

# **C430 CIRCUIT DESCRIPTION**

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## 1. **Introduction**

The model C430 is a CID (Type I and Type II) cordless telephone working at 900MHz (40 channels)..

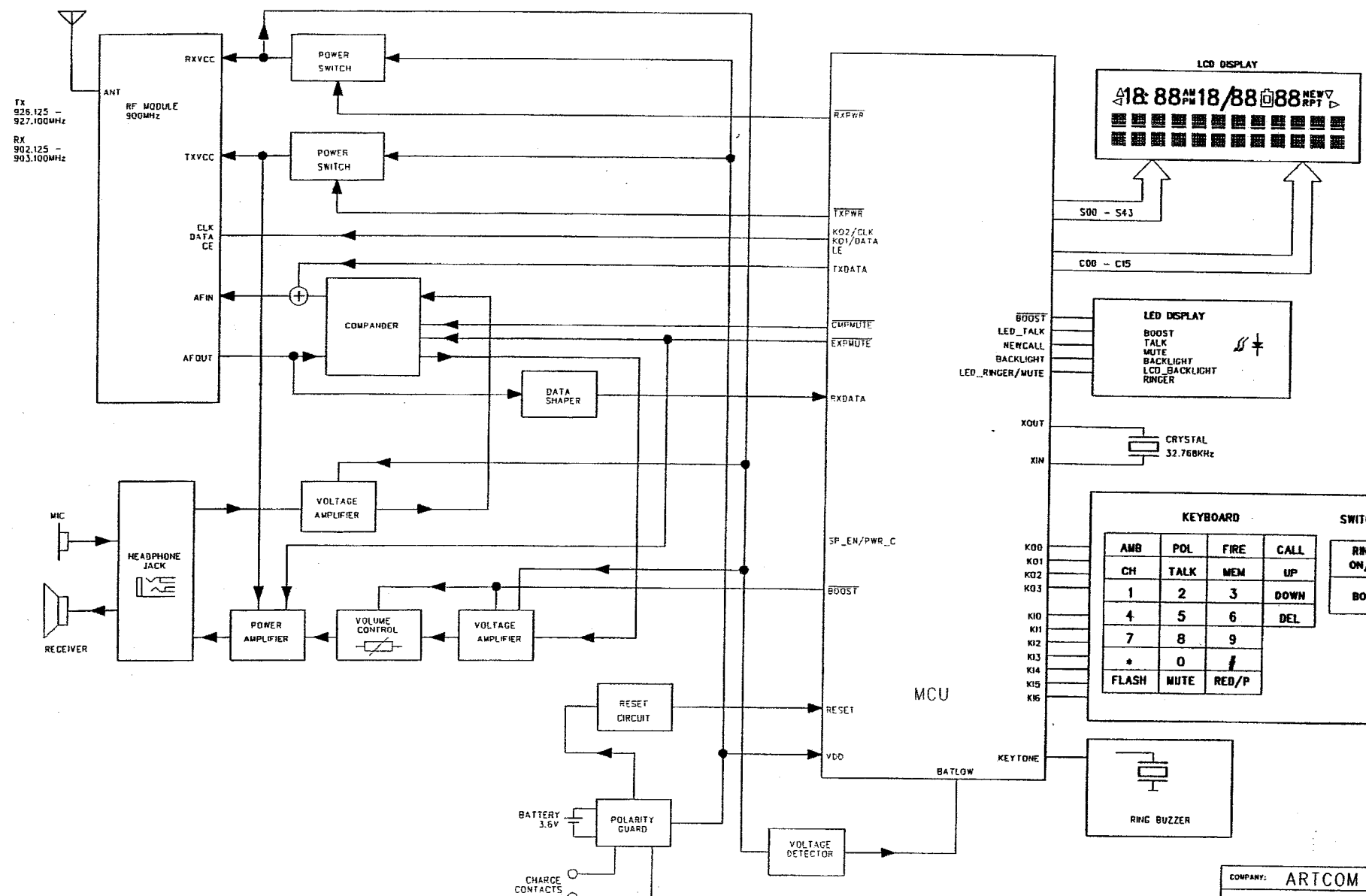
This unit is made up of two parts:

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

## 2. **Functional Blocks of C430 Handset**

The block diagram of C430 handset unit is as shown below. It is made up of the following parts:

- 2.1 Keyboard Matrix, Switches and Function LED
- 2.2 MCU and MCU Interface
- 2.3 RF Module Section
- 2.4 Compander
- 2.5 Data Shaper
- 2.6 Charge and Control
- 2.7 Low Battery Detector
- 2.8 Buzzer
- 2.9 Audio Circuit



COMPANY: ARTCOM LIMITED							
TITLE: C430 HANDSET BLOCK DIAGRAM							
DRAWN: _____	DATED: 2003-12-27						
CHECKED: _____	DATED: _____						
QUALITY CONTROL: _____	DATED: _____						
RELEASED: _____	DATED: _____						
FLAG: <table border="1" style="display: inline-table;"><tr><td>L</td><td>X</td><td>0</td></tr><tr><td>J</td><td>B</td><td>0</td></tr></table>	L	X	0	J	B	0	SCALE: _____
L	X	0					
J	B	0					
SIZE: A3	REV: 0						
DRAWING NO: _____	SHEET: 1 OF 1						

### 3. C430 Handset Unit Circuit Block Description

#### 3.1 Keyboard Matrix, Switches and Function LED

The keyboard consists of the following keys:

- CALL — for Caller ID operation
- UP/DOWN — for Caller ID menu operation
- DEL — for Caller ID menu operation
- AMB, POL, FIRE — one touch memory keys
- CH — for changing RF carrier frequency
- TALK — for On/Off hook control
- MEM — for memory program and dialing
- 1, 2, 3, 4, 5, 6, 7, 8, 9, \*, 0, # — numeric keys
- FLASH (EXIT) — provides timed On/Off hook function
- MUTE — turns on/off handset microphone
- RD/P — redials the last number or provides a pause during dialing.

The keyboard is connected to Pins 84 to 94, and pin 97 of the MCU (MCU1).

The switches consist of the followings:

- BOOST – for On/Off the receiver amplifier gain
- RINGER ON/OFF – turns On/Off the ringer buzzer

This is connected to pins 88 and 89 of MCU.

The jack consists of the following:

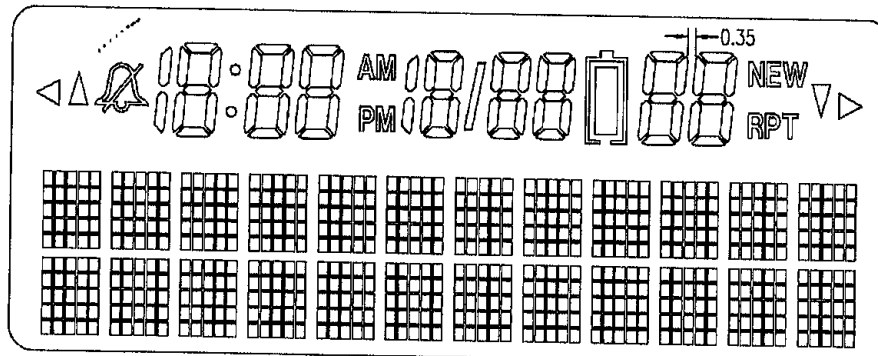
- HEADSET – for connection of an external microphone and receiver

The function LEDs consist of the followings:

- MICMUTE (KLED16 - Red) – Located under the “MUTE” key. On/Off when microphone is Off/On.
- BOOST (KLED15 – RED) – Located under the “TALK” key. On/Off when the receiver amplifier extra gain is On/Off.
- IN-USE (KLED15 – GREEN) – Located under the “TALK” key. On/Off when the handset is Off-hook/On-hook.
- BACKLIGHT (KLED1 – KLED12, LLED1 – LLED2 - Green) – Located under the keyboard and LCD backlight. On for a short time when any key is pressed
- NEWCALL/IN-USE/RINGER (KLED13, KLED14 - Red) – Located in the handset antenna. Flashes when the telephone line rings. Steady on/off when handset is off-hook/on-hook. Blinks when there is New

Call to be reviewed and during memory programming.  
These LEDs are controlled by pins 66, 91, 98, 99 of MCU.

The display format of the LCD is as shown below.



The display is controlled by pins 12 – 65 of MCU.

### 3.2 MCU and MCU Interface

The controller of the handset is LMCU1. The frequency of the crystal used is 32.768 KHz.

It controls the functions of the handset through the keyboard interface and signals from the base unit. The data to and from the base goes through pin 69 (data from base) and pin 71 (data to base).

### 3.3 RF Module Section

For operation and frequency see RF module section.

It receives the PLL data through pins 5, 6, 7 from MCU pins 93, 94 and 95.

The antenna located at the top of the unit and is permanent attached to RF module section through a copper wire.

### 3.4 Comander

A comander KU8 is used for improving the S/N of transmit and receive audio signals.

### 3.5 Data Shaper

The information which sent from base unit is recovered by the amplifier LQ6 and LQ7.

### 3.6 Charge and Control

KZD1, KD2, KD4, KD5, KD10, KQ1 provide polarity and over-voltage protection during battery charging. When the handset is put into the base cradle,

the charge signal is detected by pin 84 and a negative pulse is sent to pin 74 of the MCU.

### **3.7 Low Battery Detector**

The battery voltage is detected by KU1 and KQ4. The signal is sent to pin 67 of MCU.

### **3.8 Buzzer**

KQ3 is the buzzer signal amplifier and driven by the MCU pins 72.

### **3.9 Audio Circuit**

When handset is off-hook, speech signal is picked up by the internal microphone KMIC1 and sent to the telephone line through amplifier KU1, the compander KU8 and the RF section.

The incoming speech is received through the RF section, the compander, the amplifier KU1, and amplifier KU7. When \BOOST is on, extra gain is inserted in this audio path by KQ33, KQ35, KQ36 and KQ42. The high frequency is boosted with the increase in volume setting.

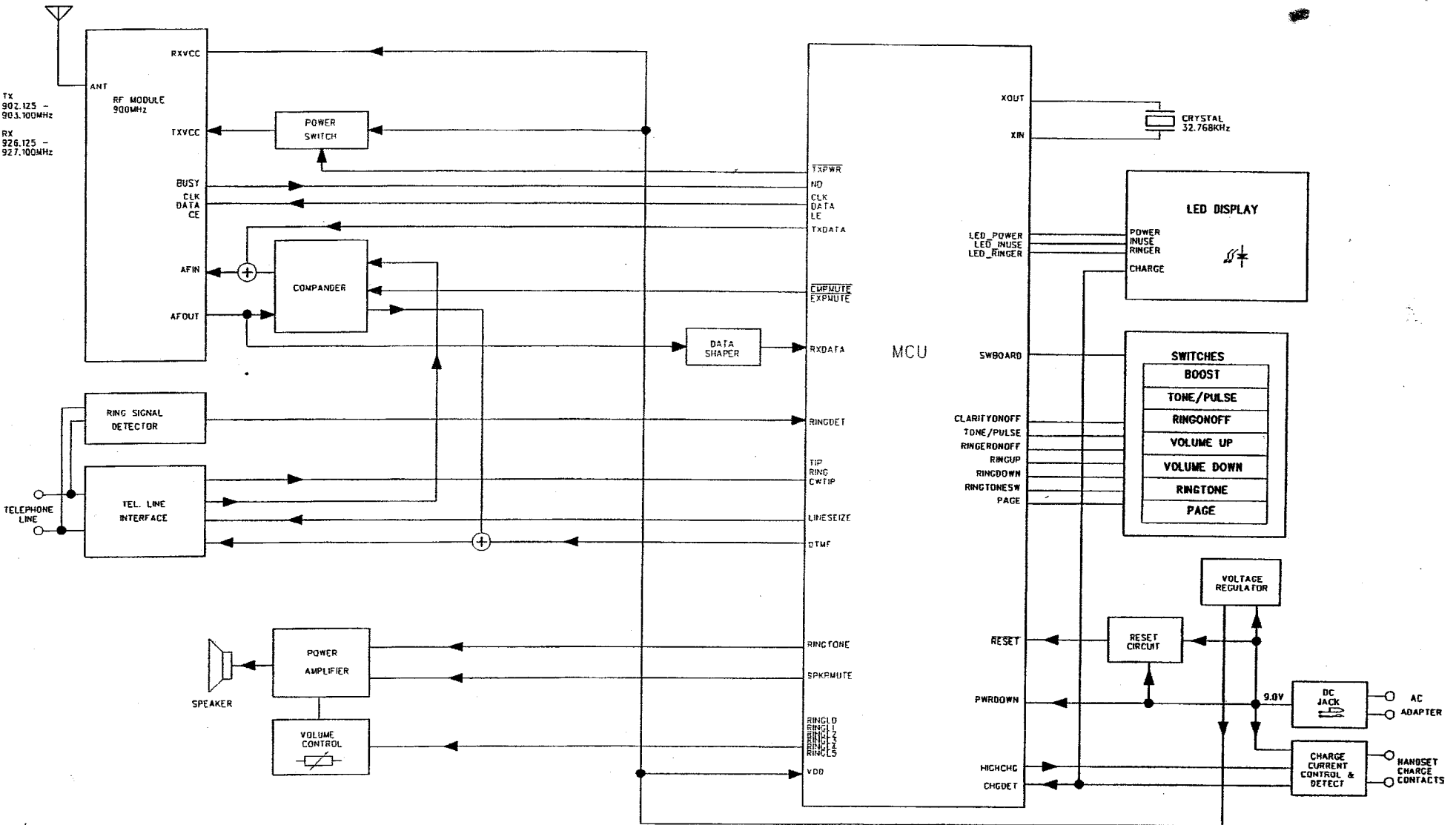
The headset jack is for external receiver and microphone.

#### 4. **Functional Blocks of C430 Base Unit**

The block diagram of C430 base unit is as shown below. It is made up of the following parts:

- Power Supply
- MCU and MCU Interface
- RF Module
- Comander
- Data Shaper
- Charge and Control
- Telephone Line Interface
- Ring Signal Detector
- Base Ringer
- Keyboard Matrix, Switches and Function LED

# C430 Base Unit Block Diagram



COMPANY: ARTCOM LIMITED							
TITLE: C430 BASE BLOCK DIAGRAM							
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CHECKED: _____	DATE: _____						
QUALITY CONTROL: _____	DATE: _____						
RELEASED: _____	DATE: _____						
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L	X	0					
J	B	0					
SCALE:	SIZE: A3 REV: 0						
DRAWING NO:	SHEET: 1 OF 1						



## **5. C430 Base Unit Circuit Block Description**

### **5.1 Power Supply**

The base unit is powered by an AC adapter (9V dc). The voltage regulator (BU3) regulates the input DC to 5V. This provides power to every part of the unit.

### **5.2 MCU and MCU Interface**

The controller of the base is BMCUX1 and it controls the function of the unit. The frequency of the crystal used is 32.768 KHz.

It communicates with the handset through the RF module. PLL data to the RF module BMD1 is sent through pins 84, 95, 97 and 98.

The data between Handset and Base is via the pin 94 (data from handset) and pin 96 (data to handset) through the RF module. The transmitter and receiver powers are controlled by the signals from pin 72 and pin 71.

The MCU monitors ring signal from telephone line through the telephone line interface at pin 5. MCU pin 2 provides DTMF signal. The keyboard interface is provided by pins 75 to 81 and 83.

### **5.3 RF Module**

For operation and frequency see RF module section.

It receives the PLL data through pins 5, 6, 7 from MCU pins 84, 95 and 97.

The antenna partly located inside the plastic rod at the side the unit is permanent attached to RF module.

### **5.4 Compander**

The compander BU2 is used for improving the S/N of the transmit and receive audio signals.

### **5.5 Data Shaper**

The information sent from handset unit is recovered by the amplifier BQ4 and BQ5.

### **5.6 Charge and Control**

BQ12 detects the handset charging current and sends signal to MCU pin 91.

BQ13, BQ29 and BQ16 control the charging current delivered to the handset.

Resistors BR55 and BR109 provide current limiting function.

BQ20 detects the 9V supply and sends a negative pulse to MCU pin 99.

## 5.7 Telephone Line Interface

BL1, BL2, BF1, BVAR1, BR32 and BC61 provide telephone line surge protection. BQ3, BD24, BD25, BD26, BD27, BU6 provide telephone On/Off hook function. BD3, BR34 and BT1 line transformer are the audio interface to the telephone line. The transformer BT1 is also used for telephone line isolation.

## 5.8 Ring Signal Detector

BL1, BC57, BR31, BZD6, BZD5, BD2, BU5, BR32, BF1 and BL2 form the ring signal detector. The signal is sent to pin 5 of MCU.

## 5.9 Base Ringer

BU7 and speaker BSP1 provide base ringer sound output. MCU pin 87 provides ringer tones (six types), and this is set by MCU pin 77 (RING STYLE switch). The ringer output level (six levels) is controlled by MCU pin 63 to 68 and they are set by pin 75 (VOLUME UP switch), or pin 76 (VOLUME DOWN switch).

## 5.10 Keyboard Matrix, Switches and Function LEDs

The keyboard and switches consist of the followings:

- PAGE – for base to page handset
- STYLE – for changing Ringer sound frequency
- VOLUME DOWN – for reducing Ringer sound output volume
- VOLUME UP – for increasing Ringer output sound volume
- RINGER CONTROL ON/OFF – turns On/Off the ringer output
- BOOST ON/OFF – turns On/Off handset receiver extra gain
- T/P – for selecting Tone or Pulse mode dialing

The switches are connected to pins 75 – 81 of MCU (BMCU1).

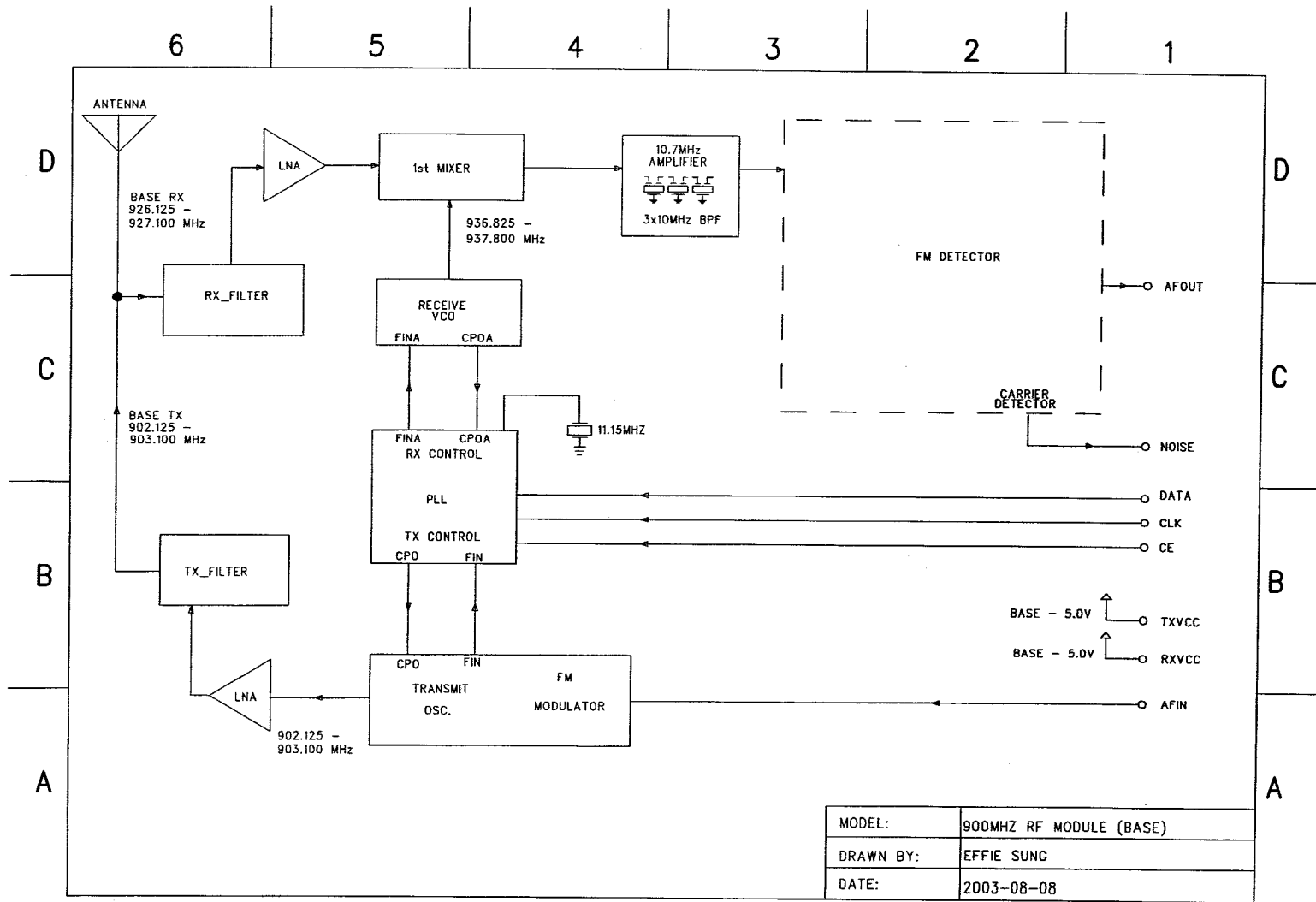
The LEDs consist of the followings:

- RINGER (BLED3, BLED5, BLED8 – Red) – Located under the red lens.  
They are controlled by transistor BQ11 and pin 70 of MCU (BMCU1).
- IN-USE (BLED1 – Green)/CHARGE (BLED1 – Red) – Green when C430 is talking to the telephone line. It is controlled by transistor BQ6 and pin 88 of BMCU1. Red when handset is the cradle. It is controlled by transistor BQ12.
- POWER (BLED2 – Red) – On when the base is powered by 9V AC adapter.

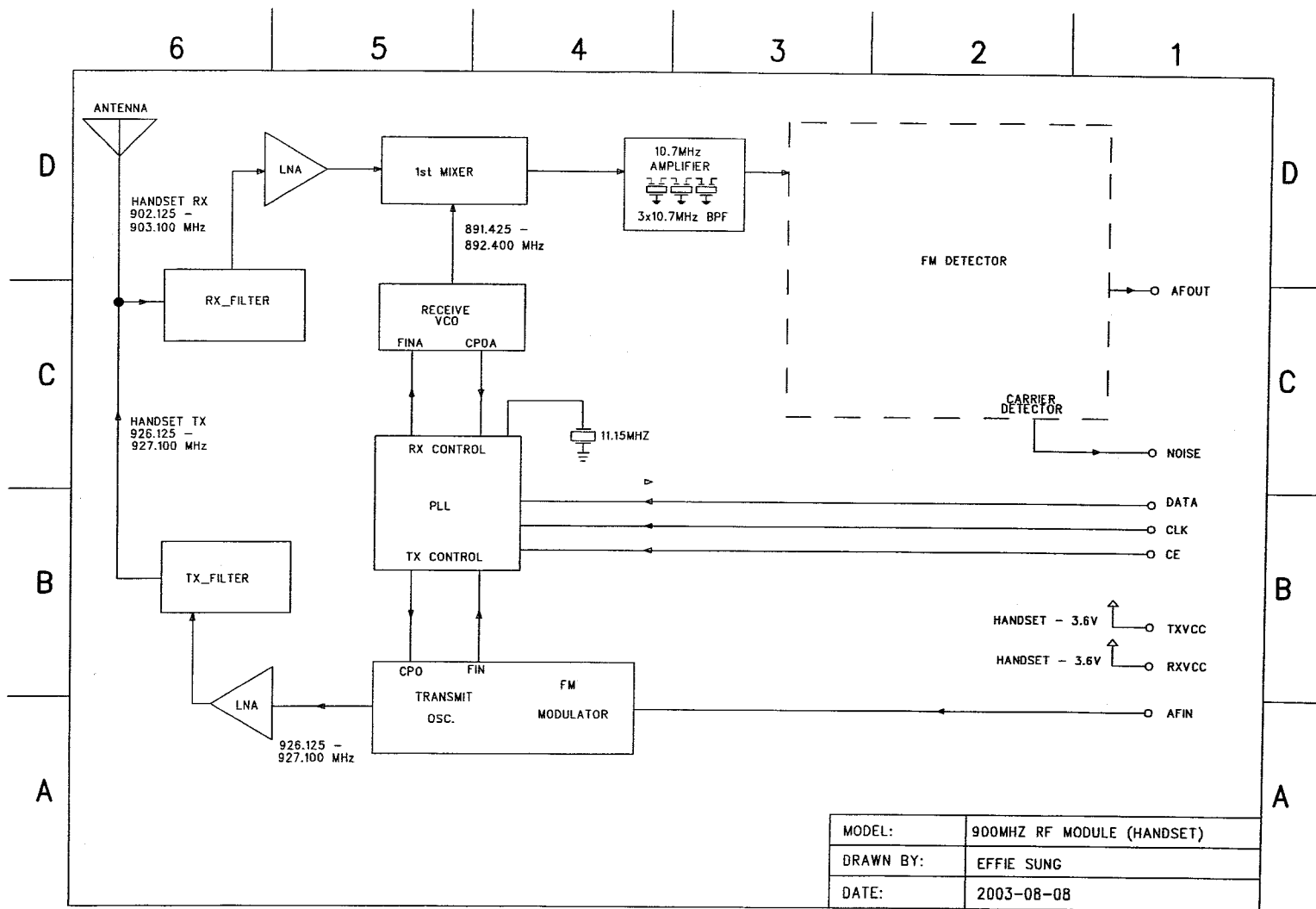
## 6. **Functional Blocks of the RF Module/Section**

The block diagrams of RF Module (Base) and RF Section (Handset) are as shown below. It is made up of the following parts:

- 6.1 Power Supply
- 6.2 PLL and MCU Interface
- 6.3 RF Transmitter
- 6.4 RF Receiver
- 6.5 Audio Detector



**RF Module (Base) Block Diagram**



RF Section (Handset) Block Diagram

MODEL:	900MHZ RF MODULE (HANDSET)
DRAWN BY:	EFFIE SUNG
DATE:	2003-08-08

## **7. RF Module/Section Circuit Block Description**

### **7.1 Power Supply**

The RF transmitter receives power from TXVCC. This voltage is 5V for the base unit and 3.6V for the handset unit. For the base unit, TXVCC is enabled only during TALK or RINGING mode. For the handset unit, TXVCC is enabled only during TALK mode.

The RF receiver receives power from RXVCC. This voltage is 5V for the base unit and 3.6V for the handset unit. For the base unit, RXVCC is enabled all the time. For the handset unit, RXVCC is enabled only during TALK or scanning for ringing signal from the base unit.

### **7.2 PLL and MCU Interface**

The frequencies of the RF transmitter and RF local oscillator are controlled by a PLL IC. The MCU transmit PLL data through DATA, CLK and CE signal lines. The basic clock frequency of the PLL is derived from an 11.15MHz crystal inside the RF module/section.

### **7.3 RF Transmitter**

The RF transmitter frequency for the base is 902.125 MHz – 903.100 MHz and the handset is 926.125 MHz – 927.100 MHz.

The RF transmitter oscillator frequency is controlled by the PLL through CPO. The PLL samples the RF frequency through FIN. The audio input signal AFIN is fed to this RF oscillator through the FM modulator.

The RF oscillator output is amplified through the LNA and coupled to the RF antenna through the TX\_FILTER.

### **7.4 RF Receiver**

The incoming RF signal is coupled from the antenna through RX\_FILTER to a LNA where it is amplified and fed to the 1<sup>st</sup> mixer. The receiver local oscillator frequency is controlled by the PLL through CPOA. The PLL samples the local oscillator RF frequency through FINA.

For the base unit, the local oscillator frequency is  $(RF + 10.7\text{MHz})$ .

For the handset unit, the local oscillator frequency is  $(RF - 10.7\text{MHz})$ .

### **7.5 Audio Detector**

The audio detector receives the incoming signal from the 10.7MHz filter. The audio signal is recovered from a FM detector to AFOUT. The quality of the incoming RF signal is indicated by logic output NOISE.

## 12. RF Channels

CHANNEL	BASE		HANDSET	
	TX (MHz)	LOCAL (MHz)	TX (MHz)	LOCAL (MHz)
CH 01	902.125	936.825	926.125	891.425
CH 02	902.150	936.850	926.150	891.450
CH 03	902.175	936.875	926.175	891.475
CH 04	902.200	936.900	926.200	891.500
CH 05	902.225	936.925	926.225	891.525
CH 06	902.250	936.950	926.250	891.550
CH 07	902.275	936.975	926.275	891.575
CH 08	902.300	937.000	926.300	891.600
CH 09	902.325	937.025	926.325	891.625
CH 10	902.350	937.050	926.350	891.650
CH 11	902.375	937.075	926.375	891.675
CH 12	902.400	937.100	926.400	891.700
CH 13	902.425	937.125	926.425	891.725
CH 14	902.450	937.150	926.450	891.750
CH 15	902.475	937.175	926.475	891.775
CH 16	902.500	937.200	926.500	891.800
CH 17	902.525	937.225	926.525	891.825
CH 18	902.550	937.250	926.550	891.850
CH 19	902.575	937.275	926.575	891.875
CH 20	902.600	937.300	926.600	891.900
CH 21	902.625	937.325	926.625	891.925
CH 22	902.650	937.350	926.650	891.950
CH 23	902.675	937.375	926.675	891.975
CH 24	902.700	937.400	926.700	892.000
CH 25	902.725	937.425	926.725	892.025
CH 26	902.750	937.450	926.750	892.050
CH 27	902.775	937.475	926.775	892.075
CH 28	902.800	937.500	926.800	892.100
CH 29	902.825	937.525	926.825	892.125
CH 30	902.850	937.550	926.850	892.150
CH 31	902.875	937.575	926.875	892.175
CH 32	902.900	937.600	926.900	892.200

CH 33	902.925	937.625	926.925	892.225
CH 34	902.950	937.650	926.950	892.250
CH 35	902.975	937.675	926.975	892.275
CH 36	903.000	937.700	927.000	892.300
CH 37	903.025	937.725	927.025	892.325
CH 38	903.050	937.750	927.050	892.350
CH 39	903.075	937.775	927.075	892.375
CH 40	903.100	937.800	927.100	892.400