

CipherLab Reference Manual

8600 Series Mobile Computer

8600/8630/8660

Version 1.02



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IMPORTANT NOTICES

FOR USA

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 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.

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.

FOR CANADA

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of Industry Canada.

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.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques," NMB-003 édictée par l'Industrie.

FOR HAND-HELD PRODUCT WITH RF FUNCTIONS

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

FOR EUROPE – EU DECLARATION OF CONFORMITY

This device complies with the essential requirements of the R&TTE Directive 1999/5/EC. The following test methods have been applied in order to prove presumption of conformity with the essential requirements of the R&TTE Directive 1999/5/EC:

- ▶ EN 60950-1: 2006+A11:2009+A1:2010+A12:2011

Safety of Information Technology Equipment

- ▶ EN 301 489-1 V1.8.1: 2008

Electromagnetic compatibility and Radio Spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

- ▶ EN 301 489-1 V1.9.2: 2011

Electromagnetic compatibility and Radio Spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

- ▶ EN 301 489-3 V1.4.1: 2002

Electromagnetic compatibility and Radio Spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz

- ▶ EN 301 489-17 V2.1.1: 2009

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for 2,4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment

- ▶ EN 301 489-17 V2.2.1: 2012

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for 2,4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment

- ▶ EN 300 328 V1.7.1: 2006

Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques; Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive

- ▶ EN 300 330-1 V1.5.1: 2006

Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 1: Technical characteristics and test methods

- ▶ EN 300 330-2 V1.3.1: 2006

Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive

- ▶ EN 302 291-1 V1.1.1: 2005

Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Close Range Inductive Data Communication equipment operating at 13,56 MHz; Part 1: Technical characteristics and test methods

- ▶ EN 302 291-2 V1.1.1: 2005

Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Close Range Inductive Data Communication equipment operating at 13,56 MHz; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive

- ▶ EN 300 440-1 V1.4.1: 2008

Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part1: Technical characteristics and test methods

This device is a 2.4 GHz wideband transmission system (transceiver), intended for use in all EU member states and EFTA countries, except in France and Italy where restrictive use applies.

In Italy the end-user should apply for a license at the national spectrum authorities in order to obtain authorization to use the device for setting up outdoor radio links and/or for supplying public access to telecommunications and/or network services.

This device may not be used for setting up outdoor radio links in France and in some areas the RF output power may be limited to 10 mW EIRP in the frequency range of 2454 – 2483.5 MHz. For detailed information the end-user should contact the national spectrum authority in France.

FOR PRODUCT WITH LASER



CAUTION

This laser component emits FDA / IEC Class 2 laser light at the exit port. Do not stare into beam.

SAFETY PRECAUTIONS

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

- ▶ The use of any batteries or charging devices, which are not originally sold or manufactured by CipherLab, will void your warranty and may cause damage to human body or the product itself.
- ▶ DO NOT disassemble, incinerate or short circuit the battery.
- ▶ DO NOT expose the scanner or the battery to any flammable sources.
- ▶ For green-environment issue, it's important that batteries should be recycled in a proper way.
- ▶ Under no circumstances, internal components are self-serviceable.
- ▶ The charging and communication cradle uses an AC power adaptor. A socket outlet shall be installed near the equipment and shall be easily accessible. Make sure there is stable power supply for the mobile computer or its peripherals to operate properly.

CARE & MAINTENANCE

- ▶ This mobile computer is intended for enterprise logistics use. The mobile computer is rated IP 65; however, it may do damage to the mobile computer when being exposed to extreme temperatures or soaked wet.
- ▶ When the body of the mobile computer gets dirty, use a clean and wet cloth to wipe off the dust. DO NOT use/mix any bleach or cleaner. Always keep the LCD dry.
- ▶ For a liquid crystal display (LCD), use a clean, non-abrasive, lint-free cloth to wipe dust off the screen. DO NOT use any pointed or sharp object to move against the surface.
- ▶ If you want to put away the mobile computer for a period of time, upload the collected data to a host computer, and then take out the battery pack. Store the mobile computer and battery pack separately.
- ▶ When the mobile computer resumes its work, the main and backup batteries will take a certain time to become fully charged.
- ▶ Keep the mobile computer away from any magnets and magnetic fields to prevent the laser engine from malfunctioning.
- ▶ If you shall find the mobile computer malfunctioning, write down the specific scenario and consult your local sales representative.

RELEASE NOTES

Version	Date	Notes
1.02	May 08, 2014	<ul style="list-style-type: none">▶ Modified: FOR EUROPE– EU DECLARATION OF CONFORMITY<ul style="list-style-type: none">>EN 301 489-1 V1.9.2: 2011 added>EN 301 489-17 V2.2.1: 2012 added>EN 302 291-1 V1.1.1: 2005 added>EN 302 291-2 V1.1.1: 2005 added▶ Modified: 3.2.3 – backlight OSD added▶ Modified: 3.2.7 – speaker volume OSD added▶ Modified: 3.9 Bluetooth Menu – FTP Client removed▶ Modified: 3.9.1 – screenshot updated (Bluetooth Info. menu)▶ Modified: 3.10.3 – screenshot & description updated (roaming setting)▶ Modified: 3.10.5 – screenshot updated (AP signal strength with minus sign)▶ Modified: Appendix III – 29-key reference table updated
1.01	Feb. 11, 2014	<ul style="list-style-type: none">▶ Added: Care & Maintenance (away from magnets & magnetic fields)▶ Modified: Pictures with icons on screen updated
1.00	Dec. 25, 2013	Initial release

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INTRODUCTION

Answering industrial demands for rugged, light-weight and versatile computers, the 8600 Series Mobile Computer is specifically designed for enterprise logistics use.

Equipped with CCD (linear imager), Laser, 2D imager, or RFID scanning modules, users can choose the appropriate option that best suits to their field applications.

With *Bluetooth* v4.0 built inside, the mobile computer supports *Bluetooth Smart Ready* playing the center role in exchanging data and information with new *Bluetooth Smart* devices and the vast amount of traditional *Bluetooth* devices in market. Besides the short-range of *Bluetooth* technology, the model-specific Wi-Fi module based on 802.11b/g/n connectivity is also equipped enabling the mobile computer have access to the Internet.

The 8600 Series Mobile Computer is bundled with powerful and rich features to ensure success in timely processing of information, and thus, makes an ideal choice for inventory control, shop floor management, warehousing and distribution operations. Being programmable, this handy device can run custom applications or terminal emulation applications.

This manual serves to guide you through how to install, configure, and operate the mobile computer. We recommend that you keep one copy of the manual at hand for quick reference or maintenance purposes. To avoid any improper disposal or operation, please read the manual thoroughly before use.

Thank you for choosing CipherLab products!

TERMINAL MODELS

The wireless capabilities of 8600 Mobile Computer Series may vary depending on the specifications implemented. Please refer to the table below.

Model	WLAN (802.11 b/g/n)	WPAN (Bluetooth 4.0)
8600	-	-
8630	√	√
8660		√

INSIDE THE PACKAGE

The following items are included in the package. Save the box and packaging material for future use in case you need to store or ship the mobile computer.

- ▶ 8600 Series mobile computer
- ▶ Rechargeable Li-ion battery pack
- ▶ Wristband
- ▶ Snap-on cable
- ▶ Power adaptor
- ▶ Product CD ROM
- ▶ Quick Start Guide

SOFTWARE & UTILITIES

- ▶ Text Browser
- ▶ MIRROR 5250 Emulator
- ▶ MIRROR VT Emulator
- ▶ FORGE Batch Application Generator
- ▶ FORGE WLAN Application Generator
- ▶ C & BASIC compilers

The items on the list above are included on the accompanying product CD ROM.

ACCESSORIES

Rich choices of optional accessories are available for you to enhance the total performance of the mobile computer.

- ▶ Swappable Keypad
- ▶ Hard-shell
- ▶ Pistol Grip (detachable)
- ▶ Spare Rechargeable Li-ion battery
- ▶ Snap-on RS-232 Cable
- ▶ Snap-on USB Cable
- ▶ Fast VPort Cable
- ▶ Charging & Communication Module (CRD-SCC-8S)
- ▶ Cradle Cup (CRD-SCP-86)
- ▶ Battery Charger (CRD-SBC-8S)
- ▶ Single Cradle Base (CRD-SBS-8S)
- ▶ Dual Cradle Base (CRD-DBS-8S)

FEATURES

- ▶ Ergonomic design — ruggedized yet streamlined, with wristband for secure hold
- ▶ Built tough to survive drop test and sealed against moisture/dust to IP 65
- ▶ Rich interface options — USB or RS-232 (cable)
- ▶ High capacity memory card (microSDHC) supported
- ▶ Flexible wireless solutions — Bluetooth or 802.11b/g/n
- ▶ FTP client support — 802.11b/g/n
- ▶ Graphic colorful LCD supports double-byte characters and bitmap graphics
- ▶ Programmable feedback includes speaker, LED indicators and vibrator
- ▶ Quick link to any backend database through MIRROR Emulator programs for VT100/220 and IBM 5250 emulation
- ▶ Easy customization of data collection applications through FORGE Application Generator (AG) programs for preloaded AG Runtime, batch and WLAN versions available
- ▶ Programming support includes BASIC & C compilers
- ▶ Built-in GPS with internal patch antenna (optional)
- ▶ 13.56MHz HF band RFID reader (optional)
- ▶ *Bluetooth v4.0 Smart Ready*

GETTING STARTED

COMPONENT NAMES

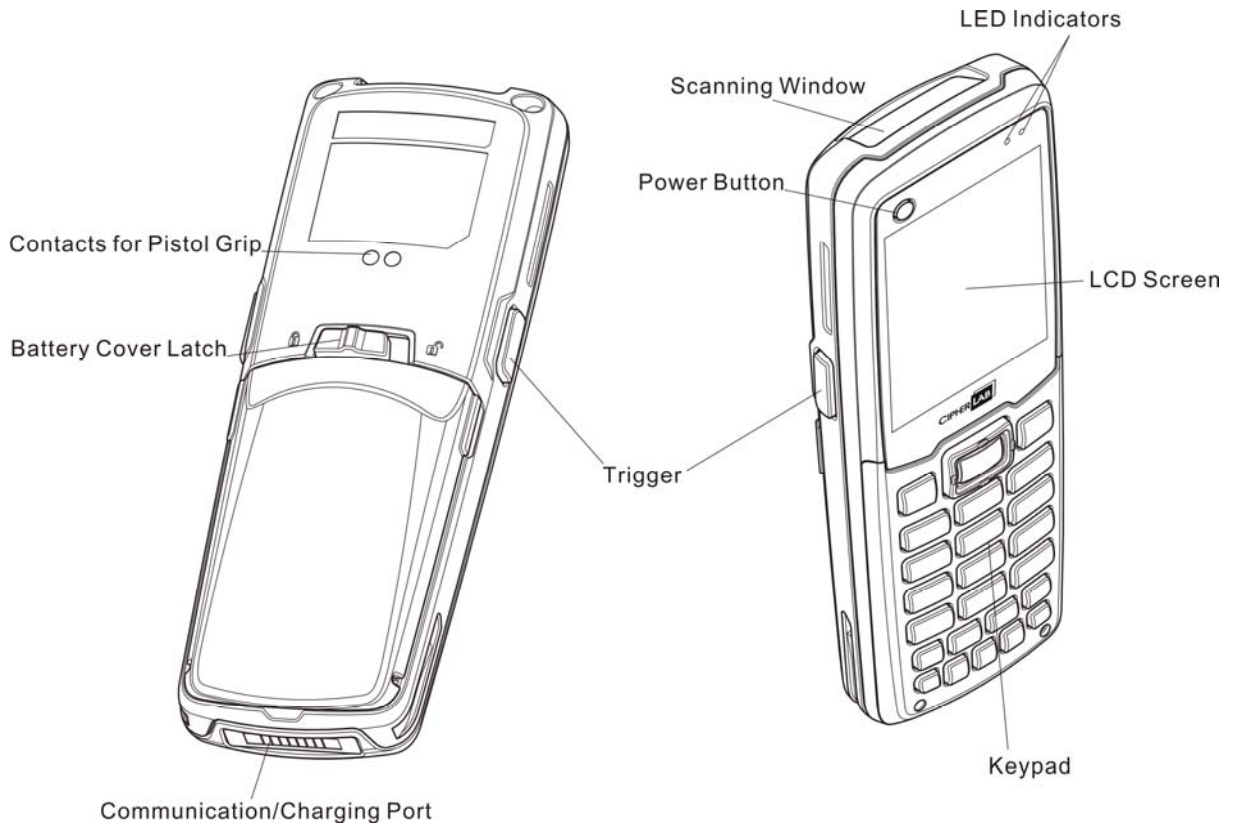


Figure 1: Overview

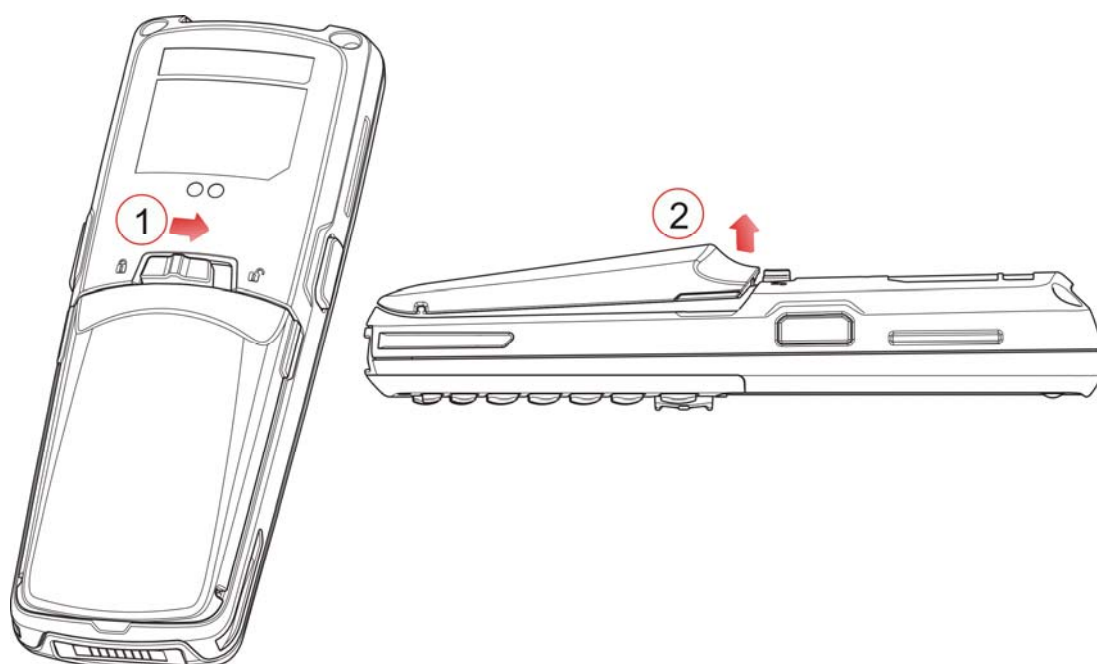
INSERTING BATTERY & MEMORY CARD

For shipping and storage purposes, save the mobile computer and the main battery in separate packages. This will keep both batteries in good condition for future use.

Note: Any improper handling may reduce the battery life.

- 1) Hold the mobile computer still and slide the release latch to the right to unlock the battery cover.
- 2) Slightly hold the sides of the battery cover and take it upward off the device.
- 3) Use your finger to slide the locking plate towards its hinge to unlock the SD card holder.
- 4) Flip up the SD card holder.
- 5) Face the metal contacts of your memory card (microSD or microSDHC) down and slide it into the SD card slot so that the card contacts align with the slot contacts.
- 6) Push the SD card holder down.
- 7) Slide the locking plate away from its hinge to secure the card.
- 8) Slide the battery pack into the battery compartment at a proper angle ($30^{\circ}\sim 45^{\circ}$) so that the metal contacts of the battery are met with the charging contacts inside the compartment. Make sure that the battery is snugly fit into the compartment.
- 9) Replace the battery cover.
- 10) Slide the release latch to the left to lock it firmly.

Note: For a new battery, make sure it is fully charged before use. Always prepare a spare battery pack, especially when you are on the road.



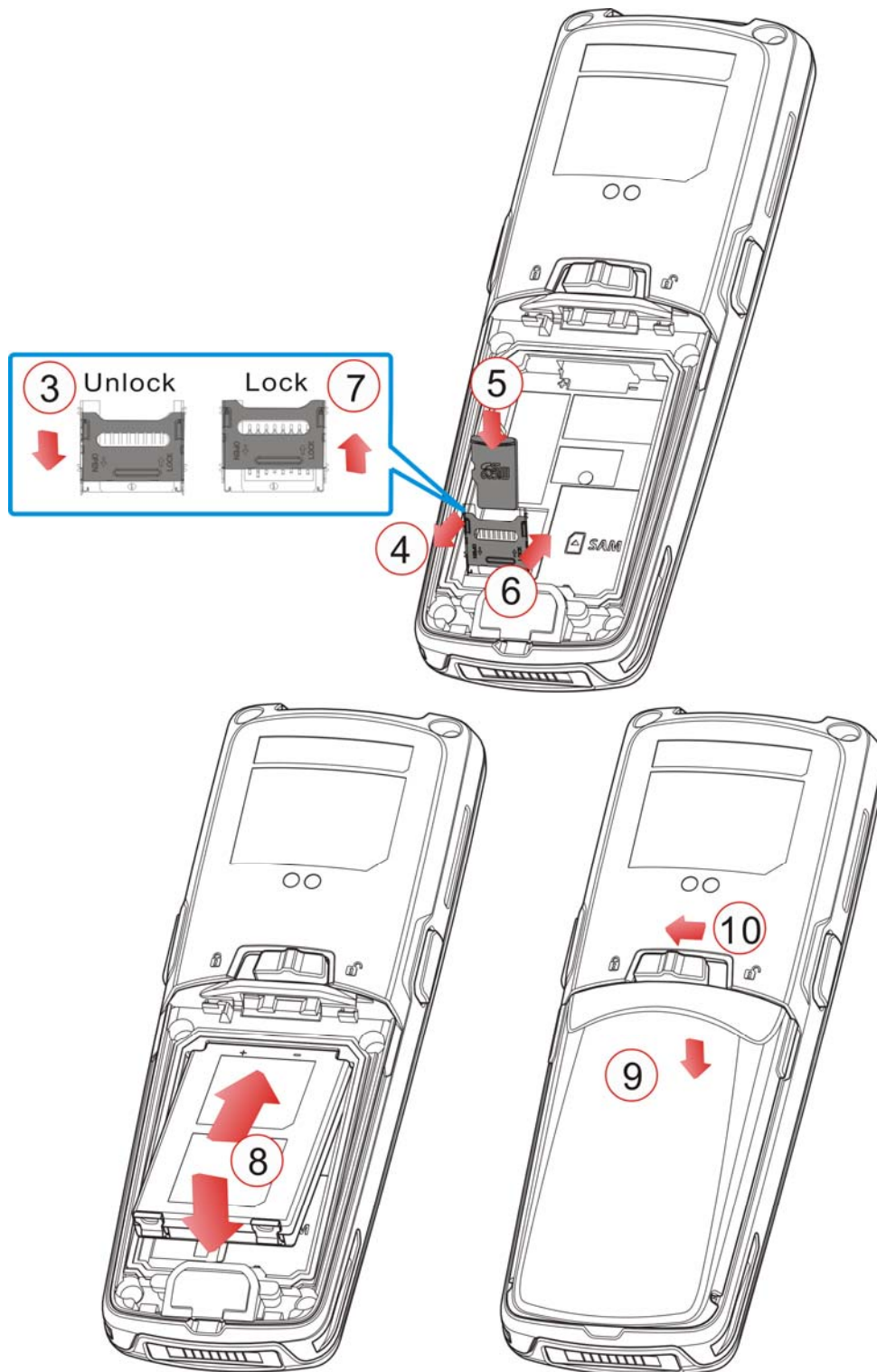


Figure 2: Installing the Memory Card & Main Battery

INSTALLING PISTOL GRIP

This contoured pistol grip enables intuitive trigger-and-scan operation, which is very helpful in scan intensive applications.

When a pistol grip is necessary, install it to the mobile computer by following these steps:

- 1) Place the terminal computer into the holder of the pistol grip.
- 2) Slide the release latch of the pistol against the terminal computer to lock it firmly, and then turn on the mobile computer to test the trigger.

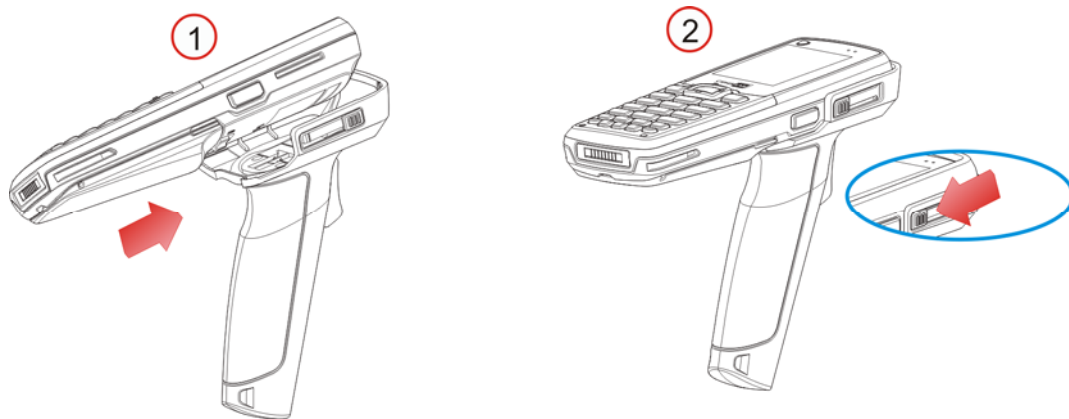


Figure 3: Installing the Pistol Grip

INITIAL CHARGING

The main and backup batteries may not be charged to full for shipment. When you first receive the package, you will need to charge the batteries to full before use. Please refer to [1.7 Charging & Communications](#).

For the first time charge, it takes approximately 2.5 hours to charge the main battery to full. As for the backup battery charging, it takes approximately at least 72 hours whether the mobile computer is in use or not.

SETTING LOCAL TIME

If you need to set your local time, go to **System Menu | 2. Settings | 1. Clock**. Please refer to [3.2.1 Clock](#).

POWER MANAGEMENT

For any portable device, power management is a critical issue especially when you are on the road. Below are some tips to help you extend battery life.

Warning: Using backlight, wireless connectivity, and peripherals will substantially reduce battery power.

- ▶ To speed up charging the mobile computer, turn off the mobile computer and seat it in the cradle or use the charging/communication cable.
- ▶ Be prepared with a second battery pack on hand.
- ▶ Stop wireless connectivity like Bluetooth or 802.11b/g/n that is not in use.
- ▶ Go to **System Menu | 2. Settings | 3. Backlit**, and configure backlight period, luminosity, as well as the shade effect. Refer to [3.2.3 Backlight](#).
- ▶ Go to **System Menu | 2. Settings | 4. Auto Off**, and configure the elapsed time before the system shuts down automatically. Refer to [3.2.4 Auto Off](#).

USING THE MOBILE COMPUTER

This chapter explains the features and usage of the 8600 Series Mobile Computer.

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1.1 BATTERY

1.1.1 MAIN BATTERY

The mobile computer is powered by a rechargeable 3.7V 1100/2200 mAh Li-ion battery pack that may not be charged to full for shipment. When you first receive the package, you will need to charge the battery to full before use. The table below lists the approximate time to fully charge the included 1100/2200mAh batteries with different charging tools.

Capacity \ Charging Tool	1100mAh	2200mAh
	Adapter	3 hrs
Cradle	3 hrs	4 hrs

Note: Battery charging stops when the temperature drops below 0°C or exceeds 40°C. It is recommended to charge the battery at room temperature (18°C to 25°C) for optimal performance.

For power-saving purposes, always turn off the backlight while working in a well-lit area and stop wireless connectivity like Bluetooth or 802.11b/g/n that is not in use.

The smart battery icon on the LCD screen shows the status of power consumption. There are two ways to monitor a low battery charge or discharged battery from the screen.

- ▶ Examine the level of the 4-bar battery icon
- ▶ Monitor voltage level (see [3.5 Power](#))

1.1.2 BACKUP BATTERY

The backup battery, a 3.0V/18mAh rechargeable Lithium button cell on the main board, takes charge of the retention of data in SRAM, real-time clock, and calendar when the main battery is removed or drained. When fully charged, the backup battery can work for at least 25 days without the main battery. In the meantime, you have to replace the main battery as soon as possible. It takes at least 72 hours to fully charge the backup battery; however, it is not necessary to fully charge the backup battery for the mobile computer to work.

- ▶ Monitor voltage level (see [3.5 Power](#))

1.1.3 CAUTION OF LOW BATTERY CHARGE

The battery pack is the only power source for the mobile computer to work. It also charges the backup battery on the main board so that the data stored in SRAM can be retained properly. Therefore, when the main battery charge goes low, you need to replace the battery pack with a charged one or charge it as soon as possible. Most of all, you should upload important data on a regular basis.

Warning: Data loss may occur in SRAM during low battery condition. Always save data before running out of power or keep a fresh battery for replacement.

1.2 MEMORY

The collected data can be sent back to a host computer immediately over wireless networks, or stored in memory (SRAM) and uploaded later. The mobile computer is equipped with a calendar chip for accurate time/date logging. When the main battery is removed or drained, the backup battery on the main board is to retain the contents of SRAM and maintain the running of real-time clock and calendar for at least 25 days, on condition that the backup battery has already been fully charged.

If you want to put away the mobile computer for a couple of days, you should be aware that data loss occurs when both the main and backup batteries discharge completely. Therefore, it is necessary to upload data and files before putting away the mobile computer!

1.2.1 READ-ONLY MEMORY (ROM)

The built-in 16 megabytes flash memory is designated for storing the core, OS, application programs, font, etc.

1.2.2 RANDOM-ACCESS MEMORY (RAM)

Options include 8 or 16 megabytes SRAM for storing data. Its contents will be retained by the backup battery.

1.2.3 SD CARD

Secure Digital (SD) card is a flash memory data storage device. High capacity memory card (microSDHC) is also supported. Refer to [Inserting Battery & Memory Card](#) for how to insert the microSD or microSDHC card. For more details, refer to [1.8 SD Card](#).

Note: (1) When SD card is present, the card icon will appear on the screen and flash while being accessed.
(2) If an SD card is installed on the mobile computer for the first time, a message like "Found New SD Card" will be displayed allowing users to scan the card for memory check. If the action is canceled, memory check can still be performed via System Menu — [3.8 Storage Menu](#).

1.3 KEYPAD

The mobile computer is equipped with a keypad of 29/39 keys for system setup, user entry and so on. The keypad comes with programmable LED backlight for illumination that makes the key characters easier to read when ambient light gets weaker. Refer to [1.4 LCD](#) for screen & backlight settings.

The key click can be configured through programming or via **System Menu**. Refer to [3.2.6 Key Click](#).

1.3.1 29-KEY & 39-KEY LAYOUT

The layout of the 29-key keypad is similar to that of a telephone, which includes alphanumeric, navigation and function keys, as well as assorted characters. Refer to [Appendix III – Key Reference Table](#) for color-coded keys.

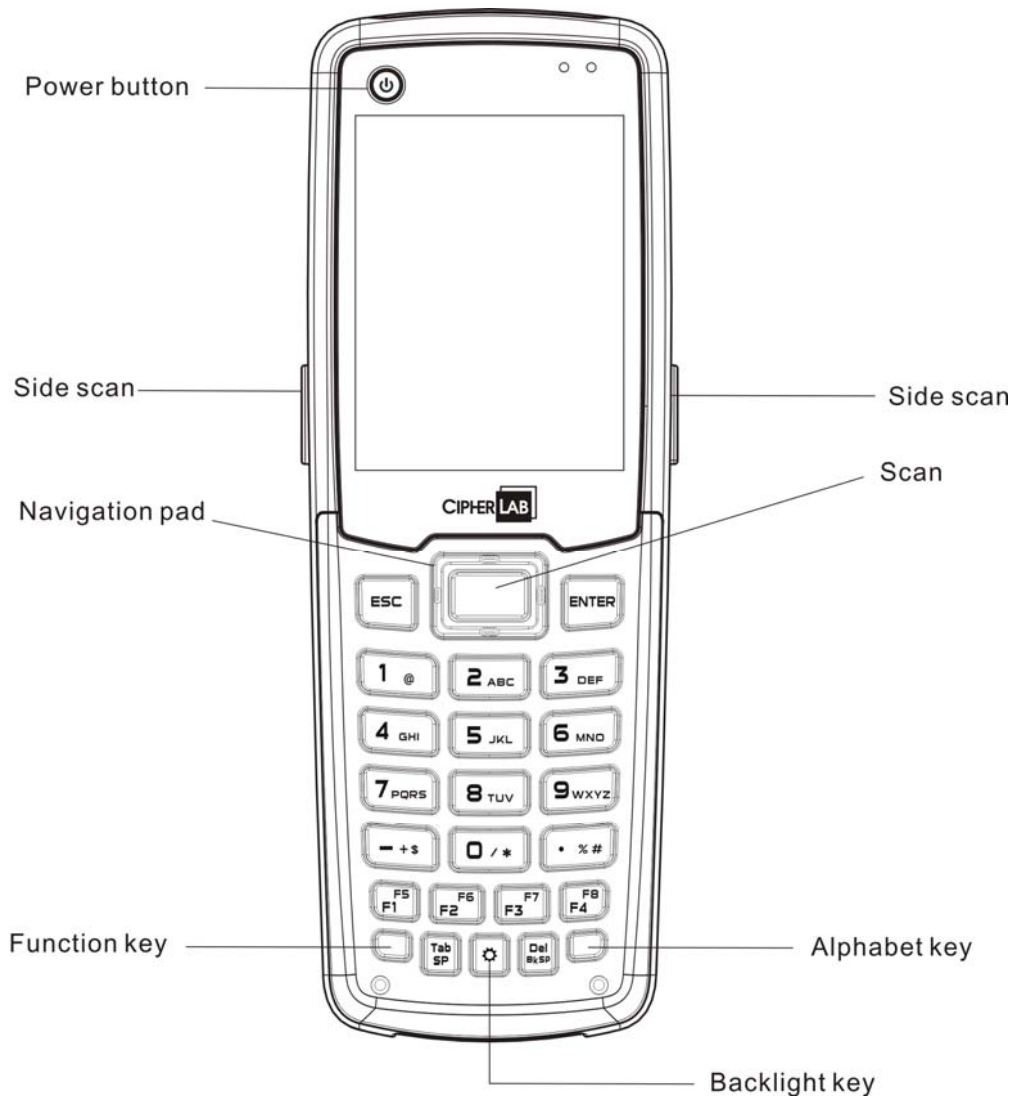





Figure 4: 29-key Layout

This alphanumeric keypad is set to numeral mode by default. Press the blue key at the bottom-right to toggle between upper-case alphabet, lower-case alphabet, and numeral modes. Press the orange key at the bottom-left to toggle between function and numeral modes.

The associated icon will appear on the top row of the screen in a sequence as shown below.

Status Icon	Function/Alpha Key	Input Mode
(none)	N/A	Numbers
	Press the blue key one time	Upper-case alphabet
	Press the blue key two times	Lower-case alphabet
	Press the orange key one time	Function Mode

For 29-key model in alphabet mode, it takes turns to show upper-case/lower-case alphabets and number when you keep pressing the same key; the lasting time of a press or interval between two presses must not exceed one second or you will always get the first letter. For example, keep pressing the number key [2], it will take turns to show "A", "B", "C" or "2" for upper-case, and "a", "b", "c" or "2" for lower-case.

- ▶ When you first press the number key [2], it will produce the letter "A" or "a".
- ▶ When you press the number key [2] twice (the time interval must not exceed one second), it will produce the letter "B" or "b".
- ▶ When you press the number key [2] three times (the time interval between each press must not exceed one second), it will produce the letter "C" or "c".
- ▶ When you press the number key [2] four times (the time interval between each press must not exceed one second), it will produce the number "2".

In order to get the desired character, you will need to press the same key, one to four times (the time interval between each press must not exceed one second). Only when you stop pressing the same key for longer than one second or you press another key, will the system send the real key code to the application program.

For 39-key in alphabet mode, each key press immediately inputs a particular letter on the screen. For example, pressing the number key [1] will show "A" or "a" on the screen; pressing the number key [2] will show "B" or "b".

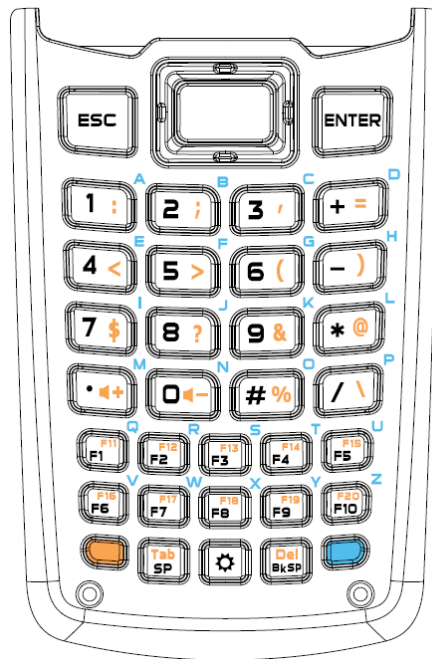


Figure 5: 39-key Layout

When in function mode, the orange key works with another key. Press the orange key and then its associated icon **Fn** will be displayed on the top line of the screen. Press the second key, say [Del], to complete the key combination and delete the character where the cursor stays.

Below briefly describes the functions of common keys on the mobile computer.

Power Button

The power button is located at the top left of the mobile computer. Press to turn on the device.

Scan

The yellow key located at the top center of the keypad is used to trigger the scan engine to read the barcode.

Side Scan

The yellow keys located at two sides of the device are also used to trigger the scan engine to read the barcode.

Navigation Pad

The 4-way navigation pad around the **SCAN** key is used to move the cursor left, up, down, or right.

ENTER



This key on the right side of the **SCAN** key is used for command execution or input confirmation.

ESC (Escape)

This key on the left side of the **SCAN** key is used to stop and exit the current operation.


Alphabet Key (the blue key)

The blue key is an auxiliary key that requires pressing a second key to get the letter (A~Z) or symbol printed in blue on the second key (or on the keypad near the key).

Icon	Description
	This icon appears when you press the blue key one time, indicating it is toggled to the alphabet mode for typing upper-case alphabetic letters.
	This icon appears when you press the blue key two times, indicating it is toggled to the alphabet mode for typing lower-case alphabetic letters.

Function Key (the orange key)

The orange key is an auxiliary key that requires pressing a second key to get the symbol or function printed in orange on the second key.

Icon	Description
	This icon appears when you press the orange key, indicating it is toggled to the function mode.

Backlight Key

This key is used to turn ON/OFF the backlight of the LCD and keypad.

Note: (1) Functionality of keys is application-dependent. The system will send the associated key code to the application program, and it is up to the application program to interpret the key code.
(2) When a status icon appears on the screen, it indicates a certain mode is activated and it is not necessary to hold down the auxiliary key.

1.4 LCD

The mobile computer comes with a TFT graphic LCD, 240 by 320 pixels resolution, which can be programmed to display text or graphics, such as specific font and company logo, to meet varying application needs.

Options	Font Size (pixels)	Characters by lines
English font	Font size 10×20 (pixels)	24 characters by 16 lines
	Font size 12×24 (pixels)	20 characters by 13 lines
Chinese font	Font size 20×20 (pixels)	12 characters by 16 lines
	Font size 24×24 (pixels)	10 characters by 13 lines
Other language fonts, company logo...	Programmable	

Note: The top line (icon zone) is reserved to display status icons, such as icons indicating battery status, alphabet upper/lower case, SD card installed. Therefore, the actual amount of lines will be less than the total count by 1.

1.4.1 ADJUSTING THE LCD BACKLIGHT

The backlight of screen helps ease reading in dim environments. It can be turned on/off by pressing the [⚙️] key located at the bottom center of the keypad. Also backlight level can be adjusted through programming or via **System Menu**. Refer to [3.2.3 Backlight](#).

Using backlight while on battery power will substantially reduce battery power. We suggest that you switch off the backlight while there's no need to read the screen or have it set to be automatically turned off when it has been idle for a certain period of time.

1.5 NOTIFICATIONS

1.5.1 STATUS LED

There are two dual-color LED indicators located at the upper-right of the screen. Both can be programmed to provide information that helps diagnosing. For example, if you are using AG runtime, you will be informed of the scanning result immediately. By default, LED1 is defined to light solid green for a single "Good Read" action upon reading a barcode successfully.

- ▶ LED1 is used to provide information on the charging status and barcode decoding.
- ▶ LED2 is used to provide information on wireless communications.

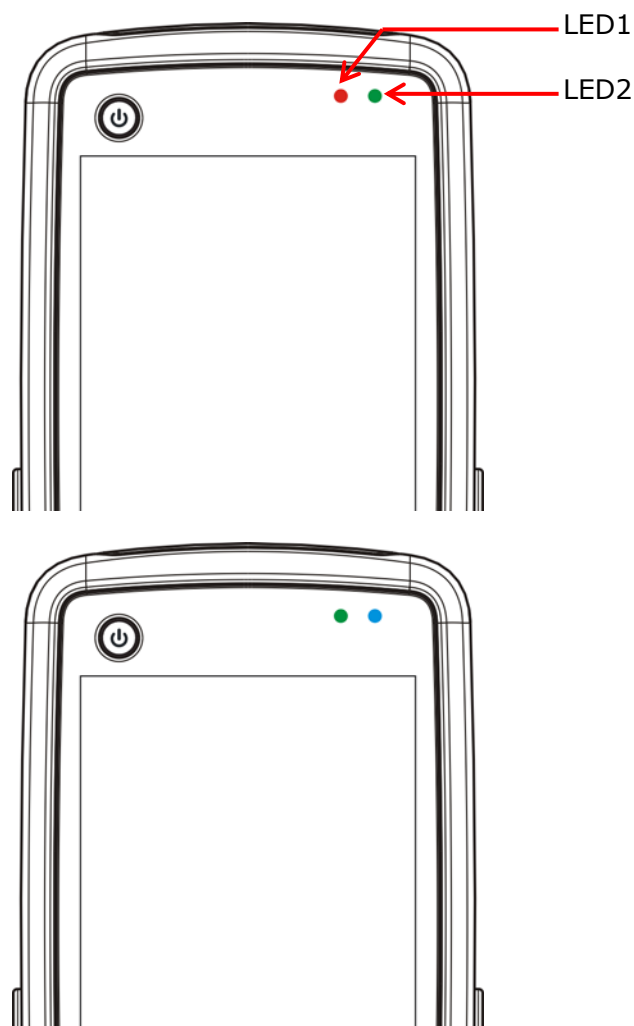


Figure 6: LED Indicators

LED1: Red/Green	Red	Green
User Power ON	User definable	User definable ▶ Solid green for Good Read by default
Power Off, Battery Charging	System default ▶ Flashing red: Charging	System default ▶ Flashing green: Charging done
Charging Error	System default ▶ Flashing red and green: Charging error occurs	
LED2: Blue/Green	Blue	Green
Bluetooth	System default ▶ Flashing blue, quickly: Waiting for connection or connecting ▶ Flashing blue, slowly: Connected	---
Wi-Fi	---	System default ▶ Flashing green, quickly: Waiting for connection or connecting ▶ Flashing green, slowly: Connected

1.5.2 AUDIO

The mobile computer has a mono or stereo speaker at the bottom, which can be programmed for status feedback. It is used to play sounds for events in the programs, or play audio files such as .WAV files. Its volume can be configured through programming or via **System Menu**. Refer to [3.2.7 Speaker Volume](#). In particular, its frequency and duration are software programmable for Good Read in the provided terminal emulation programs.

1.5.3 VIBRATOR

The mobile computer is equipped with a vibrator, which can be programmed for status feedback. It can be helpful when working in noisy environments. In particular, the vibrator is software programmable for Good Read in the provided terminal emulation programs.

1.6 DATA CAPTURE

1.6.1 BARCODE SCANNER

A wide variety of scan engines is available for delivering flexibility to meet different requirements. Depending on the scan engine integrated, the mobile computer is capable of scanning barcodes of a number of symbologies that are enabled by default while running the preloaded AG runtime. Refer to [3.3.1 Reader](#) for functional test.

If you need to scan barcodes that are encoded in a specific symbology disabled by default in AG runtime, **FORGE Application Generator** (ForgeAG.exe, the application on the included CD-ROM) allows configuring symbology settings, as well as reader settings. After launching the application, enable the desired symbologies, and then download the application settings to the mobile computer.

Note: For details on configuring reader and symbology settings, please refer to the documentation of the software you use.

Varying by the scan engine installed, the supported symbologies are listed below.

- ▶ 1D CCD scan engine
- ▶ 1D Laser scan engine
- ▶ 2D scan engine

Note: In AG or CipherNet runtime, not all of the symbologies are enabled by default. Instead of running any of them, you can develop your own applications to control the scan engine for data collection.

Symbologies Supported (Default Setting: Enable/Disable)		CCD/Laser	2D
Codabar		Enabled	Enabled
Code 11			Disabled
Code 93		Enabled	Enabled
Composite Code	CC-A/B		Disabled
	CC-C		Disabled
	TCIF Linked Code 39		Enabled
MSI		Disabled	Disabled
Plessey		Disabled	
Postal Codes			Enabled
Telepen		Disabled	
Code 128	Code 128	Enabled	Enabled
	GS1-128 (EAN-128)	Enabled	Enabled
	ISBT 128	Enabled	
Code 2 of 5	Industrial 25 (Discrete 25)	Enabled	Enabled

	Interleaved 25	Enabled	Enabled
	Matrix 25	Disabled	Disabled
	Chinese 25		Disabled
	Coop 25	Disabled	
Code 3 of 9	Code 39	Enabled	Enabled
	Trioptic Code 39		Disabled
	Italian Pharmacode (Code 32)	Disabled	Disabled
	French Pharmacode	Disabled	
EAN/UPC	EAN-8	Enabled	Enabled
	EAN-8 Addon 2	Disabled	Disabled
	EAN-8 Addon 5	Disabled	Disabled
	EAN-13	Enabled	Enabled
	EAN-13 & UPC-A Addon 2	Disabled	Disabled
	EAN-13 & UPC-A Addon 5	Disabled	Disabled
	Bookland EAN (ISBN)	Disabled	Disabled
	UPC-E0	Enabled	Enabled
	UPC-E1	Disabled	Disabled
	UPC-E Addon 2	Disabled	Disabled
	UPC-E Addon 5	Disabled	Disabled
	UPC-A	Enabled	Enabled
GS1 DataBar (RSS)	GS1 DataBar Omnidirectional (RSS-14)	Disabled	Enabled
	GS1 DataBar Truncated	Disabled	Enabled
	GS1 DataBar Stacked	Disabled	Enabled
	GS1 DataBar Stacked Omnidirectional	Disabled	Enabled
	GS1 DataBar Limited (RSS Limited)	Disabled	Enabled
	GS1 DataBar Expanded (RSS Expanded)	Disabled	Enabled
	GS1 DataBar Expanded Stacked	Disabled	Enabled
2D Symbologies	PDF417		Enabled
	MicroPDF417		Enabled
	Data Matrix		Enabled
	Maxicode		Enabled
	QR Code		Enabled

1.6.2 RFID READER

The RFID Reader supports read/write operations depending on the tags. The supported labels include ISO 15693, ISO 14443A, and ISO 14443B.

HF Tag	Protocol	UID Only	Read Page	Write Page
ISO 14443A	Mifare Standard 1K (Mifare S50)	✓	✓	✓
	Mifare Standard 4K (Mifare S70)	✓	✓	✓
	Jcop 41 (only Mifare 1K & 4K compatible)	✓	✓	✓
	Mifare Ultralight	✓	✓	✓
	Mifare Ultralight C	✓	✓	✓
	Mifare ProX	✓	✓	✓
	Mifare DESFire	✓	✓	✓
	Mifare Plus	✓	✓	✓
	Mifare Mini (Mifare S20)	✓	✓	✓
	SLE66CLX320P	✓	---	---
	SLE55R04/08	✓	---	---
	Smart MX	✓	---	---
	Jewel	✓	✓	✓
	Topaz	✓	✓	✓
ISO 14443B	SLE6666CL160S	✓	---	---
	SR176	✓	✓	✓
	SR512	✓	✓	✓
	SRIX4K	✓	✓	✓
	SLIX4K	✓	✓	✓
Dual	ISO 14443A compliant	✓	---	---
	ISO 14443B compliant	✓	---	---
ISO 15693	ICODE SLI	✓	✓	✓
	LRI12	✓	✓	✓
	LRI64	✓	✓	✓
	LRI128	✓	✓	✓
	LRI2K	✓	✓	✓
	SRF55VxxP	✓	✓	✓
	SRF55VxxS	✓	✓	✓
	TI Tag-it HF-I Std	✓	✓	✓
	TempSense	✓	---	---
	ICODE1 with EAS&AFI	✓	✓	✓
	ICODE	✓	✓	✓

1.7 CHARGING & COMMUNICATIONS

Normally, the mobile computer ships with a USB or RS-232 cable for charging and communications. A variety of cradles are available to meet different requirements.

- ▶ If you are using USB Virtual COM for the first time, you must install its driver from the CD-ROM. Driver version 5.3 or later is required. Please remove older versions! The virtual COM port will not be assigned until the USB port is in use.
- ▶ If you are using USB Virtual COM_CDC for the first time, you must install its driver from the CD-ROM. USB CDC driver installer is available in the "Windows" folder, where a vendor-supplied INF file will be copied to Windows.
- ▶ For Standard USB cable, it will release COM port in the following conditions:
 - (i) The cable is detached from the mobile computer directly.
 - (ii) The cable is detached from the cradle directly.
 - (iii) Take away the mobile computer while the cable is attached between the cradle and the host computer.
 - (iv) The mobile computer is turned off.
 - (v) No application is running on the mobile computer, or COM port is shut down.

For applications that require COM port to be occupied all the time, it is suggested to use Fast VPort cable instead.

USB Interface Cable

Task	Cable Attached
Charging	USB direct charging <ul style="list-style-type: none"> ▶ USB icon and Battery with flash icon 5V charging from the adaptor <ul style="list-style-type: none"> ▶ Plug icon and Battery with flash icon
Communications	USB Virtual COM — If using FORGE Application Generator software on your PC, you may use the included download utility to transfer data from PC to your mobile computer; or alternatively, run HyperTerminal.exe to receive data directly. USB HID — Run a text editor on your PC to receive data from the mobile computer directly. USB Virtual COM_CDC — If using FORGE Application Generator software on your PC, you may use the included download utility to transfer data from PC to your mobile computer; or alternatively, run HyperTerminal.exe to receive data directly.

RS-232 Interface Cable

Task	Cable Attached
Charging	5V charging from the adaptor (Plug icon)
Communications	If using FORGE Application Generator software on your PC, you may use the included download utility to transfer data from PC to your mobile computer; or alternatively, run HyperTerminal.exe to receive data directly.

Cradle

Task	Cable Attached
Charging	5 V charging from the adaptor (Plug icon)
Communications	Depends on the cradle type and its associated settings — ▶ USB ▶ RS-232

Note: Battery charging stops when the temperature drops below 0°C or exceeds 40°C. It is recommended to charge the battery at room temperature (18°C to 25°C) for optimal performance.

1.7.1 INTERFACE CABLE OPTIONS

For charging via the USB cable, the standard charging current is 500 mA. However, we recommend that you connect the power adaptor to speed up charging the battery.

- ▶ If you connect the mobile computer to a USB hub, the charging current may be insufficient. In that case, change the charging current to 100 mA after connecting the USB cable. It will take a longer time to charge to full. Refer to [3.2.9 USB Charge Current](#).

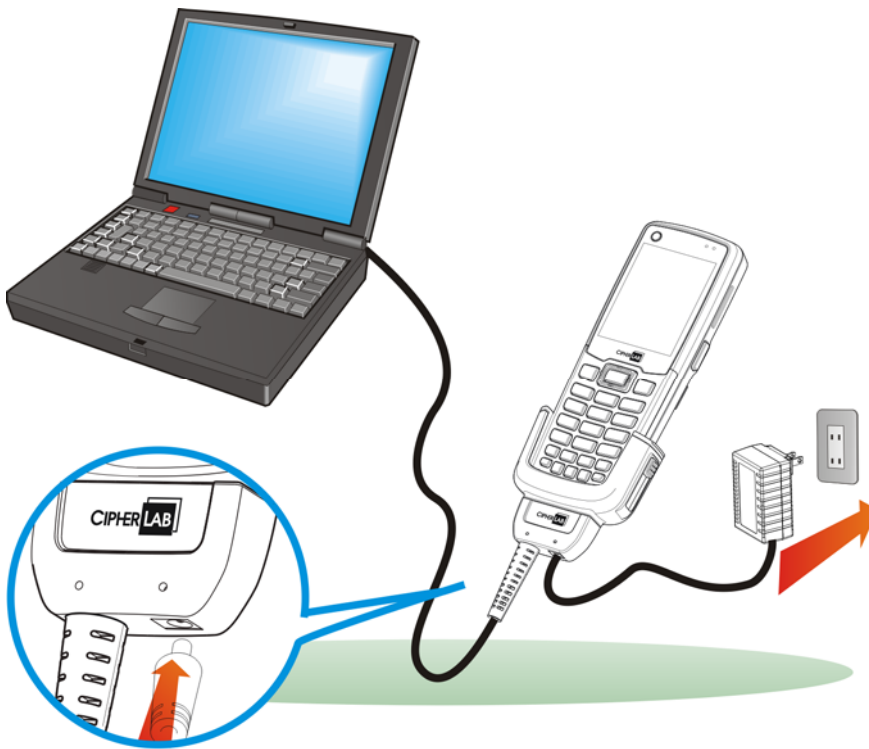


Figure 7: Using USB/RS-232 cable

Warning: The mobile computer is not allowed to function when it is solely on USB power and without a battery loaded. It will display a warning message "Battery Missing" along with an audible alert. In that case, you should install the battery before restarting.

1.7.2 CRADLE OPTIONS

A variety of cradles are developed for the mobile computer and ship on your option. These cradles employ different data connections, but they all support charging the mobile computer while transmitting data at the same time. Choose a cradle type that best suits your needs.

Task	Cradle Interface
Charging	5 V charging from the adaptor
Communications	By the cradle type and the wiring you choose, the following transmission interfaces are available at your command: <ul style="list-style-type: none"> ▶ RS-232 ▶ USB

Note: Battery charging stops when the temperature drops below 0°C or exceeds 40°C. It is recommended to charge the battery at room temperature (18°C to 25°C) for the optimal performance.

To make use of any of the cradles, follow the steps below:

- 1) Seat the mobile computer in the cradle.
- 2) Connect the power cord to the cradle.
See the illustration below. The (A) depicts the power jack on the cradle. Plug the power cord to this jack.
- 3) Connect the other end of the power cord to an external power source.
- 4) Connect the cradle to a host computer such as your PC with a communication cable for data transmission.
See the illustration below, the (B) depicts the cradle's direct communication port. Connect a USB or RS-232 cable to this port. The (C) shows users can slightly press the connector downwards to remove the cable.

A guide to the Ethernet Cradle is ready for your reference in which more details about the Ethernet Cradle can be looked up.

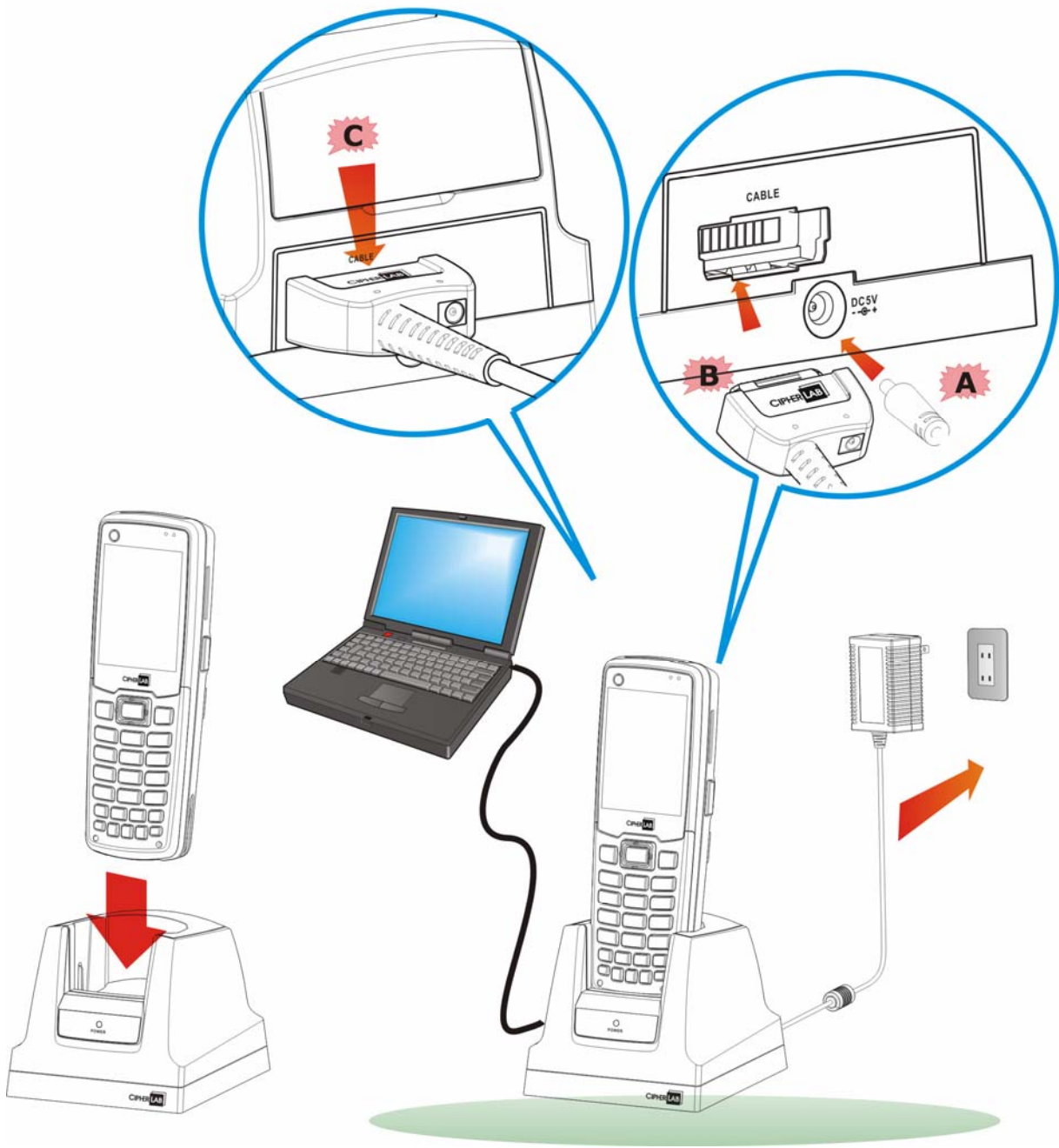
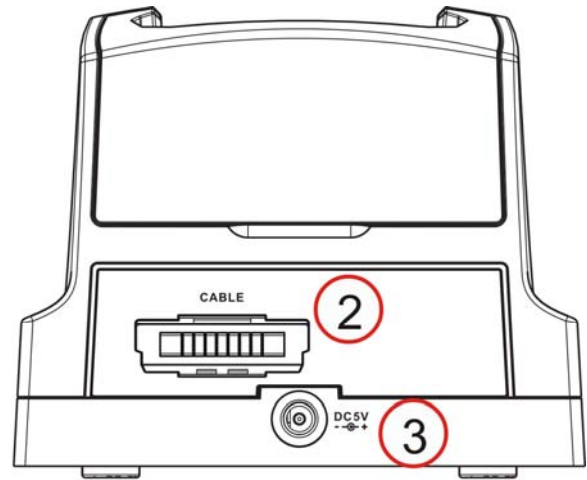
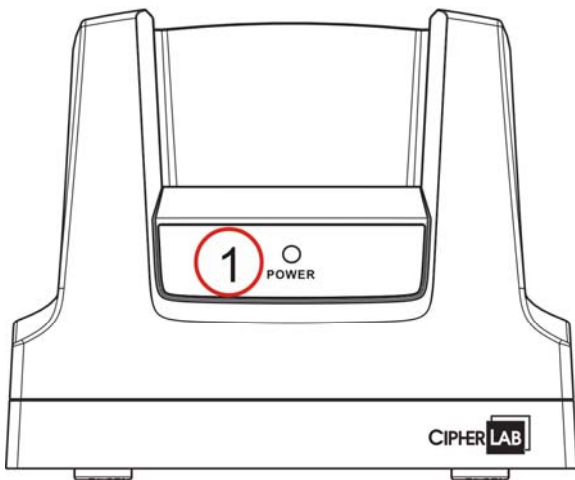


Figure 8: Setting up cradle

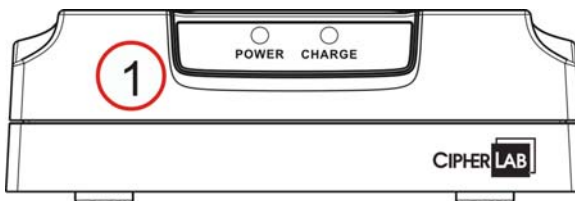
Charging & Communication Cradle



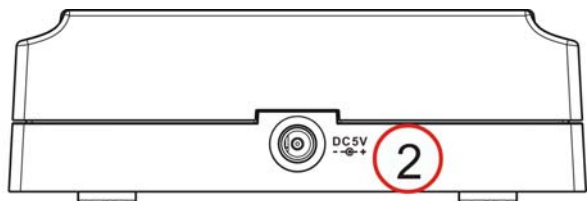
No.	Description
1	Status LED (POWER)

No.	Description
2	Cable Connector (USB or RS-232)
3	Power Jack

Battery Charger



No.	Description
1	Status LEDs (POWER, CHARGE)



No.	Description
2	Power Jack

1.8 SD CARD

SD card can be accessed directly by using the provided functions in user applications. Yet, when the mobile computer is equipped with an SD card and connected to the host computer via the USB cable, it can be treated as a removable disk (USB mass storage device) as long as it is configured properly through programming or via **System Menu | 8. Next Page | 1. Storage Menu | 1. Run As USB Disk**. Refer to [3.8 Storage Menu](#).

Note: While running BASIC applications, the size of DAT files on SD card can be calibrated. Go to **System Menu | 8. Next Page | 1. Storage Menu | 2. Access SD Card | 4. Check File Size** to refresh the size of "A:\BASICRUN\TXACTn.DAT" (n=1~6).

1.8.1 FILE SYSTEM

For 8600 Series, it supports FAT12/FAT16/FAT32 and allows editing files through C programming or formatting the card via **System Menu | 8. Next Page | 1. Storage Menu | 2. Access SD Card**. Based on the capacity of the card, it will automatically decide the FAT format:

Card Capacity	FAT Format	Sectors per Cluster
≤ 32 MB	FAT12	32
≤ 1 GB	FAT16	32
≤ 2 GB	FAT16	64
≤ 8 GB	FAT32	8

1.8.2 DIRECTORY

Unlike the file system on SRAM, the file system on SD card supports directories of hierarchical tree structure and allows creating sub-directories. Several directory names are reserved for particular use.

Reserved Directory	Related Application or Function	Remark
\Program	<ul style="list-style-type: none"> ▶ System Menu Load Program ▶ Program Manager Download ▶ Program Manager Activate ▶ Kernel Menu Kernel Update ▶ UPDATE_BASIC() 	Store programs to this folder so that you can download them to the mobile computer: <ul style="list-style-type: none"> ▶ C program — *.SHX ▶ BASIC program — *.INI and *.SYN
\BasicRun	BASIC Runtime	Store DAT and DBF files that are created and accessed in BASIC runtime to this folder. Their permanent filenames are as follows:

DAT Filename		
DAT file # 1	TXACT1.DAT	
DAT file # 2	TXACT2.DAT	
DAT file # 3	TXACT3.DAT	
DAT file # 4	TXACT4.DAT	
DAT file # 5	TXACT5.DAT	
DAT file # 6	TXACT6.DAT	
DBF Filename		
DBF file # 1	Record file	F1.DB0
	System Default Index	F1.DB1
	Index file # 1	F1.DB2
	Index file # 2	F1.DB3
	Index file # 3	F1.DB4
	Index file # 4	F1.DB5
	Index file # 5	F1.DB6
DBF file # 2	Record file	F2.DB0
	System Default Index	F2.DB1
	Index file # 1	F2.DB2
	Index file # 2	F2.DB3
	Index file # 3	F2.DB4
	Index file # 4	F2.DB5
	Index file # 5	F2.DB6
DBF file # 3	Record file	F3.DB0
	System Default Index	F3.DB1
	Index file # 1	F3.DB2
	Index file # 2	F3.DB3
	Index file # 3	F3.DB4
	Index file # 4	F3.DB5
	Index file # 5	F3.DB6

		<table border="1"> <tr> <td rowspan="7">DBF file #4</td> <td>Record file</td> <td>F4.DB0</td> </tr> <tr> <td>System Default Index</td> <td>F4.DB1</td> </tr> <tr> <td>Index file #1</td> <td>F4.DB2</td> </tr> <tr> <td>Index file #2</td> <td>F4.DB3</td> </tr> <tr> <td>Index file #3</td> <td>F4.DB4</td> </tr> <tr> <td>Index file #4</td> <td>F4.DB5</td> </tr> <tr> <td>Index file #5</td> <td>F4.DB6</td> </tr> <tr> <td rowspan="7">DBF file #5</td> <td>Record file</td> <td>F5.DB0</td> </tr> <tr> <td>System Default Index</td> <td>F5.DB1</td> </tr> <tr> <td>Index file #1</td> <td>F5.DB2</td> </tr> <tr> <td>Index file #2</td> <td>F5.DB3</td> </tr> <tr> <td>Index file #3</td> <td>F5.DB4</td> </tr> <tr> <td>Index file #4</td> <td>F5.DB5</td> </tr> <tr> <td>Index file #5</td> <td>F5.DB6</td> </tr> </table>	DBF file #4	Record file	F4.DB0	System Default Index	F4.DB1	Index file #1	F4.DB2	Index file #2	F4.DB3	Index file #3	F4.DB4	Index file #4	F4.DB5	Index file #5	F4.DB6	DBF file #5	Record file	F5.DB0	System Default Index	F5.DB1	Index file #1	F5.DB2	Index file #2	F5.DB3	Index file #3	F5.DB4	Index file #4	F5.DB5	Index file #5	F5.DB6
DBF file #4	Record file	F4.DB0																														
	System Default Index	F4.DB1																														
	Index file #1	F4.DB2																														
	Index file #2	F4.DB3																														
	Index file #3	F4.DB4																														
	Index file #4	F4.DB5																														
	Index file #5	F4.DB6																														
DBF file #5	Record file	F5.DB0																														
	System Default Index	F5.DB1																														
	Index file #1	F5.DB2																														
	Index file #2	F5.DB3																														
	Index file #3	F5.DB4																														
	Index file #4	F5.DB5																														
	Index file #5	F5.DB6																														
\AG\DBF \AG\DAT \AG\EXPORT \AG\IMPORT	Application Generator (a.k.a. AG)	Store DAT, DBF, and Lookup files that are created and/or accessed in Application Generator to this folder.																														

1.8.3 FILE NAME

A file name must follow 8.3 format (= short filenames) — at most 8 characters for filename, and at most three characters for filename extension. The following characters are unacceptable: " * + , : ; < = > ? | []

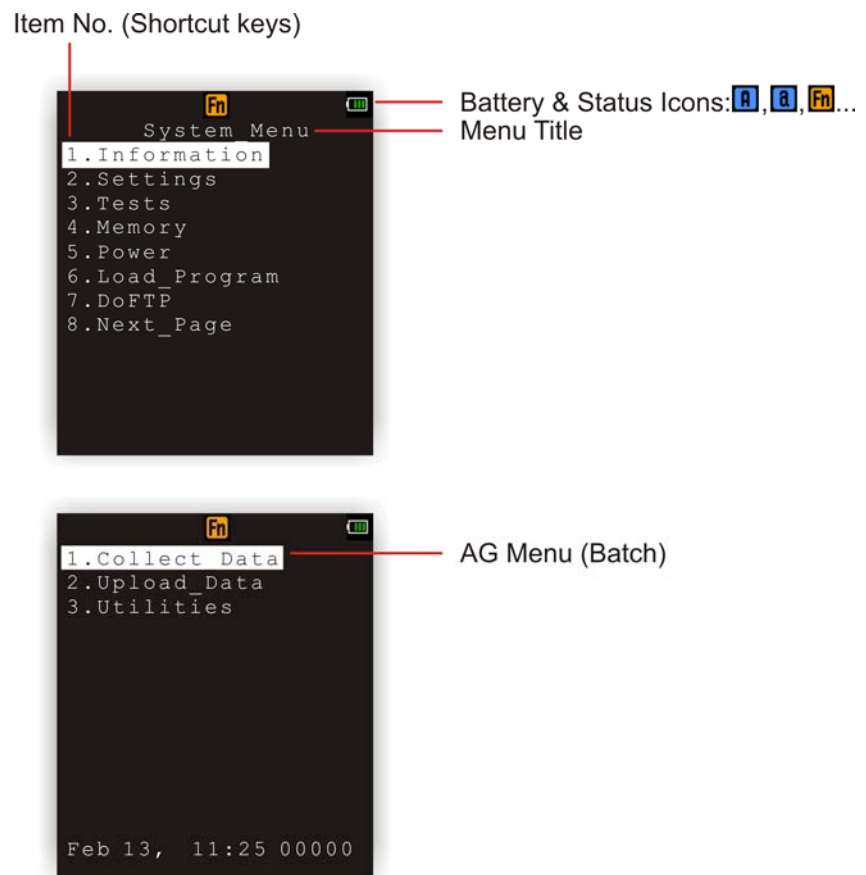
- ▶ The mobile computer can display a filename of 1 ~ 8 characters (the null character not included), and filename extension will be displayed if provided. If a file name specified is longer than eight characters, it will be truncated to eight characters.
- ▶ Long filenames, at most 255 characters, are allowed when using the mobile computer equipped with SD card as a mass storage device. For example, you may have a filename "123456789.txt" created from your computer. However, when the same file is directly accessed on the mobile computer, the filename will be truncated to "123456~1.txt".
- ▶ If a file name is not specified in ASCII characters, in order for the mobile computer to display it correctly, you may need to download a matching font file to the mobile computer first.
- ▶ The file name is not case-sensitive.

LEARNING SOFTWARE ARCHITECTURE

This chapter mainly describes the software inside the mobile computer. It consists of three modules — Kernel, System, and Application; each has a function menu.

When a menu is displayed, you may select an item by either of the following ways:

- ▶ Press the [Up] and [Down] keys to move the highlight bar.
- ▶ Press the number key that corresponds to the item number.
- ▶ Follow the on-screen instructions to change a specific setting, or press [ESC] to return to a previous page or menu.



On each screen, the top line displays status icons, such as:

- ▶ The 4-bar battery icon indicates the current power status.
- ▶ The status icon of input mode or function mode is controlled by the blue/orange key.

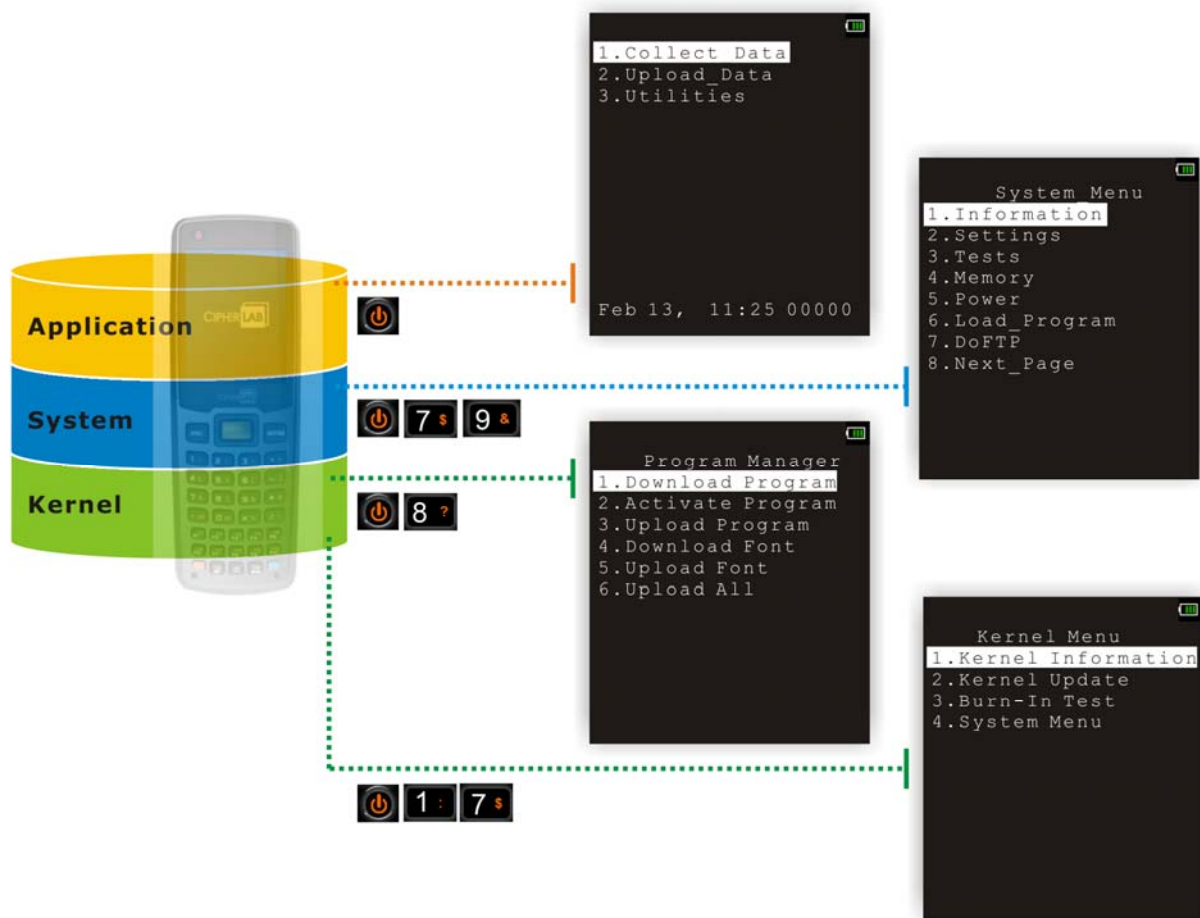


Figure 9: Software Architecture

IN THIS CHAPTER

2.1 Application Module	35
2.2 System Configuration & Core.....	37

2.1 APPLICATION MODULE

The mobile computer ships with software package on the CD-ROM including **FORGE Application Generator** (Batch and WLAN versions), **MIRROR Emulator** (VT and 5250 versions), and download utilities.

2.1.1 FORGE APPLICATION GENERATOR (AG)

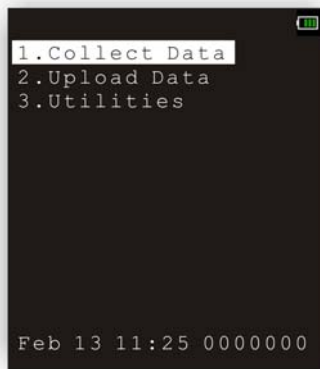
FORGE Application Generator (AG) software package includes:

- ▶ Forge.exe/AG8600WLAN.exe on the host computer
- ▶ AG Runtime on the mobile computer

AG Package	AG Runtime on mobile computer	Companion Tool on host computer
Batch AG	U8600.SHX	ForgeAG.exe
WLAN AG	WU8600.SHX	AG8600WLAN.exe

With the Batch AG runtime preloaded, the Main Menu of AG application shows up when you turn on the mobile computer.

Batch AG runtime on the mobile computer



Before using the mobile computer to collect data, you may want to create your own application templates on the host computer with the companion tool. For further details of the AG application, please refer to the respective user manuals.

Note: Batch AG supports automatically uploading data to a host computer when the upload interface is properly configured. Once the mobile computer is connected via the RS-232 or USB Virtual COM cable, a rotating hourglass icon displays on the screen, indicating the mobile computer is ready for auto-upload.

2.1.2 MIRROR EMULATOR (CIPHERNET)

The mobile computer supports VT100/220 and IBM 5250 terminal emulation for accessing a backend database. Instead of using **FORGE Application Generator**, you may download the terminal emulation program, i.e. CipherNet Runtime, to the mobile computer. Refer to [3.6 Load Program](#). Then, run individual companion tool on your computer.

For details on the **MIRROR Emulator** application, please refer to separate user manuals.

Terminal Emulation	CipherNet Runtime	Companion Tool on PC End
VT100/220	86xx-VT.SHX	CipherNet-VT.exe
IBM 5250	86xx-5250.SHX	CipherNet-5250.exe

2.1.3 USER PROGRAM

You may need to develop your own application program. For developing custom applications, CipherLab provides BASIC and C compilers through licensing. For detailed information, please contact your sales representative.

2.2 SYSTEM CONFIGURATION & CORE

For managing system configurations and multiple programs, each mobile computer comes with **System Menu**, **Program Manager**, and **Kernel Menu**. Refer to the following chapters on how to configure the 8600 Series Mobile Computer, regarding system configurations and program download.

2.2.1 SYSTEM MENU

[System Menu](#) is bundled with BASIC Runtime or user programs that are written in C language. It is provided for system configuration, functionality testing, downloading font file and program.

2.2.2 KERNEL

[Kernel](#) is the innermost core of the OS. It provides services for updating the kernel and bootloader, and repairing the system.

2.2.3 PROGRAM MANAGER

[Program Manager](#) is part of the kernel. You may download up to seven application programs to the mobile computer.

SYSTEM MENU

System Menu offers an interface for engineers (programmers or system integrator) to view system information, change the configuration parameters, download programs and run diagnostics.

This menu is designed for engineering tests and maintenance ONLY. For this reason, it provides password protection to prevent unauthorized users from accidentally changing system settings.

Warning! System Menu is NOT for the use of any end users. The system password helps ensure system safety and integrity.

How to access System Menu?

- 1) Turn off the mobile computer.
- 2) Press [7] + [9] + [Power].



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3.1 INFORMATION

Here provides important system information to help diagnose the system.



System Menu | 1. Information

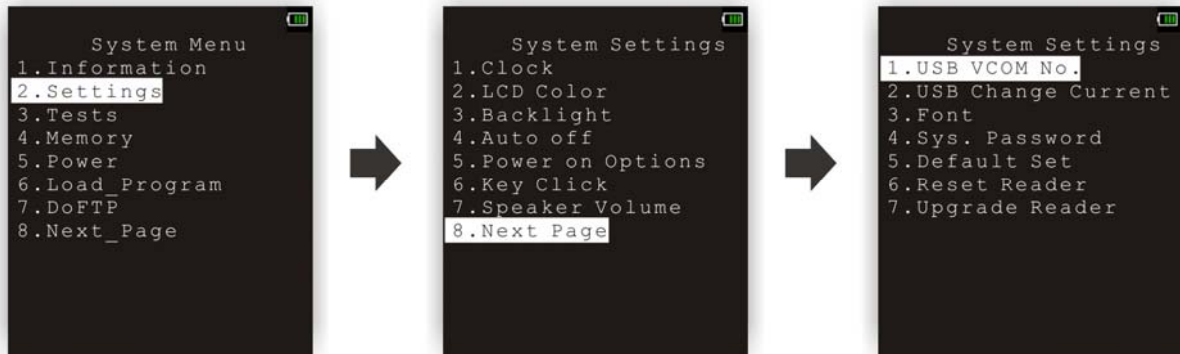
H/W	Hardware version
S/N	A serial number assigned to the mobile computer
M/D	Manufacturing date
KNL	Kernel version
LIB	C library version
BSC	BASIC Run-time version, if a BASIC application is downloaded
USR	Application program version
DEV	5-digit code for optional hardware configurations <ul style="list-style-type: none"> ▶ For example, 2800-0 indicates the mobile computer is equipped with Laser scan engine, combo module for wireless connectivity (Bluetooth + 802.11b/g/n), and the 29-key keypad.

3.1.1 UNDERSTANDING DEVICE CODE

Device Code	Modular Component	Types
1st digit	Reader module	0= none 1= CCD scan engine 2= Laser scan engine 3= 2D scan engine
2nd digit	Wireless module	0= none 5= Bluetooth only 8= Bluetooth + 802.11b/g/n
3rd digit	RFID/GPS module	1=RFID 2=GPS 3=RFID+GPS
4th digit	Reserved	0
5th digit	Keypad type	0= 29-key 1= 39-key

3.2 SETTINGS

You can change the default settings here.



System Settings	Default Values
Clock	Current time
LCD Color	Layer1 Primary: White
	Layer1 Secondary: None
	Layer 0: Black
Backlight (LCD/Keypad)	Battery Power Mode - Level: 3 Duration: 10 seconds Turn on by: Any Key
	External Power Mode - Level: 5 Duration: 30 seconds Turn on by: Any Key
Auto Off	10 minutes
Power On Options	Program Resume
Key Click	Tone 2
Speaker Volume	High volume level
USB VCOM No.	Fixed
USB Charge Current	500 mA
Font	System font
Sys. Password	Open access
Default Set (=Reset to Default)	Load factory settings
Reset Reader	Restore default reader settings
Upgrade Reader	Upgrade the reader firmware

3.2.1 CLOCK

Set date and time for Real Time Clock. Enter two digits for the year, e.g. 04 for 2004.

3.2.2 LCD COLOR

Set the LCD color for Layer1 Primary (text color), Layer1 Secondary (background color of text), and Layer0 (background color of the screen) separately.

- ▶ Press the [Up] or [Down] key to toggle between layers.
- ▶ Press the [Left] key or [Right] key to switch between colors.
- ▶ Press the [Enter] key to have the settings take effect.
- ▶ Or press the [ESC] key to return to the previous menu without changing settings.


3.2.3 BACKLIGHT

Set the backlight settings for the keypad and LCD.

- ▶ Press the [Up] or [Down] key to choose the power mode and press the [Enter] key.
- ▶ After choosing a power mode, press the [Up] or [Down] key to toggle between backlight items. Press the [Left] or [Right] key to switch between options for each item which is highlighted.

Backlight Item	Option
Level (brightness)	1 ~ 5
Duration (interval to turn off backlight)	10, 30, 60 seconds 2, 3, 5, 10, 15, 20, 30 minutes Always On
Turn on by	Any Key, Bklit Key

- ▶ Press the [Enter] key to have the settings take effect.
- ▶ Or press the [ESC] key to return to the previous menu without changing settings.

Besides entering the Backlight setting menu, users can simply press  + [Up]/[Down] keys to adjust brightness. While adjusting, the icon representing brightness shows up on the screen. And the accompanying 5-segment bar indicates the current brightness level. See the picture below (the icon won't show up while working in the LCD Backlight sub-menu).



Brightness of level 3

3.2.4 AUTO OFF

The mobile computer will be turned off automatically when no operation is taking place during a specified period of time. Enter a value between 0 and 999 (minute).

Note: To disable this function, enter 0.

3.2.5 POWER ON (& WAKEUP EVENT) OPTIONS

Set the startup screen once the mobile computer is turned on, and specify which events will wake up the mobile computer:

Power On Options

Press the [Up] and [Down] keys to select "Resume" or "Restart", and then press [ENTER].

- ▶ Resume: When selected, the mobile computer will start from the last session of program before it is turned off.
- ▶ Restart: When selected, the mobile computer will start from the first session of the program.

WakeUp Events

The specified events can wake up the mobile computer when the conditions are met. Press the [Up] and [Down] keys to select a specific event, and press [ENTER] to determine when it is treated as a wake-up event or not.

- ▶ PwrKey: If yes, it will wake up the mobile computer upon pressing the Power key.
- ▶ RS-232: If yes, it will wake up the mobile computer upon connecting the RS-232 cable.
- ▶ USB: If yes, it will wake up the mobile computer upon connecting the USB cable.
- ▶ Charging: If yes, it will wake up the mobile computer upon getting charged via the cradle or direct charging.
- ▶ Charged: If yes, it will wake up the mobile computer upon completion of charging.
- ▶ Alarm: If yes, it will wake up the mobile computer upon the alarm time is up. Alarm can be set up through programming only.



3.2.6 KEY CLICK

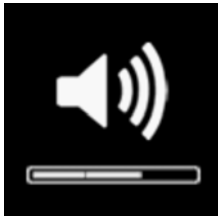
The system will produce an audible signal when any key on the keypad is pressed. The current value is highlighted. Select a desired tone for the speaker or mute it.

3.2.7 SPEAKER VOLUME

Set the speaker volume.

- ▶ Press the [Up] and [Down] keys to adjust the volume level (3 levels) or mute it.

For the device with 39-key keypad equipped, the on screen display icon will show up while users press the orange key + the / key to adjust speaker loudness. The accompanying 3-segment bar indicates the current loudness level. See the pictures below.



Loudness of level 2



Mute

3.2.8 USB VCOM NO

By default, it is set to use one virtual COM port for all (=FIXED), regardless of how many 8600 mobile computers are connected to PC when USB Virtual COM is in use. This setting requires you to connect one 8600 at a time, and will facilitate configuring a great amount of 8600 mobile computers via the same virtual COM port (for administrators' or factory use). If necessary, you can have it set to use variable virtual COM port (=Change by Serial Number), which will vary by the serial number of each different 8600.

- ▶ Press the [Up] and [Down] keys to select between "Fixed" and "Change with S/N".

3.2.9 USB CHARGE CURRENT

By default, the USB charging current is set to 500 mA. For direct charging via the USB cable without supplying a power adaptor, the standard charging current is 500 mA. If you connect the mobile computer to a USB hub, the charging current may be insufficient. In that case, change the charging current to 100 mA after connecting the USB cable. It will take a longer time to charge to full.

- ▶ Press the [Up] and [Down] keys to select between "500 mA" and "100 mA".
- ▶ To disable charging for 8600, select "0 mA".

Note: (1) USB direct charging, 500/100 mA: USB icon
(2) 5V charging from the adaptor: Plug icon

3.2.10 FONT

Font version information can be viewed here. It displays System Font if there is no custom font file. If a multi-language font file is downloaded, you will be able to select a font from the list.

3.2.11 SYSTEM PASSWORD

Set a password to control user access to **System Menu**, **Program Manager** and **Kernel Menu**. The password can be up to eight alphanumeric characters.

Note: The password is case-sensitive. To disable a previous password, enter blank on the "Input new password" and "Verify password" screens.

3.2.12 DEFAULT SET

Reset system settings to the default values, except for the reader settings.

3.2.13 RESET READER

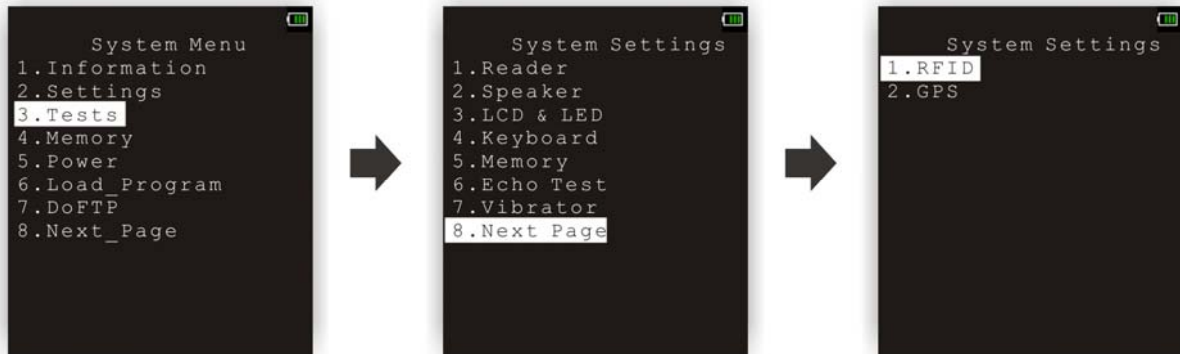
Reset reader settings to the default values.

3.2.14 UPGRADE READER

Upgrade the reader firmware.

3.3 TESTS

Here provides functional tests for key parts.



3.3.1 READER

Test the reading performance of the scanner. The supported symbologies depend on the scan engine you use. Refer to [1.6 Data Capture](#) for symbologies that are enabled by default. For symbologies that are disabled by default, they must be enabled through programming.

- ▶ Press [SCAN] to start. To stop and exit the test, press any key.

3.3.2 SPEAKER

Test the speaker with different volume levels.

- ▶ To stop and exit the test, press any key.

3.3.3 LCD & LED

Test the LCD display and LED indicators.

- ▶ To stop and exit the test, press any key.

3.3.4 KEYBOARD

Test the rubber keys. Press any key and its corresponding character will be shown on the screen.

- ▶ To stop and exit the test, press [ESC].

3.3.5 MEMORY

Test the data memory (SRAM), and the results will be shown on the screen.

- ▶ To stop and exit the test, press [ESC].

Warning! The contents of the data memory (SRAM) will be wiped out after test.

3.3.6 ECHO TEST

After a physical connection is established properly, run a test utility on your computer and start the test on your mobile computer. Select a desired baud rate if necessary.

- ▶ To stop and exit the test, press [ESC].

Interface	Description	Test Utility
RS-232	This echo test is to verify connectivity via the RS-232 cable between the mobile computer and a host computer.	EchoTest.exe
Fast VPort	This echo test is to verify the connectivity via the Fast VPort cable between the mobile computer and a host computer.	EchoTest.exe
USB	This echo test is to verify connectivity via the USB cable between the mobile computer and a host computer. <ul style="list-style-type: none"> ▶ USB VCOM Echo — The mobile computer works as a generic USB device. ▶ USB HID — The mobile computer works as an input device; select keyboard type and Caps Lock status for running a test. ▶ USB VCOM_CDC Echo — The mobile computer works as a generic USB device. 	EchoTest.exe for Virtual COM Any text editor for HID EchoTest.exe for Virtual COM

3.3.7 VIBRATOR

Select this item to test the vibrator.

- ▶ To stop and exit the test, press [ESC].

3.3.8 RFID

Select this item to test the RFID Reader.

- ▶ Press [ESC] to exit.

3.3.9 GPS

Select this item to test the GPS receiver of the device.

Received Information	Description
Latitude	Displays the latitude where the device is located.
Longit.	Displays the longitude where the device is located.
Speed	Displays the moving speed in kilometers per hour.
Altitude	Displays the altitude in meters.

Satellite Number	Displays how many GPS satellites are in view.
CNR	Displays Carrier/Noise Ratio measured in dB.

3.4 MEMORY

Here provides information and initialization function of the memory.



3.4.1 SIZE INFORMATION

- ▶ RAM — onboard SRAM for data memory
- ▶ Flash — program memory

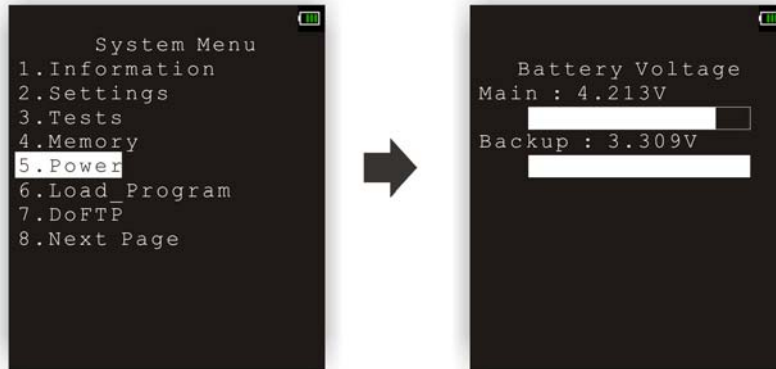
3.4.2 INITIALIZE

Initialize the data memory.

Warning! The contents of the data memory (SRAM) will be wiped out after memory initialization.

3.5 POWER

Here shows current voltage consumption.



Main (battery)

It shows dynamic status of the battery pack, which is used as the main power source.

Backup (battery)

It shows dynamic status of the button cell, which is used to retain data in SRAM.

Warning! Always examine the battery icon on the device screen so that you will be alerted for a low battery condition.

3.6 LOAD PROGRAM

Here you can access the Load Program service provided by the kernel. Because the kernel will take over the job, you will not be able to return to **System Menu** by pressing [ESC]. After downloading, restart the mobile computer to activate the new program. Refer to [Appendix I Download Utility](#).



Note: The mobile computer will stay in download mode for approximately 30 seconds.

.SHX Program

Program File

Download one of the following C program files and/or font file:

- ▶ AG Runtime: U8600.shx (Batch AG)
WU8600.shx (WLAN AG)
- ▶ CipherNet Runtime: 86xx-5250.shx (CipherNet-5250)
86xx-VT.shx (CipherNet-VT)
- ▶ BASIC Runtime^{Note}: B8600.shx
- ▶ User program

Font File

Refer to the Font Files folder on CD-ROM.

If you have downloaded a BASIC Runtime program, the next time you enter the Load Program submenu you will be able to select whether to download a C program (.SHX) or BASIC program (.SYN).

Note: "Load Basic" menu is only available after you have downloaded a BASIC Runtime program.

SETTINGS
Interface

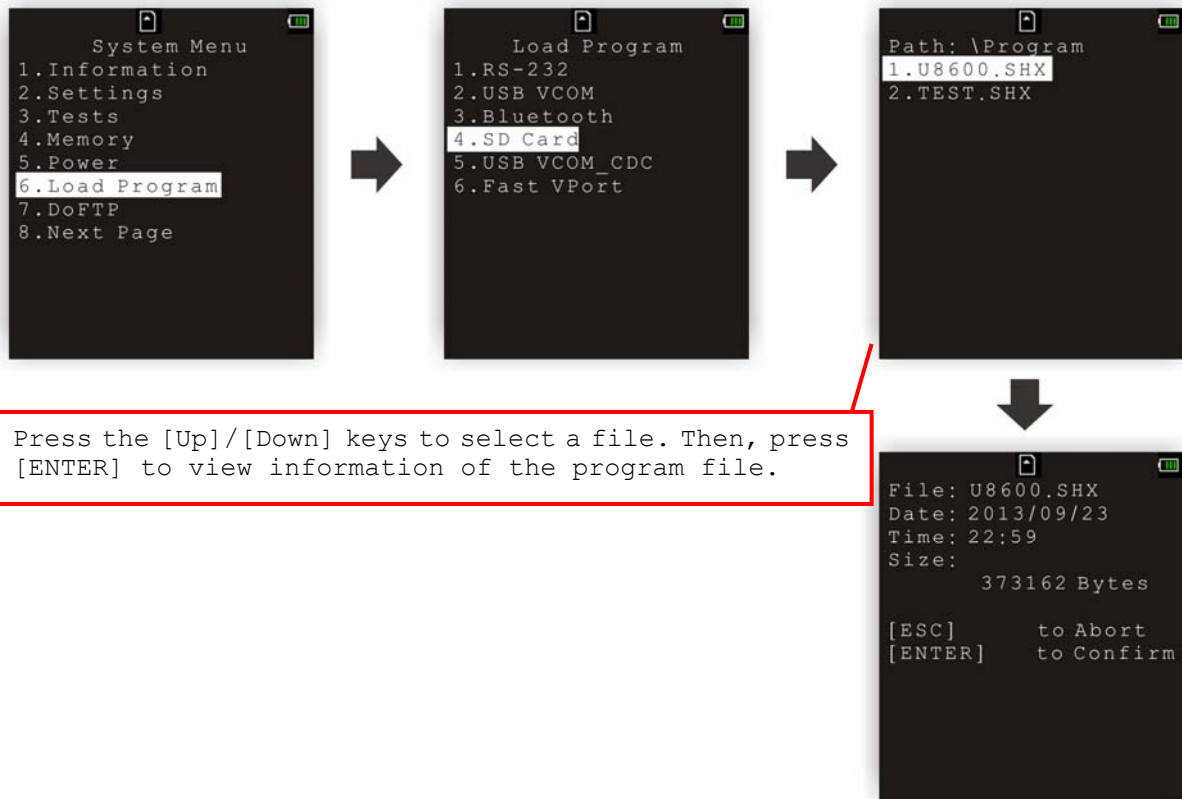
Options	Description
RS-232	Proceed to configure baud rate settings on your computer and the mobile computer.
USB VCOM	Connect the USB cable between your computer and the mobile computer.
Bluetooth	Approach the target Bluetooth enabled device.
SD Card	This option is available only when the memory card is present.
USB VCOM_CDC	Connect the USB cable between your computer and the mobile computer.
Fast VPort	Connect the Fast VPort cable between your computer and the mobile computer.

Baud Rate

 Available baud rate options: 115200/57600/38400/19200/9600 bps

LOAD PROGRAM VIA BLUETOOTH

- 1) Go to **System Menu** | **8. Next Page** | **5. Bluetooth Menu** | **3. Security**, and configure the following Bluetooth settings first.
 - ▶ Authentication
 - ▶ PIN code
- 2) Go to **System Menu** | **6. Load Program** and select Bluetooth.
- 3) Start the pairing procedure from your computer, for example, click [Pair Device] and/or [Connect Bluetooth Serial Port].
- 4) Run the download utility: ProgLoad.exe
 - Select interface RS-232 for using Bluetooth SPP.
 - Select COM port properties that match with the serial port settings used on your computer.

LOAD PROGRAM VIA SD CARD

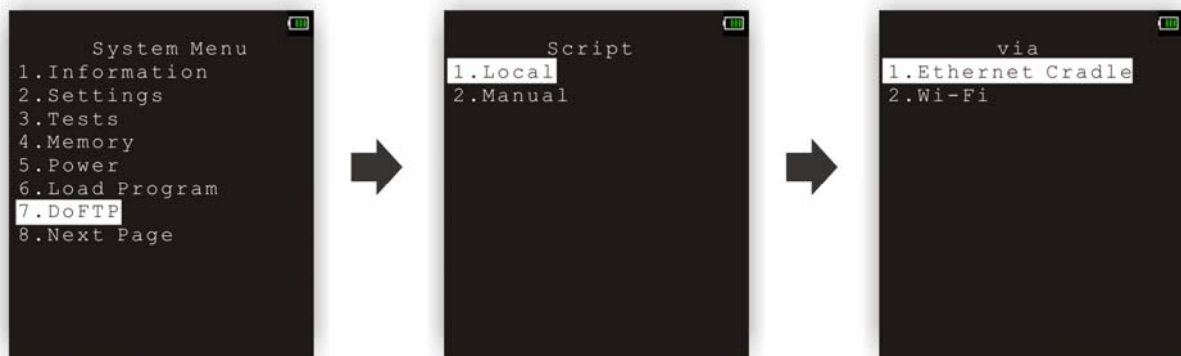
- 1) If you have copied the desired program file(s) to your SD card, go to **System Menu | 6. Load Program** and select SD Card. You will see a list of all the files under the directory “\Program”, as shown above.
- 2) Press the [Up] and [Down] keys to select a file.
- 3) Press [ENTER] to view information of the program file.
- 4) Press [ENTER] to confirm downloading the program file to the mobile computer.
Press [ESC] to abort the download task.

3.7 DOFTP MENU

This submenu is for the FTP client connection. It will log the mobile computer into an FTP server via Wi-Fi or Ethernet Cradle for the following tasks.

- ▶ Execute and/or update the script file "FTP.dat"
- ▶ Download the program update(s)

Note: Go to **System Menu** and configure the network settings first. Refer to [3.10 Wi-Fi Menu](#).



.SHX Program	Download one of the following C program files and/or font file, firmware file:	
Program File	▶ AG Runtime:	U8600.shx (Batch AG) WU8600.shx (WLAN AG)
	▶ CipherNet Runtime:	86xx-5250.shx (CipherNet-5250) 86xx-VT.shx (CipherNet-VT)
	▶ BASIC Runtime:	B8600.shx
	▶ User program	
Font File	Refer to the Font Files folder on CD-ROM.	
Firmware File	▶ Kernel update:	K8600.shx
	▶ Bootloader update:	BL8600.shx

Note: (1) When more than one program files of the same type are specified in the script file, only the last program file is used for update.
 (2) The system will restart itself right after successful update and the downloaded file(s) will then be removed.

3.7.1 LOCAL

Depending on the script file "FTP.dat" saved on the mobile computer, you may update the script file or download any program update from FTP server, if necessary.

SETTING

Interface

Options Supported	Description
Ethernet Cradle	Seat the mobile computer in the Ethernet Cradle.
Wi-Fi	Connect the mobile computer to an access point.

Note: This setting is available only when the Wi-Fi module is present.

3.7.2 MANUAL

You may log into an FTP server manually, and follow the script file on the server to update programs. However, this script file will not be kept after execution, nor replace the existing one on the mobile computer, if there is any.

SETTINGS

Server IP

Specify the IP address or name of the FTP server.

Server Port

Specify the remote port number.

- ▶ By default, TCP port 21 is used on the server for the control connection.

Login Name

Specify the user name for logging onto FTP server.

Login Password

Specify the password for logging onto FTP server.

Interface

Options Supported	Description
Ethernet Cradle	Seat the mobile computer in the Ethernet Cradle.
Wi-Fi	Connect the mobile computer to an access point.

Note: This setting is available only when the Wi-Fi module is present.

3.8 STORAGE MENU

This submenu is for using the mobile computer equipped with SD card as a removable disk, as well as for directly accessing files on SD card.



Note: When SD card is present, the card icon will appear flashing while being accessed. If the mobile computer is preloaded with Batch AG runtime, it will automatically create two working directories “\AG\IMPORT” and “\AG\EXPORT” on SD card.

3.8.1 RUN AS USB DISK

When the mobile computer is equipped with SD card and connected to your computer via the USB cable, it can be treated as a removable disk (USB mass storage device) as long as it is configured properly through programming or via selecting [Run as USB Disk].

Note: The SD card must be properly configured through programming or user menu before use.

3.8.2 ACCESS SD CARD

Edit the file system or format the SD card.

Edit Files

View and edit the file system on SD card.

Format

If the file system is not desired any more, you may format the SD card.

- ▶ If the capacity is 32 MB or under, the file system will be FAT12.
- ▶ If the capacity is 32 MB~2 GB, the file system will be FAT16.
- ▶ If the capacity is larger than 2 GB, the file system will be FAT32.

Warning! The contents on SD card will be wiped out after formatting.

Check Memory

For an SD card that has never been used on 8600, a message like "Found New SD Card" will be displayed allowing users to scan the card for memory check. If the action is canceled then, memory check can still be performed here.

Check File Size

You may calibrate the size of DAT files on SD card while running BASIC application, and it will refresh the size of "A:\BASICRUN\TXACTn.DAT" (n=1~6).

Note: "Check File Size" is only available after you have downloaded the BASIC Runtime.

3.9 BLUETOOTH MENU

This submenu is for the mobile computer, with built-in Bluetooth module, to work with other Bluetooth enabled devices. You must configure these parameters correctly.



Bluetooth Settings	Default Value	HID, SPP	DUN
Connect Setting		Items Need to Be Checked	
Local Name	Model no. + Serial no.	v	v
Remote Name	---	---	---
Broadcast Me	Enable	v	v
Power Saving	Enable	v	v
BT-GPRS AP Name	---	---	(v) ^{Note}
DHCP	Enable	---	(v) ^{Note}
Local IP Address	0.0.0.0	---	(v) ^{Note}
Security			
Authentication	Disable	v	v
PIN Code	---	v	v

Note: BT-GPRS AP Name, DHCP and local IP Address are required for DUN-GPRS mode only.

3.9.1 INFORMATION

Information of network configuration can be viewed here.



Bluetooth Menu | 1. Information

LIB	Kernel version <ul style="list-style-type: none"> ▶ All user libraries reside in Kernel; no external libraries are required.
MAC	MAC address of the Bluetooth module
IAM	A name given to the mobile computer for identification <ul style="list-style-type: none"> ▶ By default, it is made up of model number and the serial number. (Identical to 2. Connect Set 1. Local Name)
CTY	"Normal" means all 79 channels are available for frequency-hopping <ul style="list-style-type: none"> ▶ There are bandwidth limitations for 2.4 GHz ISM band in some countries. For example, only 23 RF channels are defined instead of 79 RF channels in Japan, Spain and France.
DHCP	DHCP server in use or not <ul style="list-style-type: none"> ▶ It will automatically become enabled while connecting to a BT-GPRS AP.
IP	IP address of the mobile computer

3.9.2 CONNECT SETTING

Set the connection parameters if necessary.



Local Name

Enter a name for identifying the mobile computer.

- ▶ By default, it is made up of model number and the serial number.

Remote Name

Leave it empty unless you want to make a specific connection.

Broadcast Me

Options — Enable or Disable

- ▶ For initial connection, broadcasting must be enabled so that other Bluetooth devices can discover the mobile computer.
- ▶ For security concerns, you may disable it in future use to hide the mobile computer from other Bluetooth devices.

Power Saving

This refers to the low power consumption mode.

Options — Enable or Disable (Only the Sniff mode is supported.)

BT-GPRS AP Name

For DUN-GPRS mode, enter the AP name for connecting to the content server.

DHCP

Options - Enable or Disable

Local IP Address

Enter a new address for the mobile computer, if necessary.

Note: BT-GPRS AP Name, DHCP and local IP Address are required for DUN-GPRS mode only.

3.9.3 SECURITY

Set or modify security parameters.



Authentication

Options — Enable or Disable

PIN Code

Define the encryption key values.

- ▶ Up to 16 characters, using ASCII code.

Note: When authentication is enabled without providing a pre-set PIN code, the mobile computer supports dynamic input of PIN code during pairing.

3.9.4 ECHO TESTS

These echo tests are used for verifying connectivity to make sure the mobile computer is within coverage. Press [ESC] to stop and exit the test.

- ▶ SPP: Serial Port Profile
It is used for ad hoc networking.
- ▶ DUN: Dial-Up Networking Profile
DUN Modem - It makes use of a Bluetooth modem or mobile phone as a wireless modem.
DUN GPRS - It makes use of a mobile phone with GPRS functionality and connects to GPRS AP.
- ▶ HID: Human Interface Device Profile
It is used for the mobile computer to work as an input device, i.e. keyboard, for a host computer.



SPP Master

Set the mobile computer as a master device.

1. Pairing with your computer (slave) must be completed first.
2. Run the utility "EchoTest.exe" on your computer. Associated settings include
 - Select "RS-232" for interface.
 - Use the Bluetooth COM port that has been paired.
 - Set Action Mode to "Passive".
3. Start the echo test on both ends. The mobile computer will try to connect to PC (slave).

SPP Slave

Set the mobile computer as a slave device.

1. Enable Authentication and set your PIN code on the mobile computer.
2. Run the utility "EchoTest.exe" on your computer. Associated settings include
 - Select "RS-232" for interface.
 - Use the Bluetooth COM port that has been configured as "outgoing".
 - Set Action Mode to "Passive".
3. Start the echo test on both ends.
4. The mobile computer will wait for PC (master) to start the connection.
5. Enter the preset PIN code for authentication on your computer.

DUN Modem

The mobile computer will try to connect to a Bluetooth modem or mobile phone.

1. Pairing with your mobile phone must be completed first.
Select "DialUp Network" for Target Machine options.
2. Run the utility "EchoTest.exe" on your computer. Associated settings include
 - Select "Modem" for interface.
 - Set Action Mode to "Passive".
3. Start the echo test on both ends.
4. The mobile computer will connect to your mobile phone that dials up to your computer.

HID Test

Set the mobile computer as an input device.

1. The mobile computer will wait for PC to start the connection.
It is suggested to disable Authentication on the mobile computer.
2. Run a text editor on your computer.
3. Start to input data via the keypad on the mobile computer.

DUN GPRS

The mobile computer will try to connect to a mobile phone with GPRS functionality.

1. Pairing with your mobile phone must be completed first.
Select "DialUp Network" for Target Machine options.
2. Run the utility "EchoTest.exe" on your computer. Associated settings include
 - Select "TCP/IP – Server" for interface.
 - Set Action Mode to "Passive".
3. Start the echo test on both ends.
4. Enter the server IP on the mobile computer.
5. The mobile computer will connect to your mobile phone that dials up a GPRS AP, and finally connect to your computer (server) through the GPRS AP.

3.9.5 PAIRING TEST

The pairing procedure is for the creation and exchange of a link key between two Bluetooth-enabled devices. The devices use the link key for future authentication when exchanging information.



- 1) The mobile computer will start with making an inquiry so that the system can generate a list of device(s) that has been discovered nearby.
- 2) Select a desired target device.
For the device name, it can only display a maximum length of 11 characters. When the device name is too long, it will be truncated automatically.
- 3) Select a Bluetooth service from the "Target Machine" menu. To stop and exit the test, press [ESC].
After pairing successfully, the target device will be added to the Frequent Devices list for quick connection in the future.

Note: For the initial use of Bluetooth networking, the pairing procedure must be done before the Echo tests.

3.9.6 FREQUENT DEVICES

Here is a list of devices that the mobile computer has been connected to lately. After each successful pairing, the system will update it.

This list can show information of one device that provides any of the following services:

- ▶ Serial Port (SPP)
- ▶ Dial-Up Networking (DUN)
- ▶ Human Interface Device (HID)

For the device name, it can only display a maximum length of 11 characters. When the device name is too long, it will be truncated automatically.



Note: To unpair any device, simply delete the device from this list.

3.10 WI-FI MENU

This submenu accesses the settings of 802.11b/g/n wireless networking. You must configure these parameters correctly to be able to make the connection.



Note: The menu is available only when the Wi-Fi module is present.

Wi-Fi Settings	Default Value	Ad-hoc	Infrastructure
Network Setting		Items Need to Be Checked	
DHCP	Enable	---	v
SubNet Mask	255.255.128.0	v	v
Local IP Address	0.0.0.0	v	v
Default Gateway	0.0.0.0	---	v
DNS Server	0.0.0.0	---	v
Domain Name	---	---	v
WLAN Setting			
Local Name	Model no. + Serial no.	v	v
SS ID	---	---	v
System Scale	Medium	---	v
Power Saving	Enable	---	v
Ad-Hoc	Disable	v	---
Fixed BSSID	000000000000	---	v
Scan Time	0	---	v
Security			
Authentication	Open System	---	v
WEP Menu	Disable	---	v
EAP Menu	Disable	---	v
WPA Menu	Disable	---	v

3.10.1 INFORMATION

Information of network configuration can be viewed here.



Wi-Fi Menu | 1. Information

Lib	Kernel version <ul style="list-style-type: none"> ▶ All user libraries reside in Kernel; no external libraries are required.
Ver	Firmware version of the Wi-Fi module
MAC	MAC address of the Wi-Fi module
IAM	A name given to the mobile computer for identification. <ul style="list-style-type: none"> ▶ By default, it is made up of model number and the serial number. (Identical to 3. WLAN Setting 1. Local Name)
DHCP	DHCP server in use or not
IP	IP address of the mobile computer
Mask	Subnet Mask
Gate	Default Gateway

3.10.2 NETWORK SETTING

Set parameters for IP networking.



DHCP

Options — Enable or Disable

Subnet Mask

Enter a new Mask IP, if necessary.

Local IP Address

Enter a new address for the mobile computer, if necessary.

Default Gateway

Enter a new address for the default Gateway, if necessary.

DNS Server

Enter a new address for the DNS server, if necessary.

Domain Name

The domain name of the host is displayed when DHCP server is enabled.

Note: Normally, DHCP is enabled and all of the settings can be obtained from the DHCP server.

3.10.3 WLAN SETTING

Wireless networking can operate in two modes – (1) Ad-hoc mode: peer-to-peer, and (2) Infrastructure mode: point to multi-point through access points.

Set the following parameters.



Local Name

Enter a name for identifying the mobile computer.

- ▶ By default, it is made up of model number and the serial number.

SSID

This refers to Service Set Identifier or AP name, which is used for remote device association.

- ▶ The mobile computer can ONLY communicate with access points that have the same SSID.

Roaming Setting

This refers to Access Point Density.

System Scale Options — [1] Low [2] Medium [3] High [4] Custom -Tx Rate [5] Custom -Rssi

- ▶ The value you set must match that set for the access point.
- ▶ “Low / Medium / High” means the mobile computer will search for other APs only when data transmission rate drops below “1 / 2 / 5” Mbps individually.
- ▶ “Custom -Tx Rate” lets you set data rate for the mobile computer to search for other APs when data transmission rate drops below the specified value —
802.11b: 1, 2, 5.5, 11 Mbps
802.11g: 1, 2, 5.5, 11 Mbps & 6, 9, 12, 18, 24, 36, 48, 54 Mbps
- ▶ “Custom -Rssi” lets you set the conditions for the mobile computer to search for other APs —
RSSI Threshold: options including -50, -55, -60, ..., -85, -90 dBm. When the current AP signal strength (RSSI) goes below the specified value, the mobile computer starts to search for other APs.
RSSI Delta: options including 0, 5, 10, 15, and 20. Compare the signal strength between the current AP and the new one. If the signal differential between them is equal to or higher than the specified value, the mobile computer will connect to the new AP.

Roaming Period options — 3 ~ 10 seconds

Power Saving

This refers to the low power consumption mode.

Options — Enable or Disable

- ▶ The value you set must match that set for the access point.

Ad-Hoc

This refers to peer-to-peer mode, without going through access points.

Options — Enable or Disable

Fixed BSSID

This refers to the use of a specific AP's MAC address as the fixed Basic Service Set Identifier.

- ▶ The mobile computer can ONLY communicate with this one and only access point.

Scan Time

Specify the time period the mobile computer searches for wireless devices on the network.

- ▶ Normal: By default the scanning time is set to normal.
- ▶ Double: specify double the scanning period.

3.10.4 SECURITY

Set or modify security parameters.

- ▶ WEP: Wired Equivalent Privacy
- ▶ EAP: Extensible Authentication Protocol
- ▶ WPA: Wi-Fi Protected Access



Authentication

- | | |
|-----------------|---------------------------------------|
| [1] Open System | ▶ Default authentication type |
| [0] Share Key | ▶ This requires implementing WEP key. |

WEP Menu

- | | |
|----------------|---|
| WEP Setting | ▶ Enable (For Share Key, it must be enabled!) |
| | ▶ Disable (default) |
| WEP Key Length | ▶ 64 bits |
| | ▶ 128 bits (default) |
| Default Key | WEP KEY1 |
| WEP Key | Enter WEP Keys 1 ~ 4 in one of the following input data type: |
| | ▶ ASCII (up to 13 characters) |
| | ▶ Hexadecimal (up to 26 characters) |

EAP Menu (for associating to Cisco access points)

- | | |
|--------------|---|
| EAP Setting | ▶ Enable |
| | ▶ Disable (default) |
| EAP ID | Enter a user name (up to 32 characters) |
| EAP Password | Enter a password (up to 32 characters) |

WPA Menu (WPA-PSK)

- | | |
|--------------|---------------------|
| WPA Setting | ▶ Enable |
| | ▶ Disable (default) |
| WPA2 Setting | ▶ Enable |
| | ▶ Disable (default) |

WPA Passphrase

Enter a phrase as your password (8 ~ 63 characters)

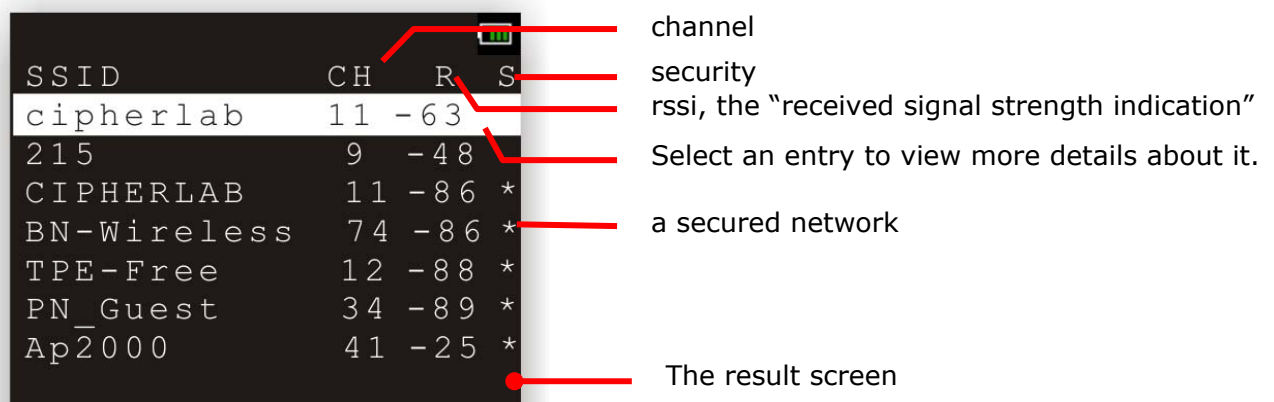
3.10.5 SCAN DEVICES

Select this command to launch the scanning for the Wi-Fi hotspots within range. The mobile computer will first produce a scanning screen and then a result screen that displays all the WiFi hotspots discovered whether open or secured.

Select an entry on the result screen to see more details about it including the BSSID, BSS Type, and the security framework it applies.



The screenshot below details the result screen:



Label	Description	Function
CH	channel	Delivers the channel (frequency range) in use by the network.
R	rssi	Delivers the "Received Signal Strength Indication". See 3.10.7 Echo Tests to know how signal strength is rated by numbers.
S	security	Delivers the security of the network. A secured network goes with an asterisk sign (*) while an open network doesn't.

3.10.6 PROFILE

This function allows users to create up to four Wi-Fi profiles.



SSID

Enter the SSID (up to 32 characters).

Ad-Hoc

This refers to peer-to-peer mode, without going through access points.

Options — Enable or Disable

Authentication

- [1] Open System ▶ Default authentication type
- [0] Share Key ▶ This requires implementing WEP key.

WEP Menu

- WEP Setting ▶ Enable (For Share Key, it must be enabled!)
- ▶ Disable (default)
- WEP Key Length ▶ 64 bits
- ▶ 128 bits (default)
- Default Key WEP KEY1
- WEP Key Enter WEP Keys 1 ~ 4 in one of the following input data type:
 - ▶ ASCII (up to 13 characters)
 - ▶ Hexadecimal (up to 26 characters)

EAP Menu (for associating to Cisco access points)

- EAP Setting ▶ Enable
- ▶ Disable (default)
- EAP ID Enter a user name (up to 32 characters)
- EAP Password Enter a password (up to 32 characters)

WPA Menu (WPA-PSK)

- WPA Setting
 - ▶ Enable
 - ▶ Disable (default)
- WPA2 Setting
 - ▶ Enable
 - ▶ Disable (default)
- WPA Passphrase Enter a phrase as your password (8 ~ 63 characters)

3.10.7 ECHO TESTS

This function is used to measure the coverage of the range, estimate the number of APs and mobile computers needed, and determine the topology of deploying APs.



Client Mode

Set the mobile computer as a client. Enter the IP address of a server to which the mobile computer connects. Then, it will try to connect to an AP.

1. Run the utility "EchoTest.exe" on your computer. Associated settings include
 - Select "TCP/IP – Server" for interface.
 - Set Action Mode to "Passive".
2. Start the echo test on both ends.
3. Enter the server IP and port number on the mobile computer.

Server Mode

Set the mobile computer as a server. The mobile computer will try to connect to an AP.

1. Run the utility "EchoTest.exe" on your computer. Associated settings include
 - Select "TCP/IP – Client" for interface.
 - Set Action Mode to "Passive".
2. Start the echo test on both ends.

While running echo tests, if WPA setting is enabled for security, the SSID and Passphrase will be processed to generate a pre-share key.

Note: If you change the SSID or Passphrase, it will have to re-generate a pre-share key.

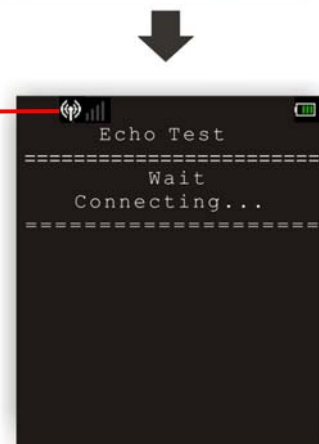
- 1) For initial association with an access point, you will see an antenna icon flashing on the top line of the screen to indicate that the mobile computer is processing a pre-share key. Meanwhile, there are four signal strength bars show up in gray.
- 2) After having generated the pre-share key, the mobile computer proceeds to establish a connection with an access point.
- 3) When the mobile computer has been connected to the access point successfully, you will see the whole antenna and the bars of wireless signal strength in white.

The flashing icon  indicates 8600 is processing a pre-share key.

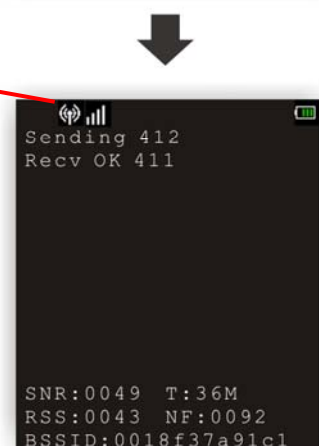
Wait for a few seconds.



The antenna icon, with gray bars, flashes to indicate 8600 is connecting to an access point under the same SSID.



Once connected, the antenna icon will stop flashing. Next to the icon, the more white bars, the stronger the signal.



Note: If you are programming in C or BASIC, be aware that the antenna icon will appear on the device screen after NetInit() or START TCPIP() is called. (WPA must be enabled first!)

Once the connection of echo test is established, the details will be displayed as illustrated below.



SNR (dB)	T	RSS (-dBm)	NF (-dBm)
(Signal to Noise ratio)	(Transmit Speed)	(Received Signal Strength Level)	(Noise Floor Level)
0 ~ 10 Very Poor	1 Mbps	0 ~ 60 Strong	0 ~ 92 Strong
10 ~ 20 Poor	2 Mbps	60 ~ 75 Moderate	92 ~ 98 Moderate
20 ~ 30 Fair	5.5 Mbps	over 75 Weak	over 98 Weak
30 ~ 40 Good	11 Mbps		
over 40 Very Good	6 Mbps		
	9 Mbps		
	12 Mbps		
	18 Mbps		
	24 Mbps		
	36 Mbps		
	48 Mbps		
	54 Mbps		

PROGRAM MANAGER & KERNEL

This chapter explains **Program Manager** and **Kernel** that manage multiple programs and firmware upgrade.

IN THIS CHAPTER

4.1 Program Manager	81
4.2 Kernel	88

4.1 PROGRAM MANAGER

The mobile computer supports multiple applications and languages. In the menu of **Program Manager**, it allows storing up to six programs and has one activated for the current use.

If there is no application program exists, **Program Manager** will be displayed after you turn on the mobile computer.

Warning! Program Manager is provided for managing programs in an administrative level.

How to access Program Manager?

- 1) Turn off the mobile computer.
- 2) Press [8] + [Power].



4.1.1 DOWNLOAD PROGRAM

Here provides a list of programs currently stored on the mobile computer with size information. Multiple application programs can be downloaded through a variety of interfaces. Upon completion of downloading, you are allowed to input a name for the program. If there is no need to rename the program, simply press [ENTER] to leave as it is.



The length of program name can be up to 12 characters. Program size is in kilobytes.

A suffix letter after the memory sector (1 ~ 6) indicates the file type of program.

- ▶ "b" for BASIC program (.SYN)
- ▶ "c" for C program (.SHX)

The last line starting with a prefix letter "f" is reserved to display the font file (.SHX) in use on the mobile computer.

Note: For a custom font file (.SHX) or a BASIC program (.SYN), it can only be downloaded via **System Menu**.

SPARE MEMORY SECTORS (1 ~ 6)

Additional program files can be directly downloaded to these sectors.

Download a program file to an empty sector:

1. Press the [Up] and [Down] keys to select an empty sector, and then press [ENTER].
2. Select a desired interface for downloading.
3. Connect the interface cable if required, and wait for a few seconds to establish a connection...
4. To abort the action, press [ESC]. Then press [ESC] again to return to the menu.

Download a program file to an occupied sector:

If no available sectors, you'll have to replace one program with the new one.

1. Press the [Up] and [Down] keys to select a program that you want to delete, and then press [ENTER].
2. The program information is displayed on the screen.
Press the blue key to enter the Alpha mode:
 - ▶ Press the capital letter [C] and follow the steps below to download a program file.
 - ▶ Press the capital letter [D] if you simply want to delete the program.
3. Select a desired interface for downloading.
4. Connect the interface cable if required, and wait for a few seconds to establish a connection.
5. To abort the action, press [ESC]. Then press [ESC] again to return to the menu.

From the menu, you'll see the program has been deleted but no new program is present (because you have canceled the download action).

ACTIVE MEMORY SECTOR ("ACT")

Only the application program, which needs to be activated immediately, can be downloaded to the active memory sector.

Download to Memory Sector "ACT":

1. Press the [Down] key to select the memory sector "ACT" (may be unoccupied), and then press [ENTER].
2. Select a desired interface for downloading.
3. Connect the interface cable if required, and wait for a few seconds to establish a connection.

If the active memory sector has already been occupied by an application program, the newly downloaded program will replace the currently active program and come into effect immediately.

4.1.2 ACTIVATE PROGRAM

The list shows the entire spare programs stored on the mobile computer. From the list, you can select from the memory sector (1 ~ 6) or SD card. The selected program will be copied to the active memory sector and replace the current one.



Note: A font file cannot be activated.

TO CLEAR FILE SYSTEM

When <New Program Start> screen appears, "Press [ESC] to clear file" means the file system in the SRAM will be cleared out by pressing [ESC]. Then there will be no data (transactions, settings, etc.) stored on the mobile computer when the new program comes into effect.

TO KEEP FILE SYSTEM

To keep the data, simply press any other key.

4.1.3 UPLOAD PROGRAM

You may duplicate one of the programs from the mobile computer to a host computer or another mobile computer. This can be used to clone software on mobile computers.

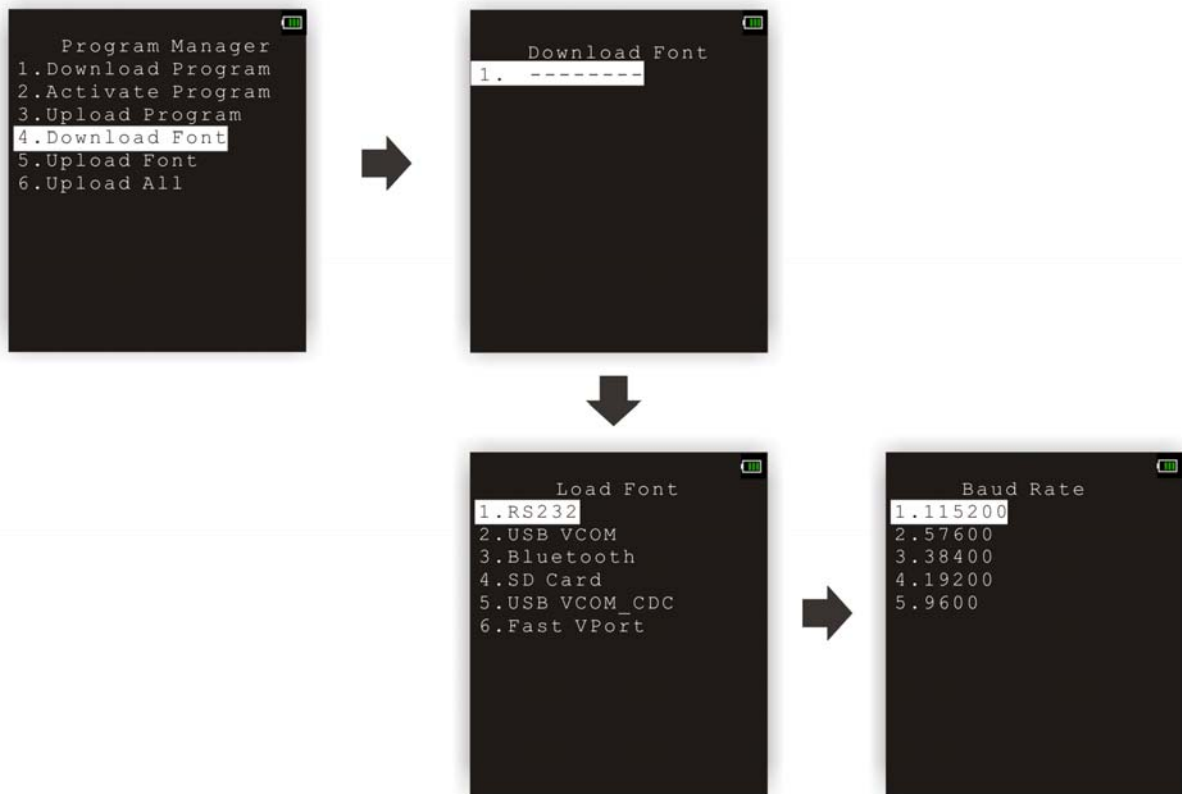
The procedures are similar to that for downloading programs.

- ▶ If the target is "Terminal", only the "RS232" and "Bluetooth" interface options are available.
- ▶ If the target is "PC", the available interface options include "RS232", "USB VCOM", "Bluetooth", "USB VCOM_CDC" and "Fast VPort".



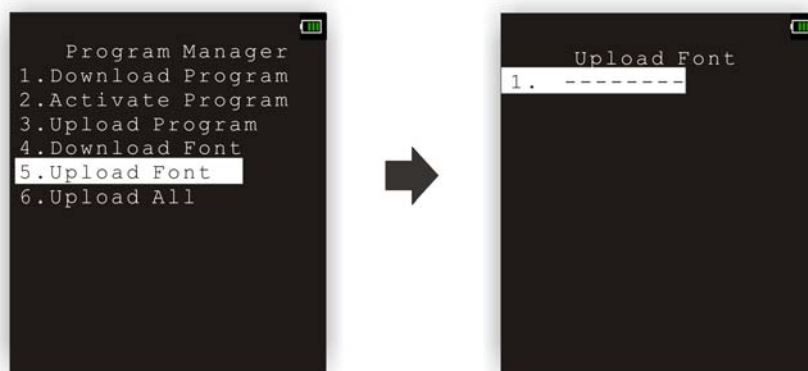
4.1.4 DOWNLOAD FONT

The terminal computer can be loaded with up to 6 font files. Users can input characters in fonts loaded on the device.



4.1.5 UPLOAD FONT

You may duplicate one of the fonts from the mobile computer to a host computer or another mobile computer.

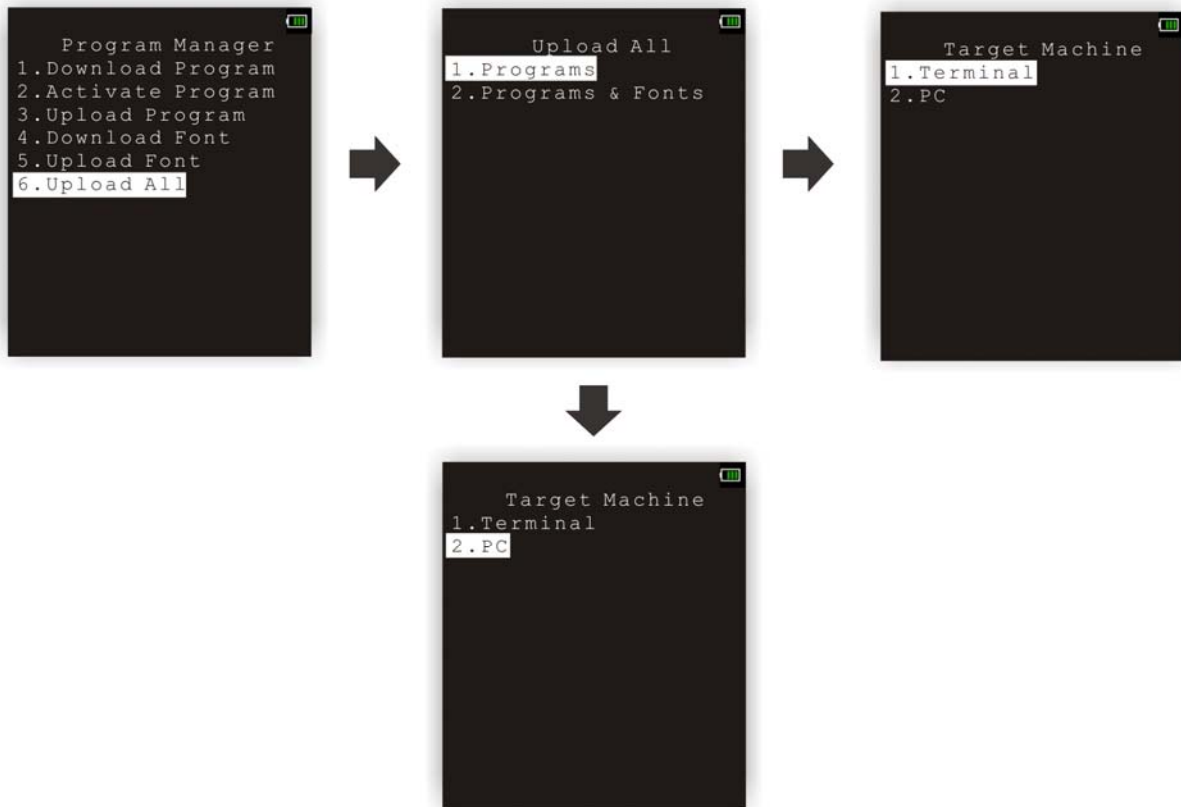


4.1.6 UPLOAD ALL

You may duplicate all of the programs/fonts from the mobile computer to another one or a host computer.

Note: To clone all of the programs, the target mobile computer cannot have any other program downloaded except the active one; that is, Memory Sectors 1 ~ 6 must be empty!

- ▶ You can determine to upload programs only, or clone programs and fonts altogether.
- ▶ If the target is "Terminal", only the "RS232" and "Bluetooth" interface options are available.
- ▶ If the target is "PC", the available interface options include "RS232", "USB VCOM", "Bluetooth", "USB VCOM_CDC" and "Fast VPort".



4.2 KERNEL

The kernel resides in the innermost core of the system. It has the highest security and is always protected by the system. When the application program is corrupted and **System Menu** fails at the same time, **Kernel Menu** provides an access to fix the system.

Warning! Kernel Menu is NOT for the use of any end users.

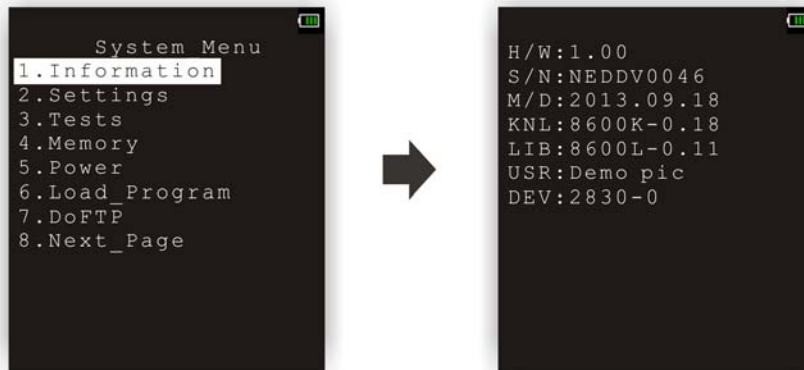
How to access Kernel Menu?

- 1) When the last session is in **System Menu** or **Program Manager**, simply turn off the mobile computer. Otherwise, you must reload the battery pack.
- 2) Press [1] + [7] + [Power].



4.2.1 KERNEL INFORMATION

Here provides important system information to help diagnose the system.



Kernel Menu | 1. Information

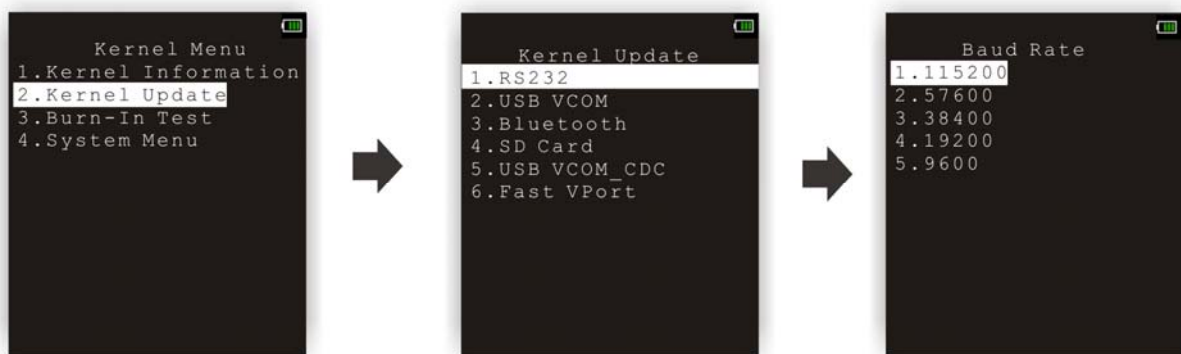
H/W	Hardware version
S/N	Serial number of the mobile computer
M/D	Manufacturing date
KNL	Kernel version
LIB	C library version
BSC	BASIC Run-time version, if a BASIC application is downloaded
USR	Application program version
DEV	4-digit code for optional hardware configurations Refer to 3.1.1 Understanding Device Code.

4.2.2 KERNEL UPDATE

The kernel and bootloader might need to be updated to improve performance or due to other considerations. Refer to [Appendix I Download Utility](#).

- ▶ The procedure of downloading a kernel (K8600.shx) or bootloader (BL8600.shx) update is like downloading a program.
- ▶ Any attempt to download an older version of bootloader will be rejected.
- ▶ The system will restart itself right after downloading.

Warning: Do not turn off the mobile computer while downloading a kernel update or re-starting the mobile computer. Otherwise, it will crash the kernel forever.



Note: The mobile computer will stay in download mode for approximately 30 seconds.

.SHX Program

Download one of the following firmware files:

Firmware File

- ▶ Kernel update: K8600.shx
- ▶ Bootloader update: BL8600.shx

SETTINGS

Interface

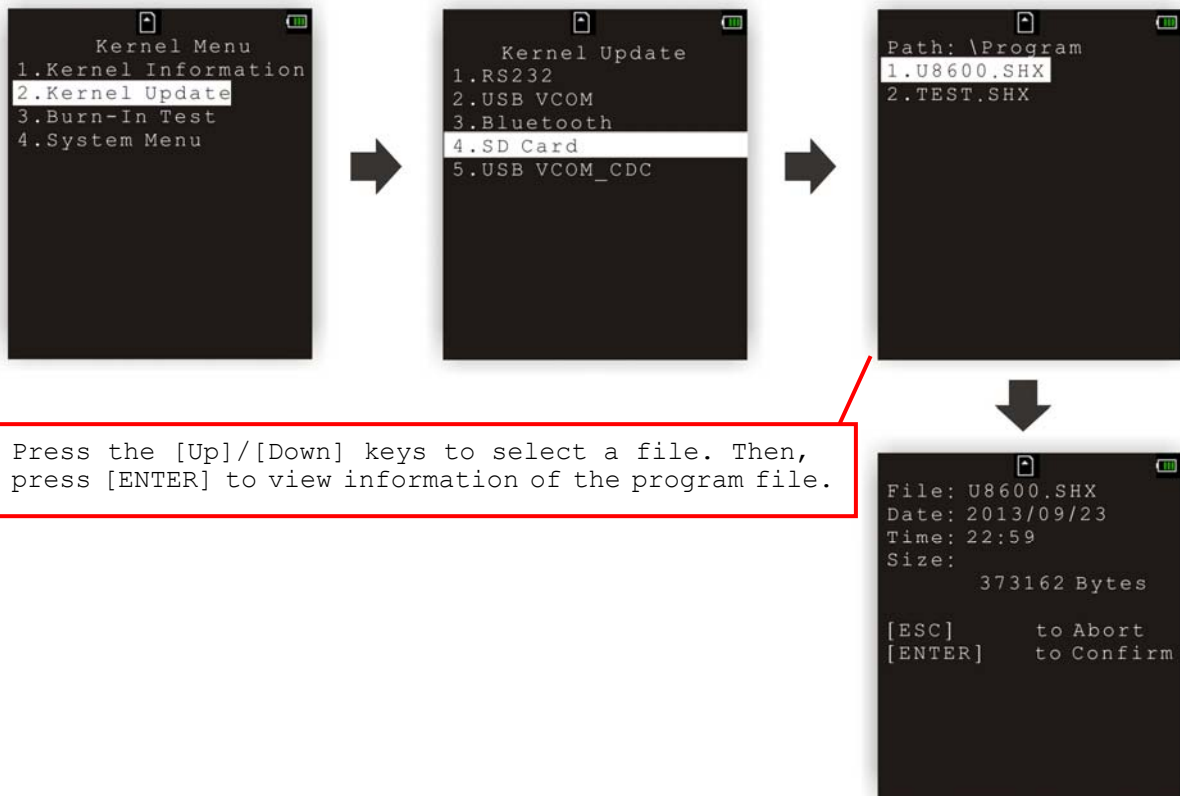
Options	Description
RS-232	Proceed to configure baud rate settings on your computer and the mobile computer.
USB VCOM	Connect the USB cable between your computer and the mobile computer.
Bluetooth	Approach the target Bluetooth enabled device.
SD Card	This option is available only when the memory card is present.
USB VCOM_CDC	This option is available only when USB Virtual COM_CDC is in use.
Fast VPort	This option is available when the Fast VPort cable is connected.

Baud Rate

Available baud rate options: 115200/57600/38400/19200/9600 bps

KERNEL UPDATE VIA BLUETOOTH

- 1) Go to **Kernel Menu** | **4. System Menu** | **8. Next Page** | **2. Bluetooth Menu** | **3. Security**, and configure the following Bluetooth settings first.
 - ▶ Authentication
 - ▶ PIN code
- 2) Go to **Kernel Menu** | **2. Kernel Update** and select Bluetooth.
- 3) Start the pairing procedure from your computer, for example, click [Pair Device] and/or [Connect Bluetooth Serial Port].
- 4) Run the download utility: ProgLoad.exe
 - Select interface RS-232 for using Bluetooth SPP.
 - Select COM port properties that match with the serial port settings used on your computer.

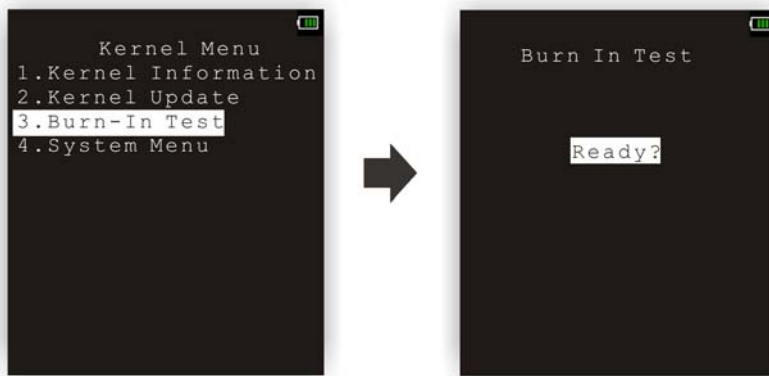
KERNEL UPDATE VIA SD CARD

- 1) If you have copied the desired program file(s) to your SD card, go to **Kernel Menu** | **2. Kernel Update** and select SD Card. You will see a list of all the files under the directory "\\Program", as shown above.

- 2) Press the [Up] and [Down] keys to select a file.
- 3) Press [ENTER] to view information of the program file.
- 4) Press [ENTER] to confirm downloading the program file to the mobile computer.
Press [ESC] to abort the download task.

4.2.3 BURN-IN TEST

This tool is provided for manufacturing use.



Warning! You should not perform this test.

4.2.4 SYSTEM MENU

Refer to [System Menu](#) for details. This submenu is the same as **System Menu** for system configuration.

SPECIFICATIONS

Model Designation	8600	8630	8660
Performance			
CPU	ARM Cortex-M3		
Memory	<ul style="list-style-type: none"> ▶ Program memory – 16 MB flash ▶ Data memory – onboard SRAM, options include 8 or 16 MB 		
Expansion	micro SD Slot with SDHC support		
Main Battery	Rechargeable Li-ion battery – 3.7 V, 1100/2200 mAh		
Expected Battery Life* (1100/2200 mAh)	32/64 hrs	12/24** hrs	17/34** hrs
Data Retention	25 days (Rechargeable Lithium battery – 3.0V, 18 mAh)		
Wireless Communications			
WLAN	–	802.11b/g/n	–
WLAN Security	–	WEP, EAP, WPA-PSK, WPA2-PSK	–
WPAN	–	Bluetooth 4.0 Dual Mode (2.1+EDR/BLE)	Bluetooth 4.0 Dual Mode (2.1+EDR/BLE)
Bluetooth Profile	–	SPP, DUN, HID	SPP, DUN, HID
Data Capture			
Barcode Reader	<ul style="list-style-type: none"> ▶ CCD (linear imager) ▶ Standard Laser ▶ 2D Imager 		
RFID Reader (optional)	13.56MHz HF band (supports ISO 14443A/14443B/15693)		
Physical Characteristics			
Display	2.83" color LCD, 240x320 pixels, TFT with LED backlight programmable		
GPS (optional)	GPS JN3, Internal antenna		
Keypad	29/39 keys, LED backlight programmable		
LED Indication	2 programmable dual-color LED indicators – <ul style="list-style-type: none"> ▶ Red/Green: charging & decoding ▶ Blue/Green: wireless communication 		
Audio	0.5W, 80dB@2KHz speaker		
Vibrator	0.45G, programmable		
Dimensions	170 x 60 x 30 mm (L x W x H)		
Weight	240g*** approx.		

User Environment	
Operating Temperature	-10 ~ 60 °C (14 ~ 140 °F)
Storage Temperature	-20 ~ 70 °C (-4 ~ 158 °F)
Humidity (non-condensed)	10% to 90% (operating) / 5% to 95% (storage)
Ingress Protection	IP65
Impact Resistance	Multi-side Drop: 1.8m/6ft. (5 drops each side onto concrete) Tumble: 1m/3.28ft. up to 1000 times
Electrostatic Discharge	± 15 kV air discharge, ± 8 kV contact discharge
EMC Regulations	FCC, CE, BSMI, NCC, RCM, IC, CCC, SRRC, TELEC
Development Support	
Programming Tools	GCC C Compiler and BASIC Compiler
Software & Utilities	<ul style="list-style-type: none"> ▶ FORGE Application Generator ▶ MIRROR Terminal Emulator ▶ Remote Console ▶ Text Browser

*: Operating at level 1 backlight brightness for one standard laser scan per five-second.

** : The statistics is measured by network conditions with one broadcasting packet within one second.

12/24 hrs: Bluetooth on; WLAN on

17/34 hrs: Bluetooth off; WLAN on

***: 8630 with the laser engine, RFID, GPS and 1100mAh battery equipped.

DOWNLOAD UTILITY

For easy development of applications, the mobile computer ships with **FORGE Application Generator** programs, batch and WLAN versions, as well as a download utility.

FILE TYPES

Depending on the file type, you may download a program or font file via **System Menu**, **Program Manager** or **Kernel Menu**.

File Type	System Menu	Kernel Menu	Program Manager
Font file	√	–	√
AG runtime	√	–	√
CipherNet runtime	√	–	√
Kernel update	–	√	–
Bootloader update	–	√	–
BASIC program	√	–	–
BASIC runtime	√	–	√

FONT FILE

Download a font file (.SHX) via **System Menu** or **Program Manager**.

- ▶ Font file: Font-Multi-Language.SHX, Font-Japanese.SHX, and so on.

C PROGRAMS

Download a C program (.SHX) via **System Menu**, **Program Manager** or **Kernel Menu**.

- ▶ AG runtime: U8600.SHX, WU8600.SHX
- ▶ CipherNet runtime: 86xx-VT.SHX, 86xx-5250.SHX
- ▶ Kernel update: K8600.SHX
- ▶ Bootloader update: BL8600.SHX

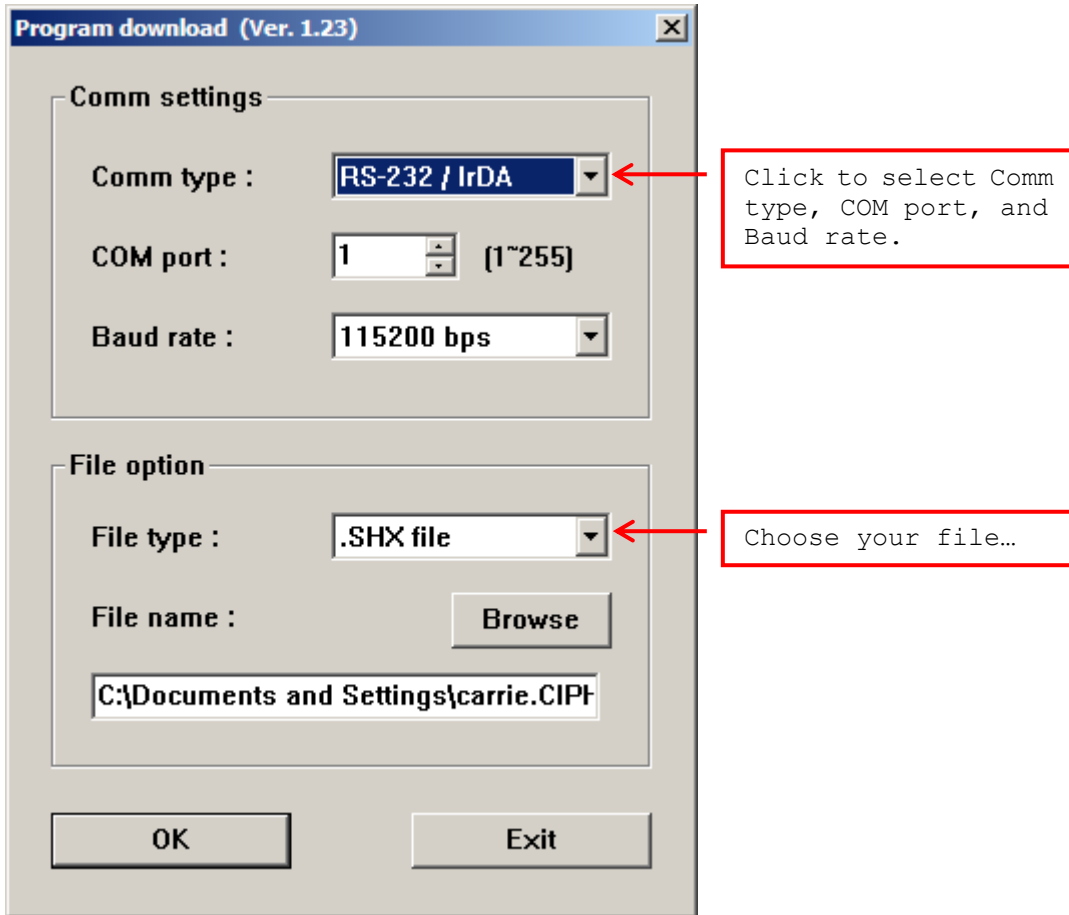
Note: You can only download a Kernel or Bootloader update via **Kernel Menu**.

BASIC PROGRAMS

First, download a BASIC runtime (e.g. B8600.SHX) via **System Menu** or **Program Manager**. Then, it will allow you to download a BASIC program (.SYN) via **System Menu**.

PROGLOAD.EXE

The utility "ProgLoad.exe" is provided for you to download a program (*.SHX, *.SYN or *.BIN) to the mobile computer. Run the program on your computer. The following dialog box pops up.



Communication Type

RS-232/IrDA	Connection via direct RS-232 cable, IrDA port, or Bluetooth SPP
Cradle-IR	Connection via cradle
TCP/IP	Connection over networks

File Type

.SHX file	Any C program, such as AG Runtime, BASIC Runtime, font file, etc.
.SYN file	Any BASIC program after BASIC Runtime has been installed first.
.BIN file	Any C program <ul style="list-style-type: none"> ▶ Use PC utility "SHX2Bin.exe" to convert the program (.SHX → .BIN).

Note: (1) For 8600, USB Virtual COM shares the interface option of RS-232/IrDA.
(2) Cradle-IR is not supported on 8600.

TROUBLESHOOTING

CANNOT TURN ON WHEN PRESSING POWER KEY

- ▶ Make sure the battery pack is installed properly.
- ▶ Re-charge the battery inside the mobile computer and monitor the charging status. (See [3.5 Power.](#))
- ▶ If the battery is faulty, replace it with a fresh and fully charged battery then.

CHARGING ERROR

- ▶ If using the USB cable for direct charging, make sure a suitable charging current is selected. (See [3.2.9 USB Charge Current.](#))
- ▶ If joining the power adaptor to the USB or RS-232 cable, make sure it is well connected between the power jack and an outlet.
- ▶ If using a cradle, make sure the power cord is well connected the cradle and an outlet.
- ▶ Check if the battery contacts of the battery itself and the battery compartment are clean.
- ▶ Try to re-charge the battery and monitor the charging status.

Warning! Only use batteries or charging device manufactured by CipherLab. The use of wrong battery or charging device could result in damage to human body or the product itself, and will void your warranty.

SPEAKER SEEMS NOT WORKING

- ▶ Perform the speaker test. (See [3.3.2 Speaker.](#))
- ▶ If the problem persists, reload the battery pack and perform the test again.

LED INDICATORS SEEM NOT WORKING

- ▶ Perform the LCD & LED test. (See [3.3.3 LCD & LED.](#))
- ▶ If the problem persists, reload the battery pack and perform the test again.

LCD SEEMS NOT WORKING

- ▶ Press the backlight key.
- ▶ Perform the LCD & LED test. (See [3.3.3 LCD & LED.](#))
- ▶ If the problem persists, reload the battery pack and perform the test again.

KEYPAD SEEMS NOT WORKING

- ▶ Perform the keyboard test. (See [3.3.4 Keyboard](#).)
- ▶ If the problem persists, reload the battery pack and perform the test again.

VIBRATOR SEEMS NOT WORKING

- ▶ Perform the vibrator test. (See [3.3.7 Vibrator](#).)
- ▶ If the problem persists, reload the battery pack and perform the test again.

MOBILE COMPUTER SEEMS NOT WORKING

- ▶ Upload all data to the host and perform the memory test. (See [3.3.5 Memory](#).)
- ▶ If the problem persists, reload the battery pack and perform the test again.

CANNOT SCAN BARCODES

LOW BATTERY CONDITION

- ▶ Check if the battery icon on the screen indicates a low battery status. If so, replace it with a fresh battery then.
- ▶ If the problem persists, check if the battery contacts get dirty or the battery pack does not fit to the compartment.

BARCODE READER PROBLEM

- ▶ Perform the reader test to see if the reader is working. (See [3.3.1 Reader](#).)
- ▶ If the problem persists, reload the battery pack and perform the test again.

CANNOT DECODE DATA AFTER SCANNING

UNREADABLE BARCODE

- ▶ Check if the barcode is defaced. A defaced barcode may not be readable.

UN-PROGRAMMED TO READ

- ▶ Check if the scanner is programmed to read the symbologies (types of barcode) that you are trying to read.
- ▶ Try scanning a test barcode of the symbology you are trying to read.

DIRTY SCAN WINDOW

- ▶ Check if the scan window gets dirty. Wipe it with a clean and dry cloth, and try again.

OUT OF SCANNING RANGE

- ▶ Try adjusting the scanning distance from the scanner to the barcode.

CANNOT TRANSMIT/RECEIVE DATA

USING RS-232 CABLE

- ▶ Check if the RS-232 connection is correct and secured.
- ▶ Make sure the serial port parameters on the host are configured to match the serial parameters on the mobile computer. Try to establish connection again.
- ▶ If the problem persists, run the Echo Test to check if the RS-232 interface between the mobile computer and the host is working. (See [3.3.6 Echo Test](#).)

USING USB CABLE

- ▶ Check if the USB connection is correct and secured.
- ▶ Check if the USB driver has been installed. (See [1.7 Charging & Communications](#).)
- ▶ If the problem persists, run the Echo Test to check if the USB interface between the mobile computer and the host is working. (See [3.3.6 Echo Test](#).)

Note: For applications that require COM port to be occupied all the time, it is suggested to use Fast VPort cable instead.

VIA BLUETOOTH

- ▶ Make sure the distance between the mobile computer and a target device is within proper range. Try to establish connection again.
- ▶ Check if the relevant settings are correct. (See [3.9 Bluetooth Menu](#).)
- ▶ If the problem persists, run the Echo Test to check if the connection is working properly. (See [3.9.4 Echo Tests](#).)

VIA WI-FI

- ▶ Make sure the mobile computer is connected to an access point properly, under the same SSID. Try to establish connection again.
- ▶ Check if the relevant settings are correct. (See [3.10 Wi-Fi Menu](#).)
- ▶ If the problem persists, run the Echo Test to check if the connection is working properly. (See [3.10.7 Echo Tests](#).)

Appendix III

KEY REFERENCE TABLE

29-KEY KEYPAD

SYSTEM DEFAULTS

Key	Blue key pressed once	Blue key pressed twice	Key	Orange key pressed once	Orange key pressed twice
1	@	@	F1	F5	F1
2	ABC	abc	F2	F6	F2
3	DEF	def	F3	F7	F3
4	GHI	ghi	F4	F8	F4
5	JKL	jkl	SP	Tab	SP
6	MNO	mno	BkSp	Del	BkSp
7	PQRS	pqrs			
8	TUV	tuv			
9	WXYZ	wxyz			
0	/*	/*			
-	+\$_	+\$_			
.	%#;,	%#;,			


EXTENDED FUNCTION KEYS

Key	Blue key pressed once	Blue key pressed twice	Key	Orange key pressed once	Orange key pressed twice
1	@	@	1	F11	1
2	ABC	abc	2	F12	2
3	DEF	def	3	F13	3
4	GHI	ghi	4	F14	4
5	JKL	jkl	5	F15	5
6	MNO	mno	6	F16	6
7	PQRS	pqrs	7	F17	7
8	TUV	tuv	8	F18	8
9	WXYZ	wxyz	9	F19	9
0	/*	/*	0	F20	0
-	+\$_	+\$_	-	F9	-
.	%#;,	%#;,	.	F10	.
			F1	F5	F1
			F2	F6	F2
			F3	F7	F3
			F4	F8	F4
			SP	Tab	SP
			BkSp	Del	BkSp

Extended Function Keys must be enabled through programming!

39-KEY KEYPAD

SYSTEM DEFAULTS

Key	Blue key pressed once	Blue key pressed twice	Key	Orange key pressed once	Orange key pressed twice
1	A	a	1	:	1
2	B	b	2	;	2
3	C	c	3	,	3
+	D	d	+	=	+
4	E	e	4	<	4
5	F	f	5	>	5
6	G	g	6	(6
-	H	h	-)	-
7	I	i	7	\$	7
8	J	j	8	?	8
9	K	k	9	&	9
*	L	l	*	@	*
.	M	m	.		.
0	N	n	0		0
#	O	o	#	%	#
/	P	p	/	\	/

Key	Blue key pressed once	Blue key pressed twice	Key	Orange key pressed once	Orange key pressed twice
F1	Q	q	F1	F11	F1
F2	R	r	F2	F12	F2
F3	S	s	F3	F13	F3
F4	T	t	F4	F14	F4
F5	U	u	F5	F15	F5
F6	V	v	F6	F16	F6
F7	W	w	F7	F17	F7
F8	X	x	F8	F18	F8
F9	Y	y	F9	F19	F9
F10	Z	z	F10	F20	F10
SP	–	–	SP	Tab	SP
BKSP	BkSp	BkSP	BkSp	Del	BkSp