Circuit Description

Audio Path (Transmit)

Audio signal picked up by condenser microphone M1 is amplified with pre-emphasis by U5A. U5D forms a band-pass filter which cut sub-audio frequencies. U5C acts as a limiter and U5B is the post-limiter filter. R55 sets the maximum modulation. The signal will then fed to the VCO for FM modulation.

Audio Path (Receive)

Demodulated signal is fed to a band-pass filter U6A to eliminate the sub-audio components. U6B is a 2^{nd}-order high-pass filter. R100 and the resistor network R42-R49 form the digital volume control block. U6C performs the de-emphasis function. U6D is a 3^{rd} order low-pass filter which further cuts the high frequency noise. U4 is the audio power amplifier which drives the speaker.

MCU

U1 is a 8-bit microcontroller that provides all necessary control signals for the audio and RF circuits. MCU clock is 4.19MHz.

Power Management

U2 is a low drop out regulator which provides a stable 3.6V power to the MCU and audio circuits. U7 is another low drop out regulator which provides a stable 3.6V power to the RF circuits.

RF VCO and Synthesizer

Q27 is the voltage controlled oscillator. Its oscillation frequency is controlled by the reversed biased voltage on the diode D7. Q23 is a buffer amplifier. U9 is a phase lock loop synthesizer which accepts control data from MCU to determine the frequency of the VCO. Y2, a 20.95MHz crystal provides a reference for all the RF frequencies. The buffered 20.95MHz also provides a 2^{nd} local oscillator for down-conversion.

RF Transmitter

When transmitting (i.e. PTT button being pushed), the RF signal is amplified by Q20, Q25 and further amplified by the power amplifier Q24. D5, L6 and D6 form a T/R switch. L3, C143, C94 and C139 form a low-pass filter to cut the harmonics before delivered to the antenna.

RF Receiver

RF signal coupled by the antenna is fed through the T/R switch to the low noise amplifier Q4. F1 is a saw filter which cuts out-of-band signals. RF signal together with the LO are fed to the mixer Q26 for mixing. IF signal at 21.4MHz is then fed to the crystal filter F2 and then further amplified by Q21. Then, the amplified IF signal is fed to the IF-demodulation IC U8. The first IF signal is further down-converted to 450kHz by the 20.95MHz buffered reference. F3 is a 450kHz ceramic filter to cut out-of-band signals. Pin 9 of U8 provides the demodulated audio signal to the receive audio circuit.