

Circuit Description

1. Frequency Configuration

The receiver utilizes double conversion superheterodyne. The first IF is 45.050MHz and the second is 455KHz. The first local oscillator signal is supplied from PLL circuit. Frequency needed in the transmitter is supplied from PLL circuit. Figure 1 shows the frequency configuration.

Frequency Range: 450 MHz—470MHz

2. Receiver

The receiver utilizes double conversion superheterodyne.

1) Front-End RF Amplifier

The input signal from antenna is amplified in RF amplifier (Q27) after passing through the receive/transmit switch circuit and a 3-stage LC band pass filter. The amplified signals are filtered by a band pass filter (a 3-stage LC BPF) to eliminate unwanted signals before they go to the first mixer.

4. Transmitter

1) Transmit Audio

The modulation signal from microphone is amplified by IC3, pre-emphasized, then filtered by another low pass filter (separate filter) (Q25 and Q24) to eliminate the frequencies higher than 3KHz. The resulting signal enters the VCO for direct FM modulation. The voice voltage amplitude control circuit (Q46\R131\R601) is used to switch between wideband and narrowband. (See Figure 5)

2) CTCSS/CDCSS Encoder

The signal needed by CTCSS/CDCSS encoder is generated by IC11 and FM-modulated to the PLL reference signal. Since the reference OSC does not modulate the loop characteristic frequency or higher, modulation is performed at the VCO side by splitter. (See Figure 5)

3) DTMF/2-Tone Encoder

DTMF/2-Tone signalings are generated by IC11 and outputted in parallel by Pin 48-51. The output signal is reshaped by resistor array CP7-CP10, then sent to IC3 (1/4) for amplification, and filtered by active LPF consisting of Q25, Q24 and other components to eliminate the corresponding HF emission before being passed to TX VCO for modulation. The modulated signal is applied to AF AMP through C254 for ease of monitoring.

4) RF Amplifier

The transmit signal obtained from VCO buffer amplifier Q14 is amplified by Q15 and Q17.

The amplified signal is passed to power amplifier Q32 and Q31, and is capable of generating a 4.0W RF power. Q50 and R617 are used to toggle between high and low power.

5. Power

The 5V reference power supply for the control circuit is derived from a LDO IC. The reference power provides a 5V voltage in transmit mode [T_V], a 5V voltage in receive mode [R_V], and a 5V voltage shared in both modes based on the control signal from the microprocessor.

6. Control System

The IC11 CPU operates at 7.3728MHz.