5. DESCRIPTION OF RADIO CIRCUIT

5-1. Frequency synthesizer

Frequency synthesizer consists of VCO,PLL IC(built in PRESCALER) and loop filter.

a) VCO

VCO is composed of One VCO. Oscillation circuit takes colpitts circuit using variable Diode. And VCO is composed R46,D5,C66,C67,L17,C70,C71,C57, R29,R28,C47,C36,R23,Q14,Q15,R22,L14,L15,C22.

VCO control voltage through loop filter adjusts frequency and Microphone Signal through Modulation terminal makes modulation.

b) PLL IC

PLL IC is adjustable IC to produce the wished frequency which VCO provides through loop filter. It has internal counter using 10.25Mhz reference frequency to make 6.25kHz as reference Signal. VCO frequency from prescaled input is divided signal is compared with Reference signal phase in phase comparator. Built-in charger pump changes voltage (until two signals are in phase) and charged voltage supplies VCO through loop filter to produce the desired frequency.

Frequency data associated with channel goes to PLL IC by CPU through CLOCK , DATA. PLL IC enables by strobe line of CPU.

c) Loop Filter

Loop filter is composed of C34, R11, C31,R13, C33 and changes pulse from pin U9.14 to DC . And eliminates harmonic component in pulse. It helps VCO oscillate clearly as DC voltage is supplied into Varicap.

5-2. Receiver

This is composed of Dual Conversion Super Heterodyne. First IF is 10.7Mhz. Local oscillator frequency is lower in 1'st IF than Rx frequency. It is called low side injection. Second IF is 450kHz . 2'nd local oscillator Frequency comes to 10.25MHz.

a) Rx / Tx Conversion Circuit

Rx signal goes to Rx / Tx conversion circuit through FIXED antenna connector, low pass filter (L1,L2,C1,C2,C113,C5) and receiver resonance circuit composed of L3,C15. When transmitting,

Voltage through R1,D1 supplies,D2 of receive input is short and

Tx is on condition. When PIN diode is off in condition of Rx, C18 resonate serially and make impedance matching at receiver bandpass filter.

b) Front End

Front-end has Q6 to provide a high sensitivity and low noise feature.

It employs band pass filter to eliminate image frequency and to produce enough pass band by Q6 input and output.

c) Mixer

The receiver which has been amplifier in the RF front-end is provided to the base of the 1st mixer Q7. The 1st L/O signal provide from the VCO is supplied to the emitter of Q7 and Converted to the 1st IF 10.7 MHz

It has RF signal through Q6 and Band Pass Filter ,L14 and RF signal from Local Oscillator mixed.

It develops 1'st IF 10.7MHz. 1'st IF goes to 1'st IF amplifier Q20 base through Ceramic filter FL2.

If of mixing signals is selected and taken into Ceramic filter. impedance of mixer is direct matched with input impedance of Ceramic filter.

Matching of filter satisfies pass bandwidth of filter, ripple elimination with in pass band, and attenuation characteristic of stop band.

Ceramic filter is composed of two pole monolithic Ceramic filter, 8kHz of IF Bandwidth. R24 is used as impedance matching with 1'st IF Amp Q20.

d) IF AMP and Detection

1'st IF AMP Q20 supplies IF IC (U8) mixer input pin16 through output resistor R24 and C95 to need gain in insertion loss of Ceramic filter and last stage circuit. Multi-use IF IC makes up of mixer IF AMP.

2'nd local frequency enter to IF IC pin1.

It supplies mixer of internal IF IC. Mixer output of IF IC through pin3 passes 450kHz ceramic filter, supplies 2'nd IF amplifier and limits.

After 2'nd IF AMP has a process of enough gain and AMP rejection, it comes to quadrature detection. Demodulated audio signal by X1 is amplified and comes out to pin9. Detected audio signal through R1,C46,C49,C145,R69,R19 C146,U3,R32,Q21,C50 and input in audio amp. Audio IC U10 through C51.

e) Squelch Circuit

Noise component of detected outputs has amplification squelch threshold Is controlled by Resistor C680,R311, R305.

f) Audio Amplifier

Demodulated audio signal enters to pin3 of AF IC (U10).

It comes out to pin5 then, it reaches at speaker.

5-3. Transmitt

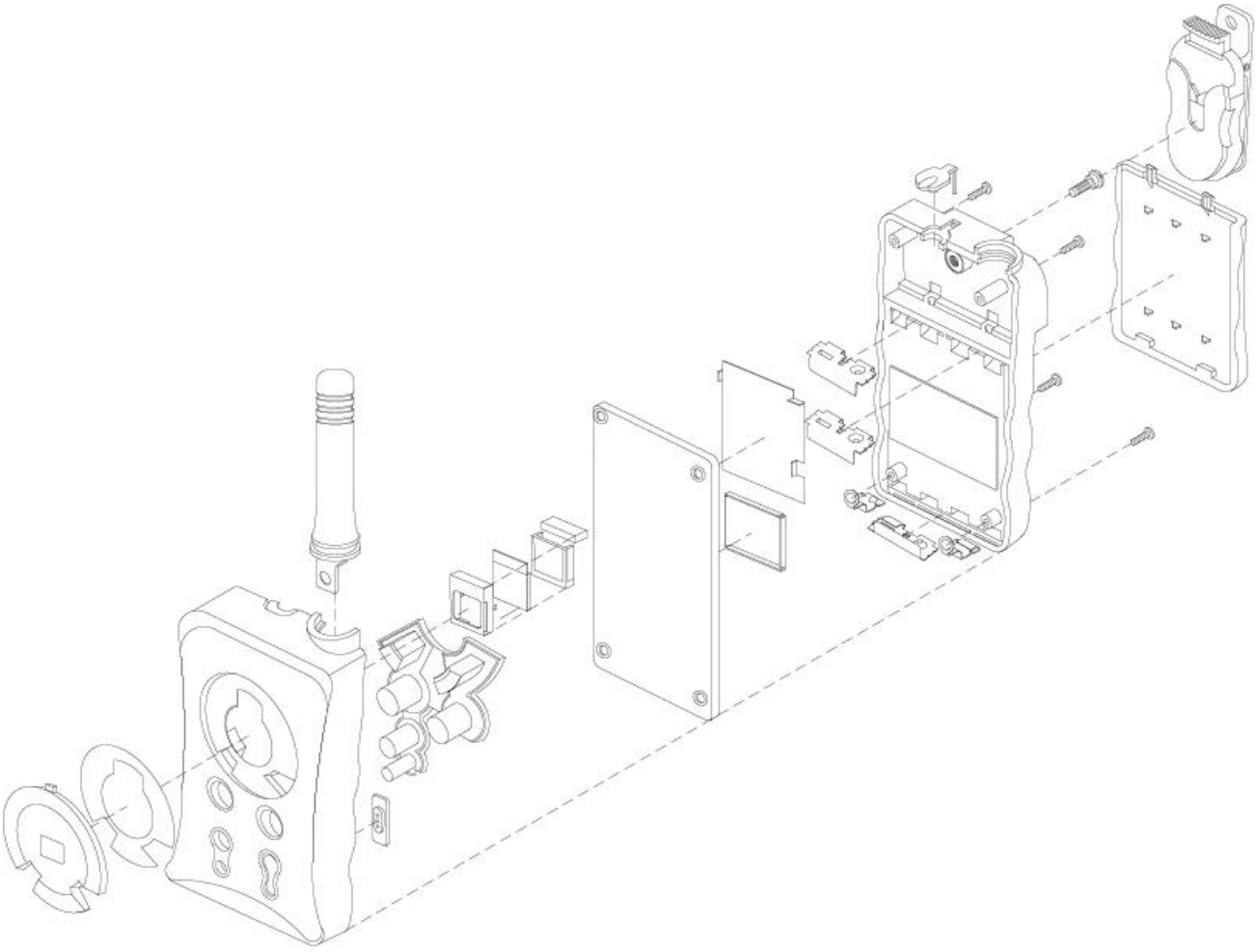
When Tx develops with pressing PTT switch, VCO output amplifies through Q13,Q2,Q1,Q3,28 transmits by antenna through low pass filter.
Tx RF signal produced from Tx VCO is amplified by Buffer Q28, Driver Q3 through C12 and entered Q1,Q2,Q13 Power Transistor input terminal with final amplification. After this stage, the signal is emitted at antenna through 50? matching circuit to low pass filter (L2,L1,C1,C2,C113,C5,) to eliminate harmonic.

a) Audio Modulation and Audio Amplification

Audio signal produced by external microphone, limits amplification, low pass filter by IC U3.

Max. Frequency modulation deviation is adjusted by VR1 keeps noise and audio from entering to VCO at time of Tx. Audio modulation and Audio Amplification has characteristic of 6 ./OCT pre-emphasis by U3.

9. EXPLODED VIEW



10. CHANNEL DATA

1) 2 way Radio Frequency Chart

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	462.5625	12	467.6625
2	462.5875	13	467.6875
3	462.6125	14	467.7125
4	462.6375	15	462.5500
5	462.6625	16	462.5750
6	462.6875	17	462.6000
7	462.7125	18	462.6250
8	467.5625	19	462.6500
9	467.5875	20	462.6750
10	467.6125	21	462.7000
11	467.6375	22	462.7250

NOTE: Channels 1 through 7 are shared between GMRS and FRS radios.
The channel number 20 is used for emergency channel.

2) FM Radio Frequency

87.5 Mhz ~ 108 Mhz