

## TELEFIELD LTD

MODEL : CP8331

DATE : Aug. 7, 2000

### CIRCUIT DESCRIPTION

#### BASE UNIT

##### 1.0 Power Supply

The regulation circuit (U303) generates DC 5V to all RF and audio circuit. The RF transmit power is controlled by the electronic switch (Q204). The transmit power is off when TALK OFF.

##### 1.1 RF Transmit Circuit

The Voltage Controlled Oscillator VCO (Q205) generates the required frequency (43-46MHz, it also act as a modulator. Digital data from base unit MCU (U301) for remote unit and base unit communication is feed into the modulator through a resistor network. Audio signal from tel. line are feed into the modulator through the buffer amplifier of the Combo chip TB31224 (U201).

##### 1.2 RF Receiver Circuit

The LNA (Q201) together with the duplexer and the tune circuit (IFT201) amplify the wanted RF signal while suppress the unwanted RF signal. This RF signal together with the RF signal from the Local Oscillator of the Combo chip TB31224 (U201) are feed into the Mixer of the Combo chip TB31224 (U201), the Mixer is work at non-linear conditions such that a series of mixed frequencies of the incoming RF signal are generated. The 10.7MHz ceramic filter (CF201) filtered out the wanted Intermediate Frequency (IF). This IF is demodulated by the narrow band FM receiver of the Combo chip TB31224 (U201) to get the wanted audio signal.

##### 1.3 Frequency Synthesizer

Frequency synthesize of the RF Transmit frequency and the LO frequency is done by the Phase Locked Loop of the Combo chip TB31224 (IC201).

The PLL divide the transmit frequency by a factor "n" with a reference 5kHz frequency (generated from the 10.24 MHz reference frequency), any phase difference between these two frequencies will produce a net DC output at Pin47 of the Combo chip TB31224 (U201). This DC signal is feed at the varator diode (VD202 and VD203) to its capacitance in a way that will decrease the phase error unit zero. That is, the transmit frequency is locked.

Change channel is easily done by vary the factor "n" which is controlled by the MCU (U301) through the 3 input port CLK, DATA and STB (Pin 6, 7, and 8) of the Combo chip TB31224 (U201).

LO frequency synthesize is done in the same way.

##### 1.4 Telephone Line Interface & Hold Line

The telephone line input ( Tip / Ring ) is connected to the hybrid transformer and couple to the Secondary coil. The circuit is also protected by a PTC resistor (PTC)and the varistor. (MOV381) The Line seizure is performed by the transistor (Q341) to turn on the Reed relay. Transistor switching is controlled by the RELAY (Pin 3) of the base MCU(U301).

The Line hold is performed by the transistor (Q320&Q321). Transistor switching is controlled by the CASE\_IN (PIN41) of the base MCU(U301).

### 1.5 Ringer Detection Circuit

When the ring signal come from the telephone line, it is detected by the RINGIN port of the MCU (U301) through the Photo Coupler IC (U302).

### 1.6 Charge Detection Circuit

When the battery is under charging, It turn on the transistor (Q353) ,and the low level is detected by the CHG port (Pin 11) of the MCU (U301) . During charging, the CHARGE LED will be lit up.

### 1.7 Data Recovery

The function of the D-COMP-IN and DATA-OUT (Pin23 and Pin24) of the Combo chip TB31224 (IC201) is to shape the recovered digital code signal to clean square pulse chain with correct duty cycle which can be recognised by the base MCU.

### 1.8 Compressor Circuit

The compressor of the Combo chip TB31224 (U201) will take a signal with an 80 dB dynamic range ( 100uV to 1.0 mVrms). and reduce that to a 40 dB dynamic range by attenuating strong signals, while amplifying low level signals .

### 1.9 Expander

The expander of the Combo chip TB31224 (U201) does the opposite in that the 40dB signal is increased to a dynamic range of 80 dB by amplifying strong signals and attenuating low level signals.

### 2.0 DTMF Detection Circuit

The circuit includes R372,R374,etc.It detects DTMF signal and send it to the DTMF Decoder U304(8870).

### 2.1 DTMF Decoder

DTMF decoder id consists of U304(8870) and associated parts,when a call comes, the U304(8870) receive the DTMF signal and decode it into digit signal to the MCU(U301).

## **REMOTE UNIT**

### 2.1 Power Supply

The power is supplied by a 3.6 Volt battery.. The RF transmitted power is controlled by the electronic switch(Q3).

### 2.2 RF Transmit Circuit

The Voltage Controlled Oscillator VCO (Q5) generates the required frequency (49MHz), it also act as a modulator. Digital data from handset MCU (IC2) for remote unit and base unit communication is feed into the modulator through a resistor network. Audio signal from the TAD or tel. line are feed into the modulator through the compressor of the Combo chip TB31224 (IC1).

### 2.3 RF Receiver Circuit

The LNA (Q1) together with the duplexer and the tune circuit (T1) amplify the wanted RF signal while suppress the unwanted RF signal. This RF signal together with the RF signal from the Local Oscillator of the Combo chip TB31224 (IC1) are feed into the Mixer of the Combo chip TB31224 (IC1), the Mixer is work at non-linear conditions such that a series of mixed frequencies of the incoming RF signal are generated. The 10.7MHz ceramic filter (CF1) filtered out the wanted

Intermediate Frequency (IF). This IF is demodulated by the narrow band FM receiver of the Combo chip TB31224 (IC1) to get the wanted audio signal.

#### 2.4 Frequency Synthesizer

Frequency synthesise of the Transmit frequency and the LO frequency is done by the Phase Locked Loop of the Combo chip TB31224 (IC1).

The PLL divide the transmit frequency by a factor "n" with a reference 5kHz frequency (generated from the 10.24 reference frequency), any phase difference between these two frequencies will produce a net DC output at TX-OUT (Pin47) of the Combo chip TB31224 (IC1). This DC signal is feed at the varator diode (D11) to its capacitance in a way that will decrease the phase error unit zero. That is, the transmit frequency is locked.

Change channel is easily done by vary the factor "n" which is controlled by the MCU through the 3 input port CLK, DATA and STB (Pin6, 7, and 8) of the Combo chip TB31224 (IC1).

LO frequency synthesise is done in the same way.

#### 2.5 Charge Detection Circuit

When the handset put into the cradle ,the handset MCU CHGIN (Pin23) pull low and it reset the MCU.

#### 2.6 Data Recovery

The function of the D-COMP-IN and DATA-OUT (Pin23 and Pin24) of the Combo chip TB31224 (IC201) is to shape the recovered digital code signal to clean square pulse chain with correct duty cycle which can be recognised by the handset MCU.

#### 2.7 Compressor Circuit

The compressor of the Combo chip TB31224 (IC1) will take a signal with an 80 dB dynamic range ( 100uV to 1.0 mVrms). and reduce that to a 40 dB dynamic range by attenuating strong signals, while amplifying low level signals .

#### 2.8 Expander

The expander of the Combo chip TB31224 (IC1) does the opposite in that the 40dB signal is increased to dynamic range of 80 dB by amplifying strong signals and attenuating low level signals.

#### 2.9 CID Function Key Interface

The MCU(IC2) will accept inputs to perform corresponding functions from the follow function deys: ----"Up" & "Down" key(SW9 & SW19)

These deys input will inform MCU(IC2) to review CID messages or to control the contrast of LCD.

----"ERASE" key (SW5)

Whe this key input is sensed, the MCU(IC2) will erase the single Caller ID message or all old Caller ID messages.

#### 3.0 LCD Display Interface

The LCD display is controlled and driven by MCU (IC2) LCD driver to indicate DATE, TIME, Caller Number and Name, Caller Counter and other messages. The LCD contrast can be adjusted by "UP" and "DOWN" keys in the contrast setting mode.