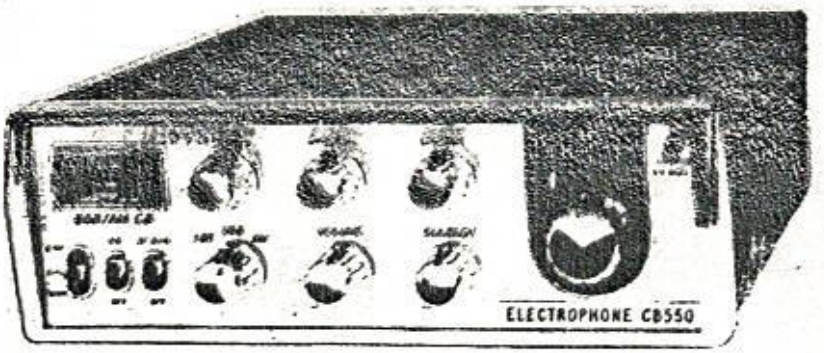
ELECTROPHONE

Model CB 550

18 CHANNEL SSB/AM MOBILE
CB TRANSCEIVER

Service Manual and Alignment Procedure



Standard Components pty. ltd.

10 HILL STREET, LEICHHARDT (P.O. BOX 174) N.S.W. 2040

TELEX: AA26827 SCOME

TABLE OF CONTENTS.

SERVICE MANUAL

CB -550

18CHANNEL CITIZEN BAND AM/SSB MOBILE TRANSCEIVER

SPECIFICATIONS

. RECEIVER

Channels	: 18
Frequency Range	: 27.015 - 27.225 MHz.
System	: SSB Single conversion superheterodyne
	AM Dual conversion super heterodyne
Sensitivity	: SSB 0.25 uV for 10 dB S/N
	AM 1 uV for 10 dB S/N
Selectivity	: SSB 2.5 kHz at 6 dB down
	AM 6 kHz at 6 dB down
Clarifier	: - 600 Hz range
Audio output	: 3 watts at 8 ohm
Squelch Range	: SSB 0.7 uV to 20 uV
	AM 1 uV to 500 uV
Intermediate Frequency	: SSB 10.695 MHz
	AM 1st 10.695 MHz,2nd 0.455 MHz

. SSB TRANSMITTER

Generation	: Double Balanced Modulator with Crystal Latice Filter
RF Output Power	: 12 W P.E.P., FCC maximum, at 13.8 V DC
Carrier Suppression	: More than 40 dB down
Unwanted Side Band Suppression	: More than 60 dB down
Harmonic Suppression	: More than 60 dB down

. AM TRANSMITTER

RF Output Power	: 4 watts (FCC max.), at 13.8 V DC
Harmonic Suppression	: More than 60 dB down
Modulation	: High Class Level B

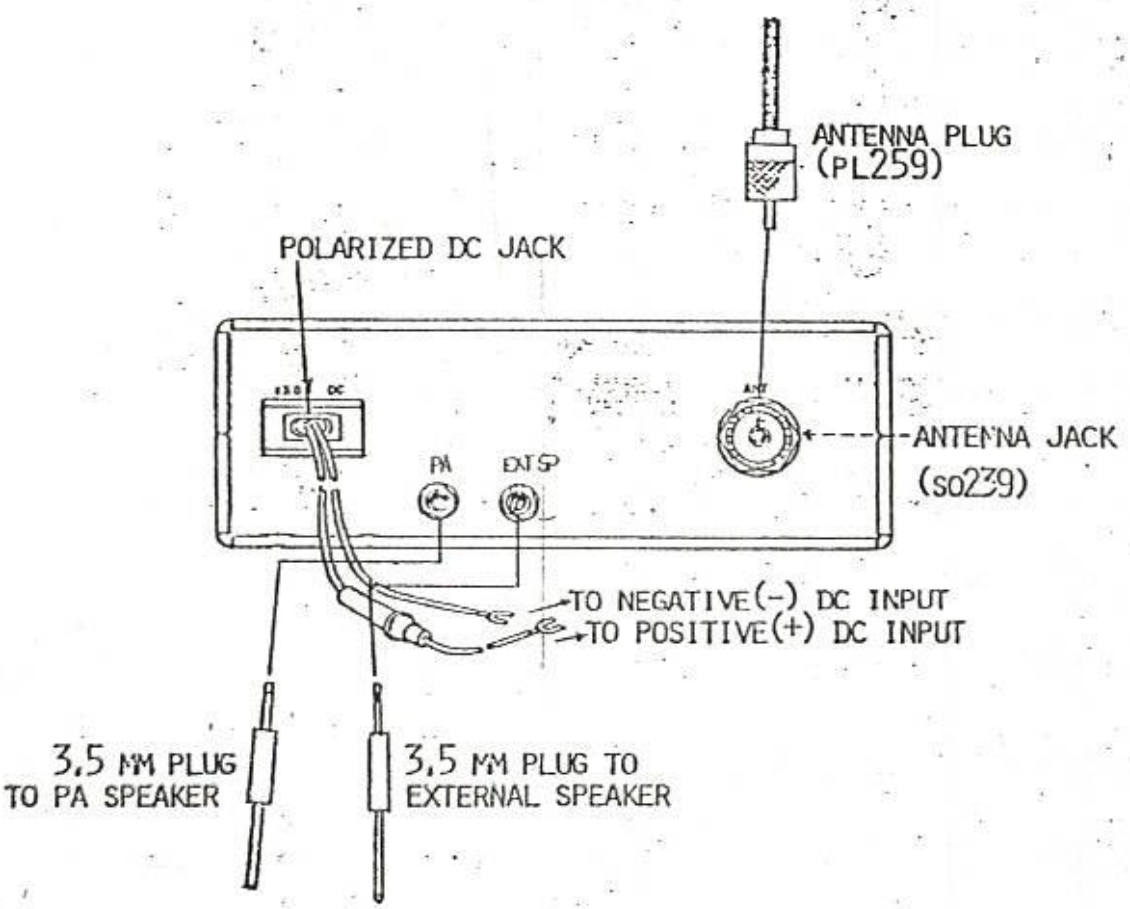
. COMMON

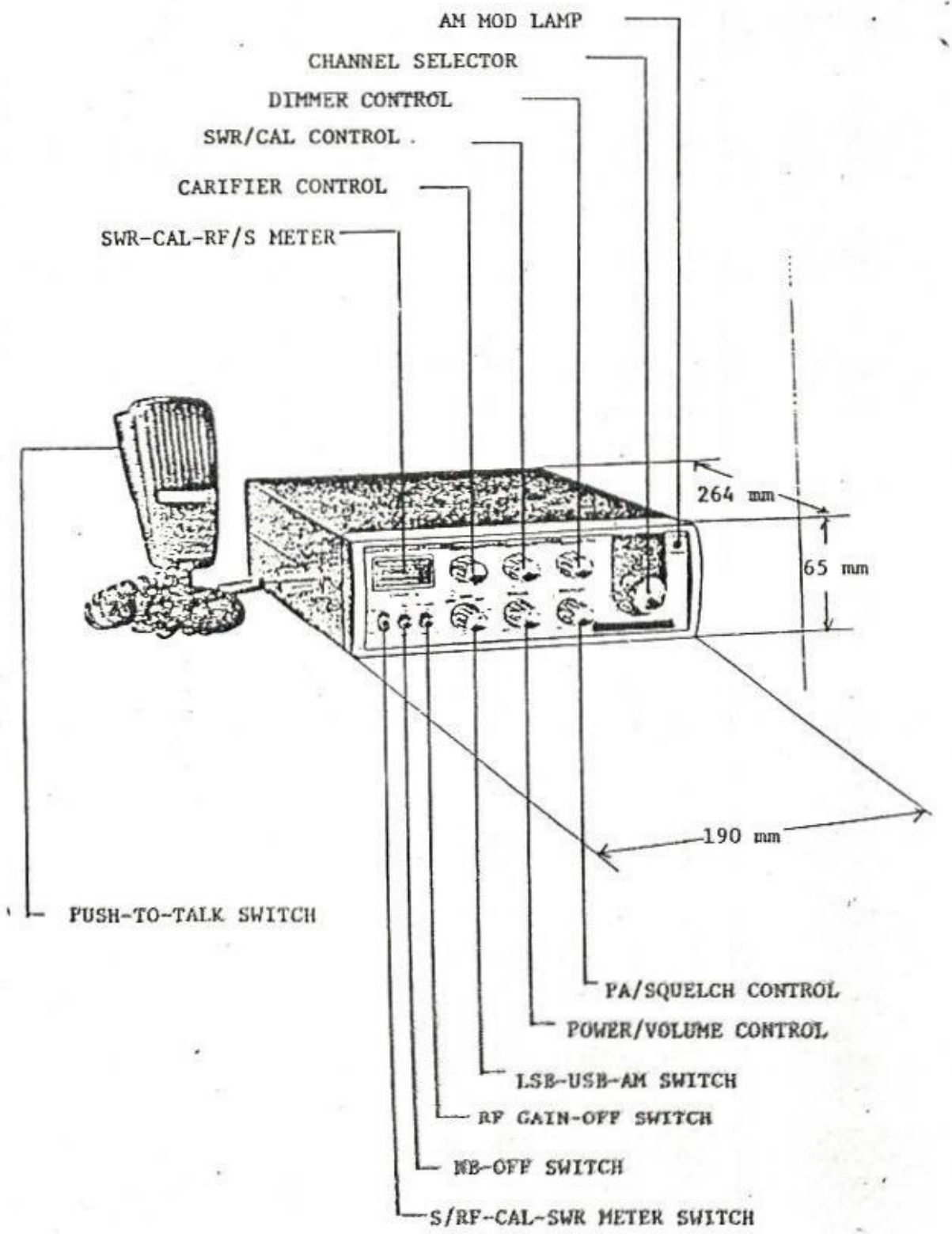
Power Supply	: DC 13.8 V Negative or Positive Ground
Speaker Impedance	: 8 ohm
Semi Conductors Device	: ICs 5, Transistors 46
Dimensions	: Width : 190 mm
	Depth : 264 mm
	Height: 65 mm

FEATURES

- § Under-dash 18 channel AM/SSB Mobile Transceiver
- § DC 13.8 V, Negative or Positive Ground System
- § PLL (Phase Locked Loop) Frequency synthesizing System
- § Clarifier circuit
- § Dimmer circuit
- § NB (Noise Blanker) circuit
- § Three-functions Meter,RF power output,SWR,CAL
- § Variable Squelch control
- § Easy-to service circuit boards
- § Coaxial type antenna connector
- § Press-to talk switch with microphone
- § AGC (Automatic gain control)
- § LED digital read-out channel indicator
- § Three-functions mode of operation,AM,LSB & USB
- § PS System (Public address amplifier system)
- § All solid-state,compact,light-weight,suitable for mobile installation

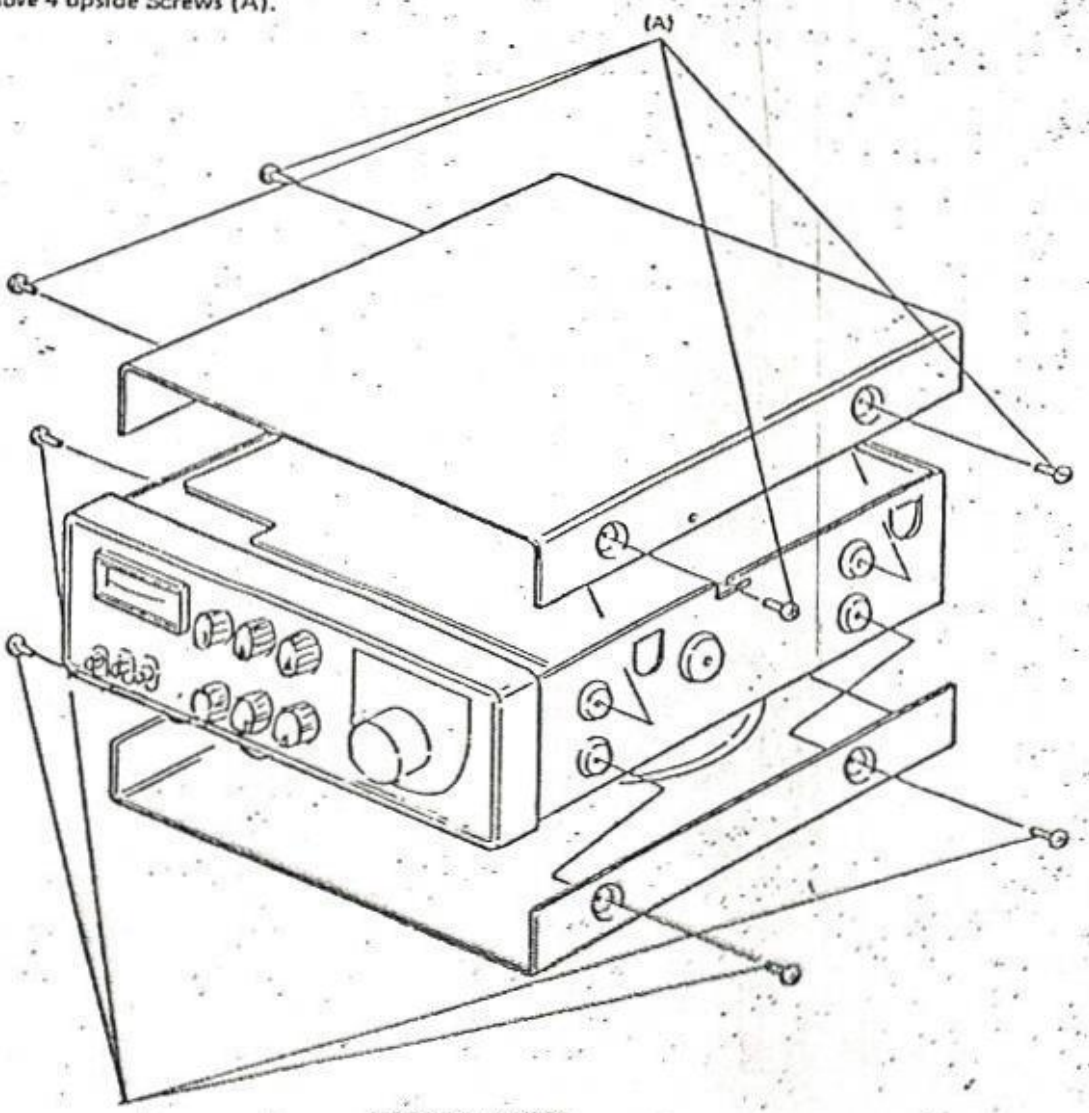
CONNECTIONS DIAGRAM




AM MOD LAMP
CHANNEL SELECTOR
DIMMER CONTROL
SWR/CAL CONTROL
CARIFIER CONTROL
SWR-CAL-RF/S METER
264 mm
65 mm
190 mm
PUSH-TO-TALK SWITCH
PA/SQUELCH CONTROL
POWER/VOLUME CONTROL
LSB-USB-AM SWITCH
RF GAIN-OFF SWITCH
NB-OFF SWITCH
S/RF-CAL-SWR METER SWITCH

UPPER COVER

1. To Remove upside case.
   - Remove 4 upside Screws (A).

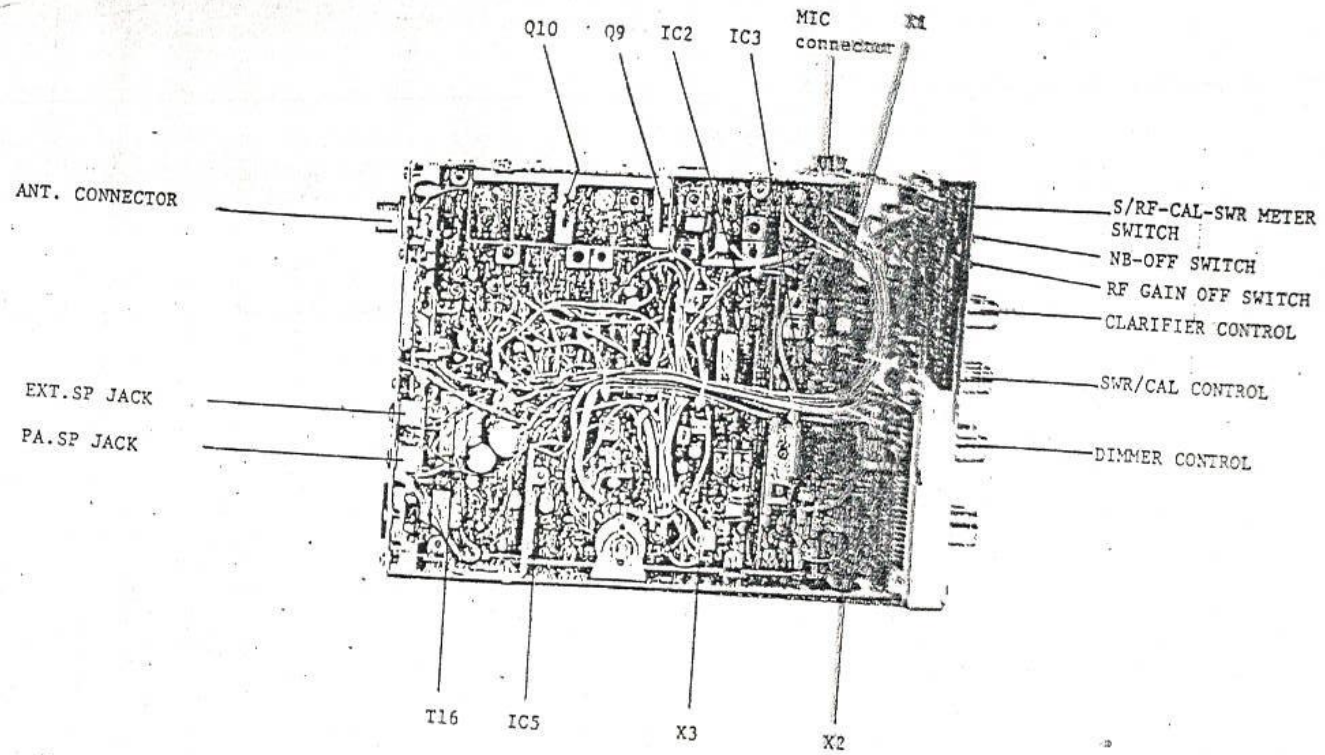


BOTTOM COVER

2. To Remove Bottom case.
   - Remove 4 Bottom Screws (B).

CAUTION: When taking off, remove speaker-leads from speaker terminals.

PARTS LOCATION, TOP VIEW



Semiconductors

(PTBM048A0X)

IC1	PLL02	Phase Detect/Div.
IC2	C3001/TA7310P	V.C.O./Mix.
IC3	C3001/TA7310P	MIXER/RF ALC
IC4	AN612	BLANCE MOD.
IC5	TA7205P	AF AMP.
Q1	2SC900	DC SWITCH
Q2	2SC710	BUFFER
Q3	2SC1687	OSC
Q4	2SC710	DC SWITCH
Q5	2SC710	BUFFER
Q6	2SC710	OSC
Q7	2SA710	RF PRE AMP.
Q8	2SC460	"
Q9	2SC2166	RF DRIVER
Q10	2SC1969	RF POWER
Q11	2SC710	DC SWITCH
Q12	2SC710	OSC
Q13	2SC710	BUFFER
Q14	2SC710	SSB IF AMP.
Q15	2SC710	AM IF AMP.
Q16	2SC710	SSB IF AMP.
Q17	2SC710	"
Q18	2SC710	DC SWITCH
Q19	2SC945	SSB DET.
Q20	2SC710	RF AMP.
Q21	2SC710	DC SWITCH
Q22	2SC710	MIXER
Q23	2SC763	NOISE BLANKER
Q24	2SK34	"
Q25	2SA733	"
Q26	2SC763	"

Q27	2SC710	AM IF AMP.
Q28	2SC710	"
Q29	2SC710	"
Q30	2SK34	SSB AGC
Q31	2SC945	"
Q32	2SA733	SQUELCH
Q33	2SC945	"
Q34	2SC945	"
Q35	2SC900	AF ALC
Q36	2SC945	DC SWITCH
Q37	2SA719	AM AF ALC
Q38	2SA719	DC SWITCH
Q39	2SC945	"
Q40	2SA683	DC SWITCH
Q41	2SC1383	"
Q42	2SA683	"
Q43	2SC1383	"
Q44	2SC1398	AVR.
Q46	2SC945	LAMP MOD.

(PTSW020C0X)

Q251

(PTLD010C0X)

LED301 LED

VOLTAGE MEASUREMENT CHART

IC 1	Terminal	1	5.4 (V)	IC 4	Terminal	1	3.1 (V)△
	"	2	1.9		"	2	3.5 △
	"	3	2.4		"	3	3.5 △
	"	4	-		"	4	0
	"	5	2.9		"	5	6.2 △
	"	6	5.4		"	6	8.3 △
	"	7	0		"	7	4.8 △
	"	8	5.4	IC 5	Terminal	1	13.7 (V)
IC 2	Terminal	1	2.6 (V)		"	2	12.6
	"	2	1.9		"	3	4.0
	"	3	1.3		"	4	8.2
	"	4	2.3		"	5	1.3
	"	5	0		"	6	3.4
	"	6	8.3		"	7	3.4
	"	7	2.0		"	8	1.3
	"	8	4.3		"	9	0
	"	9	5.5		"	10	6.9
IC 3	Terminal	1	2.6 (V) △				
	"	2	2.0 △				
	"	3	-				
	"	4	2.5 △				
	"	5	0 △				
	"	6	7.3 △				
	"	7	2.0 △				
	"	8	7.4 △				
	"	9	6.9 △				

TR	E (V)	C (V)	B (V)
Q1	4.2 △	5.4 △	4.4 △
Q2	1.4	9.3	2.1
Q3	1.0	9.2	1.5
Q4	0	0	0 □
Q5	1.5	5.4	1.5
Q6	0	1.5	0.6
Q7	1.4 △	7.2 △	2.0 △
Q8	0.8 △	13.3 △	1.4 △
Q9	0 △	0.7 △	13.5 △
			(6.4)
Q10	0	13.5 △	0.7 △
		(6.2)	
Q11	0	0	0
			0.7 □
Q12	2.3	7.9	3.1
Q13	4.1 △	6.4 △	4.8 △
Q14	0.6 △	8.6 △	1.3 △
Q15	0.1 △	8.1 △	1.7 △
Q16	0	1.9	0.7
Q17	1.2	5.7	1.9
Q18	0	1.9	0
Q19	0.4	5.4	1.0
Q20	1.1	13.0	1.9

TR	E (V)	C (V)	B (V)
Q21	0	0	0
Q22	1.2	13.0	1.8
Q23	0	5.4	0.8
Q24	0.8	5.4	0
Q25	8.4	3.4	7.7
Q26	0	0	0
Q27	0.6	7.9	1.3
Q28	0	1.8	0.7
Q29	1.1	12.7	1.8
Q30	2.1	7.5	1.7
Q31	1.7	2.2	2.0
Q32	2.7	0.7	2.0
Q33	0	0	0.7
Q34	0	3.4	0
Q35	0	0	0
Q36	0	0	0
Q37	1.5	0	4.4
Q38	1.5	0	7.8
Q39	0	8.4	0
Q40	8.6	8.3	
Q41	7.5	9.4	
Q42	9.2	8.6	
Q43	8.6	9.4	
Q44	9.4	13.8	10.0
Q45	0	0	0

△ : TX

□ : LSB

( ) : AM TX

ALIGNMENT PROCEDURES FOR AM/SSB TRANSCEIVER

1. Test Voltage

DC 13.8V ± 5%, unless otherwise specified.

2. Test Equipment

All test equipment should be properly calibrated.

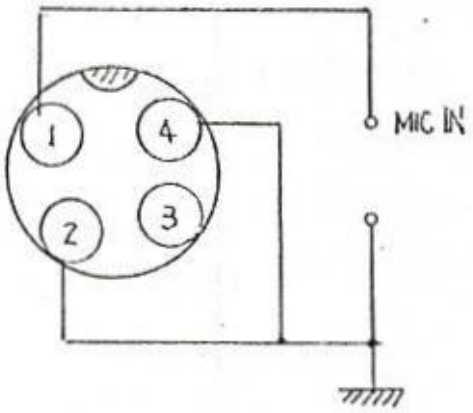
1. Audio Signal Generator, 10 Hz - 20 KHz
2. Audio Level Meter, 1 mV measurable
3. DC Ampare Meter, 2A
4. Regulated Power Supply, DC 0 - 20V, 2A or higher
5. Frequency Counter, 0 - 40 MHz, High Input Impedance Type
6. RF VTVM, Prove Type
7. Oscilloscope, 30 MHz, high input impedance
8. RF Watt Meter, thermo-couple type, 50 ohm, 15W
9. Standard Signal Generator, 100 KHz - 50 MHz, -10 - 100 dB, 50 ohm unbalanced
10. Speaker Dummy Resistor, 8 ohm, 5W
11. Circuit Tester, DC, 20K ohm/V, High Input Impedance Type (20K ohm/V or higher)

CB TRANSMITTER ALIGNMENT

PLL CIRCUIT ALIGNMENT

To set the transceiver into transmit mode without the microphone, insert the plug wired as shown below into the MIC jack on the transceiver.

When applying the audio modulation signal to the microphone input circuit, also use the same plug.



10.240 MHz Frequency Alignment

Place the Channel selector in CH 9 and mode switch in USB position.			
STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(1)	CT3	Frequency Counter to testpoint "TP2" through a 1000 pF coupling capacitor.	Adjust to obtain frequency reading of, 10.240000 MHz ± 50 Hz

10.0525 MHz Frequency Alignment

STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(2)	CT1	Both Oscilloscope and Frequency Counter to the testpoint "TP3" U.S.B	Adjust to obtain frequency reading of, 20.105 MHz ± 40 Hz
(3)	CT2	(Same as above) Place the mode switch in the LSB position. L.S.B.	Adjust to obtain frequency reading of, 20.1035 MHz ± 40 Hz

10.695 MHz Frequency Alignment

Place the mode switch in the USB position.			
STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(4)	CT5	Frequency Counter to testpoint "TP5". U.S.B	Adjust to obtain frequency reading of, 10.695 ± 50 Hz

Place the mode switch in the LSB position.			
STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(5)	CT4	(Same as above) L.S.B	Adjust to obtain frequency reading of, 10.692 ± 50 Hz

V.C.O. CIRCUIT ALIGNMENT

Place Mode Switch in L.S.B. Position

STEP	ADJUST	INDICATOR CONNECTION	REMARKS.
(6)	V.C.O BLOCK	Circuit Tester (DC12 V Range) between the ground and TPI. Note: Meter should have input impedance of 20K ohm or higher.	Turn channel selector to Ch.18 and adjust coil to obtain 1.7V ±.2V, starting from top to bottom when turning the core. Turn Channel selector to Ch.1 and check reading. This should be 2.6V ± .2V.
NOTE: Do not have any modulation during this adjustment of C.V.O. e.g. Remove Microphone.			

RF AMPLIFIER BIAS ALIGNMENT

STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(7)	RV1	An Ampare Meter between the Q10 emitter and chassis ground.	Adjust to obtain bias current of, 35 mA ± 10 mA.

Place the Channel Selector in CH 9 position and mode switch in USB position.

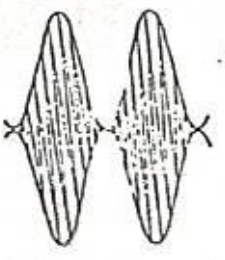
STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(8)	T1	An Oscilloscope to the PIN No.4 of. IC3.	Feed 2.4 kHz, 10 mV Audio signal to the microphone input circuit. Adjust for maximum amplitude of scope-display.
(9)	T2		

Place the Channel Selector in CH 15

STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(10)	T4	An Oscilloscope to the base of Q8.	Adjust for maximum amplitude of scope-display.
(11)	T5		

Replace the Channel Selector to CH 9

STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(12)	T6	An Oscilloscope to the ANT. Terminal in parallel with the Wattmeter.	Adjust for maximum power output on the Wattmeter.
(13)	T11		
(14)	L7		
(15)	L11		
(16)	L13		
(17)	RV4		Decrease Audio Signal input to the microphone circuit to zero. Adjust for minimum amplitude of carrier leakage on the scope display.
(18)	RV5		
(19)	RV2 (ALC)	(Same as above)	Feed two tone (500 Hz and 2400 Hz) signals of 100 mV to the microphone circuit. Adjust to obtain PEP power of 11 W. Make the PEP power output at each Channel is within 10-12 W. Make sure the scope-display of output wave shape shown below is obtained.



Place the mode switch in the LSB position.
Make sure SSB RF POWER STAGE ALIGNMENTs (Step (12) - (19) are not upset and similar results are obtained in this mode of operation.

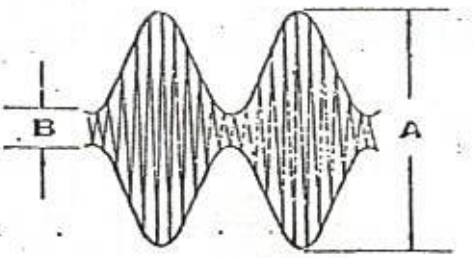
AM RF POWER STAGE ALIGNMENT

Place the mode switch in the AM position.
Channel Selector in Ch9 position.

STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(20)	VR4	(Same as SSB RF POWER ALIGNMENT)	Adjust for RF power output of 3.7 W on the Wattmeter.

MODULATION ALIGNMENT

Set the transceiver into transmit mode.
Apply 2.5 kHz, 7 mV Audio input signal to the microphone input circuit.

STEP	ADJUST	INDICATOR CONNECTION	REMARKS
(21)	RV12	An Oscilloscope to the ANT. connector.	Adjust to obtain 80 % modulation at this condition.  Modulation Ratio= $\frac{A-B}{A+B}$ X 100% Then, increase signal input to 70 mV and observe that the modulation ratio is still keeping 90% or less.

RF POWER METER ALIGNMENT

STEP	ADJUST	INDICATING CONNECTION	REMARKS
(22)	RV3	A Watt Meter to the ANT. Connector.	Adjust so that the meter pointer should indicate the same wattage as the reading obtained on the Watt Meter.

LOCK OUT CIRCUIT CHECK

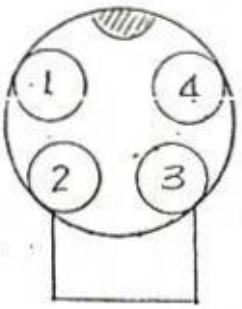
Place the Channel Selector in the open (Blank) channel (detent) position.			
STEP	ADJUST	INDICATING CONNECTION	REMARKS
(23)	----	Circuit Tester between the base of Q1 and chassis ground.	Make check that the voltage at Q1 base is 0.05 - 0.4 V.

TRANSMIT FREQUENCY CHECK

Set the transceiver into transmit mode (AM), no modulation.			
STEP	ADJUST	INDICATING CONNECTION	REMARKS
(24)	----	Connect the Frequency Counter to the ANT. connector.	Read the frequency at each channel. The frequency should be within ± 800 Hz from each center channel frequency as tabulated in the Frequency Table attached.

RECEIVER ALIGNMENT

Insert the plug wired as shown below into the microphone jack on the side panel.



A.G.C. ALIGNMENT

Place the mode switch in the ~~AM~~ SSB position.			
STEP	ADJUST	INDICATING CONNECTION	REMARKS
(25)	RV8	Circuit Tester to the No.15 terminal on the PC Board and chassis ground.	Adjust to obtain the reading of 2 V.

RECEIVE SENSITIVITY ALIGNMENT (AM MODE)

Set the Signal Generator, 27.115 MHz, 1 kHz 30 % modulation. Set the transceiver into Channel 9 position.			
STEP	ADJUST	INDICATING CONNECTION	REMARKS
(26)	T7	8 ohm dummy load, AC VTVM & Oscilloscope to the external Speaker jack.	Adjust for maximum audio output between the 8 ohm dummy resistor. This alignment should be performed with very small signal input from the Signal Generator to avoid inaccurate alignment due to AGC action.

After completion of the step (26), rotate the T7 core 1 turn clockwise.

NOTE: Throughout the above alignments, place the NB switch in OFF, Squelch control in minimum and clarifier control in "12 o'clock position.

SQUELCH CIRCUIT ALIGNMENT

Place the mode switch in AM position.
Set the Signal Generator to provide RF input signal of 54 dB (1 kHz, 30% mod.) and rotate the squelch control in full clockwise position.

STEP	ADJUST	INDICATING CONNECTION	REMARKS
(27)	RV9	8 ohm dummy load, AC VTVM & Oscilloscope to the EXT. Speaker jack.	Adjust so that the audio output just appears on the output terminal. (scope-display)

Place the mode switch in USB position

STEP	ADJUST	INDICATING CONNECTION	REMARKS
(28)	RV10	(Same as above)	Adjust in the similar way.

S-METER ALIGNMENT

Set the Signal Generator to provide 40 dB output.
Place the mode switch in the USB position.

STEP	ADJUST	INDICATING CONNECTION	REMARKS
(29)	RV7	Signal Generator to ANT. jack 8 ohm dummy load to EXT. Speaker jack.	Adjust so that the S-Meter pointer should read "9" on the meter provided on the front panel.

Place the mode switch in the AM position and retune the signal generator slightly to obtain maximum output.

STEP	ADJUST	INDICATING CONNECTION	REMARKS
(30)	RV8	(Same as above)	Adjust so that the S-meter pointer should read "9" on the meter.

SWR METER CIRCUIT ALIGNMENT

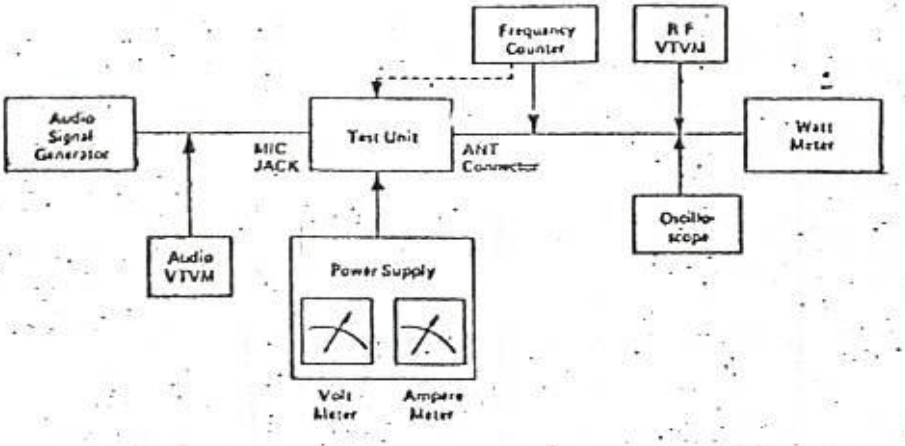
Set the transceiver into transmit mode (no modulation).
Place the SWR CAL Control to move the meter pointer on exact "SET" mark on the meter scale.

STEP	ADJUST	INDICATING CONNECTION	REMARKS
(31)	VR6	A non-inductive resistor 100 ohm to the ANT. connector on the rear panel.	Adjust to move meter pointer on exact "SET" mark on the meter scale.

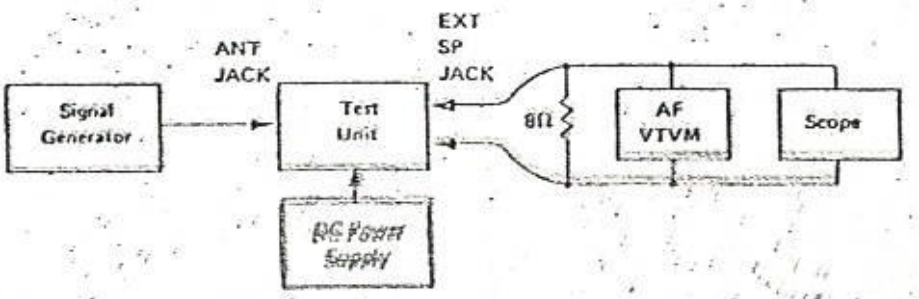
Place the SWR CAL in the SWR position.

STEP	ADJUST	INDICATING CONNECTION	REMARKS
(32)	RV501	(Same as above)	Adjust so that the meter pointer indicates "2" on the SWR meter scale.

CB TRANSMITTER SECTION

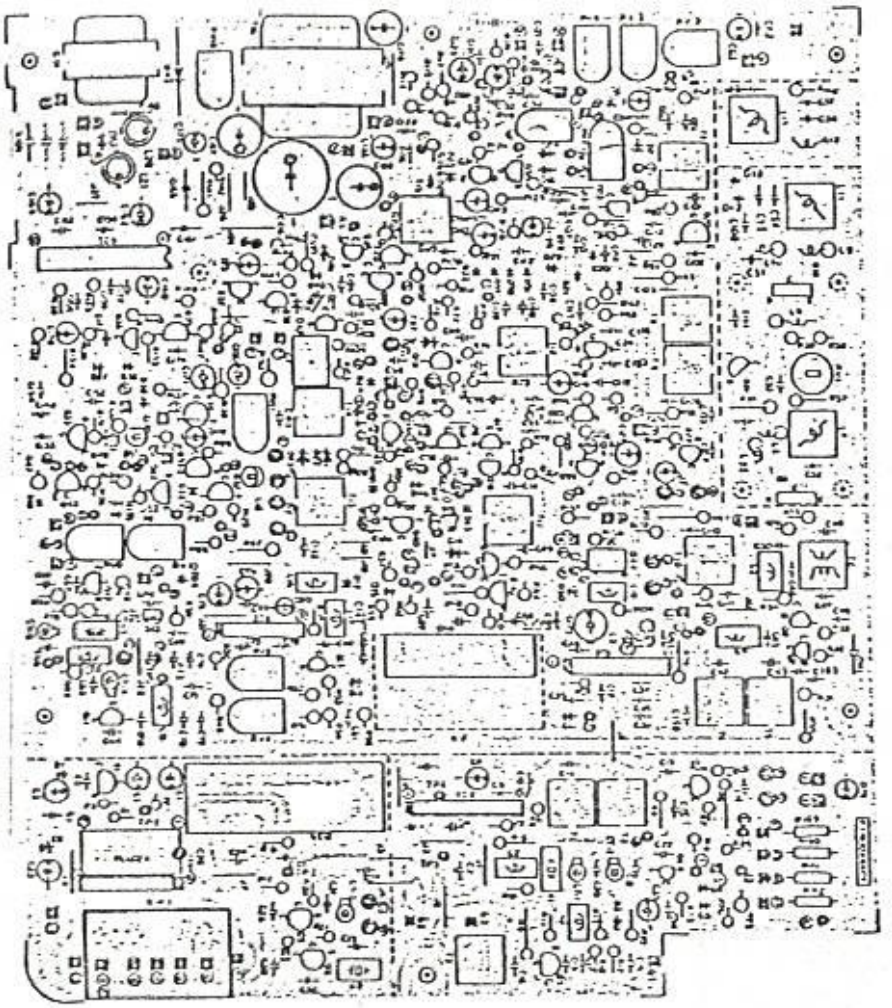


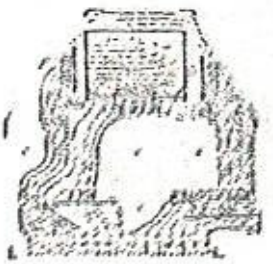
CB RECEIVER SECTION

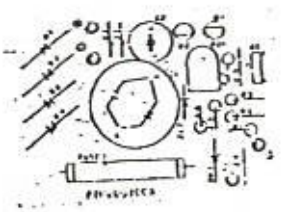


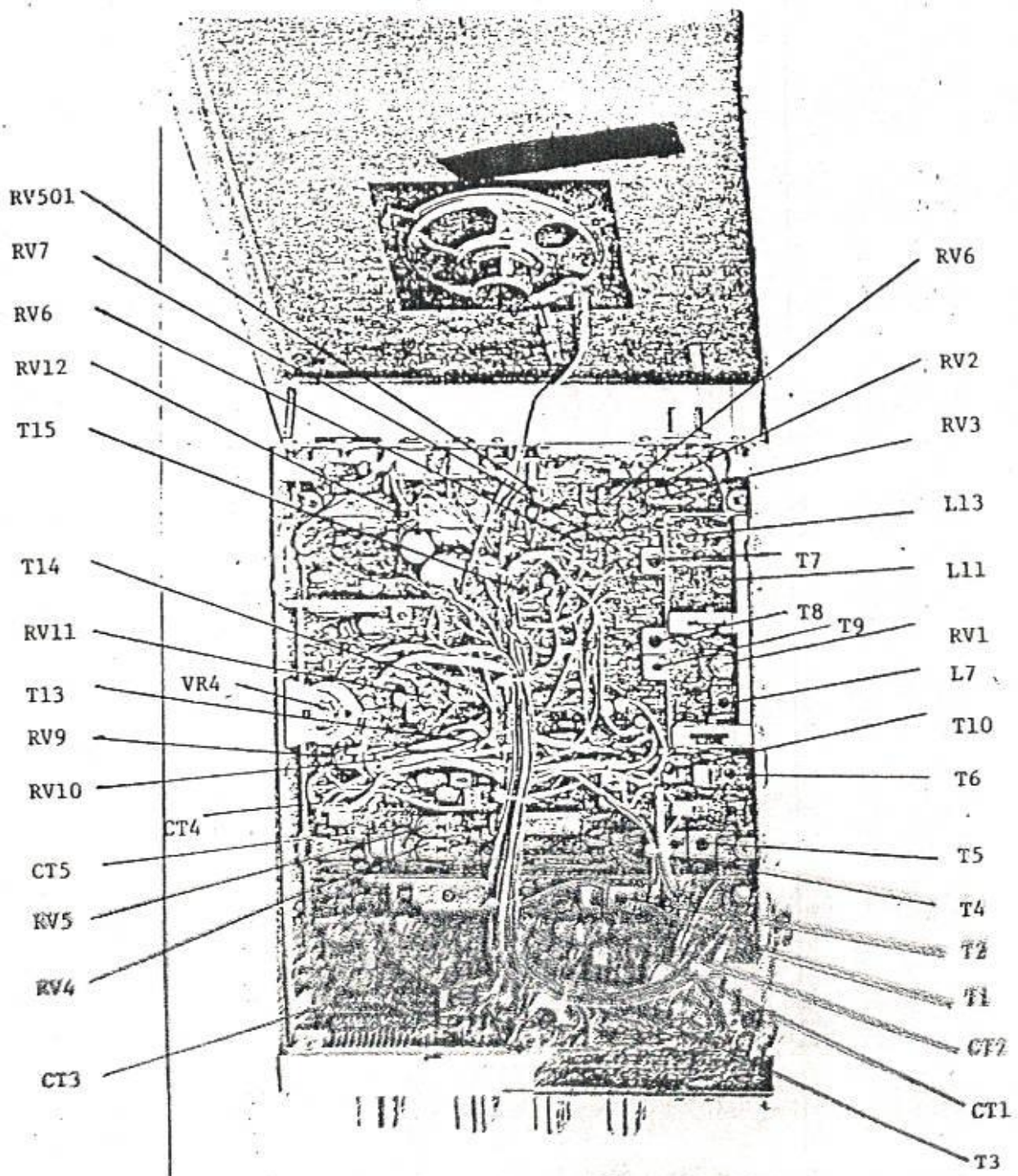
NOTE: Unless otherwise noted, place the clarifier control "12 o'clock position.

PC BOARD DETAIL








RV501
RV7
RV6
RV12
T15
T14
RV11
T13
RV9
RV10
CT4
CT5
RV5
RV4
CT3
VR4
RV6
RV2
RV3
L13
T7
L11
T8
T9
RV1
L7
T10
T6
T5
T4
T2
T1
CT2
CT1
T3

1. Fundamental Theory of PLL Circuitry

The word PLL is an abbreviation of the "Phase Loocked Loop" in which a given signal is processed to track the frequency and phase of a reference signal.

In other word, the PLL is of an automatic frequency control loop or automatic phase control.

The PLL circuitry consists of the three main units in simple form as shown in Fig. 1

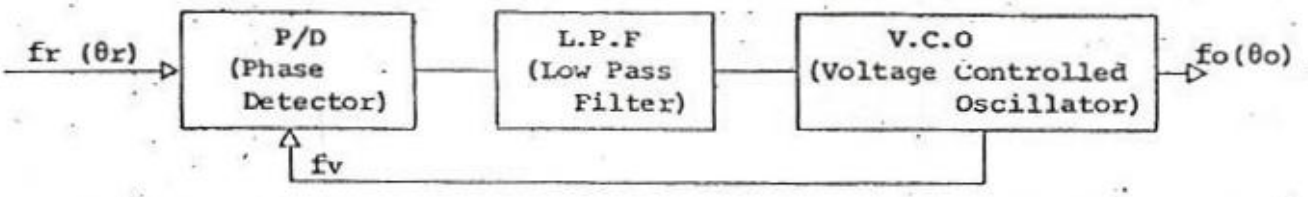


Fig. 1 Fundamental Block Diagram of PLL Circuitry

In the above block diagram, when the reference frequency fr and the VCO output frequency fv to be compared are applied to the Phase Detector P/D, fv is compared with fr in terms of Phase lag and lead.

Then the resulting output (Phase difference) is converted into the DC output voltage corresponding to the phase difference. Since the phase comparation is made at every cycle, the DC output is, then, led to the low pass filter (L.P.F) and integrated or smoothed to continuous DC voltage in proportion to the phase difference. The frequency of voltage controlled oscillator (V.C.O.) is controlled by the L.P.F. output voltage. Thus controlled VCO output is, then, split into two: One used as a operating frequency of the unit and another will be returned to the P/D, making a closed loop. The closed loop will continue to operate until the following condition is met:

$$\theta r(t) = \theta o(t)$$

This condition is called locked.

Employing the PLL system into a CB transceiver requires some modifications so that the VCO generates specific frequency corresponding to each channel frequency [1 - 40] according to the channel selection. Figure 2 is the new block diagram made with this modification. As you can see, a programmable divider, Mixer and Offset oscillator are newly added.

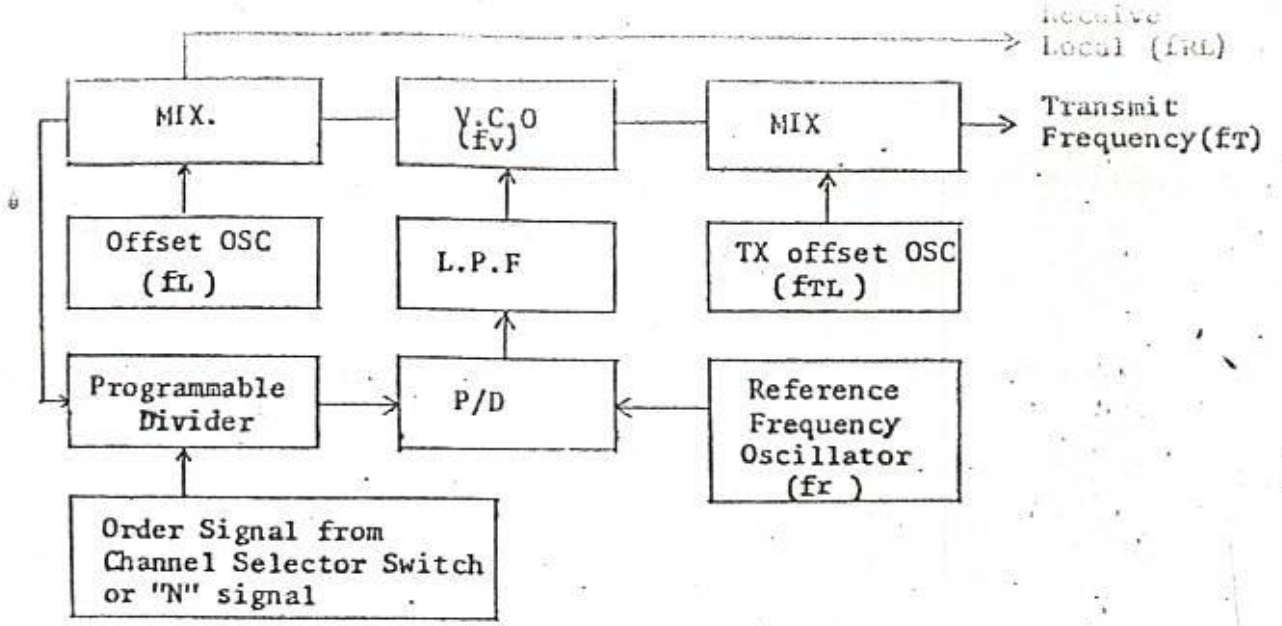


Fig. 2 Theoretical Block Diagram of PLL Frequency Synthesizer Circuitry for CB transceiver

In Fig. 2, the first local oscillator frequency for reception fRL is given below

$$f_{RL} = f_L + f_v \quad \cdots\cdots (1)$$

$$f_v = f_L - (N \times f_r) \quad \cdots\cdots (2)$$

The transmit frequency fT is

$$f_T = f_{RL} - f_{TL} \quad \cdots\cdots (3)$$

$$= f_L + f_v - f_{TL} \quad \cdots\cdots (4)$$

Where "N" is a order signal from the channel selector switch. When using the system in the transceiver, fr should have the same frequency as the channel spacing, namely, fr = 10 KHz. When receiving channel No.1, 26.965 MHz, the first local frequency fRL should be,

$$f_{RL} = 26.965 + 10.695 = 37.660 \text{ MHz}$$

The V.C.O frequency fv is

$$f_v = f_{RL} - f_L = 37.660 - 20.105 = 17.555 \text{ MHz}$$

Then, N code will be obtained by using equation 2

$$N = \frac{f_L - f_v}{f_r} = \frac{20.105 - 17.555}{0.01} = 255$$

This means that selecting the channel No.1 is to select one of "N" codes (ie 255) instead of selecting a proper crystals in a conventional CB transceiver. Thus varying "N" numbers and selecting one of them, any channel can be selected. This is the major difference between a conventional crystal type and PLL Frequency Synthesizer type transceiver.

Figure 3 is a practical operation block diagram of PLL section.

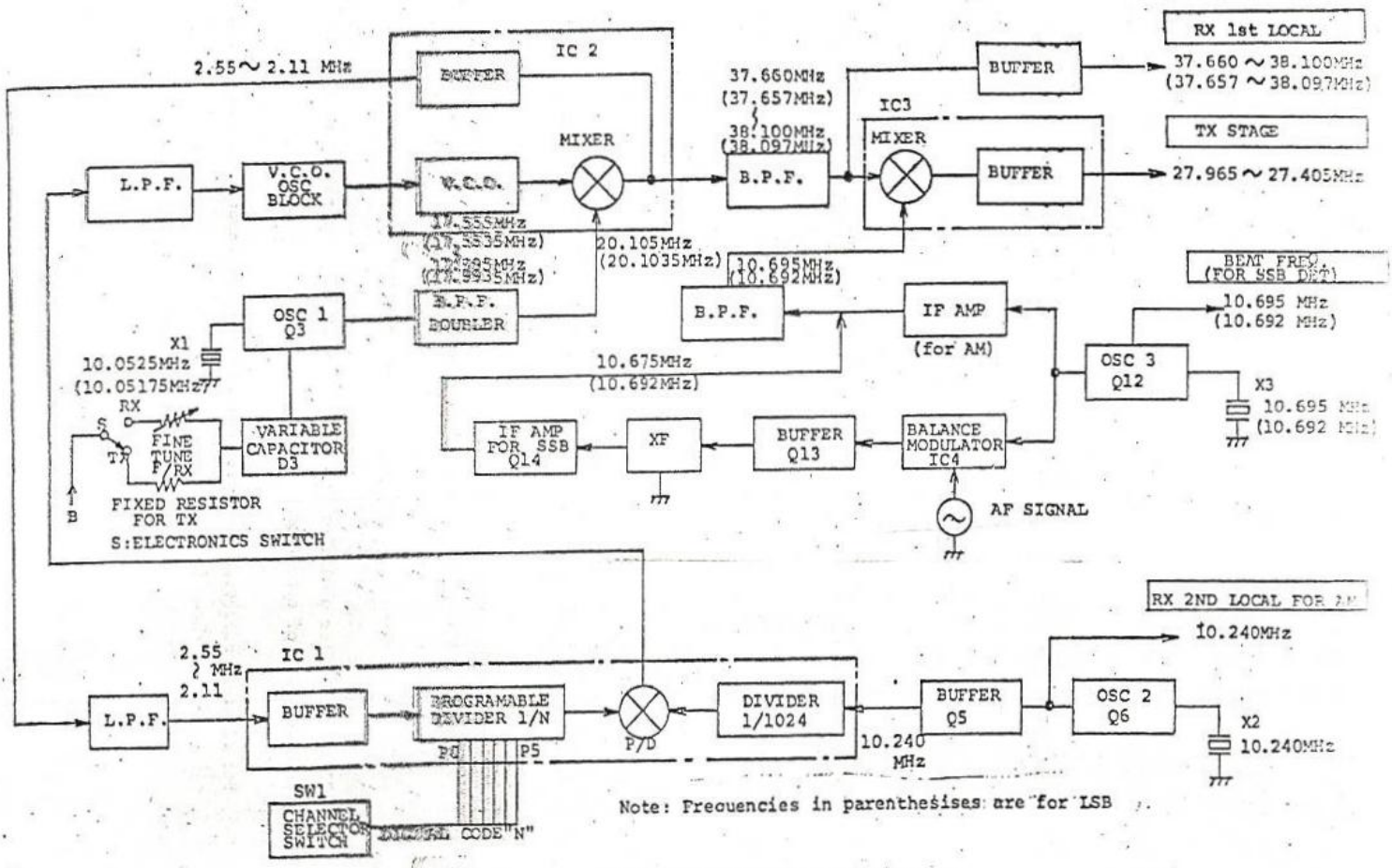


Fig. 3 BLOCK DIAGRAM FOR PLL CIRCUIT

CIRCUIT DESCRIPTION OF AM/SSB TRANSCEIVER

1. PLL Circuit

The offset frequency oscillator Q3 is being oscillated with the frequency of 10.0525 MHz for AM and USB mode of operation (10.05175 MHz for LSB operation). This frequency output is, then, doubled in passing B.P.F (T3) and applied to the IC 2, PIN No. 4 terminal to mix with the VCO output frequency being applied to the IC 2, PIN No. 2 terminal. The resultant sum frequency is obtained from IC 2, PIN No. 6 terminal and used as a first local frequency (37 MHz band). T 1 and T 2 are band pass filter for this frequency. While the difference frequency is amplified / buffered inside the IC 2 and the resultant frequency output (2.55 -- 2.11 MHz) is led to the PLL IC 1 through IC 2, PIN No. 9.

Q4 is the switching circuit to shift the oscillating frequency of Q3 by 1.5 KHz for LSB operation. In terms of first local frequency 3 KHz will be shifted toward minus direction.

Q6 is the standard reference oscillator (10.240 MHz) and Q5 is the buffer amplifier for the oscillator.

Q7 is a switching transistor provided to cut off the RF Pre-amp, Q7, when the PLL IC 1 is out-of-locked, thus avoiding frequencies other than predetermined are amplified and radiated.

D6 is the diode through which DC voltage, which is supplied when the chann selector is placed between channels, is applied to the IC 3 to disable the mixing operation inside the IC 3. Thus no frequency will be generated though the channel selector is placed between correct channel positions.

Q2 is the buffer amplifier for RX local frequency, operating only in the receiver mode of operation.

For clearer under standing, please refer to the schematic diagram and the Block Diagram shown in Fig. 4.

2. AM Receiver Circuitry

A received signal passes T7, then amplified in Q20, and again passes the band pass filter consisting of T8 and T9, then, enters into the Mixer stage of Q22. On the other hand the first RX local signal frequency is applied to the base of Q22 through a coupling capacitor of C14. Then, both signals are mixed with inside the Q22 and converted into the first IF signal (10.695 MHz) in passing through the T10 and T13. The 10,695 MHz signal and 10.240 MHz signal generated in Q6 are applied to the balanced mixer consisting of D22 and D23 and 455 KHz 2nd IF frequency will be made.

This frequency is then led to the T14, CF (ceramic filter), Q27, Q28, Q29 (amplified), T15 and finally led to the detector D25. The audio signal is then applied to the AF amplifier (IC5) through ANL (D26) circuit. The IC output drives the built-in speaker.

To improve signal over load sistortion which would be caused when the receiver is subjected to a strong signal, three stages of AGC loops, each for Q20, Q22 and Q27, are provided

Q21 is a switching transistor to short-circuit the primary circuit of T9 during transmit operation, thus disabling the receiver circuit. Refer to Fig. 5.

3. SSB Receiver Circuitry

An incoming signal induced on the antenna is led to the T7 and then to Q20 and amplified. The amplified output is applied to the Q22 mixer through a bandpass filter consisting of T8 and T9. While the first local frequency is being applied to the base of the same transistor, both frequencies are mixed with each other and first IF frequency will be made (10.695 MHz for AM/USB, 10.692 MHz for LSB).

This IF signal then amplified in passing through the T10, crystal filter, Q14, T11, Q16 and Q17 and finally detected into the audio signal with the product detector consisting of Q19. The audio signal is led to the Power IC (IC 5) to drive the built-in speaker.

Q18 is the transistor to avoid undesirable impulse noise, which would be generated in pressing the push-to-talk switch, from entering into the AGC circuit.

To reduce the signal over load distortion in the SSB mode of operation, peak-value type AGC circuitry consisting of Q30, and Q31 is employed for exclusive use of SSB operation.

Refer to the Block Diagram shown in Fig. 6.

4. AM Transmitter Circuitry

The first local oscillator frequency (37 MHz band) and 10.695 MHz frequency generated in the Q12 are led to the PIN No. 4 and PIN No. 1 of IC 3, respectively, and mixed with each other, resulting in 27 MHz band transmit frequency. The 27 MHz output is led to the Q7 through T4 and T5, then led to the Q8, Q9 and Q10 in this order and amplified up to the high level necessary for transmission. Thus amplified Power output is applied to the Antenna Connector through a bandpass filter consisting of L11, L12, L13, etc.

On the other hand, the microphone input signal enters into the Power IC, (IC5, NO. 6 PIN terminal) and amplified output is applied to the collectors of Q9 and Q10 through the transformer T16 and diode D43 to modulate the transmit carrier frequency.

Transistor Q35 is the automatic level controller provided to suppress the audio input level to the IC5 properly to avoid the over modulation.

Q37 obtains its input signal from the audio output circuit through D43 and its output controls Q35, thus keeping modulation signal level to a relatively constant value.

Refer to the Block Diagram shown in Fig.7.

5. SSB Transmitter Circuit

In the mode of SSB operation, either of first local oscillator frequency of 37.660 -- 38.100 MHz (AM/USB) or 37.657 -- 38.097 MHz (LSB) will be led to the IC3, No. 4 PIN terminal. On the other hand the 10.695 MHz (in LSB mode, this will be shifted to 10.692 MHz as previously mentioned) generated with Q12 is led to the balanced modulation IC (IC4). The IC is designed to produce carrier-suppressed double side band signals when an audio signal amplified with IC5 is applied to the PIN terminal of NO. 1. Thus produced DSB signal will flow to Q13 and amplified, then led to the XF (crystal filter) to separate the desired side band.
The side band signal is led to the Q14 and amplified, then, the output is led to the No. 3 Pin terminal of IC3 and mixed with the first local oscillator signal to produce 27 MHz transmit signal. The 27 MHz SSB output is the led to the T4 and T5, then further led to the linear amplifiers Q7, Q8, Q9 and Q10.
Thus amplified RF output is finally led to the antenna terminal through the Bandpass and low pass networks provided between the Q10 and antenna connector.

To avoid over modulation distortion, an ALC circuitry consisting of Q35 and Q38 is provided in the SSB microphone amplifier circuit. Another ALC circuit is also employed in the RF circuit (from Q10 to IF Amp Q14) to reduce the distortion in the RF stages.
Transistor Q36 and Q39 are switching circuits to operate IC5 as a SSB microphone amplifier.
Refer to the Block Diagram shown in Fig. 8.

6. Noise Blanker Circuit

An impulse signal included in the IF signals will be picked up through the capacitor C113 and applied to the D21. The rectified positive-half voltage is then applied to the transistors Q24 and Q25 and amplified to the enough level capable of turning the transistor Q26. The amplified impulse signal makes Q26 turn on while the impulse is being applied.. In other word, the primary circuit of T10 is grounded to the chassis through C121 and the emitter-collector of Q26, so no mixer output will be obtained during this period. In this way the impulse noise will be blanked out.

D20 is the diode provided to control the bias voltage to the Q24 in according to the signal strength of the normal signals received, thus avoiding operation error which would be caused by the normal signals.

7. Squelch Circuit

When AGC voltage lowers with a weak received signal, transistors Q32 and Q33 turn on and this makes Q34 turn off, controlling the bias voltage to the AF AMP (IC5) and disabling the amplifier. On the other hand when the transistor Q34 is turned on, the amplifier will start to operate.

8. Regulated Power Supply Circuit

This circuit consists of Q44 and D50 and supplies the regulated voltage through the switching transistors Q40, Q41, Q42 and Q43, depending upon the mode of operation.

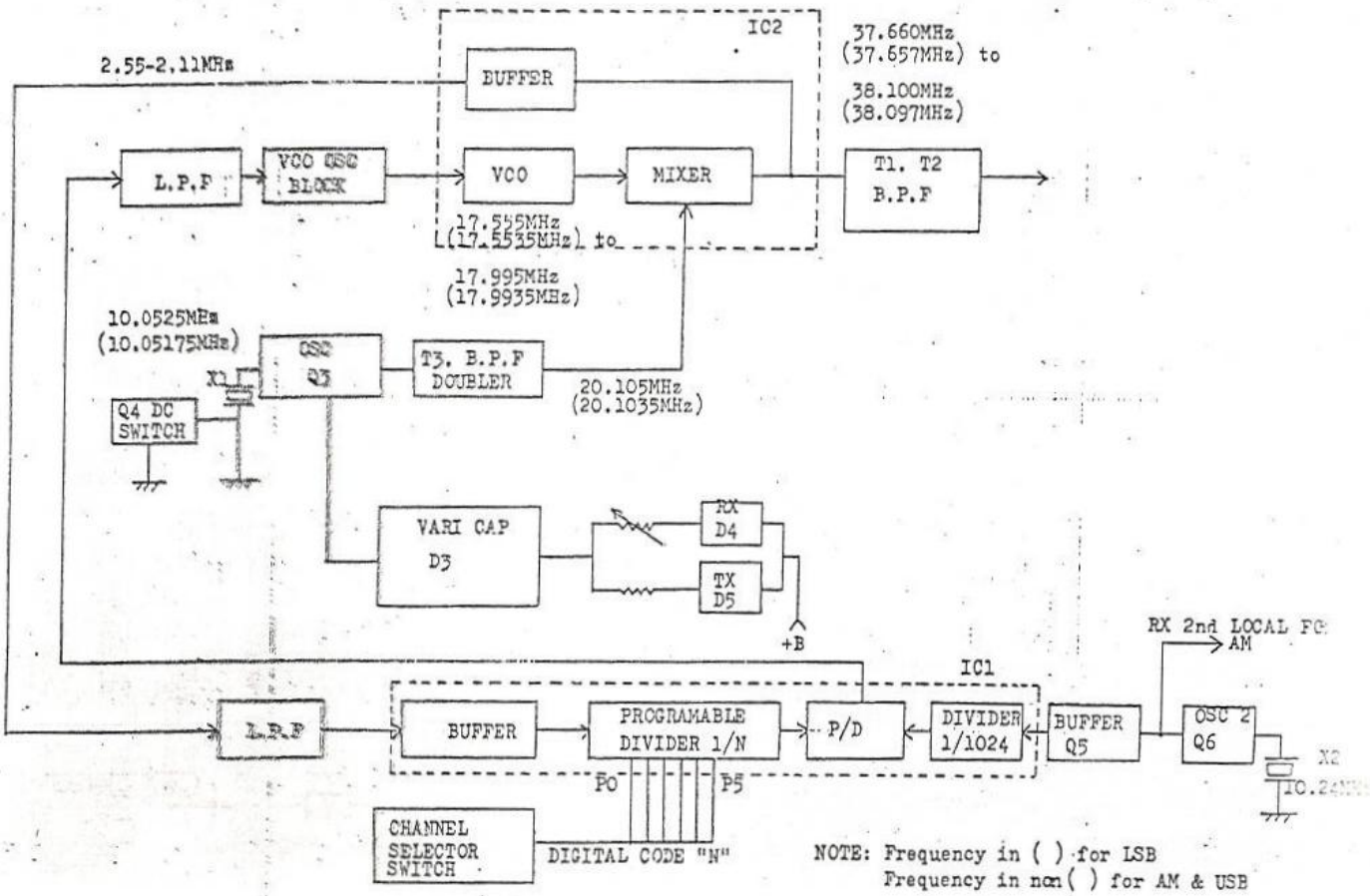


Fig. 4 PLL CIRCUIT

RECEIVER DIAGRAM

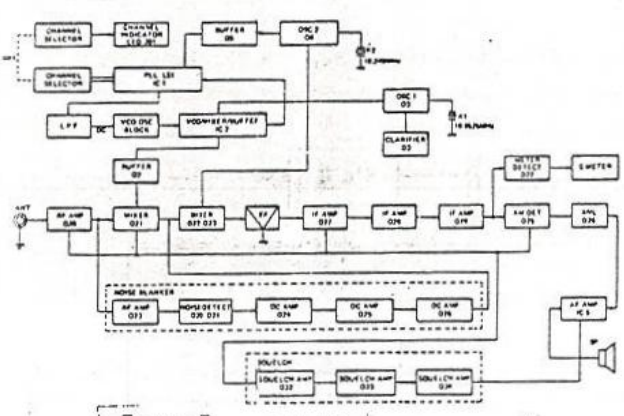


FIGURE 5 AM RX

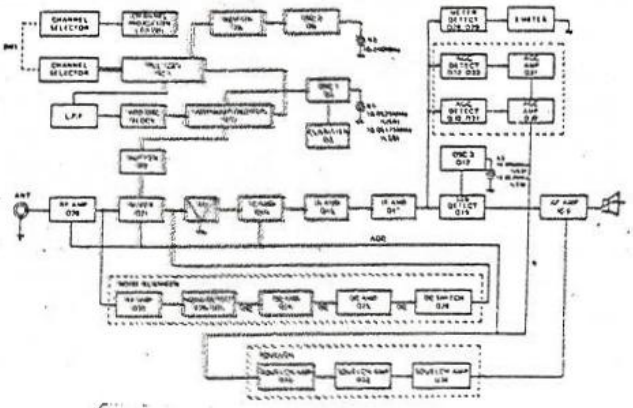


FIGURE 6 SSB RX

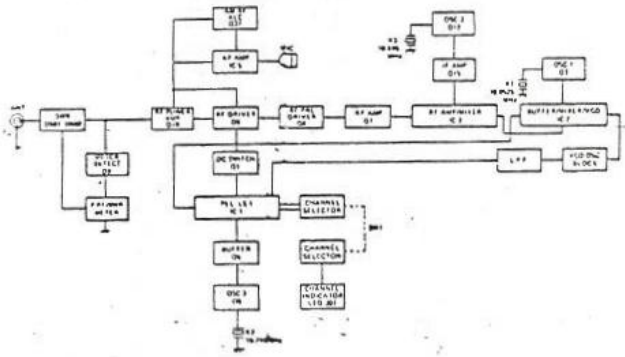


FIGURE 7 AM TX

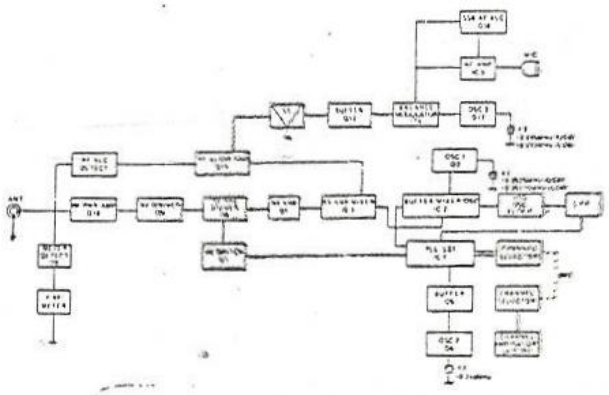
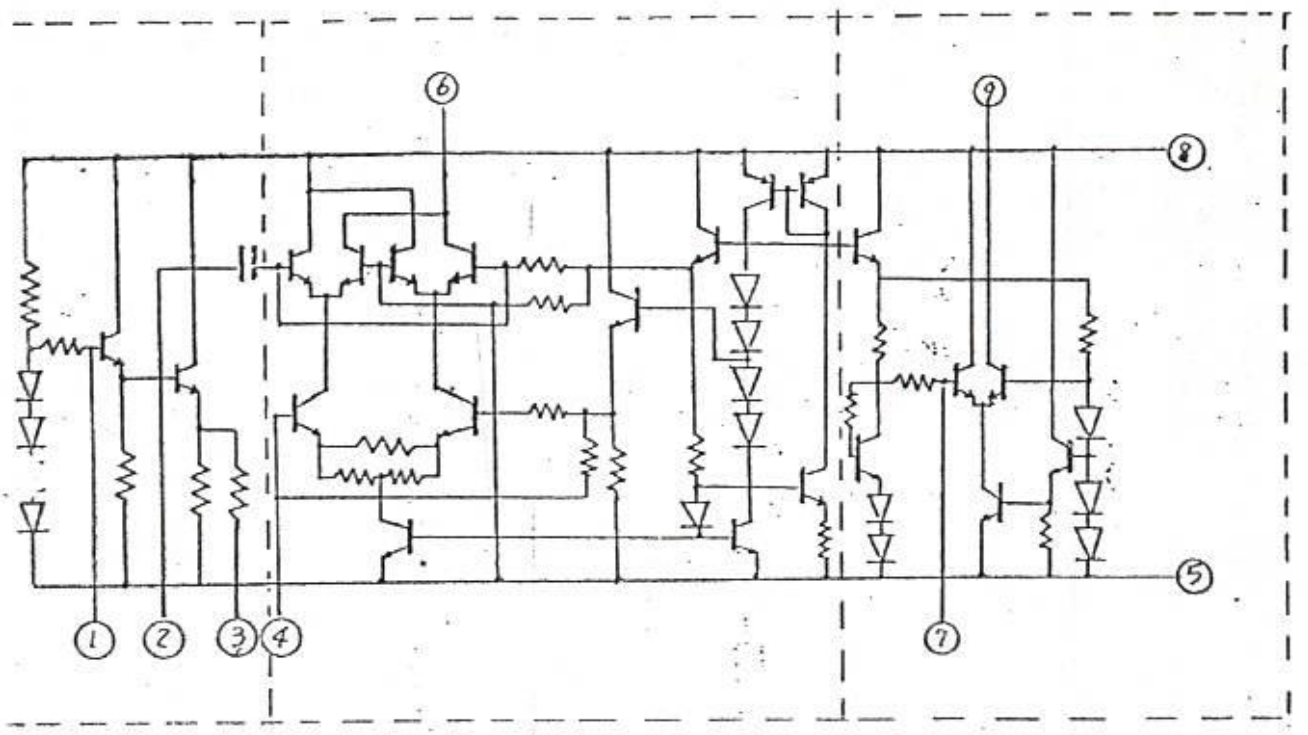
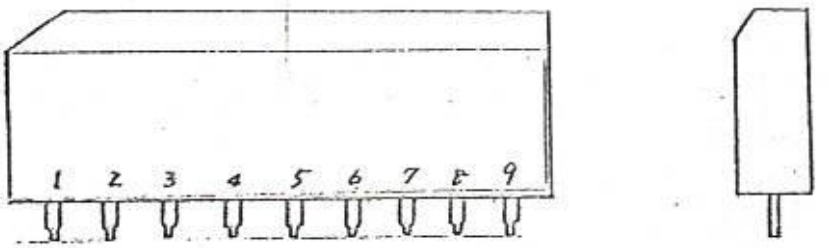


FIGURE 8 SSB TX

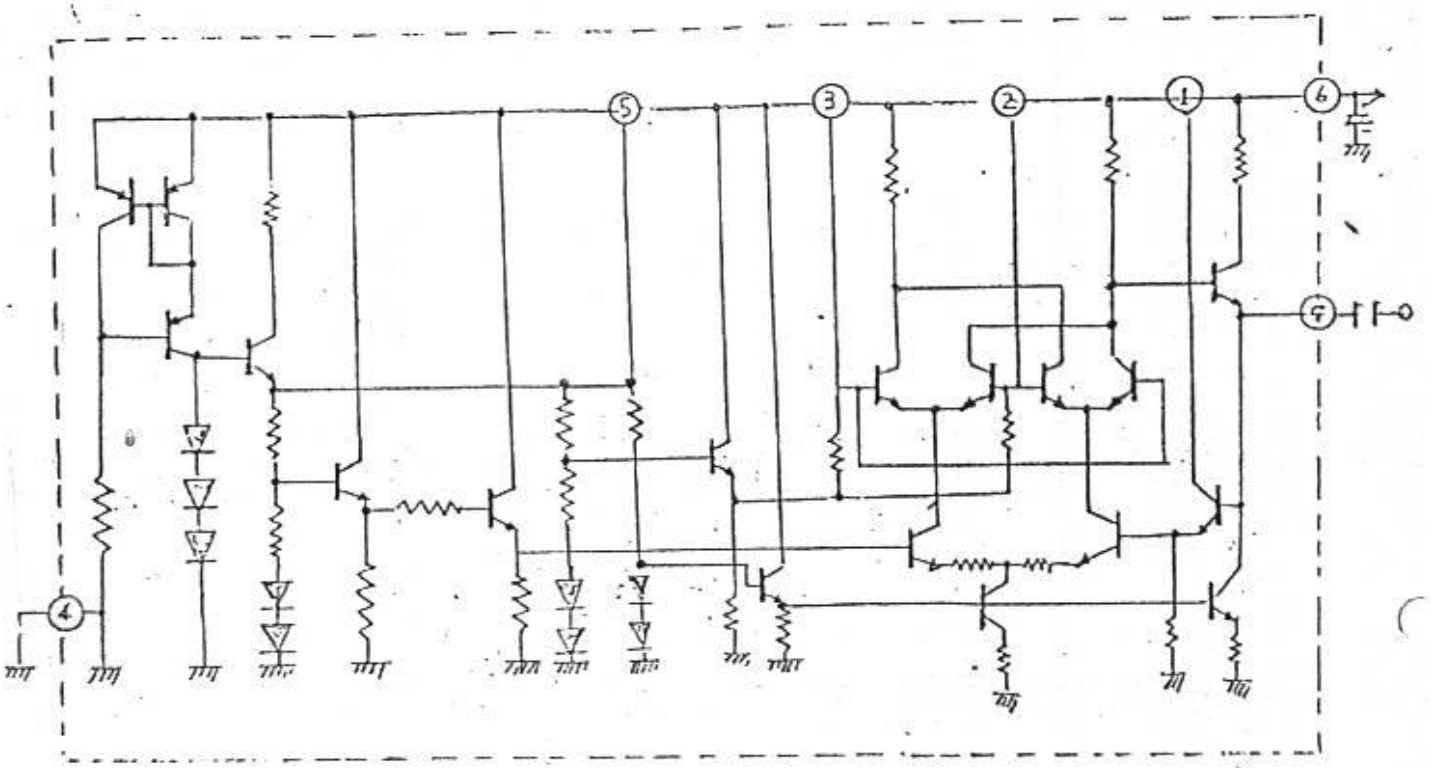
IC2 & IC3 :IC2 V.C.O/MIXER/BUFFER,IC3 OSC2/MIXER/RF AMP.

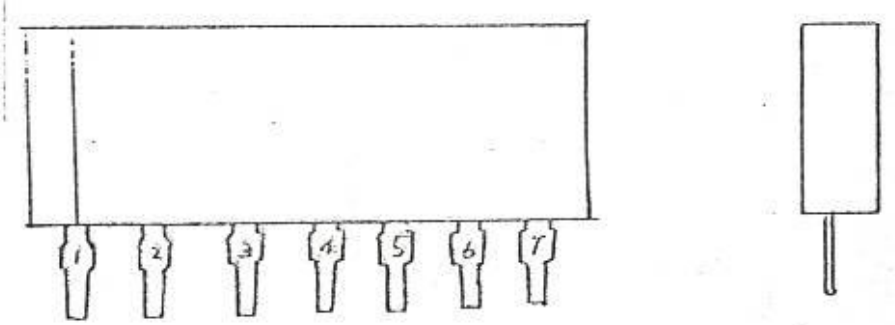




TA7310P

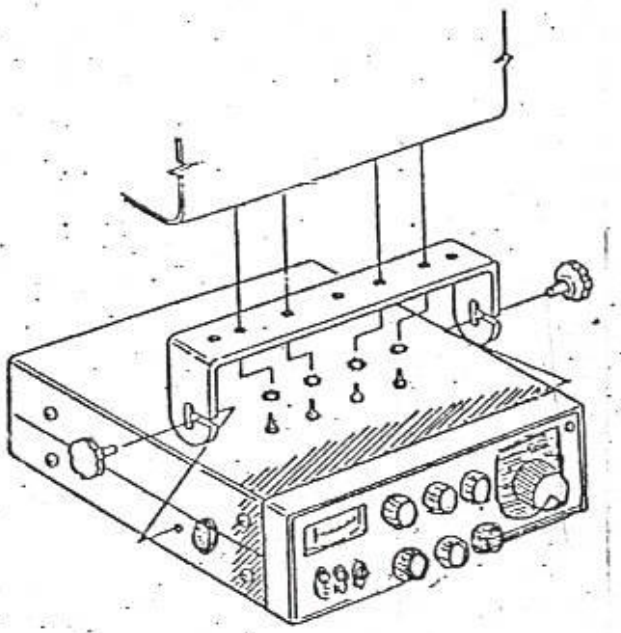
IC 4 : BALANCE MOD:





AN612

INSTALLATION INSTRUCTIONS



CB CHANNELS AND FREQUENCIES

Frequency	Channel	Frequency	Channel
26.965 MHz	1	27.085 MHz	11
26.975 MHz	2	27.105 MHz	12
26.985 MHz	3	27.115 MHz	13
27.005 MHz	4	27.125 MHz	14
27.015 MHz	5	27.135 MHz	15
27.025 MHz	6	27.155 MHz	16
27.035 MHz	7	27.165 MHz	17
27.055 MHz	8	27.175 MHz	18
27.065 MHz	9	27.185 MHz	19
27.075 MHz	10	27.205 MHz	20

Frequency	Channel	Frequency	Channel
27.215 MHz	21	27.315 MHz	31
27.225 MHz	22	27.325 MHz	32
27.235 MHz	24	27.335 MHz	33
27.245 MHz	25	27.345 MHz	34
27.255 MHz	23	27.355 MHz	35
27.265 MHz	26	27.365 MHz	36
27.275 MHz	27	27.375 MHz	37
27.285 MHz	28	27.385 MHz	38
27.295 MHz	29	27.395 MHz	39
27.305 MHz	30	27.405 MHz	40

AUSTRALIAN
18 Channels.

Frequency	Channel
27.015 Mhz	1
27.025 "	2
27.035 "	3
27.055 "	4
27.065 "	5
27.085 "	6
27.095 "	7
27.105 "	8
27.115 "	9
27.125 "	10
27.135 "	11
27.155 "	12
27.165 "	13
27.175 "	14
27.185 "	15
27.195 "	16
27.205 "	17
27.225 "	18

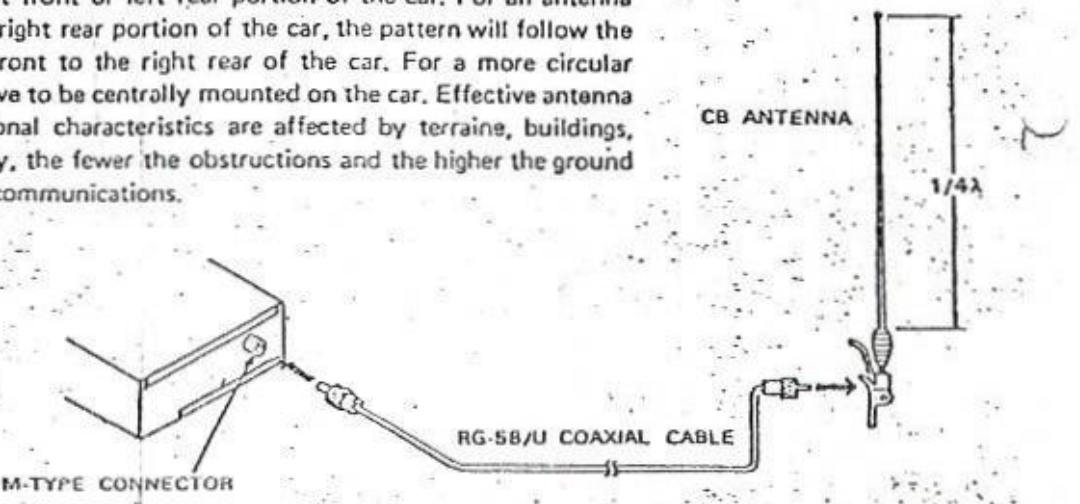
CB ANTENNA SYSTEM

It is very important that you use the correct type of transmission line. It should be of the coaxial type and should have an impedance equal to the antenna impedance.

Since the is designed to operate most efficiently into a 50 Ω load, it is best to use a 50 Ω coaxial cable. We suggest type RG-58/U.

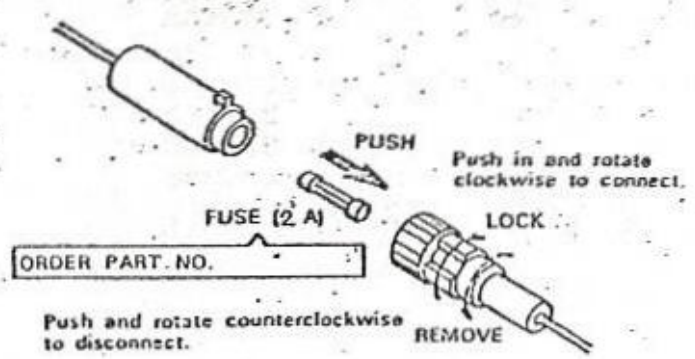
There are many different types of antennas designed for CB mobile use. Selection of one should be made on the basis of the type of installation, or car mount desired and the antenna specifications. A vertical whip normally has a 360° radiation pattern; and it can be mounted on the rear bumper, rear fender, or trunk lid.

Generally, it is better to mount the antenna on the left side of the car than on the right side, to minimize contact with trees and other low-clearance obstructions. Generally, the better the antenna, the better the communications over greater distances. A full 1/4 wavelength antenna is usually more efficient than the shorter versions equipped with a loading coil to electrically make up for the shorter length. However, the antennas can provide adequate service, and be less proneto damage from contact with external obstructions. Some short antennas can be more centrally located on the car. The car body acts as a ground plane and tends to shift the radiation pattern to favor a diagonal line, running from the right front of the car to the left rear, for antenna mounted on the right front or left rear portion of the car. For an antenna ounted on the left front or right rear portion of the car, the pattern will follow the gonal line from the left front to the right rear of the car. For a more circular ttern, the antenna would have to be centrally mounted on the car. Effective antenna ight, clearance and directional characteristics are affected by terraine, buildings, nnels, bridges, etc. Generally, the fewer the obstructions and the higher the ground vel, the greater the range of communications.



NORMAL CARE AND MAINTENANCE

- *Be sure to use a 2 A fuse for replacement. Use of a larger fuse may not protect the unit from excessive current drain.*



- *The vehicle can be the cause of much noise interference. Since the receiver section of the set is very sensitive, it will pick up even the smallest noise signals and amplify them. Any noise that you hear in the set is almost totally from external sources. The receiver itself is exceptionally quiet. Steady high noise levels cannot be totally eliminated by the international Automatic Noise Limiter circuit. Noise problems cannot be solved internally (in the transceiver); they must be solved at the source of the noise.*
  Several noise suppressor kits are available from local dealers which include all necessary parts and instructions.
- To clean the outside of the set (escutcheon and chassis) wipe off dust with a soft cloth.
  Never use benzine, thinner or any other type of solvent.