

THEORY OF OPERATION

Model: 5M5

Date: 5/27/2009

Ver.: 1.0

1. Frequency Configuration

The receiver utilizes single conversion. The IF is 450 KHz, The local oscillator signal both for TX and RX is supplied from the crystal oscillator circuit.

2. Receiver System

1) RF AMP

The RF signal coming from the antenna passes through harmonic filter (LPF) consisting of C27,C1, L1, C33, C3, L2,C35 to filter out the unwanted signals, the antenna switching circuit (D1, D2,), and is amplified by RF Low-Noise-Amplifier Q5, and goes to the mixer.

2) Mixer

The signal from the front end is mixed with the local oscillator signal generated in the crystal oscillator by Q6 to produce IF of frequency of 450 KHz.

3) IF amplifier

The IF signal is amplified then applied to the IF system IC1 (SL5018) The IF system IC1 (SL5018) integrates the IF limiting amplifier, quadrature detector, noise amplifier, noise detector. The IF signal is passed through the ceramic filter F1 to remove the adjacent channel signal. The filtered IF signal is amplified by the limiting amplifier and demodulated by detector with the ceramic discriminator CD1. The demodulated signal is routed to the audio circuit

4) AF amplifier

The AF signal from the IF IC1 (SL5018) passes through the de-emphasis circuit of R42 and C73 to restore the audio frequency characteristics. Then passes the active filter consisting of Q8 (emitter follower) to remove sub-audio signal out of 300~3000 Hz, then passes through switch SW1C to be selected and enters the audio power amplifier IC2 (KA8602) , and goes to another switch SW1D , then goes to drive the speaker.

5) Squelch

Part of the AF signal from the IC1 enters the IF IC again, and the noise component is amplified and rectified by a filter consisting of R49, C52, C53, R39, R41 and an amplifier to produce a DC voltage corresponding to the noise level.

The DC voltage will be converted to control signal by IC1 build-in Schmitt trigger, and the controller signal from pin14 of IC1 will mute the AF signal if RF signal is too weak.

3. Local oscillator

Both receive and transmitter shares the oscillator circuit by Q1, but different crystal (switched by SW1A) to generate the local oscillator signal for reception and the RF carrier signal for transmission.

4. Transmitter System

1) Transmit audio

The audio is picked up from the internal MIC, the signal is switched by SW1C, then amplified by Amplifier IC2 (KA8602), and passed the switch SW1D, then goes to emitter follower by Q9

2) Modulation and RF amplifier

The audio signal from microphone signal is modulated to local oscillator by D4. The modulated signal output from the oscillator is pre-amplified by Q4, Q3 and Q2. Then it is amplified by RF power amplifier Q7.

3) ANT switch and LPF

The amplified signal then passes through a low-pass filter network which consists of C27,C1, L1, C33, C3, L2,C35 filters out spurious emission, and the antenna switching circuit D1, D2.. The signal is then applied to the antenna terminal.

5. Power Supply

Power supply circuit is consisted of VR-SW and regulator IC3(3302) and switch SW1B, to produce the working voltage needed for Tx and Rx..

6. Power indicator

Q10,Q11,Q12 consist a low battery detector, to monitor the battery voltage. LED1 will indicate the power supply status.