR-M0010AFZZ	30K (B) ohm, Pot., RF Power Meter Adjust	
R28/SW2 -A, B	RVR-B0137AFZZ	10K (B) ohm, Squelch/P.A. Switch	
R29	VRD-ST2EE103J	10K ohm	
R30	VRD-ST2EE472J	4.7K ohm	
R31	VRD-ST2EE473J	47K ohm	
R35	VRD-SU2EY333K	33K ohm, 1/4W, ±10%, Carbon	
R36	VRD-SU2EY472K	4.7K ohm, 1/4W, ±10%, Carbon	
R37	VRD-SU2EY222K	2.2K ohm, 1/4W, ±10%, Carbon	
R38	VRD-ST2EE222J	2.2K ohm	
R39	VRD-ST2EY473K	47K ohm, 1/4W, ±10%, Carbon	
R40	VRD-SU2EY100K	10 ohm, 1/4W, ±10%, Carbon	
R98	VRD-ST2HA470K	47 ohm, 1/2W, ±10%, Carbon	
R101/ SW1	RVR-D0104AFZZ	5K (D) ohm, Off-On/Volume Control	
R102	VRD-ST2EE331J	330 ohm	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PRICE
R104	VRD-ST2EE154J	150K ohm	
R105	VRD-ST2EE153J	15K ohm	
R106	VRD-ST2EE102J	1K ohm	
R107	VRD-ST2EE103J	10Kohm	
R108	VRD-ST2EE331J	330 ohm	
R109	VRD-ST2EE222J	2.2K ohm	
R110	VRD-ST2EE333J	33K ohm	
R111	VRD-ST2EE2R2J	2.2 ohm	
R112	RVR-M0116AFZZ	1K (B) ohm, Modulation Level Adjust	
R113	VRD-ST2EE103J	10K ohm	
R114	VRD-SU2EY222K	2.2K ohm, 1/4W, ±10%, Carbon	
R115	VRD-ST2EE220J	22 ohm	
R201	VRD-SU2EY103K	10K ohm, 1/4W, ±10%, Carbon	
R202	VRD-ST2EY563K	56K ohm, 1/4W, ±10%, Carbon	
R203	VRD-SU2EY103K	10K ohm, 1/4W, ±10%, Carbon	
R204	VRD-SU2EY182K	1.8K ohm, 1/4W, ±10%, Carbon	
R205	VRD-SU2EY224K	220K ohm, 1/4W, ±10%, Carbon	
R206	VRD-ST2EY151K	150 ohm, 1/4W, ±10%, Carbon	
R207	VRD-ST2EE102J	1K ohm	
R208	VRD-ST2EY823K	82K ohm, 1/4W, ±10%, Carbon	
R209	VRD-SU2EY331K	330 ohm, 1/4W, ±10%, Carbon	
R210	VRD-SU2EY105K	1Meg ohm, 1/4W, ±10%, Carbon	
R216	VRD-SU2EY104K	100K ohm, 1/4W, ±10%, Carbon	
R217	VRD-ST2EY104K	100K ohm, 1/4W, ±10%, Carbon	
R218	VRD-SU2EY122K	1.2K ohm, 1/4W, ±10%, Carbon	
R219	VRD-SU2EY124K	120K ohm, 1/4W, ±10%, Carbon	
R220	VRD-SU2EY102K	1K ohm, 1/4W, ±10%, Carbon	
R221	VRD-SU2EY274K	270K ohm, 1/4W, ±10%, Carbon	
R222	VRD-ST2EY105K	1 Meg ohm, 1/4W, ±10%, Carbon	
R223	VRD-ST2EE470J	47 ohm	
R225-A ~ E	RMPTC0003AFZZ	Resistor Array, 56K ohm x 5	
R301	VRD-ST2EE105J	1 Meg ohm	
R302	VRD-SU2EY102K	1K ohm, 1/4W, ±10%, Carbon	
R304	VRD-ST2EE223J	22K ohm	
R305	VRD-ST2EE102J	1K ohm	
R306	VRD-ST2EE101J	100 ohm	
R307	VRD-ST2EE470J	47 ohm	
R308	VRD-ST2EE223J	22K ohm	
R309	VRD-ST2EE332J	3.3K ohm	
R310	VRD-ST2EE101J	100 ohm	
R311	VRD-ST2EE101J	100 ohm	
R312	VRD-SU2EY680K	68 ohm, 1/4W, ±10%, Carbon	
R314	VRD-ST2HA471J	470 ohm, 1/2W, ±	
R315	VRD-ST2EE332J	3.3K ohm	
R316	VRD-ST2EE682J	6.8K ohm	
R318	VRD-ST2HA470K	47 ohm, 1/2W, ±10%, Ca.	

MISCELLANEOUS

REF. NO.	PART NO.	DESCRIPTION	PRICE
	GCAB-3016AFSA	Cabinet	
	GWAKP1059AFSA	Front Panel	
	HINDM1090AFSA	Indication Metal, Channel	
	HDALP0356AFSA	Drum, Channel	
	JKNBN0097AFSA	Knob, Channel Selector	
	JKNBN0098AFSA	Knob, Off-On/Volume and Squelch/P.A. Switch	
	JKNBM0236AFSA	Knob, A.N.L. Switch and Delta Fine Tuning Switch	
	JHNDM1052AFFW	Mobile Mounting Bracket	
	LBSHZ0051AFZZ	Bushing, Transistor Q305	
	LCHSM0236AFFW	Chassis, Main	
	LCHSZ0051AFZZ	Chassis, Front	
	LANGS0053AFFW	Bracket, Speaker	
	LX-BZ0021AGFD	Bolt (5ϕ x 8mm)	
	LX-BZ0053AFFD	Bolt (5ϕ x 10mm)	
	LX-WZ3017CEFN	Washer, P.W. Board	
	LX-NZ0052AFFD	Nut, Front Chassis	
	PFLT-0132AF00	Felt, Front Panel	
	PCAPH0001AGZZ	Cap, A.N.L. Switch	
	PCOVM3050AFFW	Hole Cover, Rear Chassis	
	PHAG-8001AFFC	Hanger, Microphone	
	PRDAR0121AFFW	Heat Sink, Transistor Q305	
	PRDAR0122AFFW	Heat Sink, IC-301	
	PMLT-0114AFZZ	Sponge, Speaker	
	PGUMM0002AF00	Rubber Washer, Mounting Bracket	
	PLNS-0008AGSA	Lens, Channel Indicator	
	PCOVU7105AFZZ	Cover, Meter, Shade	
	PCUSU0157AF00	Sponge, Meter	
	PCOVU8040AF00	Cover, Rubber, Volume and Squelch Control	
	PCOVU9100AFZZ	Plate, Shade, Pilot Lamp	
	PCOVM8052AF00	Cover, Rubber, A.N.L. and Delta Switches	
CNP601	QCNCM0806SGZZ	Plug, 8 Pin	
CNP602	QCNCM0806SGZZ	Plug, 8 Pin	
CNP603	QCNCM0902AGZZ	Plug, 9 Pin	
CNP604	QCNCM110HAFZZ	Plug, 8 Pin (U-bend)	
CNP605	QCNCM111KAFZZ	Plug, 10 Pin (U-bend)	
CNS601-A ~ E	QCNW-0138AFZZ	Connection Cord with Socket Assembly	
CNS602	QCNW-0143AFZZ	Connection Cord with Socket, Speaker	
CNS603	QCNW-0140AFZZ	Connection Cord with Socket, Microphone	
J601-A, B	QJAKB0050AFZZ	Jack, External Speaker (J601-A) and P.A. Speaker (J601-B)	
	QPWBF0495AFZZ	Printed Wiring Board, Main	
	QPWBF0496AFZZ	Printed Wiring Board, Volume	
	QPWBF0542AFZZ	Printed Wiring Board, Sub	
	QFSHJ9052AFZZ	Power, Supply Cord with Fuse Holder and Socket	
Ⓐ, Ⓑ	QSOCE0401AFZZ	Socket, Test Point	
	QPLGE0403AGZZ	Plug, Test Point	
PG601	QSOCZ2454AFZZ	Plug, Power Supply	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PRICE
SO601	QSOCZ2453AFZZ	Socket, External Antenna (50 ohms)	
SO602	QSOCZ2456AFZZ	Socket, Microphone	
SW1/ R101	RVR-D0104AFZZ	5K (D) ohm, Off-On/Volume Control	
SW2-A, B/R28	RVR-B0137AFZZ	10K (B) ohm, Squelch/ P.A. Switch	
SW3	QSW-B0028AGZZ	Switch, A.N.L.	
SW4	QSW-R0132AFZZ	Switch, Channel Selector	
SW5	QSW-B0003AFZZ	Switch, Delta Fine Tuning	
SW6-A ~ D/RY101	RRLYZ0007AFZZ	Relay with Receiver/ Transmitter Switch	
C120, C121	RC-KZ1009AFZZ	Feed Through Capacitors with Bracket	
PL1	RLMPM0058AFZZ	Lamp, Illumination (14V, 80mA)	
	RMICD0206AFZZ	Microphone Assembly (with Press-to-talk Switch)	
ME601	RMTRE0057AFZZ	Meter, S/RF Power	
SP601	VSP0080P-208A	Speaker, 8 phms	
	XBBSC30W08000	Screw (3ϕ x 8mm), Plus and Minus	
	XNESD50-40000	Nut (5ϕ)	
	XWHSD30-05000	Washer (3ϕ)	
	XWHSD50-05000	Washer (5ϕ)	
	XWSSJ50-13000	Spring Washer (5ϕ)	

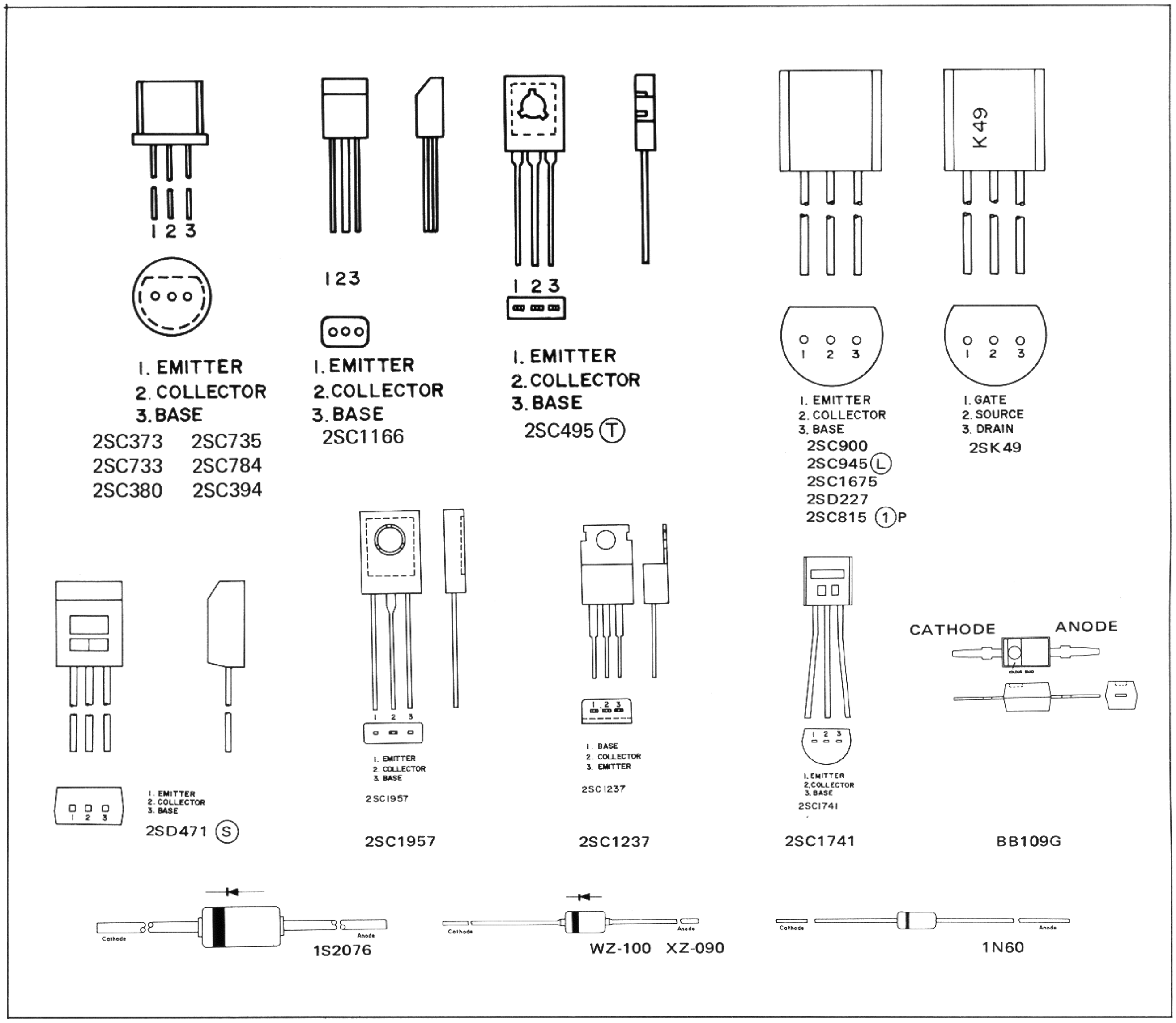


Figure 20 SEMICONDUCTORS BASING

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