CIRCUIT DESCRIPTION

1 Base

a. RF Transmitter Section – RF Board

The compressed audio signal (RF module pin 10) is modulated through the varactor diode VD201. These components, i.e. VD201, C216, L201, Q203 and the external components of Q203 compose 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 (SIT8825B)'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 Q202 that also acts as the buffer amplifier. The RF amplifier Q201 boosts the signal for transmission. This amplified RF signal is trimmed to the desired frequency band by F2 (BPF2403) 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. The Band Pass Filter F1 (BPF2475) trims the signal to the desirable frequency band. Transistor Q101 $ Q104 is a low noise amplifier that boosts the RF signal to a specific level for mixing. PLL U2 (SIT8825B) is used as a Universal Phase Lock Loop circuit. The frequency from the Voltage Controlled Oscillator (VCO) VD101, L102 and Q103, 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 Q104. Q104 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 F3 to 10.7MHz which is then mixed with the second local oscillator frequency 11.150MHz (derived from X1 & VC1) 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 10.7Mz. Quadrature signal detection is accomplished internally by the Narrow-band Detector U1 (SIT8531) with the IF coil T1. The recovered audio frequency can be taken from U1 audio output pin7.

c. Transmitter Audio Section – Main Board

The Audio Frequency signal from the telephone line that is through Q7/9, R23,R4, R9,C7,R90, U4-8, U4-1, C54, VR1, etc is compressed through the compressor part of U4 to minimize the transmission noise. The degree of compression depends on the external RC combinations. AGC is also utilized by U4 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 from the RF module (pin3) is passed through passive RC filters for acoustic compliance. The filtered audio is then fed to the Compander U4 (pin16 and

pin17) for expansion thus retrieving the original Audio signal with noise filtered out. Q2 is used as buffer circuit. Bridge rectifier D1,D2,D6,D7 isolates the high-voltage telephone line to the rest of the circuit.

2 Handset

a. RF Transmitter Section – RF Board

Refer to portion 1.b for this section. All circuit performance is the same except that Band Pass Filter BPF2403 is changed to BPF2475 for the handset transmission.

b. RF Receiver Section – RF Board

Refer to portion 1.b for this section. All circuit performance is the same except that Band Pass Filter BPF2475 is changed to BPF2403 for the handset transmission.

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 from the RF module 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. Q2 & Q10 act as audio amplifier to sufficiently drive the handset speaker. Q7 and Q8 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 hands free 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 and its external components are the reset circuit. R24 and R25 detect this action and send a command to the CPU (IC2 pin24) 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 and Q6 that drives the Buzzer.

4 OTHERS (Base):

a. Hook Switching and Dialing

The transistor Q1 that is controlled by the U1 (pin21) accomplishes the hook switching and the pulse dialing function. The DTMF signal from the U1(pin38) is amplified by Q2.

b. Over-voltage Protection

Fuse 1 and varistor ZR1 act as high current and high voltage protectors for the telephone line interface. In case of presence of voltage surge across the telephone line, Fuse 1 decreases its resistance and dumps the line voltage to a safe level. Fuse1 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 Q6 detects the presence of the handset on cradle. Q6 form the reset circuit in conjunction with the charge detects circuit to command the CPU to change the security code. 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 operational amplifier IC2B detects incoming ring signal. 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 D11 ensures uniform polarity for the entire circuit. IC3 regulates the voltage to +5Vdc for the rest of the circuit. Transistor Q3 controls the power supplied to the TX part of the RF circuits.

f. Squelch Detection

The pin1 of the RF module outputs the RSSI signal for the U1 to examine the noise level.

g. Caller ID Detection

FSK Caller ID data is processed through the C15 and C17 to the U1 (pin33 and pin34). The CPU controls the call state signal detection whether it is 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 IC2C. The composite output is the RX Data that is input to the CPU for validation and processing.