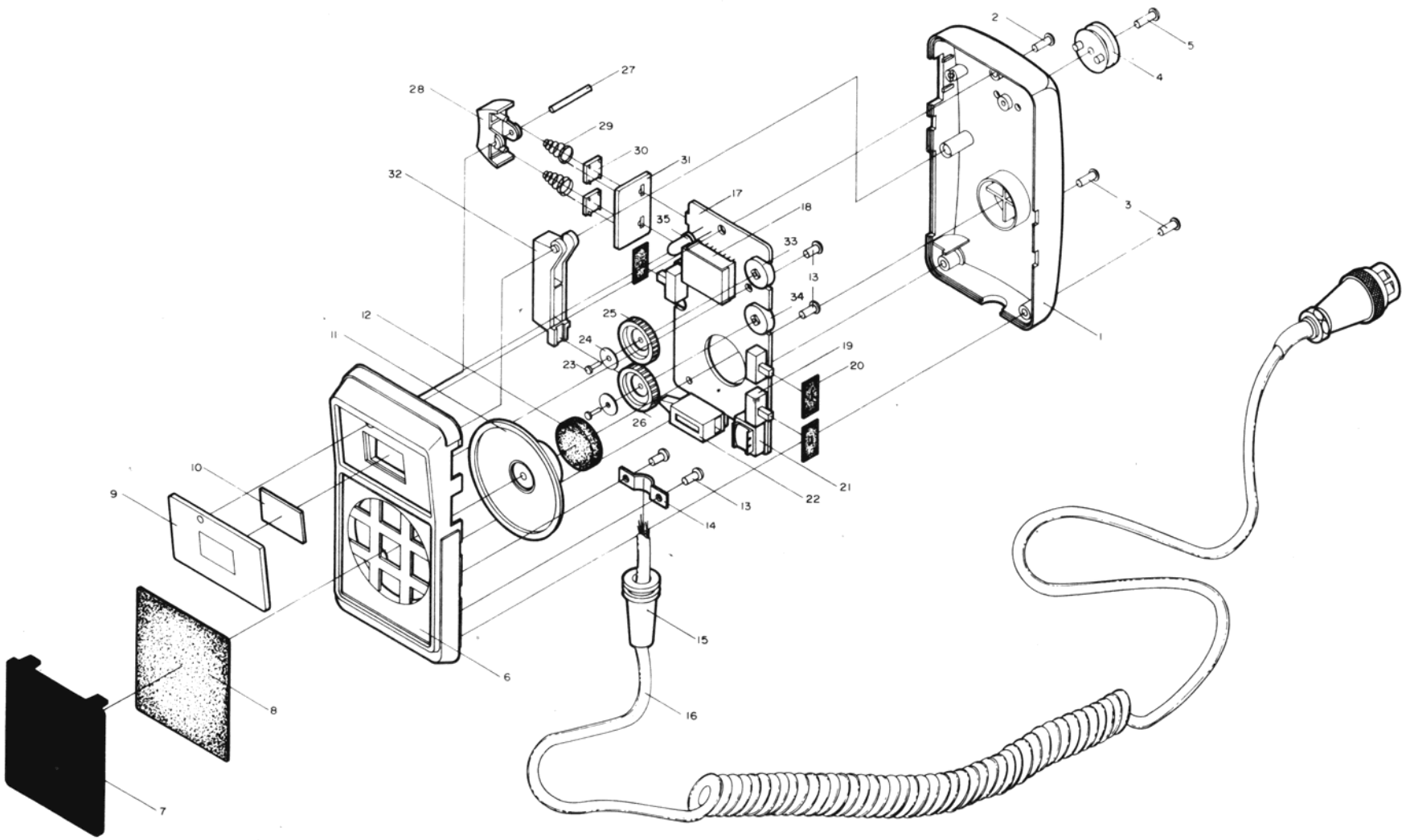
Exploded view(Remote)



Exploded View Part List (Remote)

No.	Part No.	Part Name and Description
1	714590	Bottom Cover
2	642044	(+) Wood Screw (R+F-H) 2.7x16-1S
3	642026	(+) Wood Screw (R+F-H) 2.7x14
4	730024	Holder (MIC)
5	642008	(+) Wood Screw (R+F-H) 2.7x12
6	714580	Upper Cover
7	791070	Grille Plate
8	903600	Felt 58x50x0.3T
9	812780	Lens (Large)
10	812790	Lens (Small)
11	4201360	Speaker
12	891940	Rubber Sponge
13	621159	(+) Tapping Screw (R+F-H) 2.6x8-1S.
14	721196	Bracket (Cord MTG)
15	731750	Holder (Wire MTG)
16	504091	Curled Cord/Plug Ass'y
17	401047-D	Main P.C.B 99x52x1.6T
18	2520162	Led Display
19	4310141	Slide S.W 2P-1C
20	901244	Felt 20x10x0.3T
21	3000850	Transformer
22	4320307	Push S.W.
23	610090	Machine Screw M1. 7x6 (RH)
24	660780	Flat Washer
25	822930	Volume Knob
26	823270	Squerch Knob
27	851950	Shaft (Seesaw S.W knob)
28	822940	Seesaw S.W. Knob
29	880720	Spring (See S.W. Knob)
30	4340025	Touch S.W
31	401242C	P.C.B. (S.W. MTG)
32	740370	Lever
33	4504128	Variable Resistor (VR) 121PS2-1 10KA
34	4504151	Variable (VR) 121PN2-2 1.2C 10KC
35	2510486	Led Lamp

ALIGNMENT PROCEDURE

1. Test Voltage

DC 13.8V ± 5%, unless otherwise specified.

2. Test Equipment

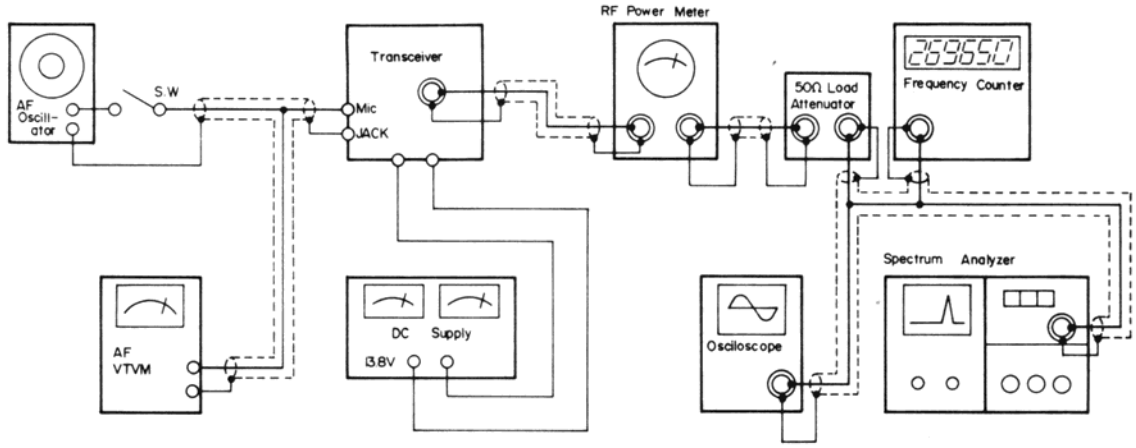
All Test equipment should be properly callibrated.

1. Audio signal generator, 10Hz-20KHz.
2. VTVM 1 mV measurable
3. DC ampere meter, 2A
4. Regulated power supply, DC 0-20V, 2A or higher
5. Frequency counter, 0-40MHz, high input impedance type
6. RF VTVM probe type
7. Oscilloscope, 30MHz, high input impedance
8. RF watt meter, thermo-couple type, 50 ohm, 5W
9. Standard signal generator, 100KHz-500MHz, - 10-100dB, 50 ohm unbalanced.
10. Speaker dummy resistor, 8 ohm, 5W
11. Circuit tester, DC, 20K ohm/V

3. Alignment of Transmitter Circuitry

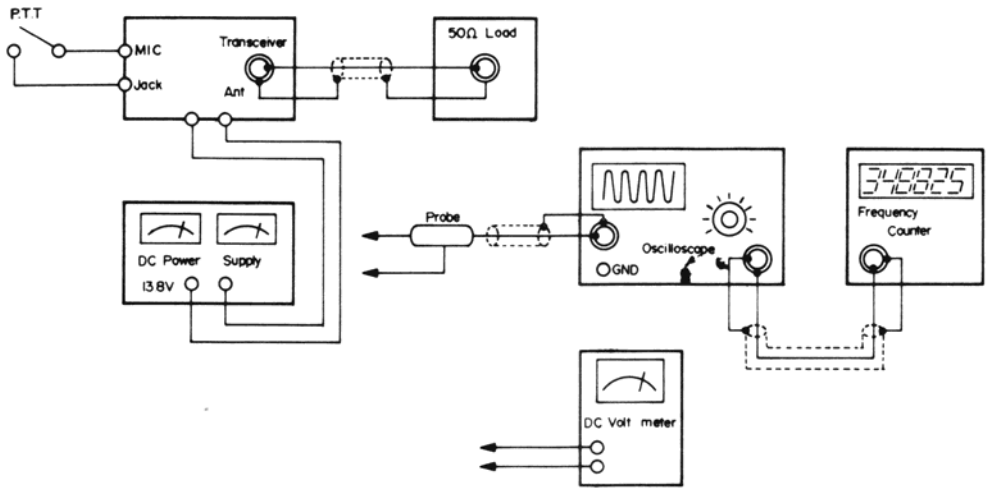
3.1 Test Setup

TRANSMITTER SECTION



3.2 PLL Circuit alignment

PLL AND CARRIER SECTION



3.2.1 10.24MHz

Connect a frequency counter to the pin 12 and check to see 10.240000MHz-100Hz. When a defective crystal is replaced, and if the frequency is higher than by 100Hz, the CT1 should be increased. If the frequency is lower, the CT1 should be reduced in capacitance.

3.2.2 VCO alignment

1. Set the Radio to channel 40 and in receive mode.
2. Connect a circuit tester between R51/and ground.
3. Adjust L6 to obtain 3.1V DC.
4. Set the Radio to channel 1 and in transmit mode. (make certain 50 ohm dummy load or wattmeter is connected to antenna terminal)
5. Check to see the TP/DC voltage dropping to a level between 1.3 to 1.5 volt DC.

As long as the DC level stays between 3.1V DC for receive at channel 40 and 1.3 to 1.5V DC for transmit at channel 1 the VCO is set properly.

3.3 RF driver stage alignment

1. Select channel "19".
2. Connect an oscilloscope to the base of Q18 and ground.
3. Adjust L8 and L9 for maximum amplitude of scope display (27.185MHz signal).
4. Connect the scope to Q19 collector.
5. Adjust L10 for maximum amplitude of scope display.

3.4 RF Power amplifier alignment

1. Set power supply voltage to 13.8V and set the radio into channel 19 position.
2. Connect a watt meter to the antenna connector.
3. Adjust L8, L9, L10, L11 L13 and L14 for maximum power indication.
   Also again touch up L8, L9 and L10 to peak power.
4. When all coils are peaked, the power meter shoule indicate above 4.0 watts.
5. Turn L13 and L14 until the power reading of 4.0 watt is obtained.

3.5 Transmit frequency check

1. Set the radio into transmit mode with no modulation.
2. Connect the frequency counter to the antenna load or to the tab provided at the wattmeter.
   The frequency should be within ±800Hz from each channel center frequency as tabulated in the frequency table attached.

3.6 Modulation sensitivity alignment

1. Set the unit into transmit mode and apply 6mV, 1KHz signal to the Mic input circuit.
2. RV4 should be adjusted to obtain 85% modulation at this condition.
3. Next, decrease signal input to 10mV and observe that the modulation ratio is keeping the value higher than 30%.

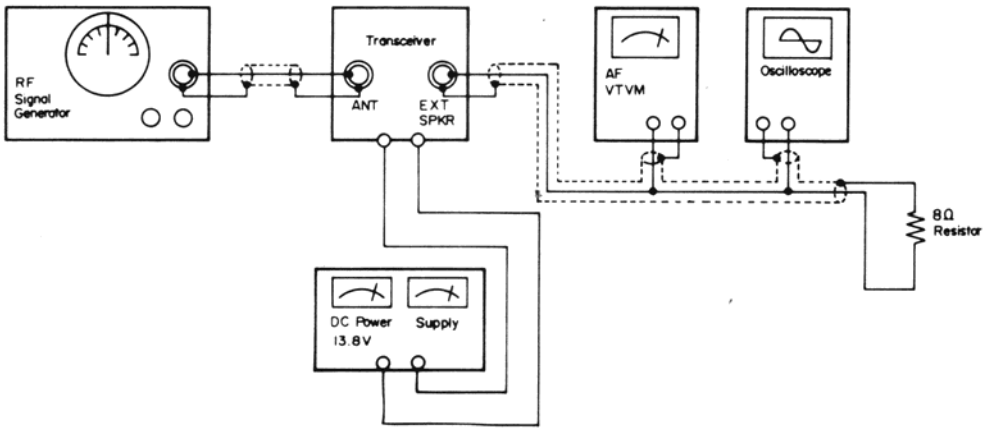
3.7 Transmit power indicator alignment

1. Set the unit into transmit mode with no modulation.
2. Adjust RV3 right after the NO.4 LED just light on.

4. Alignment of Receiver Circuitry

4.1 Receiver Section

Test Set-up



4.2 Receiver Sensitivity Alignment

1. Set the signal generator at 27.185MHz, 1KHz and 30% modulation.
   Also set the radio at channel 19 position.
2. Adjust L1, L2, L3, L4 and L5 for maximum audio output across the 8 ohm dummy load resistor.
   This alignment should be performed by gradually decressing the signal output signal to a minimum level required for tuning to aboid inaccurate alignment due to AGC action.

4.3 Squelch circuit alignment

1. Set the signal generator to provide RF input signal of 60dB (1 KHz, 30% modulation)
2. Rotate the squelch control in full clockwise direction.
3. Temperarily adjust RV1 for maximum audio output, and note the audio output level. Then adjust RV1 so that the audio output level decreases by 6 dB.

4.4 Receive signal indicator alignment

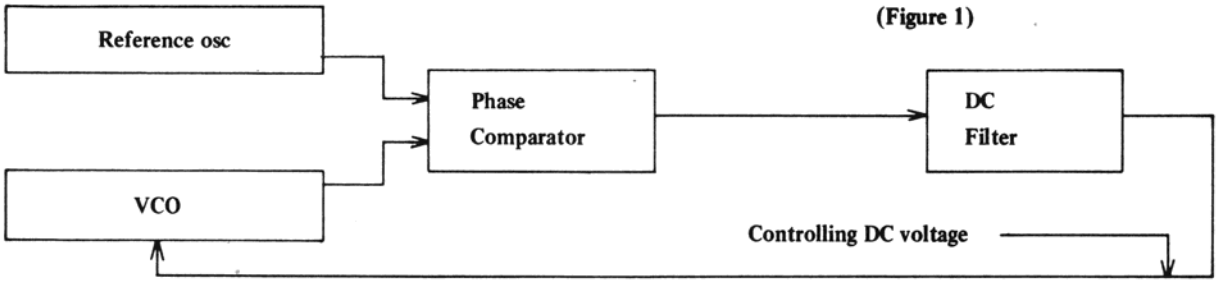
1. Set the signal generator to provide RF input signal of 40 dB (1KHz, 30% modulation).
2. Adjust RV2 right after the NO.3 LED just on.
3. Reduce antenna input signal level to 0-10, and check to see the first LED light on.

OPERATING THEORY OF PLL FREQUENCY SYNTHESIZER

1. Fundamental theory of PLL Circuitry

The purpose of PLL (Phase Locked Loop) circuit is to generate multiple number programable frequencies from a signal reference frequency with quartz crystal accuracy.
A basic PLL circuitry consists of reference oscillator, VCO, phase comparator and DC filter (low pass filter).

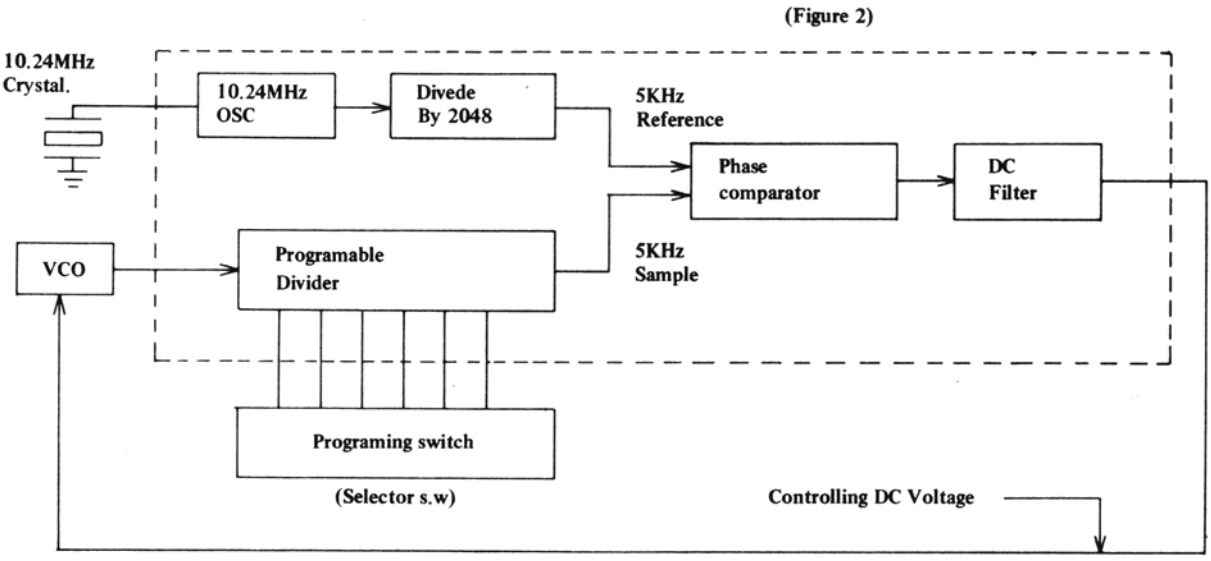
(Figure 1)



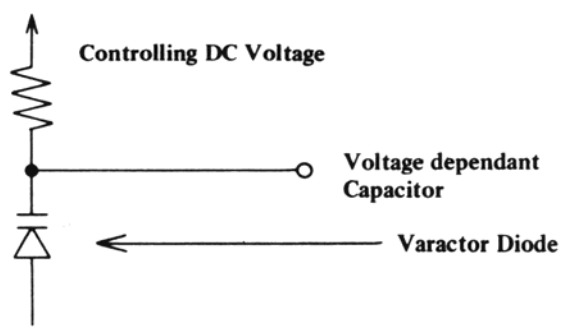
With the above circuit the VCO (Voltage Controlled Oscillator) Frequency is effectively locked to the reference oscillator, and its accuracy is as good as the reference oscillator.
Since the CB radio's adjacent channel spacing is 10KHz (or multiple of 5KHz), our purpose should be to preoduce multiple of programable frequencies that are spaced apart by 10KHz.

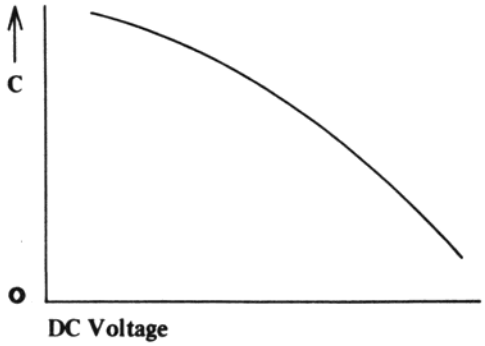
Therefore the basic PLL circuitry is espanded as follow:

(Figure 2)



The most important part of VCO circuitry is a voltage controlled variable capacitor called varicap or varactor diode whose capacitance depends on DC voltage applied to its cathode.





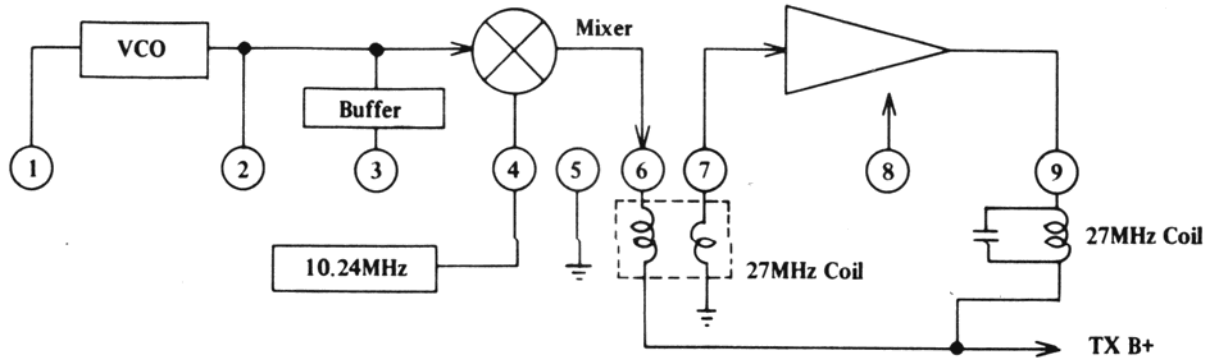
The varactor diode is responsible for setting VCO frequency, and once set it regulates the VCO frequency against the reference.
The VCO frequencies are chosen in 16 to 17MHz range as shown on table 1.
To obtain transmit signal the VCO is mixed with 10.24MHz. As an example for channel 1:
10.24 + 16.725 = 26.965MHz
For receiver mode the VCO is used as a first local oscillator
channel 1:

26.965 – 16.27 = 10.695MHz
The above first IF of 10.695MHz is mixed again with 10.24MHz crystal oscillator frequency which serves as the second local oscillator.
10.695 – 10.24 = 0.455MHz
As can be seen above the VCO frequency shifts from 16.725 to 16.27MHz when changed from transmit to receive for the same channel 1.
The shift is accomplished by "read only memory" incorporated inside the PLL IC-2 between the selector switch and the VCO divider (programable).
When transmit logic signal is applied to the IC-2 through pin 19, the programable divider will divide incoming VCO frequency by 3345 to produce 5KHz sampling signal.
16725 ÷ 3345 = 5KHz
For the receiver mode the programable divider will automatically change to divide the VCO frequency by 3245.
16270 ÷ 3254 = 5KHz
Note that the reference frequency of 5KHz is obtained by dividing the 10.24MHz by 2048 times. (5KHz reference is used instead of 10KHz for division convenience).
See table 1 for transmit/receive mode VCO frequencies.

2. Transmitter Circuit

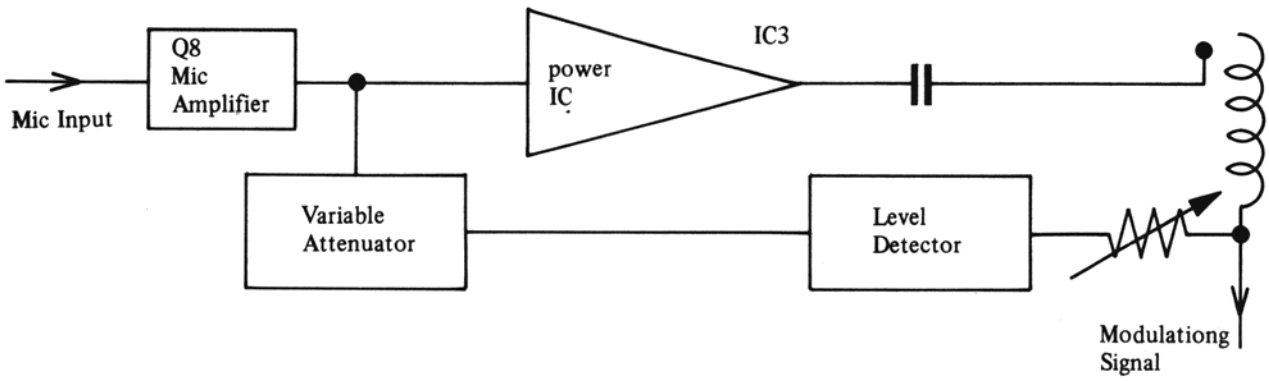
IC-2 (PLL LSI), VCO section of IC-4 (pin 1, 2 and 3) are operational regardless of the receive or transmit mode. When the radio is set to the transmit mode, mixer/amplifier section of IC-4 (pin 4, 6, 7 and 9), Q17, Q18, Q19 and Q20 are activated. The VCO frequency selected by the channel selector switch is mixed with 10.24MHz to generate desired transmit frequency. The mixing is done by a mixer circuit located inside the IC4.

Equivalant Circuit of IC-4.



The resulting transmit frequency from pin 9 of IC4 is filtered by L8 and L9.
Q18 is an amplifier/switch circuit. When VCO frequency is out of "Lock" condition pin 14 of IC2 pulls down bias voltage of Q18 to ground disabling Q18 from passing possible illegal frequencies.
Q19 is a RF power driver circuit and Q20 is the final RF power amplifier.

A modulation audio signal is applied to the collectors of Q19 and Q20 through a audio power transformer T1.
The audio signal (mic input) applified by a single power IC3.
The modulation limiting is accomplished by a automatic livel control circuit which is as follow:



L13 and C103 are series resonator, and L14, L15, C105 and C107 make up pielow pass filter. C99 is factory selected and limits the RF output power level to within the FCC limit of 4 watts.

3. Receiver Circuit

In the receiver mode of operation. Q17 transistor is turned off. Q2 is a 27MHz RF input amplifier and any excessive input signal is limited by dildes D4 and D5. The amplified 27MHz is mixed with VCO frequency selected by channel switch. For channel 1 VCO is set at 16.27MHz. The resulting first IF is 26.965 – 16.27 = 10.695MHz. Q3 is the first converter, and the 10.695MHz is sharply filtered by L3 and a ceramic filter CF-1. The first IF is again mixed with a second local oscillator of 10.24MHz. 10.695 – 10.24 = 0.455MHz.
Q4 is the second converter and the 455KHz. Second IF is filtered by a razor sharp ceramic filter of CF-2 coupled with L4.
Q5 is a first 455KHz amplifier, and the Q6 being the last amplifier.
D6 is a detector diode which produces audio signal as well as a negative DC voltage for AGC action.
The negative voltage also provides forward biasing to the cathode of ANL clipping diode of D8. The biasing voltage has a time constance determined by R34 and C33.

Frequency Chart (Table 1)

CH NO	CHANNEL FREQ (MHz)	CRYSTAL OSC	VCO	
			TX	RX
1	26.965	10.24	16.725	16.27
2	26.975	"	16.735	16.28
3	26.985	"	16.745	16.29
4	27.005	"	16.765	16.31
5	27.015	"	16.775	16.32
6	27.025	"	16.785	16.33
7	27.035	"	16.795	16.34
8	27.055	"	16.815	16.36
9	27.065	"	16.825	16.37
10	27.075	"	16.835	16.38
11	27.085	"	16.845	16.39
12	27.105	"	16.865	16.41
13	27.115	"	16.875	16.42
14	27.125	"	16.885	16.43
15	27.135	"	16.895	16.44
16	27.155	"	16.915	16.46
17	27.165	"	16.925	16.47
18	27.175	"	16.935	16.48
19	27.185	"	16.945	16.49
20	27.205	"	16.965	16.51
21	27.215	"	16.975	16.52
22	27.225	"	16.985	16.53
23	27.255	"	17.015	16.56
24	27.235	"	16.995	16.54
25	27.245	"	17.005	16.55
26	27.265	"	17.025	16.57
27	27.275	"	17.035	16.58
28	27.285	""	17.045	16.59
29	27.295	"	17.055	16.60
30	27.305	"	17.065	16.61
31	27.315	"	17.075	16.62
32	27.325	"	17.085	16.63
33	27.335	"	17.095	16.64
34	27.345	"	17.105	16.65
35	27.355	"	17.115	16.66
36	27.365	"	17.125	16.67
37	27.375	"	17.135	16.68
38	27.385	"	17.145	16.69
39	27.395	"	17.155	16.70
40	27.405	"	17.165	16.71

PARTS LIST 67LTD

SYMBOL	DESCRIPTION	PART NO.	SYMBOL	DESCRIPTION	PART NO.
	BRACKET (MIC) SPC 58X41X1T CR-P	250 173 9 001	RFC6	INDUCTOR 6.8UH MOLD TYPE	047 039 9 004
			L15	COIL AM TX ANT 27MHZ A	046 039 9 012
	BRACKET (SET) SPC 85X95X0.6T BLACK SPRAY	250 174 9 001	L13	COIL AM TX ANT 27MHZ B	046 039 9 013
			L14	COIL AM IFT 27MHZ TX ANT TUNING-C	046 039 9 014
	BASE COVER ASS'Y	523 820 9 001			
Q20	TRANSISTOR 2SC 2078 (D)	172 075 9 001	L4	COIL IFT 455KHZ-A	047 002 9 012
Q19	TRANSISTOR 2SC2314 (E)	176 120 9 001	L5	COIL IFT 455KHZ-B	047 002 9 013
IC3	I.C. KIA 7217AP	307 331 9 001	L6	IFT VCO OSC	047 039 9 005
	JACK EARPHONES HS J 0615-01-010	773 126 9 001	L8	IFT 27MHZ RF AMP-A	047 039 9 006
			L9	IFT AM AMP 27MHZ C	047 039 9 007
	JACK EARPHONES HS J 0465-01-020	773 134 9 001	L10	IFT 27MHZ TX RF PRE AMP	047 039 9 008
			L1	27MHZ RX ANT	047 039 9 009
	PLUG ASS'Y (3 PIN)	523 821 9 001	L2	27MHZ RF AMP (RX)	047 039 9 010
	MAIN BODY SPC 440X50X1T ZN-PLAT	257 157 9 001	L3, 7	10.6MHZ RF 1ST MIXER (RX)	047 039 9 011
			L11	27MHZ RF-C (TX)	047 039 9 012
	FRONT BODY VINYL & SPTE 137X42X1T NITY TOP SBK08	254 102 9 001		RELAY MZ-12HS	441 047 9 001
				REMOTE COVER ASS'Y (MIC ASSY)	523 824 9 001
	BOTTOM COVER VINYL & SPTE 180X158X1T NITY TOP SBK08	252 052 9 001	D303	LED LAMP SPRMUW 3	158 064 9 001
				LED DISPLAY LTD-482LGC GRN	158 064 9 002
	UPPER COVER VINYL & SPTE 180X158X1T NITY TOP SBK08	253 131 9 001		SPEAKER C050A20-305G00 16 OHM	580 069 9 001
			SW302, 303, 305	SLIDE S.W 2P-1C (SS12ZP-06P)	084 108 9 001
R92	RES., METALOXIDE 10 OHM 1W	011 001 5 100	SW306	PUSH SW HPW 0208-01-130 2P-2C	088 144 9 001
R45	RES., METALOXIDE 22 OHM 2W	011 002 5 220	SW304, 307	TOUCH S.W. EVQ-QJW-02K (EVZ-Q7302K)	081 007 9 001
RV1	RES., SEMIFIXED 10K OHM 8 DIA	008 505 9 002			
RV4	RES., SEMIFIXED 5K OHM 8 DIA	008 471 9 006	VR301	VARIABLE RES. (VR) 121PS2-1 10KA	008 833 9 001
TH1	THERMISTOR 500 OHM	005 013 9 001			
Q2, 3, 4, 18	XSTOR MPS9426 (C)	176 115 9 001	VR302	VARIABLE RES. (VR) 121PN2-2 1.2C 10KC	008 833 9 002
Q10, 11, 15, 17	XSTOR MPS9681 (T)	176 049 9 001			
Q9, 16	XSTOR MPS9418 (T)	176 115 9 004		CURLED CORD/PLUG ASS'Y	428 102 9 001
Q8, 12, 13, 14	XSTOR MPS9631 (T)	176 132 9 001		CURLED CORD 15 COND MIC REMOTE CORD	428 102 9 002
Q1	XSTOR MPS9468A (T)	177 066 9 002			
IC4	I.C. TA7310P	307 403 9 001		CONNECTOR 16PIN PLUG FM17PS-16A	777 047 9 006
IC2	I.C. LC7131	307 272 9 002			
IC1	I.C. LC7181	307 283 9 001		CONNECTOR PIN FOR FM17PS-16A	777 047 9 007
D25	DIODE ZENER 7.5V	152 063 9 001			
D21	DIODE ZENER UZ9.1B	152 125 9 001		UPPER COVER ABS SILVER SPRAY SILK	271 312 9 001
D26	DIODE VARICAP MV2209	154 009 9 001			
D1, 2, 4, 5, 8, 11, 12-16, 22, 23	DIODE 1S2473 "F" TYPE	151 125 9 001		BOTTOM COVER ABS BLACK SPRAY SILK	271 313 9 001
D3, 6, 18, 27	DIODE GE OA90	150 020 9 001		LEVER ABS BLACK SPRAY SILK	265 039 9 001
D10, 17, 24	DIODE SI 1N4002	151 082 9 001		LENS (LARGE) VINYL 40X55X1T (CLEAR)	753 016 9 001
D19, 20	DIODE SI 1N4003 (1A 200V)	151 083 9 001			
X1	CRYSTAL 10.240MHZ HC-18/U	132 036 9 001		LENS (SMALL) VINYL 22X15X1T COLOR: ORANGE	753 016 9 002
CF2	CERAMIC FILTER CFU455HT	140 026 9 001			
CF1	CERAMIC FILTER 10.7MJ	140 037 9 001		VOLUME KNOB ABS BLACK WHITE PAINT	751 307 9 001
CH1	TRANSFORMER CHOKE	042 041 9 001			
T1	TRANSFORMER OPT	042 051 9 001		ROCKER SW KNOB ABS BLACK (CHANNEL UP/DOWN)	751 307 9 002
RFC5	COIL CHOKE 1UH BOBBIN	041 134 9 007			
RFC7	COIL CHOKE 1UH RESISTOR TYPE	047 039 9 001		SQUELCH KNOB ABS BLACK	751 307 9 003
RFC1	COIL RF CHOKE 20UH CORE	047 039 9 002	Q301	XSTOR MPS9631 (T), NPN	176 132 9 001
L12	COIL RF CHOKE 0.5UH SPRING	041 134 9 008	IC301	I.C. LC7191	307 289 9 001
RFC8, 9, 10	COIL RF CHOKE 0.8UH SPRING	047 039 9 003	D302	DIODE ZENER BZX83-C7V5	152 128 9 001
RFC3	INDUCTOR 25UH MOLD TYPE	047 012 9 001	D301	DIODE 1S2473 "F" TYPE	151 125 9 001
RFC4	INDUCTOR 0.45UH MOLD TYPE	047 012 9 002	T301	TRANSFORMER MATCHING	068 017 9 001
RFC2	COIL CHOKE 4UH BOBBIN TYPE	047 012 9 004			

TECHNICAL BULLETIN NUMBER 1284

September 10, 1985

TO: COBRA CB WARRANTY STATIONS

MODELS AFFECTED: 67LTD

SYMPTOMS: Car radio audio is heard from Automobile speakers instead of CB Audio when using a CA-63 Monitor Accessory with a 67LTD (Turned on and with NO Squelch).

CAUSE: The relay control circuit in the 67LTD causes the CA-63 relay to be de-energized when it should be energized. This condition causes the car radio Audio to be connected to the car speakers instead of the Audio from the 67LTD.

ACTION: Reverse the switching logic of the 67LTD relay control circuit by replacing the PNP device at Q15 with an NPN device. Increase the resistance at R70 and remove the resistor at R71 to improve low temperature operation.

DETAILS OF CHANGE:

1. Remove both covers of the base unit by removing 8 screws.
2. Unsolder, remove and discard 4.7k ohm resistor at R71. (See attached diagram.)
3. Install and solder a short jumper wire at R71.
4. Unsolder, remove and discard 10k ohm resistor at R70. (See attached diagram.)
5. Install and solder a 20K ohm 1/4 watt resistor (Dynascan P/N 002-104-5-203) at R70.
6. Unsolder, remove and discard MPS9681 at Q-15 (see attached diagram).
7. Install and solder an MPS9418T transistor (Dynascan P/N 176-115-9-004) at Q-15, observing REVERSE POLARITY (ie, E of new transistor in hole marked C, and C of new transistor in hole marked E. The B lead of the new transistor will still be in the hole marked B).
8. Replace both covers with 8 screws.
9. Check for proper CA-63 operation.

Production Change Point: **LOT 704**

This Field Bulletin Applies To All Units With A Serial Number Less Than 0004047.

**Units Affected Are From Ser. #0000001 Thru Ser. #0004047.*
This Bulletin Applies Only To Units Sent In For Repairs.

67 LTD BASE PCB 401055-B PARTS LAYOUT

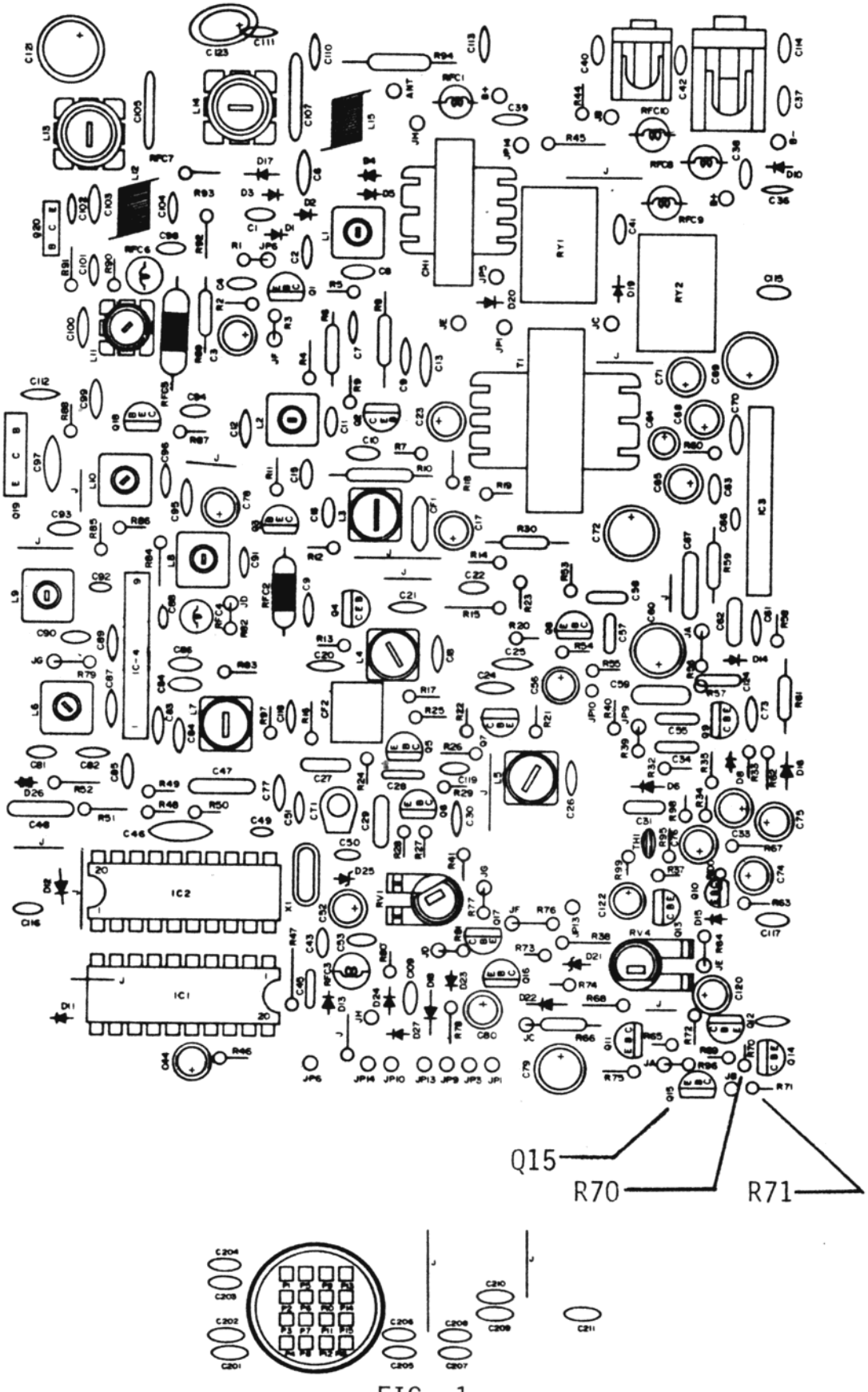


FIG. 1