



7. 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 D71, Q71,72 C75,76,77,14,15,19,20 and L71.

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 R72, 73,101,C70,71,72,73 and changes pulse from pin14 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 (L333, 334, 209,C334, 336,337,339,) and receiver resonance circuit

composed of L211, C213. When transmitting, voltage through R33B, L7, D211 212 supplies, D211,212 of receive input is short and Tx is on condition.

When PIN diode is off in condition of Rx, L211 and C213 resonate serially and make impedance matching at receiver band-pass filter.

b) Front End

Front-End has Q211 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 BFQ67W(Q221) to feature high low noise quality. It has RF signal through C7, F1 and Q211 RF signal from Local oscillator mixed.

It develops 1st IF, 21.7MHz. 1st IF goes to 1st IF amplifier Q231 (BFQ67W) base through X-tal filter F231.

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 within 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 R231 is used as impedance matching with 1st IF Amp Q231.

d) IF AMP and Detection

1st IF AMP Q231 supplies IF (U201) mixer input pin16 through output resistor R232 and C231 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 2nd local frequency enters to pin16.

It supplies mixer of internal IC. Mixer output of IC through pin3 passes 450kHz ceramic filter, supplies 2nd IF amplifier and limits. After 2nd IF AMP has a process of enough gain and AM rejection, it comes to quadrature detection. Demodulated audio signal by T201 (Quad Coil) is amplified and comes out to pin9. Detected audio signal through R249, U801B,C,D R824 and input in audio amp. U602 through C830.

e) Squelch Circuit

Noise component of detected outputs has amplification Squelch threshold is controlled by Resistor R244,246,247

f) Audio Amplifier

Demodulated audio signal enters to pin3 of U602. After above signal amplifies in U602 pin5 through C830. It comes out to pin5 Then, It reaches at speaker.

3) Transmitter

When Tx develops with pressing PTT switch, VCO output amplifies through Q321, Q7 transmit by antenna through low pass filter.

Tx RF signal produced from Tx VCO Is amplified by Driver Q321 through C331 and entered Q7 Power TR input terminal with final amplification.

After this stage, the signal is emitted at antenna through 50 Ω matching circuit to low pass filter (L333, 334,209,C334, C336, 337,339) to eliminate harmonic.

a) Audio Modulation and Audio Amplification

Audio signal produced by external or internal microphone, limits amplification by U701. It enters to VCO through low pass filter and U801. Max. Frequency modulation deviation is R27 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 U801-D (BA10324).