

SHARP

OUTSTANDING RECEPTION THE WORLD OVER

SERVICE MANUAL

CB-750A



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 $\pm 0.005\%$ tolerance
(at $-22^{\circ}\text{F} \sim +140^{\circ}\text{F}$)
Transmitter modulation ... 100% (maximum)
Modulation limiter Yields high average modulation at
average voice levels
Antenna matching Nominal 50 ohms
Carrier deviation Not greater than $\pm 800\text{Hz}$
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 $0.7\mu\text{V/m}$ 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 $\pm 0.005\%$ tolerance
(at $-22^{\circ}\text{F} \sim +140^{\circ}\text{F}$)
Selectivity 6dB down at $\pm 3\text{kHz}$;
50dB down at $\pm 10\text{kHz}$.
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 $\pm 1.0\text{kHz}$ 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) \times 5-3/4"(W) \times 7-7/8"(D)
Weight 3.6 lbs. with microphone
Cabinet Metal body with plastic front

SHARP ELECTRONICS CORPORATION

Executive Office:

10 Keystone Place, Paramus, New Jersey 07652 (201) 265-5600

Regional Offices & Distribution Centers:

10 Keystone Place, Paramus, New Jersey 07652 (201) 265-5600

21580 Wilmington Ave. Long Beach, Calif. 90810 (213) 830-4470

U.S. Subsidiary of SHARP Corporation, Osaka, Japan

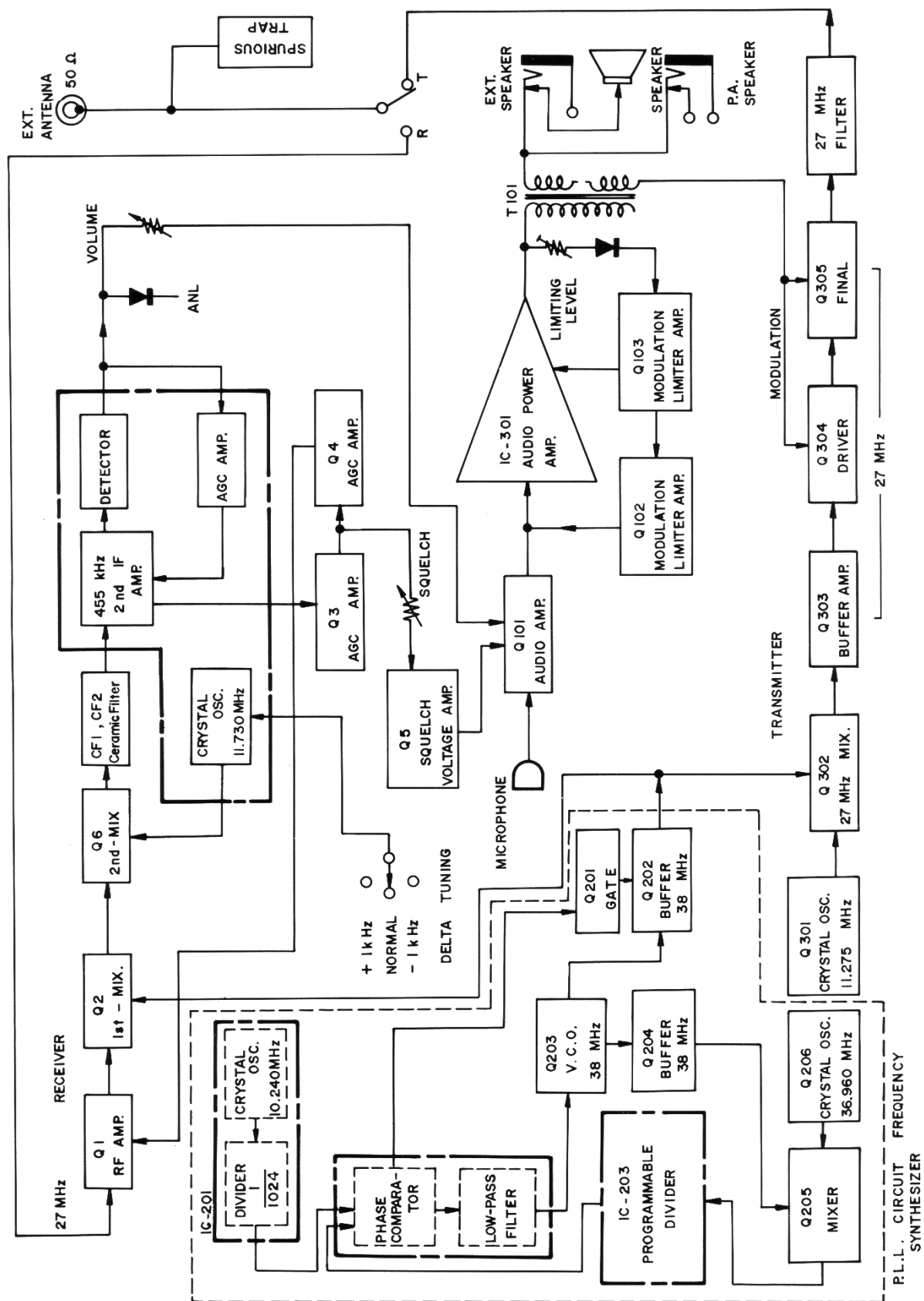


Figure 1 BLOCK DIAGRAM

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 pin ⑦ of IC-1 via the transformer T5 and ceramic filters CF1 and CF2. (The 2nd-IF signal is amplified between the pin ⑦ and pin ⑧ of IC-1 and it is also detected between the pin ⑫ and 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.

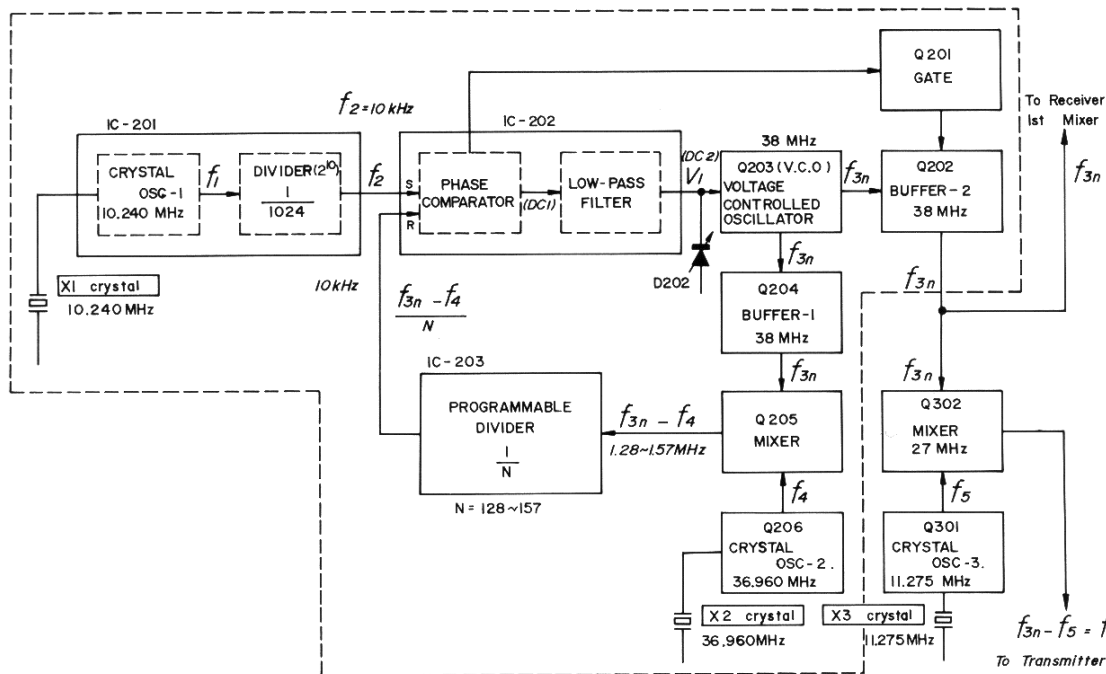


Figure 2 P.L.L. CIRCUIT FREQUENCY SYNTHESIZER

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 divider 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:

$$f_{3n} = Nf_2 + f_4$$

$$\text{Where } f_2 = 10\text{kHz}$$

$$f_4 = 36.960\text{MHz}$$

$$N = 128 \text{ to } 157 \dots \dots \text{Determined by channel selector as shown in Table 1.}$$

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

$$\begin{aligned} f_{3n} &= 128 \times 0.01 + 36.960 \text{ (MHz)} \\ &= 38.240 \text{ (MHz)} \end{aligned}$$

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}	$f_{3n} - f_4$	$\frac{f_{3n} - f_4}{N}$	$f_2 \cdot \frac{f_{3n} - f_4}{N}$	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

$$\begin{aligned} f_6 &= f_{3n} - f_5 \\ &= (Nf_2 + f_4) - f_5 \end{aligned}$$

$$\text{Where } f_5 = 11.275\text{MHz}$$

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) $f_1 = 10.240\text{MHz}$
 - 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 $10.240\text{MHz} \pm 300\text{Hz}$.
2. Crystal Oscillator 2. (Q206) $f_4 = 36.960\text{MHz}$
 - 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 $36.960\text{MHz} \pm 600\text{Hz}$.
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 **(A)** and **(B)**.
- 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.

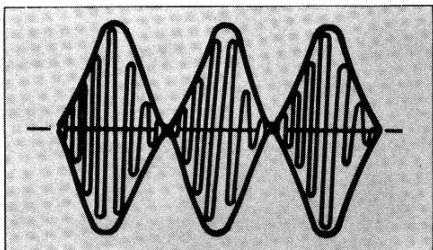


Figure ③

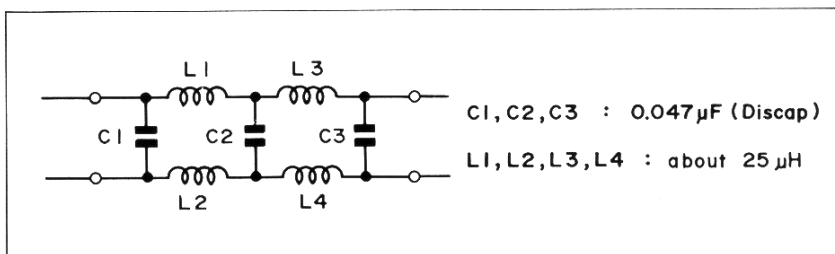


Figure 4 RF FILTER

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.

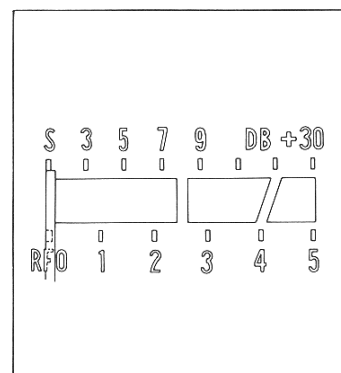
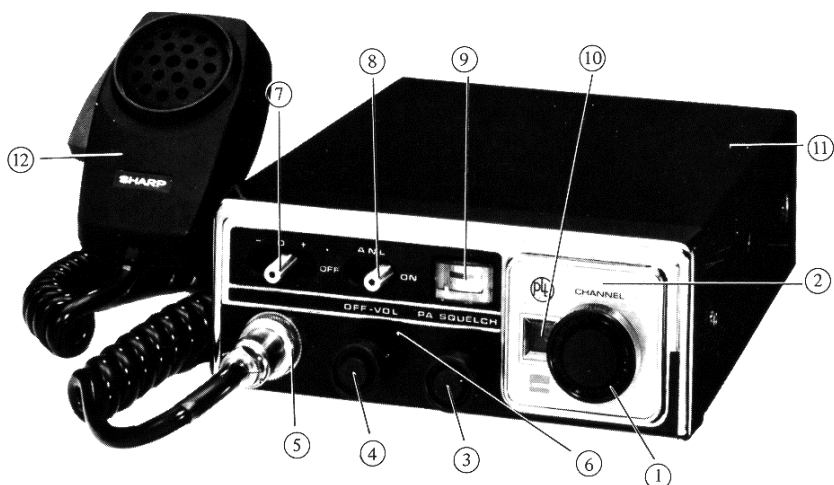


Figure 5 S/Rf POWER METER (ME601)

FRONT PARTS LAYOUT



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

Figure 6 FRONT PARTS LAYOUT

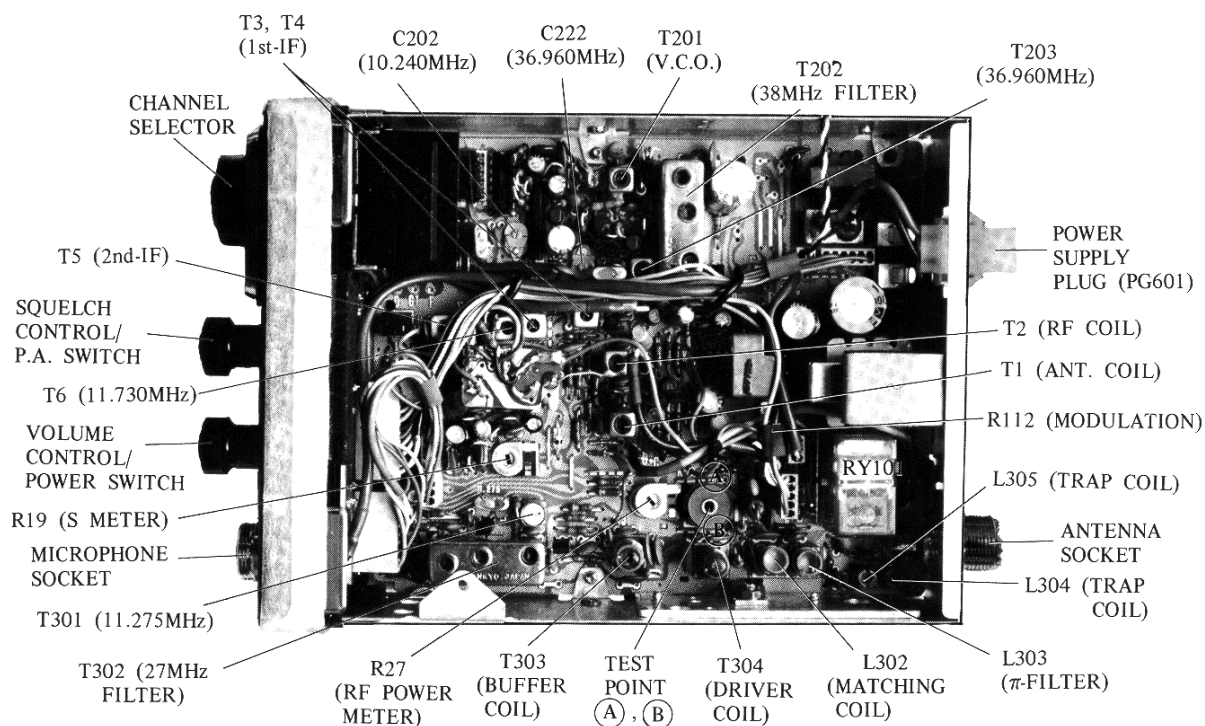


Figure 7 ALIGNMENT POINTS

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	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 1000\AA to 1500\AA . 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 nearby high-tension power source or A.C. power source and it may be given a larger voltage unexpectedly due to body discharge possibly causing dielectric breakdown of the gate. To eliminate this, during transportation and preservation of MOS IC all the terminals should 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.

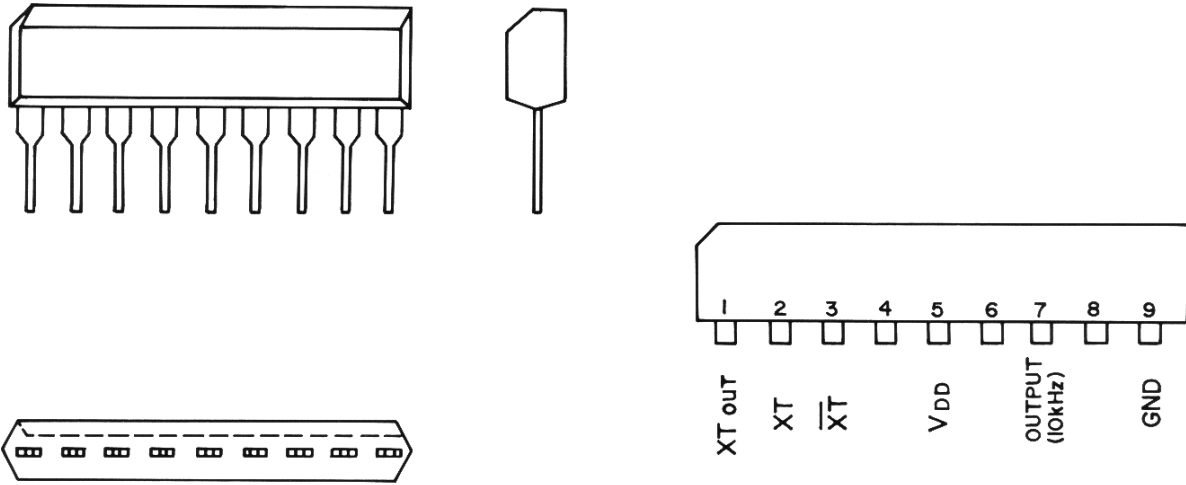
Note: Never put MOS IC in a mal-conductive container such as made of polystyrene.

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

OUTER VIEW



LOGIC DIAGRAM

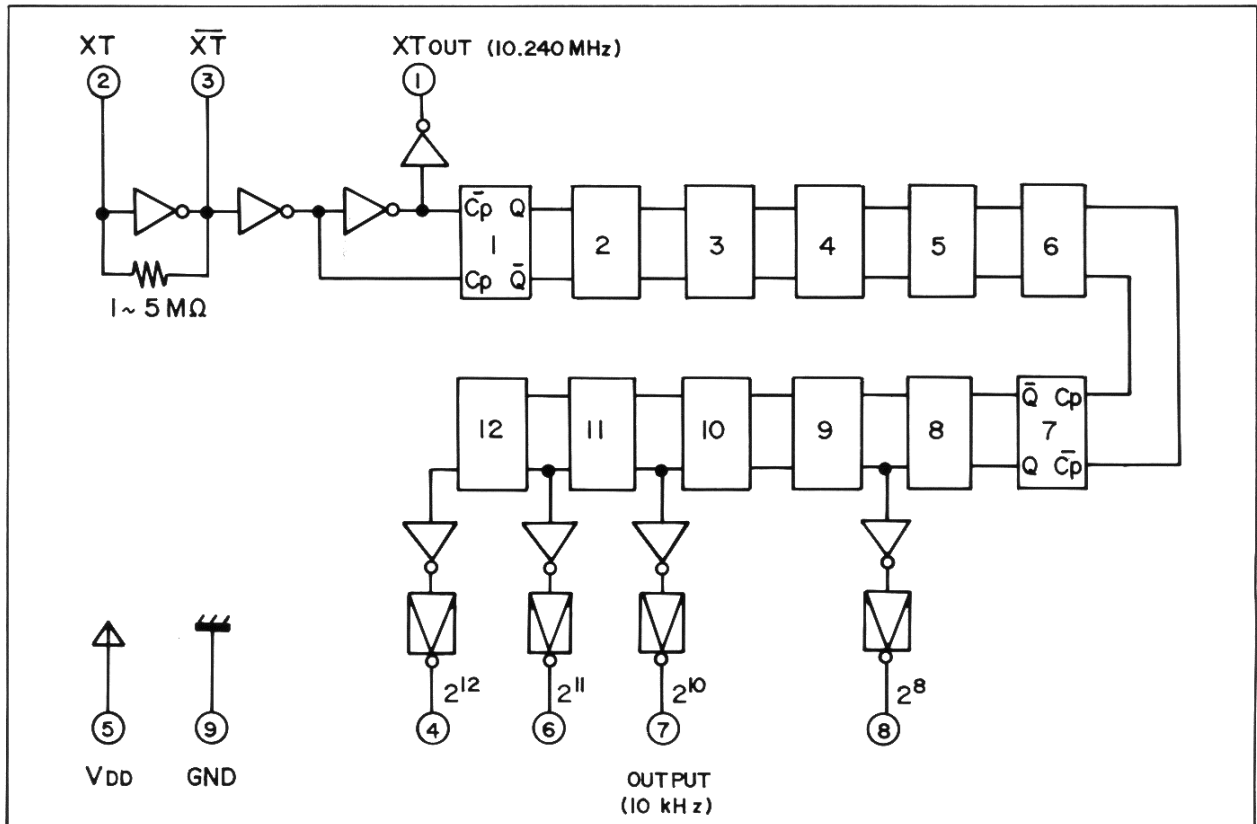


Figure 8 EQUIVALENT CIRCUIT OF IC-201

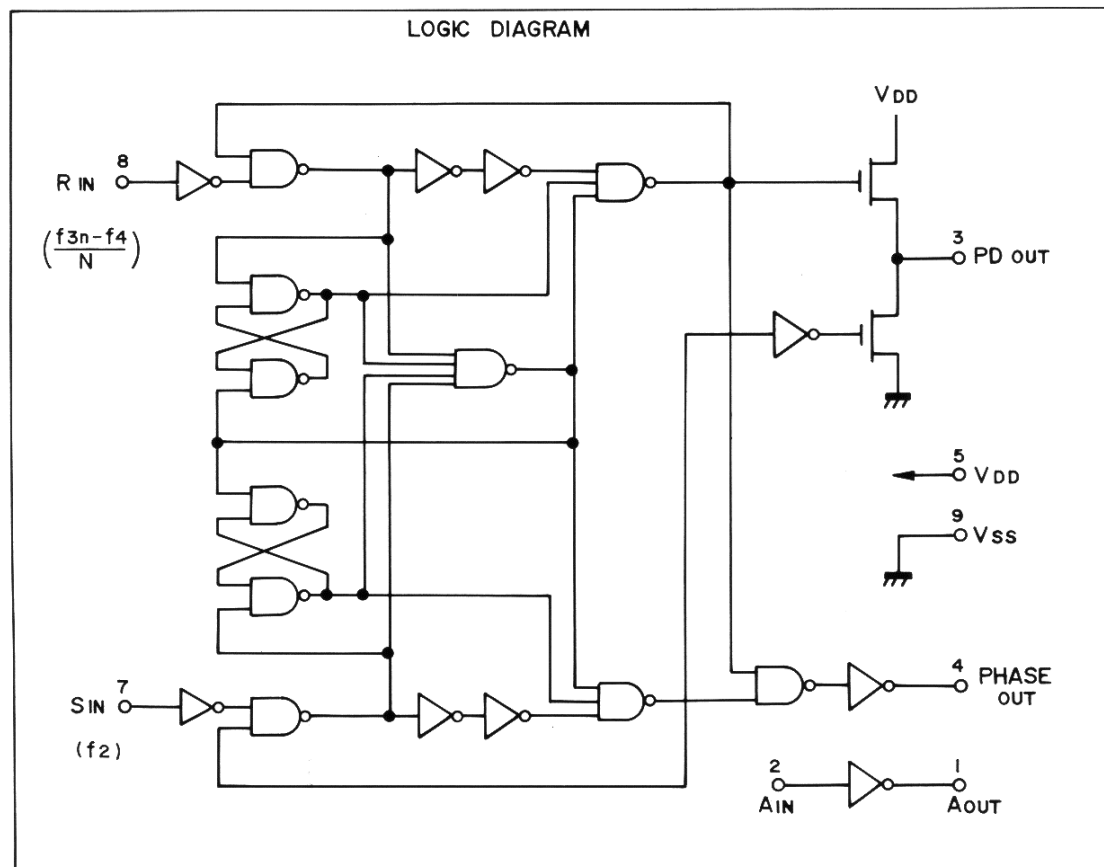
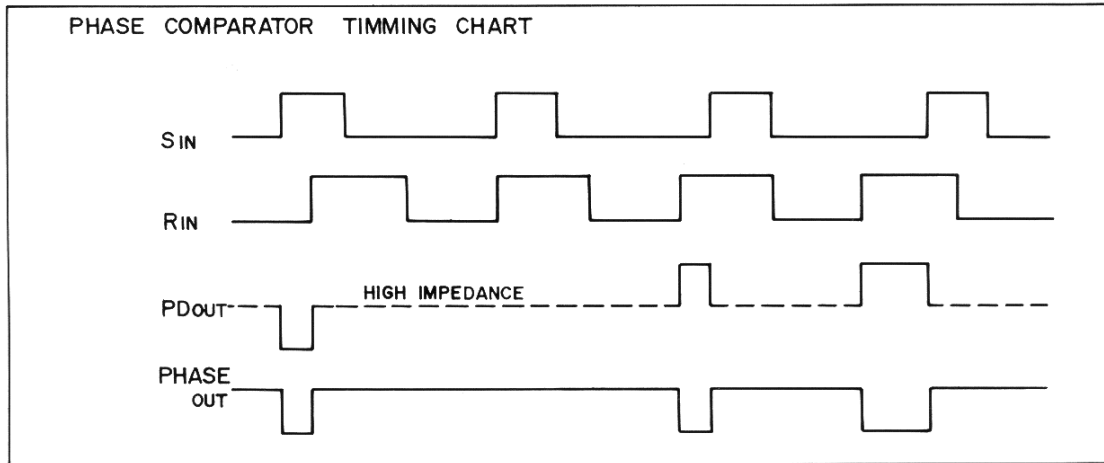
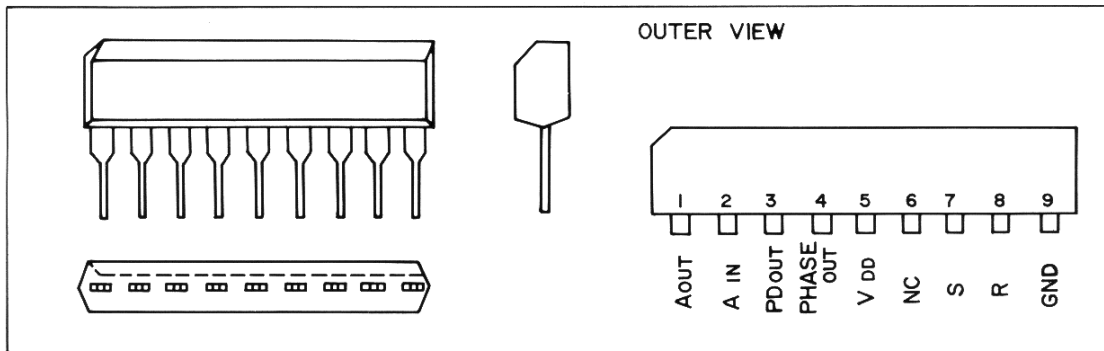
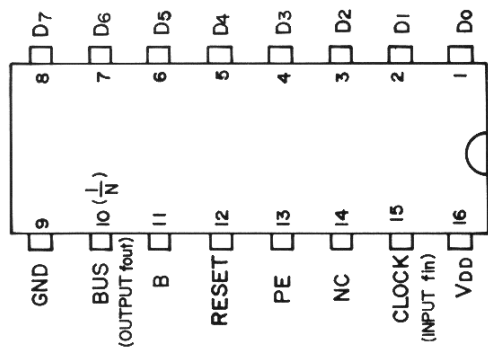
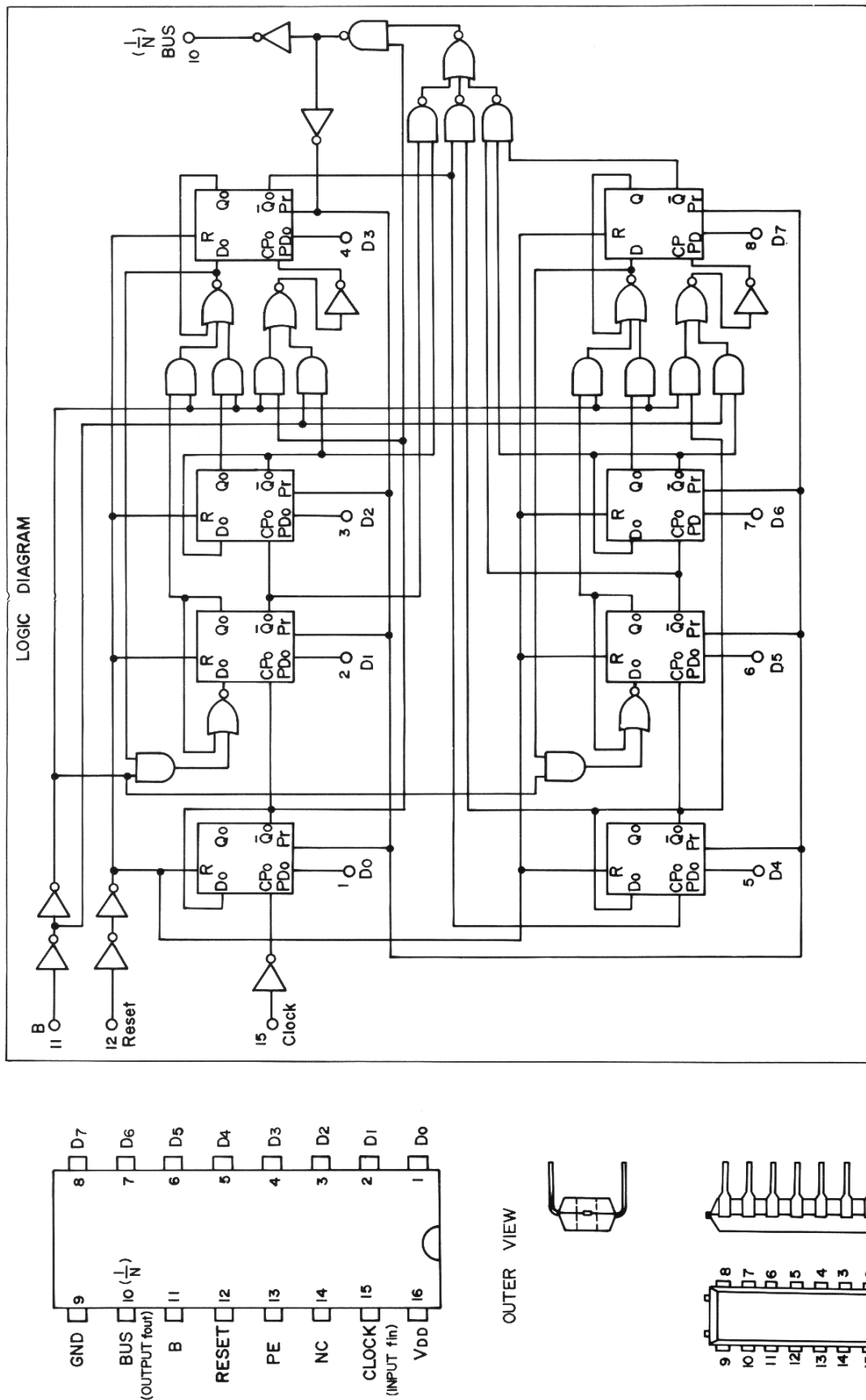


Figure 9 EQUIVALENT CIRCUIT OF IC-202

RH-IX1037AFZZ

(IC-203) PROGRAMMABLE DIVIDER



OUTER VIEW



Figure 10 EQUIVALENT CIRCUIT OF IC-203

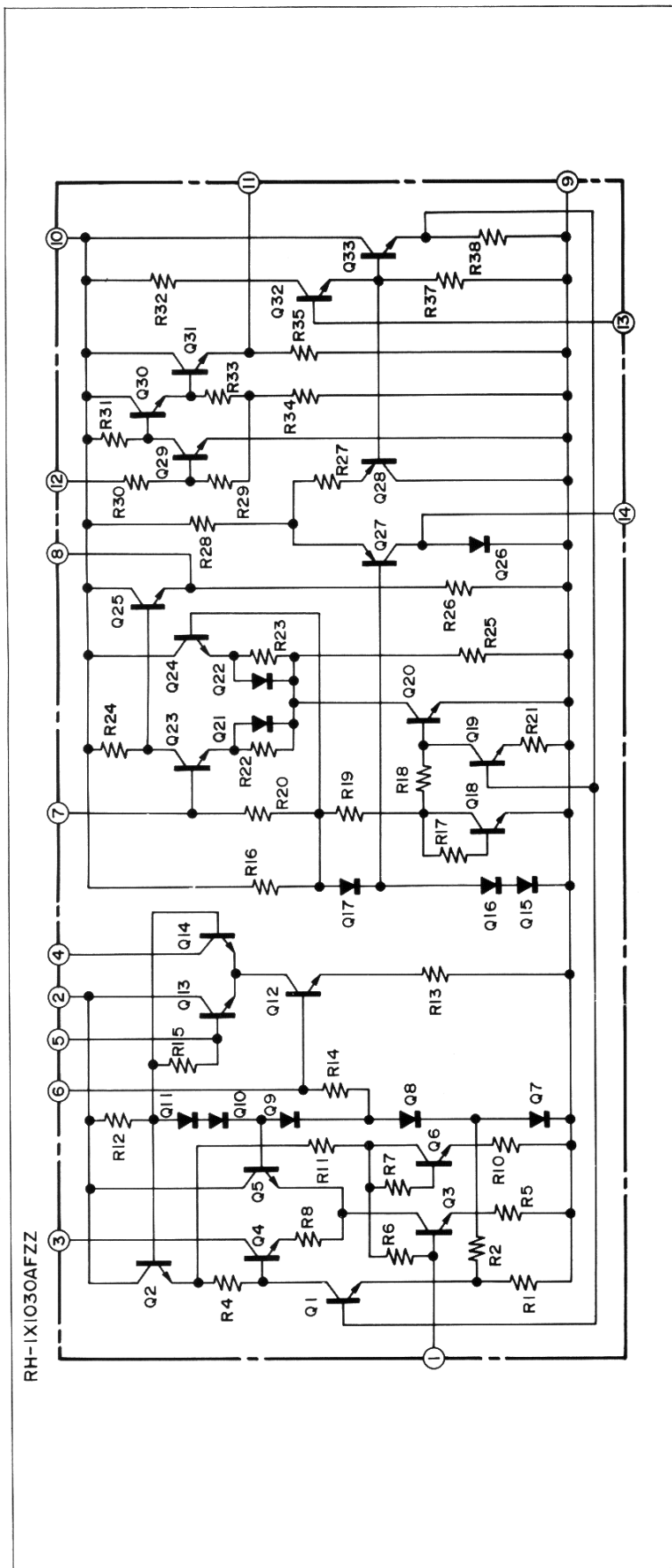


Figure 11 EQUIVALENT CIRCUIT OF IC-1

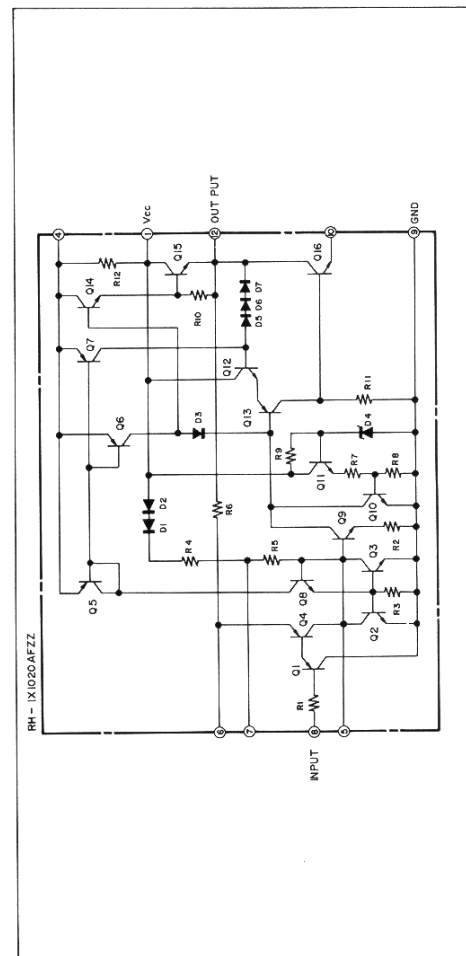


Figure 12 EQUIVALENT CIRCUIT OF IC-301

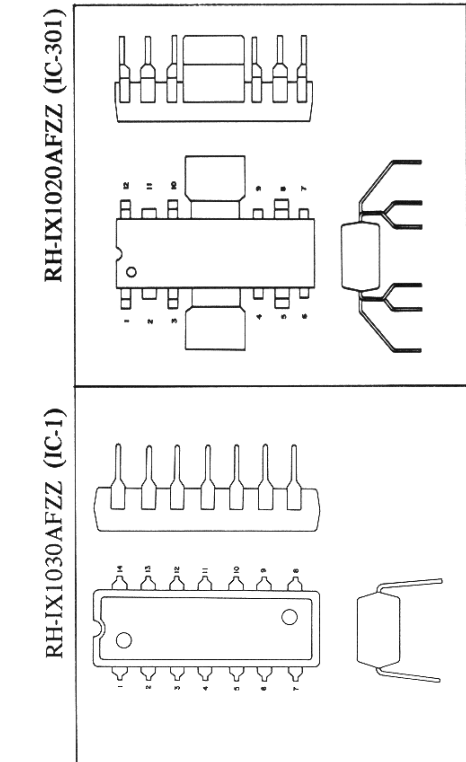


Figure 13 IC BASING

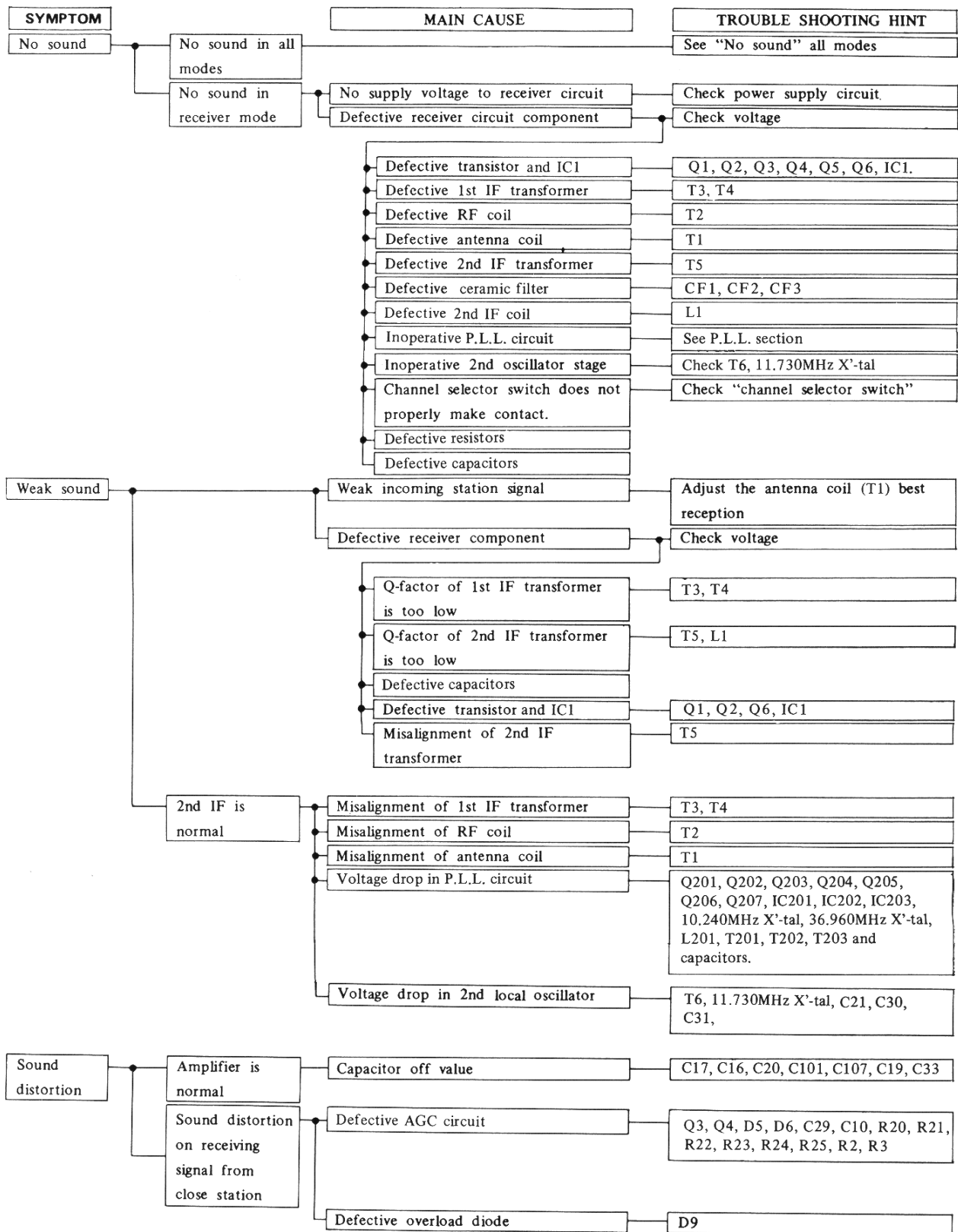
TROUBLE SHOOTING GUIDE (1)

(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.
	No power, lamp is off.	Check speaker cord and voice coil
		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
Weak sound		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
Sound distortion		Defective squelch volume
		R28
		Defective zener diode
		D3
		Defective capacitor
Noise		C28, C27, C25, C10
		Defective power supply circuit
		Check power switch (SW1)
		Defective audio amplifier circuit
		Check and compare voltages of each transistor and IC301
Control has no effect		Capacitor off value, leaky or shorted
		Weak transistor and IC301
		Q101, IC301
		Defective speaker
		Replace speaker
Control has no effect		Insufficient voltage of power circuit
		Check voltage
		Defective audio amplifier circuit
		Weak transistor and IC301
		Q101, IC301
Control has no effect		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



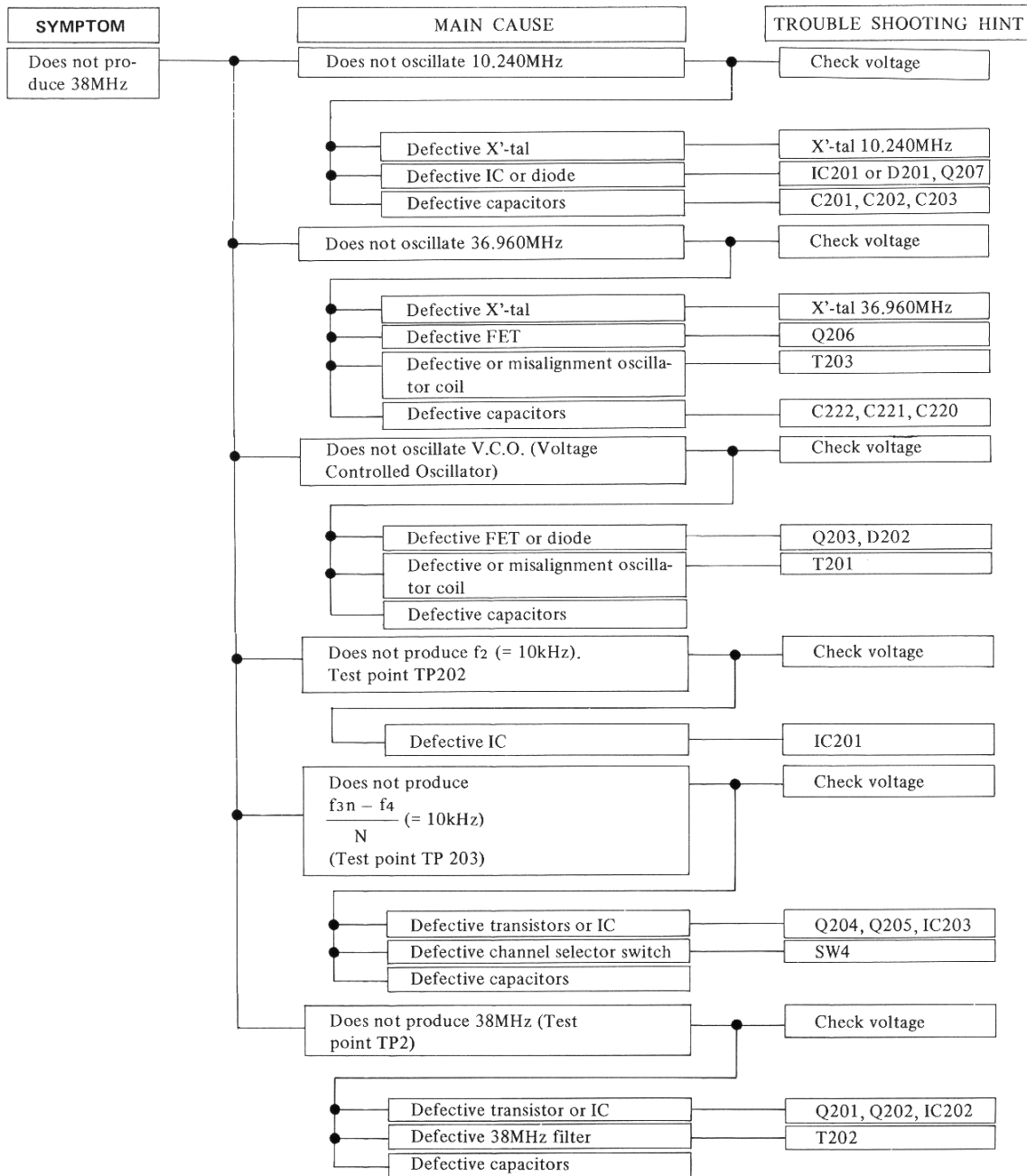
TROUBLE SHOOTING GUIDE (3)

(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 ⑧) with current meter (DC 150mA)
		Check voltage
	Defective transistor	Q304
	Defective driver coil	T304
No modulation or poor modulation	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 ⑨) 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
	Defective audio circuit	Check voltage
	Defective transistor and IC301	Q101, IC301
	Defective transformer	T101
	Defective microphone	Microphone
	Defective modulation limiter circuit	Q102, Q103, D101, R1'3, R112, C117
	Defective capacitor	C101 ~ 118, C123 ~ C128

TROUBLE SHOOTING GUIDE (4)

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



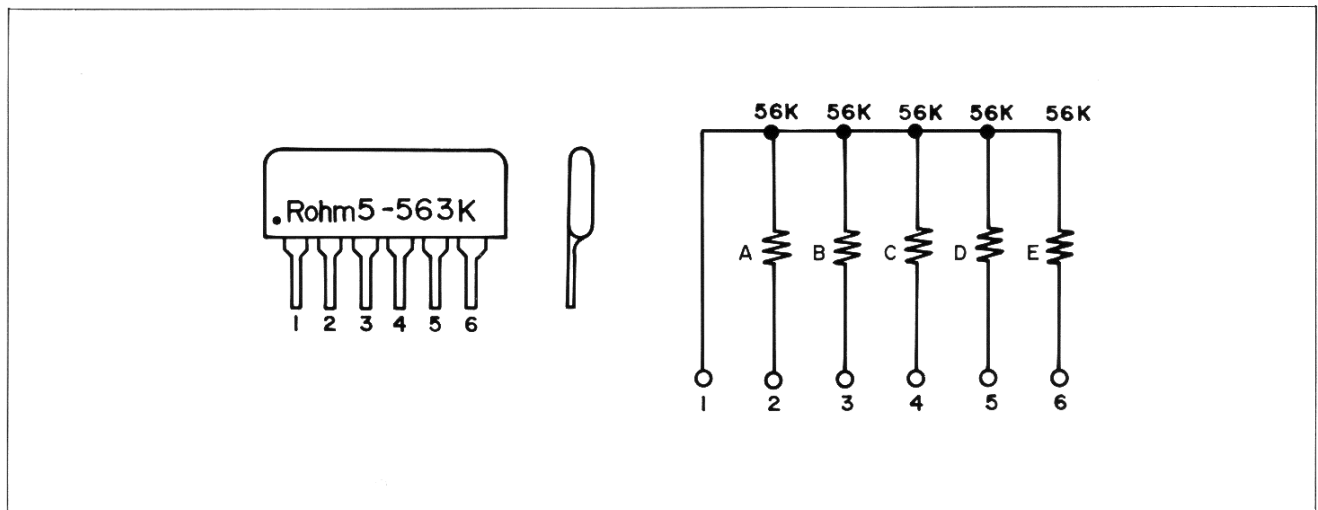


Figure 14 RESISTOR ARRAY

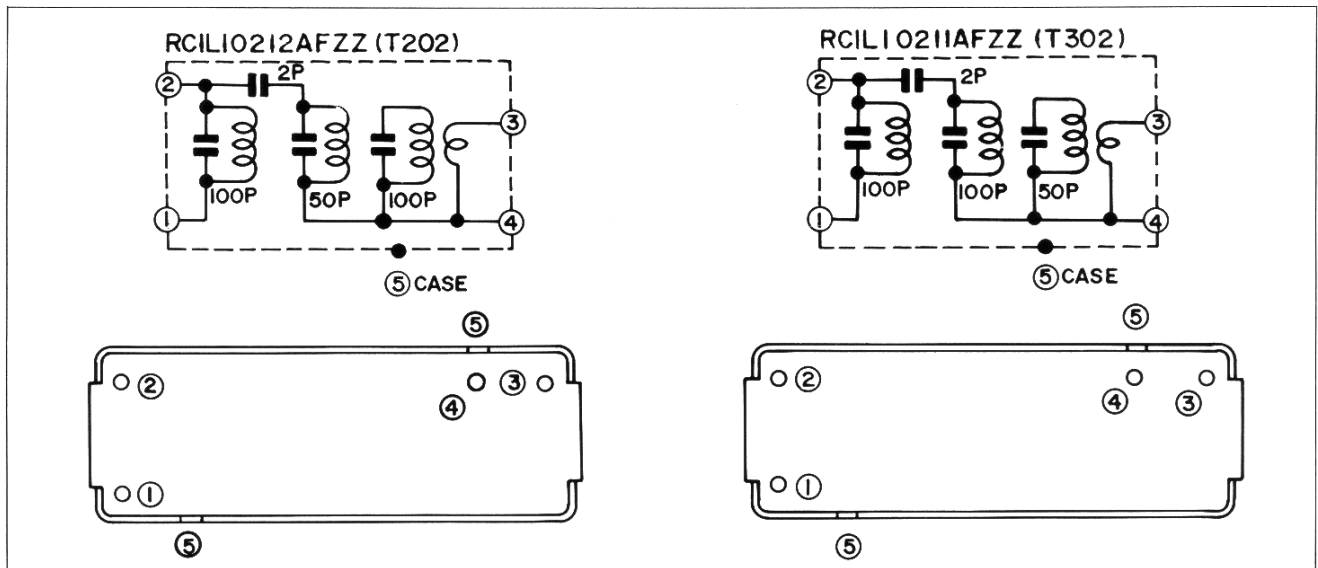


Figure 15 TRANSFORMERS (T202 and T302) BASING

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.

REF. NO. GROUP	Q303	Q304	Q305	C328	C314	C315	C316
A	2SC815 ① P	2SC1957	2SC1909	22PF	390PF	330PF	10PF
B	2SC1166 ② Y or ③ O	2SC495 ④ T	2SC1237	10PF	220PF	470PF	39PF

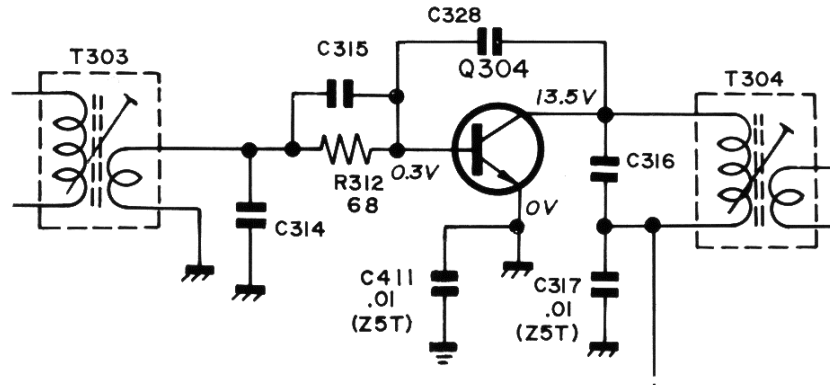
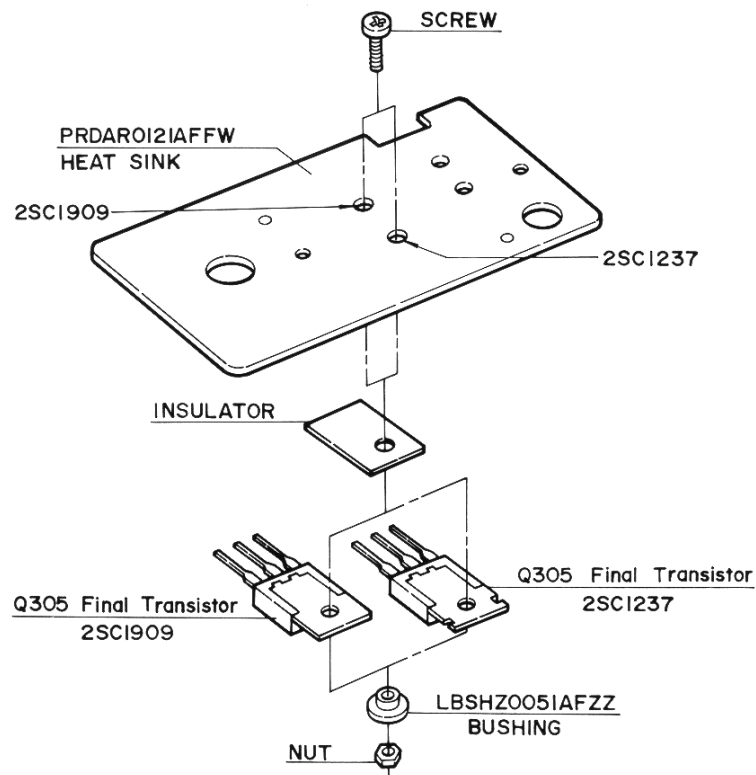


Figure 16



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

REF. NO.	PART NO.	DESCRIPTION	PRICE	REF. NO.	PART NO.	DESCRIPTION	PRICE
INTEGRATED CIRCUITS							
IC1	RH-IX1030AFZZ	2nd IF Amplifier and Detector		Q301	VS2SK49-F/-1	Transmitter, FET, Crystal (11.275MHz) Oscillator (2SK49 (F))	
IC201	RH-IX1039AFZZ	Oscillator and Divider		Q302	VS2SC945LP/-1 or VS2SC735-Y/-1	Transmitter, 27MHz Mixer (2SC945 (L) P or 2SC735 (Y))	
IC202	RH-IX1038AFZZ	Phase Comparator and Low Pass Filter		Q303	RH-TX1008AFZZ	Transmitter, Buffer Amplifier (2SC815 (1) P)	
IC203	RH-IX1037AFZZ	Programmable Divider		* Q304	VS2SC1957/-1	Transmitter, Driver (2SC1957)	
IC301	RH-IX1020AFZZ	Driver and Audio Amplifier		Q305	VS2SC1909/-1	Transmitter, Final (2SC1909)	
TRANSISTORS				Q303	VS2SC1166-Y-1 or VS2SC1166-O-1	Transmitter, Buffer Amplifier (2SC1166 (Y) or (O))	
Q1	VS2SC1675M/-1 or VS2SC784-R/-1	RF Amplifier (2SC1675 (M) or 2SC784 (R))		* Q304	VS2SC495-T/-1	Transmitter, Driver (2SC495 (T))	
Q2	VS2SC1675M/-1 or VS2SC394-Y/-1	1st-Mixer (2SC1675 (M) or 2SC394 (Y))		Q305	VS2SC1237-1F	Transmitter, Final (2SC1237)	
Q3	VS2SC945LK/-1 or VS2SC373-G/-1	AGC Amplifier (2SC945 (L) K or 2SC373)		* See the descriptions in page 20.			
Q4	VS2SC945LP/-1 or VS2SC373-G/-1	AGC Amplifier (2SC945 (L) P or 2SC373)		DIODES			
Q5	VS2SC900-U/-1 or VS2SC733-B/-1	Squelch Voltage Amplifier (2SC900 (U) or 2SC733 (BL))		D1	VHD1S2076/-1	Static Protector (1S2076)	
Q6	VS2SC460-B/-1	2nd-Mixer (2SC460 (B))		D2	VHD1S2076/-1	Static Protector (1S2076)	
Q101	VS2SC945LP/-1	AF Amplifier (2SC945 (L) P)		D3	VHEWZ-100//1F	Zener Diode, Voltage Regulator (10V±0.5V)	
Q102	VS2SD227-V/-1 or VS2SC735-Y/-1	Modulation Limiter Amplifier (2SD227 (V) or 2SC735 (Y))		D4	VHD1N60///-1	A.N.L. (Automatic Noise Limiter) (1N60)	
Q103	VS2SC945LP/-1 or VS2SC373-G/-1	Modulation Limiter Amplifier (2SC945 (L) P or 2SC373)		D5	VHD1N60///-1	AGC Detector (1N60)	
Q201	VS2SC945LP/-1 or VS2SC373-G/-1	P.L.L. Synthesizer, Gate (2SC945 (L) P or 2SC373)		D6	VHD1N60///-1	AGC Detector (1N60)	
Q202	VS2SC945LP/-1 or VS2SC394-Y/-1	P.L.L. Synthesizer, Buffer (2SC945 (L) P or 2SC394 (Y))		D7	VHD1S2076/-1	Static Protector (1S2076)	
Q203	VS2SK49-F/-1	P.L.L. Synthesizer, FET, V.C.O. (Voltage Controlled Oscillator) (2SK49 (F))		D8	VHD1N60///-1	S (Signal) Meter (1N60)	
Q204	VS2SC945LP/-1 or VS2SC373-G/-1	P.L.L. Synthesizer, Buffer (2SC945 (L) P or 2SC373)		D9	VHD1N60///-1	Overload (1N60)	
Q205	VS2SC945LP/-1 or VS2SC373-G/-1	P.L.L. Synthesizer, Mixer (2SC945 (L) P or 2SC373)		D101	VHD1N60///-1	Modulation Detector (1N60)	
Q206	VS2SK49-F/-1	P.L.L. Synthesizer, FET, 36.960MHz Oscillator (2SK49 (F))		D201	VHEXZ-090/-1	Zener Diode, Voltage Regulator (9V±0.25V)	
Q207	VS2SD471-S/-1 or VS2SC1741/-1	P.L.L. Synthesizer, Voltage Regulator (2SD471 (S) or 2SC1741)		D202	VHCB109G/-1	Varicap, V.C.O.	
				D301	VHD1S2076/-1	RF Power Meter (1S2076)	
				CRYSTALS			
				X3	RCRSB0015AFZZ	11.275MHz	
				X4	RCRSB0016AFZZ	11.730MHz	
				X1	RCRSB0051AFZZ	10.240MHz	
				X2	RCRSB0052AFZZ	36.960MHz	
				CERAMIC FILTER			
				CF1	RFILA0050AFZZ	455kHz, 2nd-IF	
				CF2	RFILA0050AFZZ	455kHz, 2nd-IF	
				CF3	RFILA0001AFZZ	455kHz	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	PRICE	REF. NO.	PART NO.	DESCRIPTION	PRICE
COILS				C30	VCCSPU1HL270J	27PF, 50V, $\pm 5\%$, Ceramic	
L1	RCILZ0014AGZZ	2nd-IF, 1mH		C31	VCCSPU1HL470J	47PF, 50V, $\pm 5\%$, Ceramic	
L101	RCILC0023AFZZ	AF Choke		C32	VCKZPU1HF103Z	.01MFD	
L201	RCILC0024AFZZ	Low Pass Filter		C33	VCQYKU1HM333M	.033MFD, 50V, $\pm 20\%$, Mylar	
L301	RCILC0011AFZZ	RF Choke		C35	VCCSPU1HL120J	12PF, 50V, $\pm 5\%$, Ceramic	
L302	RCILR0135AFZZ	Transmitter, Matching (Loading)		C36	VCCSPU1HL330J	33PF, 50V, $\pm 5\%$, Ceramic	
L303	RCILR0055AFZZ	Transmitter, π -Filter		C37	VCCSPU1HL681J	680PF, 50V, $\pm 5\%$, Ceramic	
L304	RCILC0055AFZZ	Trap, 81MHz		C101	VCQYKU1HM333M	.033MFD, 50V, $\pm 20\%$, Mylar	
L305	RCILC0055AFZZ	Trap, 54MHz		C102	VCQYKU1HM102M	.001MFD, 50V, $\pm 20\%$, Mylar	
TRANSFORMERS				C104	VCQYKU1HM103M	.01MFD, 50V, $\pm 20\%$, Mylar	
T1	RCILA0377AFZZ	Antenna		C106	VCQYKU1HM223M	.022MFD, 50V, $\pm 20\%$, Mylar	
T2	RCILR0304AFZZ	RF		C107	VCQYKU1HM222M	.0022MFD, 50V, $\pm 20\%$, Mylar	
T3	RCILI0210AFZZ	1st-IF (11.275MHz)		C108	VCQYKU1HM103M	.01MFD, 50V, $\pm 20\%$, Mylar	
T4	RCILI0210AFZZ	1st-IF (11.275MHz)		C109	VCQYKU1HM222M	.0022MFD, 50V, $\pm 20\%$, Mylar	
T5	RCILI0154AFZZ	2nd-IF (455kHz)		C119	VCKZPU1HF104Z	.1MFD	
T6	RCILI0210AFZZ	2nd Local Oscillator (11.730MHz)		C122	VCKZPU1HF104Z	.1MFD	
T101	RTRNM0050AFZZ	Output and Modulation		C123	VCKZPU1HF103Z	.01MFD	
T102	RTRNC0003AFZZ	Power Choke		C124	VCKZPU1HF103Z	.01MFD	
T201	RCILB0384AFZZ	Voltage Controlled Oscillator		C125	VCQYKU1HM222M	.0022MFD, 50V, $\pm 20\%$, Mylar	
T202	RCILI0212AFZZ	38MHz Filter		C126	VCQYKU1HM333M	.033MFD, 50V, $\pm 20\%$, Mylar	
T203	RCILB0383AFZZ	36.960MHz Oscillator		C127	VCKYPU1HB103M	.01MFD, 50V, $\pm 20\%$, Ceramic	
T301	RCILB0378AFZZ	Transmitter, 11.275MHz Oscillator		C128	VCKZPU1HF223Z	.022MFD	
T302	RCILI0211AFZZ	Transmitter, 27MHz Filter		C201	VCCSPU1HL470J	47PF, 50V, $\pm 5\%$, Ceramic	
T303	RCILB0221AFZZ	Transmitter, Buffer		C202	RTO-H1009AFZZ	Trimmer Capacitor, 10.240MHz Oscillator	
T304	RCILR0037AFZZ	Transmitter, Driver		C203	VCCSPU1HL470J	47PF, 50V, $\pm 5\%$, Ceramic	
CAPACITORS				C205	VCKZPU1HF103Z	.01MFD	
(Unless otherwise specified capacitors are 50V, +80 $\pm 20\%$, Ceramic Type)				C206	VCKZPU1HF103Z	.01MFD	
C1	VCKZPU1HF103Z	.01MFD		C207	VCKZPU1HF103Z	.01MFD	
C2	VCKZPU1HF103Z	.01MFD		C208	VCCCPU1HH180J	18PF (CH), 50V, $\pm 5\%$, Ceramic	
C3	VCKZPU1HF103Z	.01MFD		C209	VCCCPU1HH100F	10PF (CH), 50V, $\pm 1\text{PF}$, Ceramic	
C4	VCKZPU1HF103Z	.01MFD		C210	VCKZPU1HF103Z	.01MFD	
C5	VCKZPU1HF223Z	.022MFD		C211	VCCUPU1HJ150J	15PF (UJ), 50V, $\pm 5\%$, Ceramic	
C6	VCKYPU1HB472M	.0047MFD, 50V, $\pm 20\%$, Ceramic		C213	VCCCPU1HH220J	22PF (CH), 50V, $\pm 5\%$, Ceramic	
C7	VCKZPU1HF223Z	.022MFD		C214	VCCSPU1HL220J	22PF, 50V, $\pm 5\%$, Ceramic	
C8	VCKZPU1HF103Z	.01MFD		C215	VCQYKU1HM223M	.022MFD, 50V, $\pm 20\%$, Mylar	
C9	VCCSPU1HL2R0C	2PF, 50V, $\pm 0.25\text{PF}$, Ceramic		C216	VCCSPU1HL331J	330PF, 50V, $\pm 5\%$, Ceramic	
C10	VCCSPU1HL220J	22PF, 50V, $\pm 5\%$, Ceramic		C218	VCCCPU1HH5R0C	5PF (CH), 50V, $\pm 0.25\text{PF}$, Ceramic	
C11	VCKYPU1HB472M	.0047MFD, 50V, $\pm 20\%$, Ceramic		C219	VCKZPU1HF103Z	.01MFD	
C12	VCCSPU1HL330J	33PF, 50V, $\pm 5\%$, Ceramic		C220	VCCCPU1HH5R0C	5PF (CH), 50V, $\pm 0.25\text{PF}$, Ceramic	
C13	VCKZPU1HF103Z	.01MFD		C221	VCCUPU1HJ100J	10PF (UJ), 50V, $\pm 5\%$, Ceramic	
C15	VCKZPU1HF103Z	.01MFD		C222	RTO-H1009AFZZ	Trimmer Capacitor, 36.960MHz Oscillator	
C16	VCKZPU1HF103Z	.01MFD		C223	VCKZPU1HF103Z	.01MFD	
C17	VCQYKU1HM103M	.01MFD, 50V, $\pm 20\%$, Mylar		C224	VCKZPU1HF103Z	.01MFD	
C19	VCQYKU1HM153M	.015MFD, 50V, $\pm 20\%$, Mylar		C227	VCKYPU1HB102M	.001MFD, 50V, $\pm 20\%$, Ceramic	
C20	VCQYKU1HM223M	.022MFD, 50V, $\pm 20\%$, Mylar		C228	VCCCPU1HH5R0C	5PF (CH), 50V, $\pm 0.25\text{PF}$, Ceramic	
C21	VCCSPU1HL680J	68PF, 50V, $\pm 5\%$, Ceramic		C230	VCCUPU1HJ180J	18PF (UJ), 50V, $\pm 5\%$, Ceramic	
C22	VCCSPU1HL131J	130PF, 50V, $\pm 5\%$, Ceramic		C232	VCKZPU1HF103Z	.01MFD	
C23	VCKYPU1HB102M	.001MFD, 50V, $\pm 20\%$, Ceramic		C233	VCCSPU1HL680J	68PF, 50V, $\pm 5\%$, Ceramic	
C25	VCKZPU1HF103Z	.01MFD		C301	VCCSPU1HL560J	56PF, 50V, $\pm 5\%$, Ceramic	
C26	VCKZPU1HF103Z	.01MFD		C302	VCKZPU1HF103Z	.01MFD	
				C304	VCCSPU1HL330J	33PF, 50V, $\pm 5\%$, Ceramic	
				C305	VCCSPU1HL101J	100PF, 50V, $\pm 5\%$, Ceramic	
				C308	VCKZPU1HF103Z	.01MFD	

PARTS LIST


REF. NO.	PART NO.	DESCRIPTION	PRICE	REF. NO.	PART NO.	DESCRIPTION	PRICE
C309	VCKZPU1HF103Z	.01MFD		C212	VCEALU1HW104M	.1MFD, 50V, $\pm 20\%$,	
C310	VCKZPU1HF103Z	.01MFD		C217	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	
C311	VCCSPU1HL180J	18PF, 50V, $\pm 5\%$, Ceramic		C225	VCEAAU1AW107Y	100MFD, 10V, +50 –10%	
C312	VCKZPU1HF103Z	.01MFD		C229	VCEAAU1AW477Y	470MFD, 10V, +50 –10%	
C313	VCKZPU1HF103Z	.01MFD		C323	VCAAKU0XA474M	.47MFD, 6.3V, $\pm 20\%$, Aluminum	
C314	VCCSPU1HL221J	220PF, 50V, $\pm 5\%$, Ceramic		RESISTORS			
C314	VCCSPU1HL391J	390PF, 50V, $\pm 5\%$, Ceramic		(Unless otherwise specified resistors are 1/4W, $\pm 5\%$, Carbon Type)			
C315	VCCSPU1HL471J	470PF, 50V, $\pm 5\%$, Ceramic		R1	VRD-ST2EE562J	5.6K ohm	
C315	VCCSPU1HL331J	330PF, 50V, $\pm 5\%$, Ceramic		R2	VRD-ST2EE152J	1.5K ohm	
C316	VCCSPU1HL390J	39PF, 50V, $\pm 5\%$, Ceramic		R3	VRD-ST2EE102J	1K ohm	
C316	VCCSPU1HL100F	10PF, 50V, ± 1 PF, Ceramic		R5	VRD-ST2EE333J	33K ohm	
C317	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 –20%, Ceramic		R6	VRD-ST2EE472J	4.7K ohm	
C318	VCCSPU1HL511J	510PF, 50V, $\pm 5\%$, Ceramic		R7	VRD-ST2EE102J	1K ohm	
C319	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 –20%, Ceramic		R9	VRD-SU2EY273K	27K ohm, 1/4W, $\pm 10\%$, Carbon	
C320	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 –20%, Ceramic		R10	VRD-ST2EE102J	1K ohm	
C321	VCCSBU1HL181J	180PF, 50V, $\pm 5\%$, Ceramic		R12	VRD-SU2EY151K	150 ohm, 1/4W, $\pm 10\%$, Carbon	
C322	VCCSPU1HL680J	68PF, 50V, $\pm 5\%$, Ceramic		R13	VRD-SU2EY472K	4.7K ohm, 1/4W, $\pm 10\%$, Carbon	
C324	VCCSPU1HL220J	22PF, 50V, $\pm 5\%$, Ceramic		R14	VRD-SU2EY333K	33K ohm, 1/4W, $\pm 10\%$, Carbon	
C325	VCCSPU1HL680J	68PF, 50V, $\pm 5\%$, Ceramic		R15	VRD-SU2EY153K	15K ohm, 1/4W, $\pm 10\%$, Carbon	
C326	VCKZPU1HF103Z	.01MFD		R16	VRD-SU2EY223K	22K ohm, 1/4W, $\pm 10\%$, Carbon	
C328	VCCSPU1HL220J	22PF, 50V, $\pm 5\%$, Ceramic		R17	VRD-SU2EY124K	120K ohm, 1/4W, $\pm 10\%$, Carbon	
C328	VCCSPU1HL100F	10PF, 50V, ± 1 PF, Ceramic		R19	RVR-M0119AFZZ	5K (B) ohm, Pot., S (Signal) Meter Adjust	
C401	VCKZPU1HF103Z	.01MFD		R20	VRD-ST2EE224J	220K ohm	
C402	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 –20%, Ceramic		R21	VRD-ST2EE223J	22K ohm	
C404	VCKZPU1HF103Z	.01MFD		R22	VRD-ST2EE272J	2.7K ohm	
C405	VCKZPU1HF103Z	.01MFD		R23	VRD-ST2EE471J	470 ohm	
C406	VCKZPU1HF103Z	.01MFD		R24	VRD-ST2EE224J	220K ohm	
C407	VCKZPU1HF103Z	.01MFD		R25	VRD-ST2EE333J	33K ohm	
C408	VCKZPU1HF103Z	.01MFD		R27	RVR-M0010AFZZ	30K (B) ohm, Pot., RF Power Meter Adjust	
C409	VCKZPU1HF103Z	.01MFD		R28/SW2	RVR-B0137AFZZ	10K (B) ohm, Squelch/P.A. Switch	
C410	VCKYPU1HB103M	.01MFD, 50V, $\pm 20\%$, Ceramic		-A, B			
C411	VCKYPU1SD103Z	.01MFD (Z5T), 30V, +80 –20%, Ceramic		R29	VRD-ST2EE103J	10K ohm	
C412	VCKZPU1HF103Z	.01MFD		R30	VRD-ST2EE472J	4.7K ohm	
ELECTROLYTIC CAPACITORS				R31	VRD-ST2EE473J	47K ohm	
C14	VCEAAU1AW107Y	100MFD, 10V, +50 –10%		R35	VRD-SU2EY333K	33K ohm, 1/4W, $\pm 10\%$, Carbon	
C18	VCEAAU1EW335Y	3.3MFD, 25V, +50 –10%		R36	VRD-SU2EY472K	4.7K ohm, 1/4W, $\pm 10\%$, Carbon	
C27	VCEAAU1HW105Y	1MFD, 50V, +50 –10%		R37	VRD-SU2EY222K	2.2K ohm, 1/4W, $\pm 10\%$, Carbon	
C28	VCEAAU1EW475Y	4.7MFD, 25V, +50 –10%		R38	VRD-ST2EE222J	2.2K ohm	
C29	VCEAAU1CW106Y	10MFD, 16V, +50 –10%		R39	VRD-ST2EY473K	47K ohm, 1/4W, $\pm 10\%$, Carbon	
C34	VCEAAU1CW106Y	10MFD, 16V, +50 –10%		R40	VRD-SU2EY100K	10 ohm, 1/4W, $\pm 10\%$, Carbon	
C103	VCEAAU1EW475Y	4.7MFD, 25V, +50 –10%		R98	VRD-ST2HA470K	47 ohm, 1/2W, $\pm 10\%$, Carbon	
C105	VCEAAU1CW106Y	10MFD, 16V, +50 –10%		R101/	RVR-D0104AFZZ	5K (D) ohm, Off-On/Volume Control	
C110	VCEAAU1CW476Y	47MFD, 16V, +50 –10%		SW1			
C111	VCEAAU1AW336Y	33MFD, 10V, +50 –10%		R102	VRD-ST2EE331J	330 ohm	
C112	VCEALU1HW104M	.1MFD, 50V, $\pm 20\%$,					
C113	VCEAAU1CW476Y	47MFD, 16V, +50 –10%					
C114	VCEALU1HW104M	.1MFD, 50V, $\pm 20\%$,					
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%					

3

28


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		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		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 × 8mm), Plus and Minus	
	XNESD50-40000	Nut (5φ)	
	XWHSD30-05000	Washer (3φ)	
	XWHSD50-05000	Washer (5φ)	
	XWSSJ50-13000	Spring Washer (5φ)	



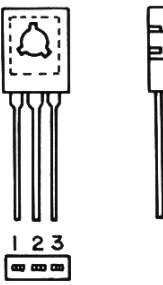
1. EMITTER
2. COLLECTOR
3. BASE

2SC373 2SC735
2SC733 2SC784
2SC380 2SC394



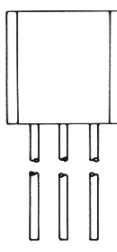
1. EMITTER
2. COLLECTOR
3. BASE

2SC1166



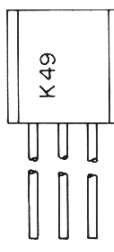
1. EMITTER
2. COLLECTOR
3. BASE

2SC495 (T)



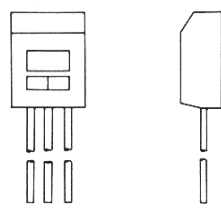
1. EMITTER
2. COLLECTOR
3. BASE

2SC900
2SC945 (L)
2SC1675
2SD227
2SC815 (1) P



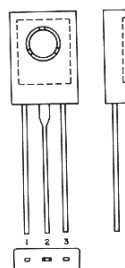
1. GATE
2. SOURCE
3. DRAIN

2SK 49



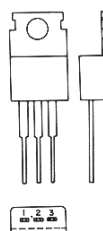
1. EMITTER
2. COLLECTOR
3. BASE

2SD471 (S)



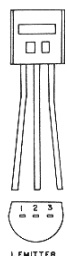
1. EMITTER
2. COLLECTOR
3. BASE

2SC1957



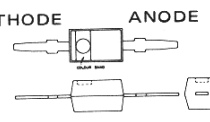
1. BASE
2. COLLECTOR
3. EMITTER

2SC1237



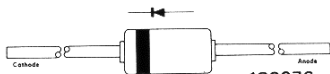
1. EMITTER
2. COLLECTOR
3. BASE

2SC1741

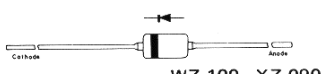


CATHODE ANODE


BB109G



1S2076



WZ-100 XZ-090



1N60

Figure 20 SEMICONDUCTORS BASING