

SP5600 Terminal

User's Guide

Version 1.00

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1. Preface

The **SP5600 terminal** is rugged, versatile, high performance data terminals designed for all-day, everyday use. It is powered by a Li-ion rechargeable battery with working time longer than 16 hours. 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 802.11b WLAN module, the **SP5600 terminal** is ideal for real time applications such as inventory control, shop floor management, warehousing and distribution operations.

CAUTION :

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCT

Battery disposal For green-environment issue it's important that batteries should be recycled in a proper way.

FCC Regulations:

- This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- This device 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 radiated 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 or more 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 : To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

- This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment is a portable hand held device and complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. The highest reported SAR value is 0.332 W/kg.

Canada (Industry Canada):

"To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing."

"Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

2. General Features and Characteristics

Basic characteristics of the *SP5600 Terminal* are listed below,

2.1 Electrical

- Operation battery: 3.7V Li-ion rechargeable battery, 700mAH
- Backup battery: 3.0V, 7mAH rechargeable Lithium battery for SRAM & calendar
- Working time: 16 hours

2.2 Environmental

- Operating Humidity: non-condensed 10% to 90%
- Storage Humidity: non-condensed 5% to 95%
- Operating Temperature: 0 to 50 °C
- Storage Temperature: -20 to 70 °C
- EMC regulation: FCC, CE and C-tick
- Shock resistance: 1.2m drop onto concrete
- IP rating: IP65

2.3 Physical

- Dimensions: 194mm (L) x 77mm (W) x 44mm (H)
- Weight: 250g (including battery)
- Color: Black
- 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

- 256K Bytes SRAM

2.6 Reader

The 8300 Series Terminal can be equipped with either Laser or Long Range CCD scanner. Detailed specifications are as follows:

SP5600-L (Laser)

- Light source: visible Laser diode operating at $670\pm15\text{nm}$
- 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

SP5600-C (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 Display

- 100x64 graphic dots FSTN LCD display with LED back-light

2.8 Keypad

- 21 numeric rubber keys.

2.9 Indicator

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 Communication

- RS-232: Baud rate up to 115200bps
- Serial IR: Baud rate up to 115200bps
- Standard IrDA: Standard 1.0 compatible. Baud rate up to 115200bps

2.11 802.11b WLAN Specification

SP5600 Terminal

• Frequency Range:	2.4 ~ 2.5 GHz, unlicensed ISM Band
• Modulation:	DSSS with DBPSK(1M), DQPSK(2M), CCK(5.5&11M)
• Data Rate:	11, 5.5, 2, 1 Mbps Auto-fallback
• Channels:	Standard
• Coverage:	250M line-of-sight
• Maximum Output Power:	100mW
• Compliance:	IEEE 802.11b & Wi-Fi compliance

Access Point

- Works with commercially available standard IEEE 802.11b Access Point

2.12 Software

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

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 (BC83x0.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 System

The system module provides the following services:

- **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.

- **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

8. **Font**

This option will display the current font file name and version. Languages can be selected by pressing “arrow up” or “arrow down” key if multi-font file is downloaded.

Supported languages in multi-font file:

[16] System Font

[17] French

[18] Hebrew

[19] Latin

[20] Nordic

[21] Portugal

[22] Russian

- [23] Slavic
- [24] Polish
- [25] Turkish
- [26] Slovak(CP1250)

Default: System Font

- **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.

- **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.

- **Power**

Show the voltages of the main battery and backup battery.

- **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. Download.exe is required when Direct RS232 or standard IrDA interface is used. And IrLoad.exe is required when Cradle-IR is used.

- **802.11b Menu**

This item will be displayed only if an 802.11b module is installed.

1. **Information**

It includes the WLAN LIB version, MAC ID, DHCP status, IP address, Subnet Mask, and Gateway.

2. **IP Settings**

DHCP Server will dynamically assign the following IP settings to the terminal if DHCP Server is installed and the option is enabled. These IP Settings also can be configured manually if DHCP is disabled. Please contact your MIS engineer if you don't know how to configure it.

- 1). **DHCP**

DHCP stands for Dynamic Host Configuration Protocol.

Default: [1] Enable

- 2). **SubNet Mask**

The number used to identify the IP sub-network, indicating whether the IP address can be recognized on the LAN.

Default: 255.255.128.0

- 3). **Local IP Address**

The address which identifies a location of the terminal on the network must be unique.

Default: 0.0.0.0

- 4). **Default Gateway**

the Gateway IP address is the IP address of a local router in between the forwarding node and the remote network.

Default: 0.0.0.0

- 5). **DNS Server**

Domain Name Server is a distributed, replicated, data query service mainly used on the Internet for translating host names to IP addresses.

Default: 0.0.0.0

- 3. WLAN Settings**

The RF settings and their default values are as follows,

1). Local Name

Specify name for terminal SP5600

Default: the S/N of the SP5600 terminal

2). Domain Name

The domain name locates the organization or other entity on the Internet.

Default: <None>

3). SS ID

The SSID is a 32-character (maximum) string identifying the wireless local area network. All APs & terminals within the same service set should have the same SSID.

Default: <None>

4). System Scale

This option which depends on the Access Point Density determines when the terminal should look for other Access Point that has bigger signal strength.

- [1] Low
- [2] Medium
- [3] High

Default: [2] Medium

5). Power Saving

Wireless products can be put in lower power consumption mode when “Power Saving” is enabled.

Default: [1] Enable

6). Preamble

Select either a short preamble or long preamble. Select a short preamble for SP5600 terminal with high network traffic; select a long preamble when the network traffic is low.

Default: [1] Long

4. Security

1). Authentication

802.11b supports two subtypes of network authentication services: *open system* and *shared key*. Open system authentication is used when no authentication is required. Under Share Key Authentication, it involves a shared secret key to authenticate the station to the AP(access point). WEP must be implemented to utilize this.

- [0] Share Key
- [1] Open System

Default: [1] Open System

2). WEP Menu

■ WEP Setting

Wireless Equivalent Privacy (WEP) is an encryption to translate data into a secret code. It provides wireless clients with confidentiality and authentication in an IEEE 802.11b environment.

- [0] Disable
- [1] Enable

Default: [0] Disable

■ **WEPKey Length**

When WEP is enabled, Data sent between the client and the access point is scrambled using either a 64-bit or 128-bit key. The higher the level of encryption, the more secure it is.

- [0] 64 bits
- [1] 128 bits

Default: [1] 128 bits

■ **Default Key**

Activate one of the four encryption keys

Default: [1] WEP KEY1

■ **WEP Key**

Define the encryption key values for Key1~Key4 using hexadecimal digits.

When WEPKey Length “**64 Bit**” is selected, the user is required to fill in **5** bytes of hexadecimal values as the encryption key.

When WEPKey Length “**128 Bit**” is selected, the user is required to fill in **13** bytes of hexadecimal values as the encryption key.

3). **EAP Menu**

EAP Stands for **Extensible Authentication Protocol**. SP5600 terminal only support EAP-MD5. When these features are implemented, a wireless client that associates with an access point cannot gain access to the network until the user performs a network logon. Therefore, **Identity** and **Password** are needed when **EAP** is enabled.

- EAP Setting
- EAP ID
- EAP Password

5. Echo Tests

The terminal will echo the received data from the client or server and also signals a beep.

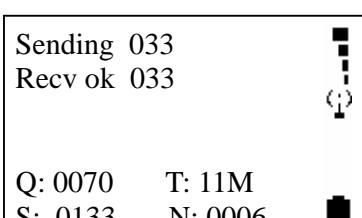
The function is used to measure the coverage of the range, estimate the number of APs and terminals needed, and determine the AP's deployment topology.

1. Client Mode

2. Server Mode

Cipherlab provides TCPServer.exe (only for Client Mode) and TCPDemo.exe for Echo Tests.

Once the connection of Echo Test is established, the details will be displayed as the illustration below.



Link Quality (“Q”) will be the most important elements, and others are for reference only.

Q (Link Quality)	T (Transmit Speed)	S (Signal Level)	N (Noise Level)
0 ~ 10 Very Poor	1M bps	0 ~ 10 Weak	1 Weak
10 ~ 15 Poor	2M bps	30 ~ 60 Moderate	2 ~ 3 Moderate
15 ~ 30 Good	5.5M bps	Over 60 Strong	4 ~ 5 Strong
50 ~ 80 Very Good	11M bps		

3.3 Application

The Application module runs on top of the System module. The *SP5600 Terminal* is 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 Programming the terminal

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**

Besides, Terminal Emulation program which supports ANSI (VT100& VT220) and IBM is also available. For detailed information, please contact Syntech Information Co., Ltd.

3.5 Programming the communication cradle

The communication cradle of the SP5600 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 your supplier .Syntech Information Co., Ltd.

4. Operations

Batteries must be fresh and properly loaded before start operation.

4.1 Keypad operations

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	<i>Scan a barcode.</i> Press this button will trigger the scanner to read a barcode if the scanner port is enabled.
ENTER	<i>Enter.</i> 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	<i>Escape.</i> Usually this key is used to stop and exit current operation.
BS	<i>Back Space.</i> If this key is being pressed down longer than one second, a <i>clear</i> code will be sent.
ALPHA / α	<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. 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. Pressing the “Alpha” key again, lower case letter can be inputted.
FN	<i>The function key.</i> 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	<i>Power On/Off.</i> To prevent a faulty push, it needs about 1.5 sec continuous pressing to turn On/Off the power.

4.2 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.

4.3 System mode

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 Kernel mode

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 Application Manager

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.