COBY ELECTRONICS CO., LTD.

CIRCUIT DESCRIPTION

Model: CT-P7000 Series

1 Base

a. RF Transmitter Section – RF Board

Compressed audio signal is frequency modulated through the varactor diode D3. Diode D3, choke coil L4 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 Q5 that also acts as the buffer amplifier. RF amplifier Q2,Q10 boosts the signal for transmission. This amplified RF signal is trimmed to the desired frequency band by BPF2475 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 BPF906 trims the signal to the desirable frequency band. Transistor Q8,Q3 is a low noise amplifier that boosts the RF signal to a specific level for mixing. PLL IC1 (KB8825) is used as a Universal Phase Lock Loop circuit. The frequency from the Voltage Controlled Oscillator (VCO) D1, L5 and Q1, 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 Q4. Q5 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. The compressed audio is filtered and amplified for better acoustical performance. VR2 trims the transmitted audio into a desirable level.

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. Q2 & 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

Compressed audio signal is frequency modulated through the varactor diode D3. Diode D3, choke coil L5 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 HN1 that also acts as the buffer amplifier. RF amplifier Q11 boosts the signal for transmission. This amplified RF signal is trimmed to the desired frequency band by BPF906 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 Handset antenna receives RF signal, band pass filter BPF2475 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 (KB8825) is used as a universal phase lock loop circuit. The frequency from the voltage controlled oscillator (VCO) D1, L4 and HN2 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 1658MHz, down-converting the received RF signal into 817MHz. This process is accomplished through the 1st mixed circuit Q2. Q10 is used for matching the impedance of the 1st mixed circuit with the succeeding circuits.

Band pass filter BPF817 trims the signal to the desirable frequency band. Q9 is used for matching the impedance of the mixed circuit with the succeeding circuits. The PLL circuit generates the 2nd oscillator frequency 806MHz, down-converting the 817MHz signal into 10.7MHz. This process is accomplished through the 1F mixed circuit Q3 (Q1 is used for matching the impedance of the mixed circuit with the succeeding circuits. The resulting 1F signal is kept constant by the 1F 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 1F 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 handset or from the headset microphone is compressed through the compressor part of IC2 to minimize the transmission noise. The degree of compression depends on the external RC combinations. AGC is also utilized by IC2 to avoid shock noise caused by abrupt change of audio levels. The compressed audio is filtered and amplified for better acoustical performance. VR1 trims the transmitted audio into a desirable level. Q5 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 IC2 for expansion thus retrieving the original Audio signal with noise filtered out. Q202,Q3 act as audio amplifier to sufficiently drive the handset speaker. Q8, Q1 and Q8 are switching transistors that control the power supply for the RF part, the Compander part and the AF amplifier respectively. Speaker volume is adjusted through volume UP/DOWN button which sets the volume level to either Hi, Mid or Low.

3 OTHERS (Handset)

a. Charging and Reset Controls

Recharging the handset battery is accomplished by putting the handset on the cradle. Q100,Q200 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 Q201 that drives the Buzzer.

c. Squelch Detection

In conjunction with the KA336 IC (IC2 of the Handset RF), VR2 sets the level of signal detection and Q7 acts whose composite output is the RSSI signal for the CPU.

4 OTHERS (Base)

a. Hook Switching and Dialing

Hook switching and pulse dialing is accomplished by IC3 that is controlled by the CPU.

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 transistor Q7 detects the presence of the handset on cradle. The charge detect circuit commands the CPU to change the security code. When the detect circuit is activated, the CPU will send a new security code to the handset selecting among 65536 combinations.

d. Ring Detection

Incoming ring signal is detected by the comparator U1.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

IC1 regulate the voltage to 5DC for the buffer circuit. Transistor Q8 controls the power supplied to the TX part of the RF circuits.

f. Squelch Detection

In conjunction with the KA3361 IC (IC2 of the Base RF), VR1 sets the level of signal detection and U1D acts as the comparator circuit whose composite output is the RSSI signal for the CPU.

g. 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

- END -