

# W-400 Circuit Description

## **1. Introduction**

The model W-400 is a 40 channel (902.80 - 927.25Mhz) cordless telephone. The whole unit is divided into two main parts as follow :

- a. A remote Handset.
- b. A Base unit.

## **2. Functional Blocks of the Remote Handset**

- 2.1 Keyboard matrix and function LED
- 2.2 MCU and MCU interface
- 2.3 Antenna and RF module
- 2.4 Componder
- 2.5 Data shaper
- 2.6 Charge detector
- 2.7 Low battery detector
- 2.8 Buzzer amplifier

## **3. Circuit Block Description**

### **3.1 Keyboard matrix and function LED**

Pin 4 to pin7, pin 10 to pin 11 and pin 25 of the MCU U5 form a keyboard, and the talk LED is controlled by the pin 12 of the MCU and Boost status.

KLED2 to KLED5 are the keyboard backlight LED which controlled by MCU U5 pin 16.

### **3.2 MCU and MCU interface**

The handset and the base is link up by the pins(9,24 in HS and 21,24 in Base).

Besides, the PLL of the RF Module is controlled by the pins 15,17 and 18 of the MCU.

### **3.3 Antenna and RF module**

ANT is the common point for transmitting and receiving through antenna.

MD1 is a RF module which consists of Duplexer, Power amplifier, Mixer & IF, RXVCO, TXVCO, VCC & TXVCC control, Synthesizer and DEMO Audio Output circuits.

### **3.4 Compander**

A compander U2 is used for improving the S/N of the transmit and receive audio signal.

### **3.5 Data shaper**

The information which sending from base unit, is recovered by the amplifier U3C.

### **3.6 Charge detector**

ZD1, D7, D6, C43, R70, R68 and R69, D4, C42, R71, D5 form a charge detector to direct the charging signal to the MCU pin 26.

### **3.7 Low battery detector**

A battery low detector is built-in by the U3B which detects the battery dropping and sends a signal to pin 19 of MCU.

### **3.8 Buzzer amplifier**

Q2 is a buzzer amplifier driven directly by the MCU pin 23.

## **4. Functional Blocks of the Base unit**

- 4.1 Power supply
- 4.2 MCU and MCU interface
- 4.3 Antenna and RF module
- 4.4 Compander
- 4.5 Data shaper
- 4.6 Charge detector
- 4.7 Line audio interface
- 4.8 Ring detector
- 4.9 Base Ringer
- 4.10 Led function board
- 4.11 Carrier detector

## **5. Circuit Block Description**

### **5.1 Power supply**

BU1 7805 regulate the input DC 9V to 5V which provides power to every part of the circuit.

### **5.2 MCU and MCU interface**

The heart of the base is BU5 ACT8H MCU that communicates with the PLL of BMD1 through pins 5,6 and 7. Transmitter is controlled by the signal TX\_DC which output from MCU via pin 20. MCU pins 6 to 11 consist of a resistor ladder for generating DTMF signal. The communication between Handset and Base is via the pin 24 and pin 26 through the RF link.

### **5.3 Antenna and RF modulator**

ANT is antenna transmit and receive signal. BMD1 is a RF modulator which consist of Duplexer, Power amplifier, Mixer & IF, RXVCO, TXVCO, VCC & TXVCC control, Synthesizer and DEMO Audio Output circuits.

### **5.4 Compander**

A compander BU4 is used for improving the S/N of the transmit and receive audio signal.

### **5.5 Data shaper**

The information which sending from handset unit, is recovered by the amplifier BU2A.

### **5.6 Charge detector**

BQ5 is a charge detector to direct the charging signal to the MCU pin 25.

### **5.7 Line audio interface**

BR72, BK1, BR73, BC17, BL3, BL4 and BTR1 line transformer are the audio interface to the telephone line. The transformer is also used for telephone isolation.

### **5.8 Ring detector**

BC44, BR71, BZD3, BZD2, BD7, BU7(K817) and BR67 form a ring detector which feed the signal through pin 26 of MCU.

### **5.9 Base ringer**

Base ringer is formed by BU2, BU6, BQ9, BQ10, BQ11 which is controlled by the ringer detector signal from BU7 pin 4.

### **5.10 LED function board**

BLED1 is used for indicating Ring signal when there is incoming ring.

BLED2 is used for indicating "IN USE" OR "CHARGING" when handset is on cradle.

### **5.11 Carrier detector**

The RF Module BMD1 pin 10 is an output pin of the carrier detector signal, it is sent to MCU BU5 pin 23 for scanning during stand-by mode or change channel.

## TEST MODE:

### Base:

Tone/Pulse Switch=> Pulse

Ring On/Off Switch=> Off

Press and hold the Page button, plug in +9V adapter, Base enters test mode Channel 1. Press the Page button once will increase one channel number.

### Handset:

1. Press and hold '1', '4', '7' buttons at the same time.
2. Plug +3.6V battery, release the buttons
3. Press channel number, (for example: channel one: '0', '1', channel two: '0', '2'... channel forty: '0', '1') press 'Channel' button, Handset enters the test mode.

If you want to change to another channel, repeat 3. Everytime you change to another channel, Handset toggle with the receiver output 'Normal' level and 'Boost' level.

## FREQUENCY TABLE

| CH NO. | BASE   |        | HANDSET |        |
|--------|--------|--------|---------|--------|
|        | TX     | RX     | TX      | RX     |
| CH 1   | 902.80 | 925.30 | 925.30  | 902.80 |
| CH 2   | 902.85 | 925.35 | 925.35  | 902.85 |
| CH 3   | 902.90 | 925.40 | 925.40  | 902.90 |
| CH 4   | 902.95 | 925.45 | 925.45  | 902.95 |

|       |        |        |        |        |
|-------|--------|--------|--------|--------|
| CH 5  | 903.00 | 925.50 | 925.50 | 903.00 |
| CH 6  | 903.05 | 925.55 | 925.55 | 903.05 |
| CH 7  | 903.10 | 925.60 | 925.60 | 903.10 |
| CH 8  | 903.15 | 925.65 | 925.65 | 903.15 |
| CH 9  | 903.20 | 925.70 | 925.70 | 903.20 |
| CH 10 | 903.25 | 925.75 | 925.75 | 903.25 |
| CH 11 | 903.30 | 925.80 | 925.80 | 903.30 |
| CH 12 | 903.35 | 925.85 | 925.85 | 903.35 |
| CH 13 | 903.40 | 925.90 | 925.90 | 903.40 |
| CH 14 | 903.45 | 925.95 | 925.95 | 903.45 |
| CH 15 | 903.50 | 926.00 | 926.00 | 903.50 |
| CH 16 | 903.55 | 926.05 | 926.05 | 903.55 |
| CH 17 | 903.60 | 926.10 | 926.10 | 903.60 |
| CH 18 | 903.65 | 926.15 | 926.15 | 903.65 |
| CH 19 | 903.70 | 926.20 | 926.20 | 903.70 |
| CH 20 | 903.75 | 926.25 | 926.25 | 903.75 |
| CH 21 | 903.80 | 926.30 | 926.30 | 903.80 |
| CH 22 | 903.85 | 926.35 | 926.35 | 903.85 |
| CH 23 | 903.90 | 926.40 | 926.40 | 903.90 |
| CH 24 | 903.95 | 926.45 | 926.45 | 903.95 |
| CH 25 | 904.00 | 926.50 | 926.50 | 904.00 |
| CH 26 | 904.05 | 926.55 | 926.55 | 904.05 |
| CH 27 | 904.10 | 926.60 | 926.60 | 904.10 |
| CH 28 | 904.15 | 926.65 | 926.65 | 904.15 |
| CH 29 | 904.20 | 926.70 | 926.70 | 904.20 |
| CH 30 | 904.25 | 926.75 | 926.75 | 904.25 |
| CH 31 | 904.30 | 926.80 | 926.80 | 904.30 |
| CH 32 | 904.35 | 926.85 | 926.85 | 904.35 |
| CH 33 | 904.40 | 926.90 | 926.90 | 904.40 |
| CH 34 | 904.45 | 926.95 | 926.95 | 904.45 |
| CH 35 | 904.50 | 927.00 | 927.00 | 904.50 |
| CH 36 | 904.55 | 927.05 | 927.05 | 904.55 |
| CH 37 | 904.60 | 927.10 | 927.10 | 904.60 |
| CH 38 | 904.65 | 927.15 | 927.15 | 904.65 |
| CH 39 | 904.70 | 927.20 | 927.20 | 904.70 |
| CH 40 | 904.75 | 927.25 | 927.25 | 904.75 |