

RECEIVER SECTION

RF Low Noise Amplifier

The LNA is constructed with two stages of amplifiers (Q309 and Q310) and filter F303 for high rejection ratio of alternate channel and spurious. They are matching with the LC networks. The signal received from the antenna is fed to the LNA. Then, the LNA amplifies and filters out the desired signal and delivers it to the mixer.

Local Oscillator

The first local oscillation frequency is derived from a single 4MHz crystal by means of a phase locked loop (U303). The transmitter frequency is from 915.6MHz (channel 1) to 918.4MHz (channel 3). The first IF is at 136.6MHz with LO operates from 779.0MHz to 781.8MHz. The local oscillator is mainly formed with Q305, Q306, VD301, L304 and U303.

The second local oscillator is formed with a 62.95MHz crystal and a transistor Q302.

Mixer

The mixer is constructed with a single transistor (Q311). After the received signal has amplified from the LNA, it is injected to the base of transistor Q311. The local oscillation frequency from the local oscillator is fed to the base of Q311. The received signal and local oscillation frequency are heterodyned at Q311 to produce a 136.6MHz intermediate frequency (IF) signal for the second mixer.

The second mixer is built in the integrate circuit U302. The first IF is fed through the filter F312 and inject to pin 16 of U302. The second local oscillation frequency is fed to the U302 at pin 2. They are heterodyned to produce the second IF of 10.7MHz.

IF Filter/Limiter and Detector

F301, F302 and Q307 filter out the 10.7MHz IF signal to U302. U302 performs the IF Limiter and FM quadrature detector as well. The detector's center frequency is determined by adjusting L334. The audio is recovered from pin 14 and RF signal level out (RSSI) is at pin 10.

Audio Amplifier and Expander

The recovered audio from U302 is amplified by a transistor (Q1) and expanded by the expander (U2) to improve the Signal-to-Noise ratio. C21 and R4 form the de-emphasis network. The output level of the expander can be trimmed by means of adjusting VR1.

RSSI and Mute Circuit

The output of RF Signal Strength Indicator (RSSI) from U302 is fed to a comparator (IC1-A). The signal strength is proportional to the DC level develops at pin 10 of U302. If the DC level presented at pin 10 of U302 is higher then the preset level at pin 2 of IC1-A, pin 1 of IC1 goes high and turns on Q9 and Q203. The power amplifier (U3) is on. Otherwise, the power amplifier (U3) is off and the audio is muted.

The desired mute level can be trimmed by means of adjusting VR202.

Bass Booster

Q8 and rotary potentiometer (VR100) are used to form an active tone control circuitry for the bass sound. The expanded audio is coupled to the control circuitry through a capacitor (C8). When the potentiometer is rotated counterclockwise, the circuitry can provide an additional gain of up to 12dB for the bass sound.

Power/Battery Low Indicator

The Power/Battery low indicator (LED D201) is controlled by MCU. When the power is on, it lights.

The voltage detector is constructed with a comparator (IC1-B). When the battery is weak, the DC level presents at pin 6 is less than pin 5, pin 7 goes high. Once MCU detects high at pin 11, it flashes the LED.

Charger

The charger is constructed with a constant current source (Q2, Q3, Q5, Q6 and Q7). The charging current is governed by R2 & R11. As the audio is muted (pin 1 of IC1-A goes low) and the recharge ON/OFF switch is opened, the recharge starts.