

43-3101 Indoor Unit circuit description

The indoor unit composes of RF circuit part and AC intercom circuit part. RF circuit part operates at 49.835 to 49.885MHz with channel spacing 25KHz. While the AC intercom circuit part operates at 200 to 270KHz. The channel frequency allocation is that channel 1 operates at 200KHz. Channel 2 operates at 270KHz. Channel 3 is operates at 230KHz.

RF transmitter section:

The transmitter VCO composes of transistor Q2 and varactor diodes VD1 and VD2. The operation channel frequencies are 49.835MHz –49.885MHz for 3 channels with 25KHz channel spacing. The VCO output is amplified by buffer amplifier Q4 and the power amplifier Q5 respectively. The amplified signal passes through the antenna switching diodes of D8 and D9 and then being feed to antenna.

RX amplifier:

The receiver amplifier composes of Q19 and Q1. The received RF signal is amplified by Q19 and Q1 and then being feed into combo IC (U1) via transformer T2.

Combo IC:

The Combo IC MC13111A (U1) composes of dual conversion receiver, IF detector, compander, expander, dual PLL, low battery detect, mic amplifier. There are two internal mixers that down convert the received RF signal 10.7MHz (1st IF) and 450KHz (2nd IF) respectively. The two IF output signals are filtered by 10.7MHz ceramic filter X2 and 450KHz ceramic filter X3 respectively. The 450KHz 2nd IF is then demodulated by 450KHz IF detector. The detector output signal is applied to expander and then amplified via internal speaker amplifier. The amplified signal is further amplified by external audio amplifier LM386 (U8).

The audio cut off is controlled by squelch circuit formed by U4 (LM358), U2 (BAV99).

TX modulation:

The audio input signal is amplified by internal mic amplifier inside combo IC and then being feed to TX VCO. The modulation can be adjusted by tuning variable resistor (VR4).

Transistor switches:

Transistors Q7 acts as switch that control TX_V+ on and off. Transistors Q21, Q15 and Q16 act as switch that control the power of U8 on and off. Q11 acts as muting circuit that controls transmission of the intercom signal on and off. Transistor Q20 acts as switch that controls the power supply of U6.

AC intercom circuit

TX operation:

The AC intercom transmit frequency generate by U7 (NE567) which acts as frequency synthesizer and FM demodulator. The generated AC intercom signal is amplified by Q14 and then further amplified by power amplifier Q12. The amplified signal passes through low pass filter formed by L6-L10 and C89-C93, C117-C119. Finally, the signal is coupled to AC line via transformer T102.

RX operation:

The received signal is applied to input pin of amplifier (pin 1 of U6) via transformer T102. The amplified signal is further amplified by U6B and then coupled to FM demodulator IC NE567. The demodulated signal is then applied to audio amplifier U8 (LM386). The audio level can be controlled by volume control VR6.

Frequency tuning:

The operation frequencies of AC intercom can be adjusted by tuning VR1, VR2 and VR3 for channel 1, channel 3 and channel 2 respectively.