

CipherLab 8100 Series

Users Guide

Version 1.00

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1. Introduction

The **8100 series** are compact, light-weighted, high performance RF data terminals designed for all-day, everyday use. It can be powered by either two AAA size batteries or just a rechargeable Ni-MH battery pack. It is supported by a rich set of development tools, including a Windows-based application generator, “C” and “Basic” compilers. With its integrated Laser/CCD barcode scanning unit and built-in RF module, the **8100 series** is ideal for real time applications such as shop floor management, warehousing and distribution operations.

2. General Features and Characteristics

Basic characteristics of the *8100 RF Terminal* are listed below,

2.1 Electrical

- ü Operation battery: two AAA size disposable or rechargeable batteries
- ü Backup battery: 3.0V, 7.0mAh, rechargeable Lithium battery for SRAM & calendar
- ü Working time: over 20 hours for 8110 (433Mhz RF model) and 8 hours for 8150 (2.4GHz RF model)

2.2 Environmental

- ü Humidity (operating): non-condensed 10% to 90%
- ü Humidity (storage): non-condensed 5% to 95%
- ü Temperature (operating): -20 to 60 °C
- ü Temperature (storage): -30 to 70 °C
- ü EMC regulation: FCC class A, CE 0560
- ü Shock resistance: 1.2m drop onto concrete

2.3 Physical

- ü Dimensions: 145mm (L) x 63mm (W) x 33.5mm (H)
- ü Weight: 200g (including batteries)
- ü Color: Dark gray
- ü Material: ABS

2.4 CPU

- ü Toshiba 16-bit CMOS type CPU
- ü Tunable clock, up to 22MHz.

2.5 Memory

Program memory

- ü 1 M Bytes flash memory is used to store the program code, font, constant data, and so on.

Data memory

- ü 256 K Bytes SRAM.

2.6 Scanner

The *8100 RF Terminal* can be equipped with Laser or Long Range CCD scanners. Detail specifications are as following:

8110L / 8150L (Laser)

- ü Light source: visible Laser diode operating at 670±15nm
- ü Scan rate: 36±3 scans per second
- ü Scan angle: 42_nominal
- ü Minimum print contrast: 20% absolute dark/light reflectance at 670nm
- ü Depth of field: 5 ~ 95 cm, depends on barcode resolution

8110C / 8150C (CCD)

- ü Resolution: 0.15mm ~ 1.00mm
- ü Depth of field: 15cm
- ü Width of field: 45mm ~ 124mm
- ü Scan rate: 30 scans/sec
- ü Ambient Light Rejection:
 - 1200 lux (Direct Sun-light)
 - 2500 lux (Fluorescent Light)

2.7 Display

- ü 128x64 graphic dots FSTN LCD display with LED back-light

2.8 Keypad

- ü 21 rubber keys, including alphanumeric keys, arrow keys, function keys, and scan trigger key.

2.9 Indicator

Buzzer

- ü Software programmable audio indicator, 1KHz to 4KHz, low power transducer type.

LED

- ü Programmable, dual-color (green and red) LED for status indication.

2.10 Communication

Two kinds of communication are provided: standard RS-232 and RF.

- ü RS-232: Transmission speed up to 115200bps
- ü 433MHz RF: 9600bps data rate
Coverage up to 200m line-of-sight
- ü 2.4GHz RF: 19200bps data rate
Coverage over 1000m line-of-sight

2.11 Programming Language

"C", "BASIC", and a Windows-based Application Generator

2.12 Accessories

- ü RS-232 cable
- ü Cradle
- ü Battery charger
- ü RF base station

3. RF Configuration

433 MHz RF terminal

- Channel: 1 ~ 4
- ID: 01 ~ 45
- Time out: 1 ~ 99 seconds, duration of retries for sending data
- Output power: 1~5 levels (10, 5, 4, 0, -5dBm)
- Auto search: 0 ~ 99 sec, automatically search for available channel when connection to current channel is lost

2.4 GHz RF terminal

- Channel: 1 ~ 6
- ID: 01 ~ 99
- Time out: 1 ~ 99 seconds, duration of retries for sending data
- Output power: 1 levels (100mW)
- Auto search: 0 ~ 99 sec, automatically search for available channel when connection to current channel is lost

4. Software Organization

The *8100 RF Terminal* system software consists of three modules: the *kernel module*, the *system module* and the *application module*.

4.1 Kernel module

Kernel module is the innermost core of the system. It has the highest security and is always protected by the system. Only the failure of flash memory or improperly power off during system restart after updating kernel will the kernel be destroyed. The kernel module ensures that users can always download their own program even the operating system was crashed by user's program. The kernel provides the following services:

- ü **Program download**
- ü **Update kernel**
- ü **Test & Calibrate**
- ü **Version**

For detailed operations, please refer to section 5.4.

4.2 System module (the operating system)

The system module provides the following system services

- ü **Memory**
- ü **Setting**
- ü **Reader**
- ü **Battery**
- ü **Test**
- ü **Download**
- ü **Version**

For detail operations, please refer to section 5.3.

4.3 Application module

The Application module runs on top of the System module. The *8100 RF Terminal* is preloaded with the Application Generator's run-time program and the following menu will be shown upon powering the unit up:

- ü **Take data**
- ü **Utilities**

The arrow keys can be used to select the menu item, and execute it by pressing the **ENTER** key. Note if you use the Application Generator to create your application program, you need to download it to the terminal and work with the RF Database Manager. For detailed information, please refer to "RF Application Generator's Users Guide".

4.4 Build your own application module

There are three software tools available for developing application programs.

- 1. The Application Generator**
- 2. The "BASIC" Compiler**
- 3. The "C" Compiler**

For more information, please contact CipherLab USA or Syntech Information Co., Ltd.

5. Operations

Batteries must be fresh and properly loaded before start operation.

5.1 Keypad operations

The keypad of *8100 RF terminal* consists of 20 rubber keys and one trigger key. The functions of some special keys are as follows:

ENTER	<i>Enter.</i> This key is for command execution or input confirmation.
BS	<i>Back Space.</i> If pressed down longer than one second, a <i>clear</i> code will be sent.
SP	<i>Space.</i>
UP	<i>Cursor up.</i>
DOWN	<i>Cursor down.</i>
Alpha	<i>The toggle key for Alphabet / Numeral input.</i> When the system is in alpha-mode, a small icon will be shown on the display, and each numeral key can be used to generate one of the three capital letters. For example, numeral 7 can be used to produce A , B or C . Pressing the same key twice within one second, will call the letter B. Pressing the same key without halting longer than one second, will cause the three letters to be shown in a circulating way. Only when stop pressing the key for longer than one second or pressing another key, will the system send the real key code to the application program.
FN	<i>The function key.</i> This key can not be activated alone, it must be pressed with one numeral key at the same time. For example, FN + 1 generates function #1, FN + 2 generates function #2, etc (up to 9 functions). Also, this key can be combined with the UP/DOWN arrow keys to adjust the contrast of the LCD. And when this key is combined with the ENTER key, it will turn ON/OFF the LCD backlit.
ESC	<i>Escape.</i> Usually this key is used to exit current operation.
POWER	<i>Power On/Off.</i> To prevent a faulty push, it needs about 1.5 sec continuous pressing to turn On/Off the power.

5.2 Application mode

This is the default operation mode when turning on the power. The operation depends on the application module. Please refer to section 4.4.

5.3 System mode

When pressing the **7**, **9** and **POWER** keys simultaneously, the system will enter the System Mode with which provides the following services:

1. Memory

Size Information Includes the SRAM (Data memory) size and FLASH (Program memory) size in kilobytes.

Initialize To initialize the data memory (RAM). Note that the contents of the data space will be wiped out after memory initialization.

Test To test the data memory. For 256 KB SRAM, it takes about 15 seconds to finish the test. Note that the contents of the data space will be wiped out too after memory test.

2. Setting

Clock To set new date and time.

Backlit To set the intensity of LCD back-light and the duration for staying on.
Default: High intensity, the lights go off after 20 seconds.

Speed To set CPU running speed. There are five speeds available: Full speed, 1/2 speed, 1/4 speed, 1/8 speed and 1/16 speed.
Default: Full speed

Auto Off Set time threshold for auto power-off when no operation is taking place during that specified period. If this value is set to zero, this function will be disabled.
Default: 10 minutes

Power On There are two possible selections: **Program Resume**, which starts from the program being used during the last session before the last power-off; and **Program Restart**, which starts with a new program.
Default: Program Resume

Key Click To enable or disable the key click when users press the key buttons.
Default: Enable

Password To set password protection for entering the system menu.
Default: no password is set

433M/2.4G RF To set the RF properties for the terminal, including ID, channel, output power level, time for auto search channel and time-out for sending. Note that these settings can be overwritten by user's application program.

Default:
Terminal ID: 01
Terminal Channels: 01
Terminal Powers: 01
Auto Search Time: 10
Send Timeout: 02

3. Reader

To test the reading performance of the scanner.

Following are the default enabled symbologies:

Code 39
Industrial 25
Interleave 25
Codabar
Code 93
Code 128
UPCE
UPCE with ADDON 2
UPCE with ADDON 5
EAN8
EAN8 with ADDON 2
EAN8 with ADDON 5

EAN13
EAN13 with ADDON 2
EAN13 with ADDON 5

Other symbologies, must be enabled through programming.

4. Battery Show voltage of the main battery and backup battery.

5. Test

Buzzer To test the buzzer with different Frequency/Duration. Press **ENTER** key to start / stop the test.

LCD & LED To test LCD display and LED indicator. Press **ENTER** key to start / stop the test.

KBD To test the rubber keys.
Press a key and the result will be shown on the LCD display. Note that the **FN** key should be used in conjunction with numeral keys.

6. Download To download the user program via RS-232 port. The transmission speed can be up to 115200 bps.

7. Version To show version information, including Hardware Version, Serial Number, Manufacturing Date, Kernel Version, Library Version and User Program Version.

5.4 Kernel mode

Press the **7, 9** and **POWER** keys simultaneously to enter the System mode, then power off and press **1, 7** and **POWER** key simultaneously to enter the kernel mode which provides the following services:

Program download To download user program. The download procedure is same as download program in system mode. Please refer to the above section.

Update kernel To update system kernel. Sometimes the kernel might be changed for improving performance or other reasons. This function allows you to keep the kernel updated. The update procedure is same as download user program, but note that after updating the kernel, please do not power off until the system restart itself.

Test & Calibrate To perform a burn-in test and fine tuning the system clock. This function is for manufacture purpose only.

Version Information includes hardware version, serial number, manufacturing date and kernel version.

6. Troubleshooting

- a) Does not power up after pressing **POWER** key.
 - ÿ Change the batteries.
- b) Does not power up after changing batteries.
 - ÿ Check if the batteries are properly installed with battery cap firmly closed.
 - ÿ If problem persists, call for service.
- c) Battery-low indicator is on,
 - ÿ Change the batteries.
- d) Cannot download application program from the host to the *8100 RF Terminal* or vice versa, via RS-232 port.
 - ÿ Check if the RS-232 cable is plugged tightly, then,
 - ÿ Check if host communication parameters (COM port, baud rate, data bits, parity, stop bit) match the *8100 RF Terminal's*.
- e) Keypad does not work properly,
 - ÿ Turn off the power then press the **7**, **9** and **POWER** keys simultaneously to enter the kernel mode operation.
 - ÿ From the system menu, select the **Test** and then its sub-item **KBD**.
 - ÿ Perform the key-in test.
 - ÿ If problem persists, call for service.
- f) Scanner does not scan,
 - ÿ Check if symbologies used are enabled, or
 - ÿ Check if battery-low indicator is shown on the LCD display. If yes, change the batteries.
 - ÿ If problem persists, call for service.
- g) Abnormal responses,
 - ÿ Open the battery cap and re-load the batteries.
 - ÿ Enter system menu by pressing **7**, **9** and **POWER** keys simultaneously.
 - ÿ Check if the *8100 RF Terminal* can have a correct response by performing entering data.
 - ÿ If problem persists, call for service.