CIRCUIT DESCRIPTION
Model: MH9116 Series

1 Base

a. RF Transmitter Section – RF Board

Compressed audio signal is frequency modulated through the varactor diode D3. Diode D3, choke coil L2 and the external components formed the voltage controlled oscillator circuit for the transmitter part. This circuit generates the TX VCO frequency. A portion of this signal is fed back to the PLL IC's pin1 (FIN1) for phase comparison. Once the phase of oscillation stabilized, the PLL circuit generates the error voltage necessary for the VCO to oscillate at the desired transmitter's RF frequency. The VCO circuit impedance is matched with the succeeding circuit through the transistor Q7 that also acts as the buffer amplifier. RF amplifier Q5 boosts the signal for transmission. This amplified RF signal is trimmed to the desired frequency band by BPF903 so as not to interfere with the receiver circuit. The transmitter RF signal is then propagated through the antenna.

b. RF Receiver Section - RF Board

The Base Unit antenna receives RF signal. Band Pass Filter BPF927 trims the signal to the desirable frequency band. Transistor Q8 is a low noise amplifier that boosts the RF signal to a specific level for mixing. PLL IC1 (TB31202) is used as a Universal Phase Lock Loop circuit. The frequency from the Voltage Controlled Oscillator (VCO) D1, L1 and Q4, is fed back to the PLL IC through pin 16 (FIN2) for phase comparison. During channel scanning or turning the unit on, once the phase of oscillation stabilized (locked), the PLL circuit generates the first local oscillator frequency for down-converting the received RF signal into the first IF frequency 10.7MHz. This process is accomplished through the IF mixer circuit Q3. Q1 is used for matching the impedance of the mixer circuit with the succeeding circuits. The resulting IF signal is kept constant by the IF Filter FL2 to 10.7MHz which is then mixed with the second local oscillator frequency 11.150MHz (derived from X1 & C47) to produced a much lower IF frequency. This lower IF frequency if further filtered by IF Filter FL4 to produce a more stable signal of 450KHz. Quadrature signal detection is accomplished internally by the Narrow-band Detector IC2 (KA3361) with the IF coil L7. The recovered audio frequency can be taken from IC2 audio output pin9. Double conversion of received signal is utilized to improve the image frequency rejection of the unit.

c. Transmitter Audio Section – Main Board

Audio Frequency signal from the telephone line is compressed through the compressor part of IC4 to minimize the transmission noise. The degree of compression depends on the external RC combinations. AGC is also utilized by IC4 to avoid shock noise caused by abrupt change of audio levels. The compressed audio is filtered and amplified for better acoustical performance.

d. Receiver Audio Section – Main Board

The compressed Audio Frequency signal is passed through passive RC filters for acoustic compliance. The filtered audio is then fed to the Compander IC4 for expansion thus retrieving the original Audio signal with noise filtered out. Q5 & Q9 are used as buffer circuit. Matching transformer HYB1 isolates the high-voltage telephone line to the rest of the circuit.

HYB1 is also used as a hybrid transformer to create a two-way path for audio transmission to and reception from the telephone line.

2 Handset

a. RF Transmitter Section – RF Board

Refer to portion 1.a for this section. All circuit performance is exactly the same except that Band Pass Filter BPF903 is changed to BPF927 for the handset transmission.

b. RF Receiver Section – RF Board

Refer to portion 1.b for this section. All circuit performance is exactly the same except that Band Pass Filter BPF927 is changed to BPF903 for the handset reception.

c. Transmitter Audio Section – Main Board

Audio Frequency signal from the handset or from the headset microphone is compressed through the compressor part of IC1 to minimize the transmission noise. The degree of compression depends on the external RC combinations. AGC is also utilized by IC1 to avoid shock noise caused by abrupt change of audio levels. The compressed audio is filtered and amplified for better acoustical performance. Q3 is a switching transistor that controls the power supply for the TX RF part.

d. Receiver Audio Section – Main Board

The compressed Audio Frequency signal is passed through passive RC filters for acoustic compliance. The filtered audio is then fed to the Compander IC1 for expansion thus retrieving the original Audio signal with noise filtered out. Q3 act as audio amplifier to sufficiently drive the handset speaker. Q2, Q10 are switching transistors that control the power supply for the RF part, the Compander part and the AF amplifier respectively. An earphone jack is provided for an optional headset unit for handsfree conversation on the handset.

3 OTHERS (Handset):

a. Charging and Reset Controls

Recharging the handset battery is accomplished by putting the handset on the cradle. Q4 detects this action and sends a command to the CPU for proper exchange of security code.

b. Ring Detection

When the handset receives the ring command from the base unit, the CPU will send buzzer signal to the ringer amplifier Q5 & Q6 that drives the Buzzer.

4 OTHERS (Base):

a. Hook Switching and Dialing

Hook switching and pulse dialing is accomplished by the photo-coupler IC3 that is controlled by the CPU. DTMF signal from the ladder circuit internal to the CPU is filtered and amplified by IC2B.

b. Over-voltage Protection

Fuse F1 and varistor Z1 act as high current and high voltage protectors for the telephone line interface. In case of presence of voltage surge across the telephone line, Z1 decreases its resistance and dumps the line voltage to a safe level. Fuse F1 opens when excessive current is present on the line thus protecting both the user and the line interface.

c. Battery Charging & Code Setting

Battery charging commences when resistor R74 detects the presence of the handset on cradle. C73 and R65 form the reset circuit to command the CPU to change the security code everytime the dc supply is removed and restored. When the reset circuit is activated, the CPU will send a new security code to the handset selecting among 65536 combinations.

d. Ring Detection

The KA324 IC2B detects incoming ring signal. External RC combinations set the level of signal detection. The CPU checks the frequency of the ring signal, and when valid, sends the ringing command to the speaker or to the Handset.

e. Power Supplies

Diode D10 ensures uniform polarity for the entire circuit. IC5 regulates the voltage to +5Vdc for the rest of the circuit. Transistor Q9 controls the power supplied to the TX part of the RF circuits.

f. Squelch Detection

In conjunction with the 3361 IC (IC2 of the Base RF), fixed resistor sets the level of signal detection and U1C acts as the comparator circuit whose composite output is the RSSI signal for the CPU.

j. Caller ID Detection

FSK Caller ID data is processed through the FSK detector IC8 for input to the CPU. The signal levels and signal frequency spectrum is filtered by IC1A & IC1B. The CPU controls the call state signal detection whether it be a normal caller ID or a caller ID on call waiting.

h. RX Data

Commands from the Handset is filtered and re-constructed by the Schmitt trigger circuit U1B. The composite output is the RX Data that is input to the CPU for validation and processing.

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