

7. THEORY OF OPERATIONS

7-1. Circuit Composition and Operation Theory

The basic explanation for the circuit composition GMRS-1545CH consists mainly of the one board controlling the analog circuit parts and the digital circuit parts for the other control.

7-2. Receiver

GMRS-1545CH transmission parts is composed in the double conversion system, which has the 1st IF frequency of double 21.7 MHz and the 2nd IF frequency of 450 kHz. With the RF fronted which has an excellent band characteristics and skirt characteristics, the 2 pole MCF used in the 1st IF, and the 3 pole ceramic filter in the 2nd IF, the reception interrupting factors such as the image and the sensitivity repression are reduced for the more stable reception.

7-2-1. RF Front-end

The signal received by the antenna will be transmitted to the band pass filter through the antenna switching circuit consisted of L1, L2, L3, L4, C1, C2, C4, C5,C24,C25,D2,D1 The front RF amplifier transistor Q6 consists of the L21, L12, C86, C87, C26,C28 input band pass filter and FL1 output band pass filter, primarily diminishes the other signal rather than the 1st IF image and other signal within the reception band and amplifier only the necessary signal within the RF.

7-2-2. 1st Mixer

The receiver which has been amplifier in the RF front-end is provided to the base of the 1st mixer Q7. The 1st L/O signal provide from the VCO is supplied to the emitter of Q7 and Converted to the 1st IF 21.7 MHz

7-2-3. 1st IF Filter and 1st IF Amplifier

The signal covered by Q7 to 21.7 MHz, the 1st frequency, change its impedance through C48, and then is infused to the fundamental MCF which has the center frequency of 21.7 MHz and the width of +/- 3.75 kHz.

Here, the signal reduces the image and other unwanted signal for the 2nd IF , and changes its impedance again through the R24. Then the signal is infused to the Q8, the 1st IF amplifier. The signal infused to the Q8 is amplifier approximately by 20 dB in other to acquire the required reception sensitivity, and infused to the U8 which functions as the 2nd mixer, the 2nd IF amplifier, and the FM detector.

7-2-4. 2nd Mixer, and IF, FM Detector (U8)

The receiver IF signal of 21.7 MHz, which has been infused to U8 is mixed with the 2nd L/O converted to 450 kHz, the 2nd IF frequency. The receiver signal converted to the 2nd IF signal frequency passed through the FL3, the ceramic filter of 450 kHz again. After the limiting inside the U8 and the FM demodulating by the quadrature detector inside the U8, the signal offers the output through the 9th pin of U8.

The squelch circuit is composed to detect the noises from the received signal demodulate in the 9th pin of the U8. For this purpose, the noise filter is using the OP amplifier inside the U8