

Circuit functions

The device is basically a transceiver operating in the 900mhz ISM band. It can be operated with battery or external AC/DC adapter. An external speaker connection is provided and no other means of connection. The antenna is a build-in monopole type and should be rotated 180 degrees up when wall-mounted and 90 degrees up when placed flat on a table. No earth ground or RF ground is necessary for safety or radiation suppression. When switched on, it is in the receive standby mode and it will transmit when the TALK or CALL button is pressed. There are three discrete channels set by a mechanical switch on the left side. The exact frequency of each channel is programmed into the microprocessor for PLL synthesizer setting and cannot be changed by the user.

The device circuitry is composed of two main functional blocks which are physically implemented on two separate PCB's interconnected by feed wires. The circuitries of these blocks are provided on two separate schematics and are described as follows:

1) The control block.

This circuitry is composed of the microprocessor IC3 which controls the external keys and LED displays. It also programs the phase lock loop ic in the RF circuitry according to the channel switch setting. Others functions include voice activation control, audio squelching and call tone generation. A tone decoding and encoding ic (IC4) is used as pilot tone in signal identification. In receive mode, the microprocessor detects the signal identification from the tone decoder and if positive, it turns on the audio amplifier. In transmit mode, it turns on the RF power amplifier and generate the call tone if call button is pressed. In voice activation mode, it detects the audio level threshold and commences transmission if threshold exceeded.

2) The RF block.

This circuitry contains a voltage controlled oscillator, together with a phase lock loop ic, form a programmable frequency synthesizer. In transmit mode, it is programmed to the required frequency and fed directly to the transmit amplifier Q1. Frequency modulation is achieved by feeding audio signal to the anode of the tuning diode D2. In receive mode, it is programmed to be 45mhz above the transmit frequency and injected into the mixer Q3 so that the RF frequency is converted down to an IF of 45mhz. This IF is fed into IC1 which further down-converts to a second IF of 10.7mhz . At 10.7mhz, the signal is frequency demodulated and the recovered audio is directed to the control board for tone detection and audio amplification.