CipherLab 8300 Series

User's Guide

Version 1.05

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1. **Preface**

The **8300 Terminals** are rugged, versatile, high performance data terminals designed for all-day, everyday use. They are powered by a Li-ion rechargeable battery with working hour longer than 100 hours. They are supported by a rich set of development tools, including a Windows-based application generator, "C" and "Basic" compilers. With their integrated Laser/CCD barcode scanning unit and optional RF module, the **8300 Terminals** are ideal for both batch and real time applications such as inventory control, shop floor management, warehousing and distribution operations.

Federal Communication Commission Interference Statement
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
RFID and WLAN transmitters are simultaneously transmitted.
The collocated effects are verified and there is no significant collocated effect.

IMPORTANT NOTE: FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal.
This device can not be worn on the body and at least keep it 20 cm away from body parts other than hand, wrists, feet and ankles.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2. General Features and Characteristics

Basic characteristics of the 8300 Terminal are listed below,

2.1 Electrical

- Operation battery: 3.7V Li-ion rechargeable battery, 1800mAH.
- Backup battery: 3.0V, 7mAH rechargeable Lithium battery for SRAM & calendar
- Working time: over 36 hours for 8300.

2.2 Environmental

- Operating Humidity: non-condensed 10% to 90%
- Storage Humidity: non-condensed 5% to 95%
- Operating Temperature: -20 to 50 °C
- Storage Temperature: -30 to 70 °C
- EMC regulation: FCC, CE and C-tick
- Shock resistance: 1.2m drop onto concrete
- IP rating: IP65

2.3 Physical

- Dimensions – Batch model: 169mm (L) x 77mm (W) x 36mm (H)
- Dimensions – RF model: 194mm (L) x 77mm (W) x 44mm (H)
- Weight – Batch model: 230g (including battery)
- Weight – RF model: 250g (including battery)
- Housing color: Black
- Housing material: ABS

2.4 CPU

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

2.5 Memory

Program memory

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

Data memory

- 2M / 4M Bytes SRAM

2.6 Reader

The 8300 Series Terminal can be equipped with Laser, Long Range CCD scanner and 13.56MHz RFID. The angle of the scanning beam can be straight (0°) or 45° to the LCD plane. Detailed specifications are as follows:

Laser

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

CCD

- Resolution: 0.125mm ~ 1.00mm
- Depth of field: 2 ~ 20cm
- Width of field: 45mm ~ 124mm
- Scan rate: 100 scans/sec
- Ambient Light Rejection:
  1200 lux (Direct Sun-light)
  2500 lux (Fluorescent Light)

2.7 <u>Display</u>

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

2.8 <u>Keypad</u>

- 24 numeric or 39 alphanumeric rubber keys.

2.9 <u>Indicator</u>

Buzzer

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

LED

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

2.10 <u>Communication</u>

- RS-232: baud rate up to 115200 bps
- Serial IR: baud rate up to 115200 bps
- Standard IrDA: baud rate up to 115200 bps
- IEEE-802.11b: data rate up to 11 Mbps

2.11 <u>RF Specification</u>

IEEE-802.11b

- Frequency Range: 2.4 ~ 2.4835 GHz
- Modulation: DSSS with DBPSK(1Mbps), DQPSK(2Mbps), CCK
- Data Rate: 11, 5.5, 2, 1 Mbps auto-fallback
- Coverage: 250M line-of-sight
- Maximum Output Power: 100mW
- Standard: IEEE 802.11b & Wi-Fi compliance

RFID

- Frequency Range: 13.56MHz
- Modulation: ASK
- Data Rate: 848K bps

2.12 <u>Software</u>

- Operating System: CipherLab proprietary OS
- Programming Tools: "C" compiler, BASIC compiler and a Windows-based Application Generator

2.13 <u>Accessories</u>

- Charging & Communication cradle
- RS-232 cable
- Keyboard wedge cable
- Power adapter
- Li-ion rechargeable battery pack
- 802.11b WLAN Access Point
- USB cable / cradle
- Modem cradle

3. Software Architecture

The 8300 Series Terminal system software consists of three modules: the **kernel & Application Manager** module, the **System** module and the **Application** module.

3.1 Kernel & Application Manager

The kernel 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 application program even the operating system was crashed by the user's program. The kernel provides the following services:

- **Kernel Information**

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

- **Load Application**

  To download the application program, BASIC run-time or font files.

- **Kernel Update**

  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 tune the system clock. This function is for manufacturing purpose only.

Besides the kernel menu, if there is no application program exists, then upon power up the terminal the following Application Manager's menu will be shown:

- **Download**

  To download application programs (*.SHX), BASIC run-time (BC8300.SHX), BASIC programs (*.SYN) or font files (8xxx-XX.SHX) to the terminal. There are 6 resident locations and one Active Memory, i.e. at most 7 programs can be downloaded to the terminal. But only the one downloaded to the Active Memory will be activated and running. To run other programs, they need to be activated first, but only one at a time. Right after downloading, you can input a name for the program or just press the enter key to keep its current name if there is. And then the downloaded program's type, name and size will be shown on the list when entering the Download or Activate menu of the Application Manager. The file type is a small letter follows the program number (01~06), it can be either 'b', 'c' or 'f' which represents BASIC program, C program or font file respectively. The program name is up to 12 characters and the program size is in unit of K bytes.

- **Activate**

  To copy one of the 6 resident programs to the Active Memory to make it become the active program. After activating, the original program in the Active Memory will be replaced by the new one. Note a font file cannot be activated, and a BASIC program cannot be activated either if the BASIC run-time does not exist.

- **Upload**

  To transmit the application programs to a host PC or another terminal. The function allows a

terminal to be cloned without going through a PC.

3.2 <u>System</u>

The system module provides the following services:

- **1. Information**

  The system information includes hardware version, serial number, manufacturing date, kernel version, C library or BASIC run-time version, application program version and hardware configurations.

- **2. Settings**

  The system settings include the following:

  1. **Clock**

     Set date and time for the system.

  2. **Backlight ON Period**

     Set the staying on duration for the keyboard and LCD backlight.
     Default: the lights go off after 20 seconds.

  3. **CPU Speed**

     Set CPU running speed. There are five speeds available:
     Full speed, half speed, quarter speed, eighth speed and sixteenth speed.
     Default: Full speed

  4. **Auto Off**

     Set time threshold for automatically 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*

  5. **Power On Options**

     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

  6. **Key Click**

     Select a tone for the beeper or disable the beeper when the user presses a key button.
     Default: Enable

  7. **System Password**

     Set a password to protect the user from entering the system menu.
     Default: no password is set

- **3. Tests**

  1. **Reader**

     To test the reading performance of the scanner. The following barcodes are default to enable:

     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 barcodes must be enabled through programming.

2. **Buzzer**

   To test the buzzer with different Frequency/Duration. Press **ENTER** key to start and then press any key to stop the test.

3. **LCD & LED**

   To test LCD display and LED indicator. Press **ENTER** key to start and then press any key to stop the test.

4. **Keyboard**

   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.

5. **Memory**

   To test the data memory (SRAM). Note after the test, the contents of the memory space will be wiped out.

- **4. Memory**

  1. **Size Information**

     Information includes sizes of the base memory (SRAM), memory card (SRAM) and program memory (FLASH) in the unit of kilobytes.

  2. **Initialize**

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

- **5. Power**

  Show the voltages of the main battery and backup battery.

- **6. Load Application**

  To download the application program, BASIC run-time or font file. There are three interfaces supported by the system, namely, the Direct-RS232, Cradle-IR and standard IrDA.

- **7. 802.11b Menu**

  This item will be shown only if the 802.11b module is installed. The 802.11b menu includes the following items:

  1. **Information**

  2. **IP Setting**

  3. **WLAN Setting**

4. **Security**

5. **Echo Tests**

3.3   <u>Application</u>

The Application module runs on top of the System module. The 8300 Terminals are preloaded with the Application Generator's run-time program and the following menu will be shown upon powering the unit up:

- **1. Take data**
- **2. 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 for RF models, you need to use the RF Database Manager to handle the in-coming and out-going data to and from the PC. For detailed information, please refer to "8300 Series Application Generator User's Guide" and "RF Application Generator User's Guide".

3.4   <u>Programming the terminal</u>

There are three software tools available for developing application programs for the terminal.

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

For detailed information, please contact Syntech Information Co., Ltd.

3.5   <u>Programming the communication cradle</u>

The communication cradle of the 8300 Portable Data Terminal supports serial IR interface only. Before your PC application starts to communicate with the terminal via its cradle, first you need to configure the cradle through programming. There is a DLL available for this purpose. For more information, please contact CIPHERLAB Co., Ltd.

4. <u>Operations</u>

Batteries must be fresh and properly loaded before start operation.

4.1 <u>Keypad operations</u>

The 8300 Series Terminals have two keyboard layouts: 24 rubber keys and 39 rubber keys. The functions of some special keys are as follows:

SCAN   *Scan a barcode*.
      Press this button will trigger the scanner to read a barcode if the scanner port is enabled.

ENTER   *Enter*.
      There are two enter keys on the side of the scan key. Normally the enter keys are used for command execution or input confirmation.

ESC   *Escape*.
      Usually this key is used to stop and exit current operation.

BS   *Back Space*.
      If this key is being pressed down longer than one second, a ***clear*** code will be sent.

ALPHA / α *The toggle key for Alphabet / Numeral input*.
      When the system is in alpha-mode, a small icon will be shown on the display. For the 24-key keyboard, each numeral key can be used to generate one of the three capital letters. For example, numeral *2* 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   *The function key*.
      This key cannot 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 backlight.

POWER   *Power On/Off*.
      To prevent a faulty push, it needs about 1.5 sec continuous pressing to turn On/Off the power.

4.2 <u>Application mode</u>

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

4.3   <u>System mode</u>

To enter the system menu, you need to press the *7*, *9* and ***POWER*** keys simultaneously upon power up the terminal. For details of the services provided by the system, please refer to section 4.2.

4.4   <u>Kernel mode</u>

To enter the kernel menu, you need to press *7*, *9* and ***POWER*** keys simultaneously to enter the system menu first, then power off the unit and press *1*, *7* and ***POWER*** key simultaneously. Or if the battery is just reloaded, then press *1*, *7* and ***POWER*** key simultaneously will directly go to the kernel. For details of the services provided by the kernel, please refer to section 4.1.

4.5   <u>Application Manager</u>

Although the Application Manager is part of the kernel, to enter it, you need to press '*8'* and ***POWER*** key simultaneously. Or if the application program does not exist, the unit will automatically go to the Application Manager's menu upon power up.

The three services: Download, Activate and Upload provided by the Application Manager are explained in Section 4.1. But what if you need to update a program or delete it? For both cases, you need to select the Download menu and select the program to be updated or deleted. The Application Manager then shows the selected program's information such as Program Name, Download Time, Used and Free Flash memory. And then please input 'C' to update the selected program, or input 'D' to delete it.

5. <u>Troubleshooting</u>

a) Does not power up after pressing ***POWER*** key.

    ➢ Make sure the battery is loaded.

    ➢ Charge the battery and check the charging status. If no charging information shown on the display, reload the battery and check if the battery is properly installed then try again.

    ➢ Call for service if problem persists.

b) Cannot transmit data or programs via the terminal's communication port.

    ➢ Check if the cable is plugged tightly, then,

    ➢ Check if host communication parameters (COM port, baud rate, data bits, parity, stop bit) match with the Terminal's.

c) Keypad does not work properly,

    ➢ Turn off the power then press the ***7***, ***9*** and ***POWER*** keys simultaneously to enter the system menu.

    ➢ From the system menu, select the ***Test*** and then its sub-item ***KBD***.

    ➢ Perform the key-in test.

    ➢ If problem persists, call for service.

d) Scanner does not scan,

    ➢ Check if the barcodes used are enabled, or

    ➢ Check if battery-low indicator is shown on the LCD display. If yes, charge the battery.

    ➢ If problem persists, call for service.

e) Abnormal responses,

    ➢ Open the battery cap and re-load the battery.

    ➢ Enter system menu by pressing ***7***, ***9*** and ***POWER*** keys simultaneously.

    ➢ Check if the terminal can have a correct response by performing tests.

    ➢ If problem persists, call for service.