9. Circuit Description

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 of D202,Q202,C203,205,206,207,L202. 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 21.25MHz 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 R221,220,C240,238,237 and changes pulse from pin3 to DC., and eliminates harmonic component in pulse.
It helps VCO oscillate clearly as DC voltage is supplied into Varicap.

2) Receiver

This is composed of Dual Conversion Super Heterodyne. First IF is 21.7MHz. Local oscillator frequency is lower in 1'st IF than Rx frequency. It is called low side injection. Second IF is 450kHz. 2nd local oscillator frequency comes to 21.25MHz.

a) Rx/Tx Conversion Circuit

Rx signal goes to Rx/Tx conversion circuit through FIXED antenna connector, low pass filter(L310,311,312,C314,318,320,321,) and receiver resonance circuit composed of L313,C102. When transmitting, voltage through R311,L308,D301 supplies,D301 of receive input is short and Tx is on condition. When PIN diode is off in condition of Rx, L313 and C102 resonate serially and make impedance matching at receiver band-pass filter. (CF1).

b) Front End

Front-End has Q101 to provide a high sensitivity and low noise feature. It employs Saw filter as band pass filter to eliminate image frequency and to produce enough pass band by Q101 input and output.

c) Mixer

Mixer has one base 2SC4901(Q102) to feature high low noise quality. It has RF signal through C218, CF101 and Q101 RF signal from Local oscillator mixed.

It develops 1'st IF ,21.7MHz. 1st IF goes to 1st IF amplifier Q103(KTC4080) base through X-tal filter CF102.

IF of mixing signals is selected and taken into X-tal filter.

Output impedance of mixer is direct matched with input impedance of X-tal filter. Matching of filter satisfies pass bandwidth of filter, ripple elimination with in pass band, and attenuation characteristic of stop band. X-tal filter is composed of two pole monolithic X-tal filter, 8 kHz of IF bandwidth R113 is used as impedance matching with 1'st IF Amp Q103.

d) IF AMP and Detection

1'st IF AMP Q103 supplies IF(IC101) mixer input pin16 through output resistor R122 and C128 to need gain in insertion loss of X-tal filter and last stage circuit.

Multi-use IF IC makes up of mixer IF AMP. pin1 2'nd local frequency enter to pin1. It supplies mixer of internal IC. Mixer output of 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 AM rejection, it comes to quadrature detection. Demodulated audio signal by L108 (Quad Coil) is amplified and comes out to pin9. Detected audio signal through R140,IC102A/C and input in audio amp. IC103 through C151.

e) Squelch Circuit

Noise component of detected outputs has amplification Squelch threshold is controlled by Resistor R123,R125

f) Audio Amplifier

Demodulated audio signal enters to pin2 of IC103. After above signal amplies in IC103 pin5 through C156. It comes out to pin5 Then, It reaches at speaker.

3) Transmitter

When Tx develops with pressing PTT switch, VCO output amplifies through Q302,303 transmits by antenna through low pass filter.

Tx RF signal produced from Tx VCO is amplified by Driver Q302 through C306 and entered Q303 Power TR input terminal with final amplification.

After this stage, the signal is emitted at antenna through 50Ω matching circuit to low pass filter(L310,311,312,C314,C318,320,321)to eliminate harmonic.

a) Audio Modulation and Audio Amplification

Audio signal produced by external or internal microphone, limits amplification by IC503.. It enters to VCO through low pass filter and IC503B. Max. Frequency modulation deviation is adjusted by RV201 keeps noise and audio from entering to VCO at time of Tx. Audio modulation and Audio Amplification has characteristic of 6dB/OCT pre-emphasis by IC503D(KIA324).