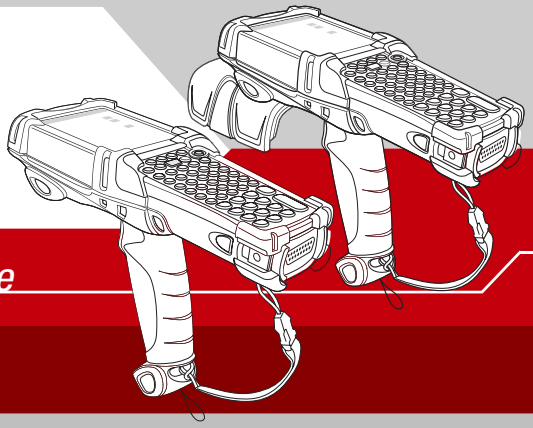
MC9000-G

Product Reference Guide

with Windows® Mobile 2003 Software for Pocket PCs



symbol®
The Enterprise Mobility Company™

MC9000-G with Windows® Mobile 2003 Software for Pocket PCs Product Reference Guide

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Revision A
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symbol®
The Enterprise Mobility Company™

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Revision History

Changes to the original manual are listed below:

Change	Date	Description
-01 to -02	12/2003	Added *Bluetooth* wireless technology functionality.
-01 to -02	12/2003	Added new cold boot procedure.
-01 to -02	12/2003	Updated Spectrum24 Configuration to V. 3.9.2.
-01 to -02	12/2003	Added 9000 Demo sample application programs clarification note to *Appendix B, Demo Program*.
-01 to -02	12/2003	Added ImagerSample to *Appendix B, Demo Program*.
-01 to -02	12/2003	Added "optimizing display" note to *Power on page 3-44*.
-02 to -03	4/2004	Updated Spectrum24 Configuration.
-02 to -03	4/2004	Add 28-key keypad.
-03 to -04	6/2004	Updated battery removal procedure.
-03 to -04	6/2004	Added Modem Module accessories.
-03 to -04	6/2004	Added keypad brightness display control (color units).
-03 to -04	6/2004	Updated *Bluetooth* wireless technology operation.
-03 to -04	6/2004	Updated battery voltage (technical specifications).
-03 to -04	6/2004	Added registry settings for Enter/Return and Green/Red dot keys.
-03 to -04	6/2004	Added information for applying applications to F6/F7 keys.
-04 to -05	7/2004	*Bluetooth* wireless technology update.
-05 to -06	9/2004	Added RFID tag reading information: demo program; how to read tags; RFID device tech specs.
-05 to -06	9/2004	Updated "Parts" to include RFID.
-05 to -06	9/2004	Added valid battery charging temperature ranges.
-06 to -07	11/2004	Added Rapid Deployment to *Configuring the Mobile Computer*.
-06 to -07	11/2004	Added *Rapid Deployment Client* information (*Chapter 8, Rapid Deployment Client*).

Change	Date	Description
-06 to -07	11/2004	Updated *Radio Power* window information (*Chapter 3, Settings*).
-06 to -07	11/2004	Added *Adaptive Frequency Hopping* information (*Chapter 6, Bluetooth Wireless Technology*).
-06 to -07	11/2004	Added *Rapid Deployment Client* information (*Chapter 8, Rapid Deployment Client*).
-06 to -07	11/2004	Added additional Reader Params descriptions in the Scanner Settings section (*Chapter B, Demo Program*).

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About This Guide

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Introduction

This *Product Reference Guide* provides information about the MC9000-G mobile computer using the Microsoft® Windows Mobile 2003 Software for Pocket PCs, and its accessories. The MC9000-G mobile computer includes the following variations:

- MC9010: Windows® Mobile 2003 Software for Pocket PCs operating system performs 1-dimensional bar code scanning with an integrated laser scanner, or 1-dimensional and 2-dimensional bar code scanning with an integrated imager; 802.11 Spectrum24® wireless technology to perform local area network (LAN) communication; memory configuration 64 MB ROM/64 MB RAM; 28-key, 43-key, 53-key, 3250 Emulator, 5250 Emulator and VT Emulator interchangeable keypads; QVGA monochrome touch panel display; Rapid Deployment.
- MC9050: Windows® Mobile 2003 Software for Pocket PCs operating system performs 1-dimensional bar code scanning with an integrated laser scanner, or 1-dimensional and 2-dimensional bar code scanning with an integrated imager; 802.11b Spectrum24® wireless technology to perform local area network (LAN) communication; memory configuration 64 MB ROM/64 MB RAM; 28-key, 43-key, 53-key, 3250 Emulator, 5250 Emulator and VT Emulator interchangeable keypads; QVGA monochrome or color touch panel display; Rapid Deployment.
- MC9060: Windows® Mobile 2003 Software for Pocket PCs operating system performs 1-dimensional bar code scanning with an integrated laser scanner, or 1-dimensional and 2-dimensional bar code scanning with an integrated imager; 802.11b Spectrum24® wireless technology to perform local area network (LAN) communication; *Bluetooth* wireless technology; memory configuration 64 MB ROM/64 MB RAM; 28-key, 43-key, 53-key, 3250 Emulator, 5250 Emulator and VT Emulator interchangeable keypads; QVGA monochrome or color touch panel display; Rapid Deployment.
- MC906R (RFID): Windows® Mobile 2003 Software for Pocket PCs operating system performs1-dimensional and 2-dimensional bar code scanning with an integrated imager and Radio Frequency Identification (RFID); 802.11b Spectrum24® wireless technology to perform local area network (LAN) communication; memory configuration 64 MB ROM/64 MB RAM; 28-key, 43-key, 53-key, 3250 Emulator, 5250 Emulator and VT Emulator interchangeable keypads; QVGA monochrome or color touch panel display; Rapid Deployment.

Screens and windows pictured in this Product Reference Guide are samples and may vary.

Chapter Descriptions

Topics covered in this guide are as follows:

- *Chapter 1, Getting Started* lists the accessories for the mobile computer and explains how to install and charge the batteries, replace the strap and start the mobile computer for the first time.
- *Chapter 2, Operating* explains the physical buttons and controls on the mobile computer, how to use the mobile computer, including instructions for powering on and resetting the mobile computer, using the stylus and a headset, entering information and scanning.
- *Chapter 3, Settings* explains how to adjust settings on the mobile computer and remove programs.
- *Chapter 4, Communications* explains how to use Microsoft® ActiveSync® for communication between the mobile computer and host computer.
- *Chapter 5, Spectrum24 Configuration* describes how to configure the Spectrum24 wireless connection.
- *Chapter 6, Bluetooth Wireless Technology* explains how to use the *Bluetooth* wireless technology radio mode.
- *Chapter 7, AirBEAM Smart* explains how to set up the mobile computer to synchronize with a server using the AirBEAM® Client and AirBEAM Staging applications.
- *Chapter 8, Rapid Deployment Client* explains how to use the Rapid Deployment Client to facilitate software downloads to the mobile computer from a Mobility Services Platform (MSP) Console's FTP server.
- *Chapter 9, Applications* describes how to use the applications installed on the mobile computer.
- *Chapter 10, Accessories* describes the accessories available for the mobile computer and how to setup power connections and battery charging capabilities, where applicable.
- *Chapter 11, Software Installation on Development PC* provides instructions for installing the Device Configuration Package (DCP) for MC9000w, the Symbol Mobility Developer Kit (SMDK) for eVC4 and the Symbol Mobility Developer Kit (SMDK) for .NET on the host computer.
- *Chapter 12, Configuring the Mobile Computer* describes how to install and use the Terminal Configuration Manager (TCM) and Initial Program Loader (IPL).
- *Chapter 13, Maintenance & Troubleshooting* provides information to help you take proper care of the mobile computer and solve problems that may come up.

- *Chapter A, Block Recognizer* describes how to using the Block Recognizer to write characters.
- *Chapter B, Demo Program* provides an overview of the mobile computer demo program applications, such as scanning, imager, setup, diagnostic utilities and file management.
- *Chapter C, RFID Demo Program* provides an overview of the MC906R-G RFID mobile computer's demo program applications: RFID and image capture.
- *Chapter D, Specifications* includes a table listing the technical specifications for the mobile computer.
- *Chapter E, Keypad Maps* includes tables listing key functionality for each keypad.

Notational Conventions

The following conventions are used in this document:

- "Mobile computer" refers to any Symbol MC9000-G or MC906R-G RFID terminal.
- MC9000-G Series refers to all non-RFID configurations of the mobile computer.
- MC906R-G RFID refers to all RFID configurations of the mobile computer.
- "User" refers to anyone using an application on the mobile computer.
- "You" refers to the End User, System Administrator or Technical Support person using this manual as a reference to install, configure, operate, maintain and troubleshoot the mobile computer.
- *Italics* are used to highlight the following:
  - chapters and sections in this and related documents
  - dialog box, window and screen names
  - drop-down list and list box names
  - check box and radio button names
  - icons on a screen.
- **Bold** text is used to highlight the following:
  - key names on a keypad
  - button names on a screen.
- Bullets (•) indicate:
  - action items
  - lists of alternatives
  - lists of required steps that are not necessarily sequential.

- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

Related Documents and Software

The following documents provide more information about the MC9000-G mobile computer.

- *MC9000-G Quick Start Poster*, p/n 72-63360-xx
- *MC9000-G Licensing, Patent and Regulatory Information*, p/n 72-65259-xx
- *SMDK Help File for Symbol Mobile Computers*, p/n 72E-38880-xx
- *Symbol Mobility Developer Kit for eMbedded Visual C++ v4.0 (SMDK for eVC4),* available at: http://www.symbol.com/mc9000-g
- *Symbol Mobility Developer Kit for .NET (SMDK for .NET),* available at: http://www.symbol.com/mc9000-g
- Device Configuration Package for MC9000w (DCP for MC9000w), available at: http://www.symbol.com/mc9000-g
- eConnect software, available at: http://devzone.symbol.com
- ActiveSync software, available at the Microsoft web site: http://www.microsoft.com.

Service Information

If you have a problem with the equipment, contact the *Symbol Support Center* for your region. See page xxv for contact information. Before calling, have the model number, serial number and several bar code symbols at hand.

Call the Support Center from a phone near the scanning equipment so that the service person can try to talk you through the problem. If the equipment is found to be working properly and the problem is symbol readability, the Support Center will request samples of bar codes for analysis at our plant.

If the problem cannot be solved over the phone, you may need to return the equipment for servicing. If that is necessary, you will be given specific directions.

Symbol Technologies is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If the original shipping container was not kept, contact Symbol to have another sent to you.

Symbol Support Center

For service information, warranty information or technical assistance contact or call the Symbol Support Center in:

United States
Symbol Technologies, Inc.
One Symbol Plaza
Holtsville, New York 11742-1300
1-800-653-5350

Canada
Symbol Technologies Canada, Inc.
5180 Orbitor Drive
Mississauga, Ontario, Canada L4W 5L9
1-866-416-8545 (Inside Canada)
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Symbol's repair depot and shipping address:
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If you purchased your Symbol product from a Symbol Business Partner, contact that Business Partner for service.

For the latest version of this guide go to:http://www.symbol.com/manuals.

1 Getting Started

Contents

Introduction

This chapter lists the accessories for the mobile computer and explains how to install and charge the batteries, replace the strap and start the mobile computer for the first time.

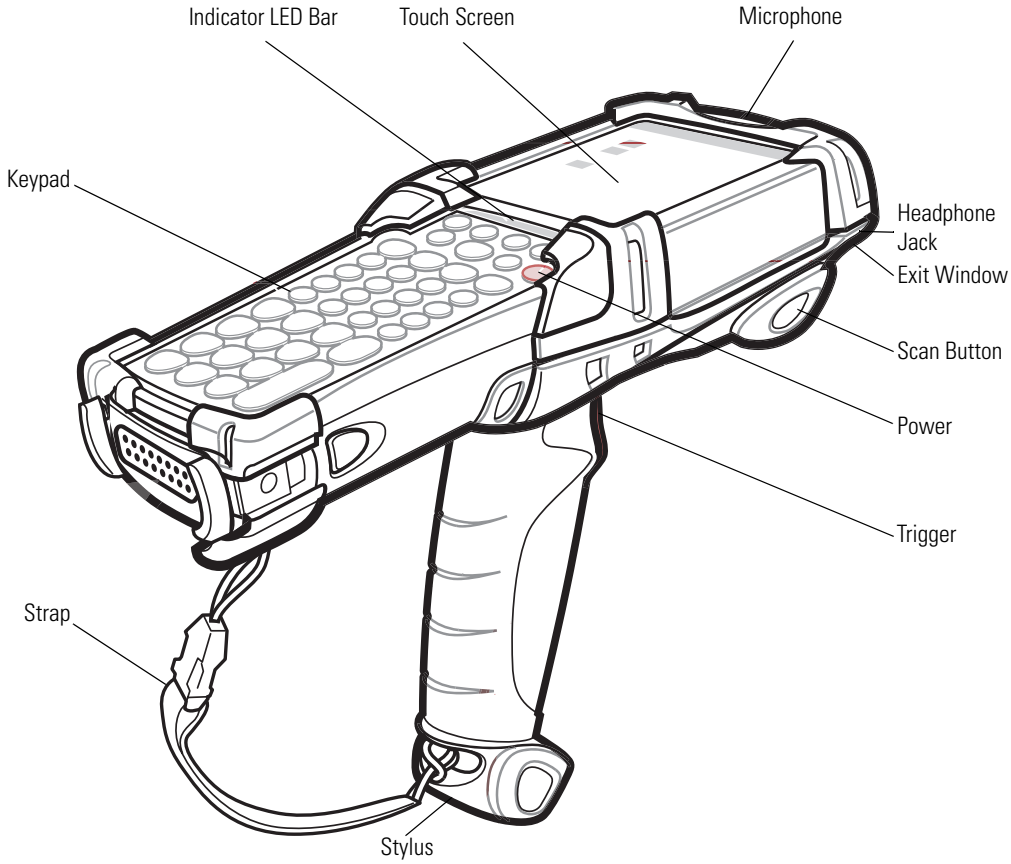

Figure 1-1. MC9000-G

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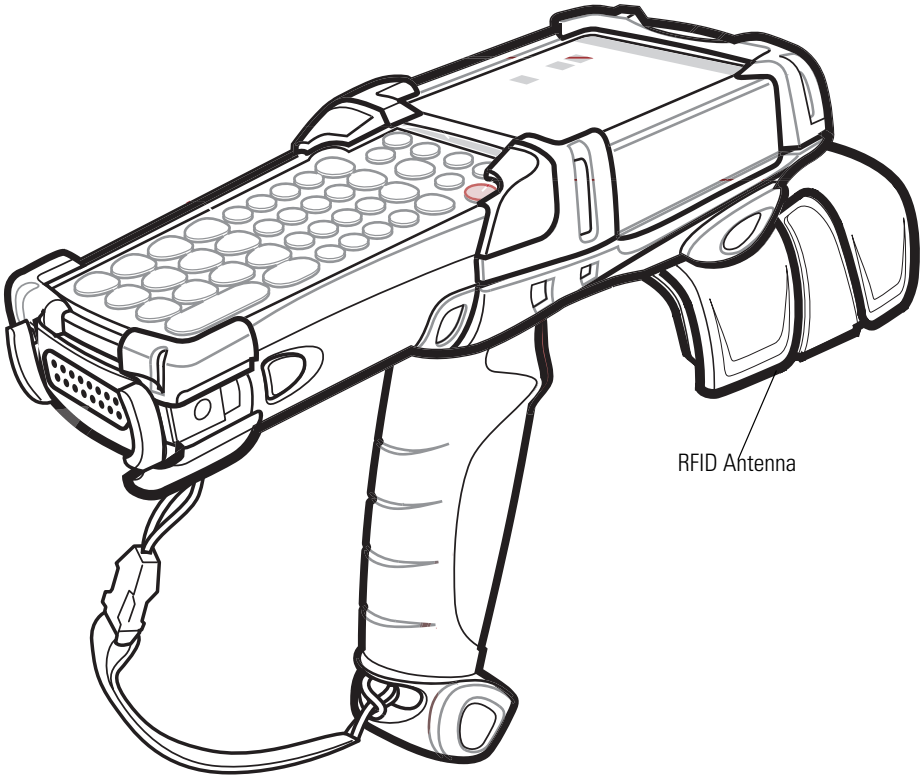


Figure 1-2. MC906R-G RFID

Unpacking the Mobile Computer

Carefully remove all protective material from around the mobile computer and save the shipping container for later storage and shipping.

Verify that you received all equipment listed below:

- mobile computer
- lithium-ion battery
- strap, attached to the mobile computer
- stylus, in the strap stylus silo
- Regulatory Guide
- *Quick Start Guide* (poster).

Inspect the equipment for damage. If you are missing any equipment or if you find any damaged equipment, contact the Symbol Technologies Support Center immediately. See *page xxiv* for contact information.

Accessories

- Cable Adapter Module (CAM): Snap-on required to connect the following cables to the mobile computer.
  - AC line cord (country-specific) and power supply, charges the mobile computer.
  - Auto charge cable, charges the mobile computer using a vehicle's cigarette lighter.
  - DEX cable, connects the mobile computer to a vending machine.
  - Serial cable, adds serial communication capabilities.
  - USB cable, adds USB communication capabilities.
  - Printer cable, adds printer communication capabilities.
- Four Slot Charge Only Cradle: Charges the mobile computer main battery.
- Four Slot Ethernet Cradle: Charges the mobile computer main battery and synchronizes the mobile computer with a host computer through an Ethernet connection.
- Four Slot Spare Battery Charger: Charges up to four mobile computer spare batteries.
- Headphone: Use in noisy environments.
- Holster: Holds the mobile computer when not in use.
- Keypads (Optional): Application specific keypads.
- Magnetic Stripe Reader (MSR): Snaps on to the mobile computer and adds magstripe read capabilities.
- Modem Module: Enables data communication between the mobile computer and a host computer, remotely through the phone lines, and synchronizes information between the mobile computer and a host computer.
- Multimedia Card (MMC): Provides secondary non-volatile storage.
- Single Slot Serial/USB Cradle: Charges the mobile computer main battery and a spare battery. It also synchronizes the mobile computer with a host computer through either a serial or a USB connection.
- Software:
  - *Symbol Mobility Developer Kit for eMbedded Visual C++ v4.0 (SMDK for eVC4),* available at: http://www.symbol.com/mc9000-g.
  - *Symbol Mobility Developer Kit for .NET (SMDK for .NET),* available at: http://www.symbol.com/mc9000-g
  - Device Configuration Package for MC9000w (DCP for MC9000w), available at: http://www.symbol.com/mc9000-g.

- Spare lithium-ion battery.
- Stylus, performs pen functions.
- Universal Battery Charger Adapter: Adapts the UBC for use with the Series 9000 batteries.
- Wall Mounting Bracket and Shelf Slide: Use for wall mounting applications.

Getting Started

In order to start using the mobile computer for the first time:

- install the main battery
- charge the main battery and backup battery
- start the mobile computer
- configure the mobile computer.

The main battery can be charged before or after it is installed. Use one of the spare battery chargers to charge the main battery (out of the mobile computer), or one of the cradles to charge the main battery installed in the mobile computer.

Installing and Removing the Main Battery

Installing the Main Battery

Before using the mobile computer, install a lithium-ion battery by sliding the battery into the mobile computer as shown in Figure 1-3.

Ensure the battery is fully inserted. Two audible clicks can be heard as the battery is fully inserted. A partially inserted battery may result in unintentional data loss.

When a battery is fully inserted in a mobile computer for the first time, upon the mobile computer's first power up, the device boots and powers on automatically.

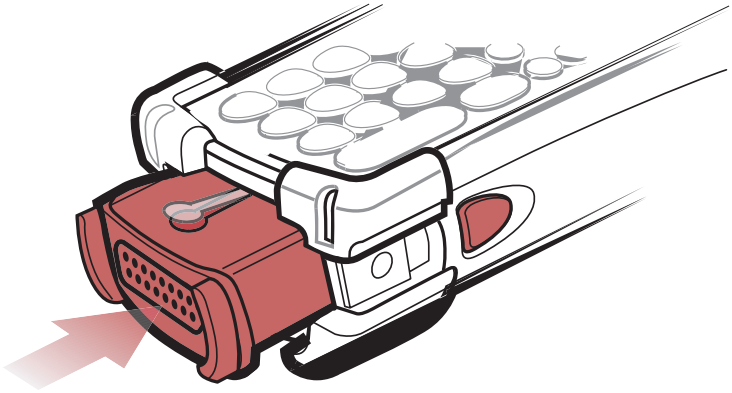


Figure 1-3. Installing the Main Battery

Removing the Main Battery

To remove the main battery:

1. Prior to removing the battery, press the red **Power** button to turn off the screen. This sets the mobile computer to suspend mode.
2. Simultaneously press both primary battery releases. The battery partially ejects from the mobile computer.
3. Pause 3-4 seconds while the mobile computer performs battery removal shutdown.
4. Press the secondary battery release, on top of the battery, and slide the battery out of the mobile computer.

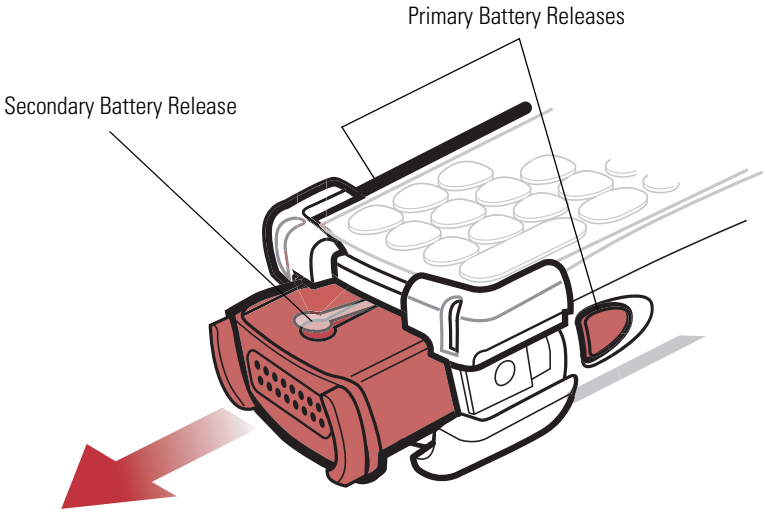


Figure 1-4. Removing the Main Battery

Charging the Battery

Charging the Main Battery and Memory Backup Battery

Before using the mobile computer for the first time, charge the main battery until the amber charge indicator light remains lit (see *Table 1-1 on page 1-11* for charge status indications). Charge time is less than four hours. The mobile computer can be charged using a cradle, the CAM with a charging cable, or the MSR with the appropriate power supply.

The mobile computer is equipped with a memory backup battery which automatically charges from the fully-charged main battery. When the mobile computer is used for the first time, the backup battery requires approximately 15 hours to fully charge. This is also true any time the backup battery is discharged, which occurs when the main battery is removed for several hours. The backup battery retains data in memory for at least 30 minutes when the mobile computer's main battery is removed. When the mobile computer reaches a very low battery state, the combination of main battery and backup battery retains data in memory for at least 72 hours.

Do not remove the main battery within the first 15 hours of use. If the main battery is removed before the backup battery is fully charged, data may be lost.

The following accessories can be used to charge batteries.

- Cradles: The mobile computer slips into the cradles for charging the battery in the mobile computer (and spare batteries, where applicable). For detailed cradle setup and charging procedures see:
  - Single Slot Serial/USB Cradle on *page 10-11*.
  - Four Slot Ethernet Cradle on *page 10-14* and Four Slot Charge Only Cradles on *page 10-17*.
- Accessories: The mobile computer's snap-on accessories provide charging capability, when used with one of the accessory charging cables. For detailed snap-on setup and charging procedures see:
  - CAM on *page 10-26*
  - MSR on *page 10-21*.
- Chargers: The mobile computer's spare battery charging accessories are used to charge batteries that are removed from the mobile computer. For detailed spare battery charging accessories setup and charging procedures see:

- Single Slot Serial/USB Cradle on *page 10-11*.
- Four Slot Spare Battery Charger on *page 10-19*
- Universal Battery Charger (UBC) on *page 10-30*.

To achieve the best battery life in mobile computers with multiple radios, turn off the radios that are not being used. This can be accomplished via the SetDevicePower() API (refer to the SMDK Help File for Symbol Mobile Computers) or via the Control Panel application (tap *Start - 9000 Demo - Ctl Panel* icon).

Charging the Main Battery

You can charge the main battery in the mobile computer using a cradle, the CAM with a charging cable, or the MSR with the appropriate power supply.

1. Ensure the accessory used to charge the main battery is connected to the appropriate power source (see *Chapter 10, Accessories* for setup information).
2. Insert the mobile computer into a cradle or attach the appropriate snap-on module.
3. The mobile computer starts to charge automatically. The amber charge LED, in the Indicator LED Bar, lights to show the charge status. See Table 1-1 for charging indications.

The main battery usually fully charges in less than four hours.

Table 1-1. Mobile Computer LED Charge Indicators

LED	Indication
Off	Mobile computer not in cradle/CAM/MSR; mobile computer not placed correctly; charger is not powered.
Fast Blinking Amber	Error in charging; check placement of the mobile computer.
Slow Blinking Amber	Mobile computer is charging.
Solid Amber	Charging complete. Note: When the battery is initially inserted in the mobile computer, the amber LED flashes once if the battery power is low or the battery is not fully inserted.

Charging Spare Batteries

The mobile computer has three accessories that can be used to charge spare batteries.

- Single Slot Serial/USB Cradle
- Four Slot Spare Battery Charger

- UBC Adapter.

To charge a spare battery:

1. Ensure the accessory used to charge the spare battery is connected to the appropriate power source (see *Chapter 10, Accessories* for setup information).
2. Insert the spare battery into the accessory's spare battery charging slot with the charging contacts facing down (over the charging pins) and gently press down on the battery to ensure proper contact.
3. The battery starts to charge automatically. The amber charge LED on the accessory lights to show the charge status. See *Chapter 10, Accessories* for charging indications for the accessory.

The battery usually fully charges in less than four hours.

Stylus

Use the mobile computer stylus for selecting items and entering information. The stylus functions as a mouse.

- Tap: Touch the screen once with the stylus to press option buttons and open menu items.
- Tap and Hold: Tap and hold the stylus on an item to see a list of actions available for that item. On the pop-up menu that appears, tap the action you want to perform.
- Drag: Hold the stylus on the screen and drag across the screen to select text and images. Drag in a list to select multiple items.

To remove the stylus:

Pull the stylus cord down and outward to remove the stylus.

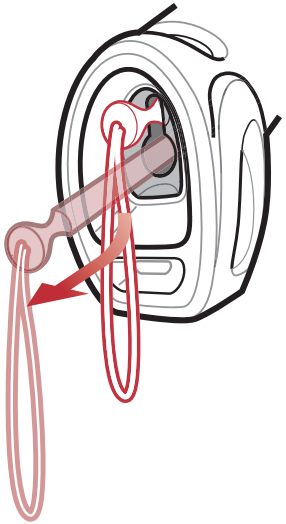


Figure 1-5. Removing the Stylus

To replace stylus:

Push the stylus back into the storage position. The stylus automatically locks in place.

Strap

The strap may be moved to either the left or right side of the mobile computer to suit user preferences.

To reposition the strap:

1. Disconnect the strap disconnect clip.
2. Open loop and slide the disconnect clip through the loop.
3. Slide the loop out of the connector post.
4. Repeat the procedure on the remaining connector to remove the strap.
5. Reverse the procedure to re-attach the strap. Two strap connectors are provided on the mobile computer's main body. The strap cord may be attached to either connector.

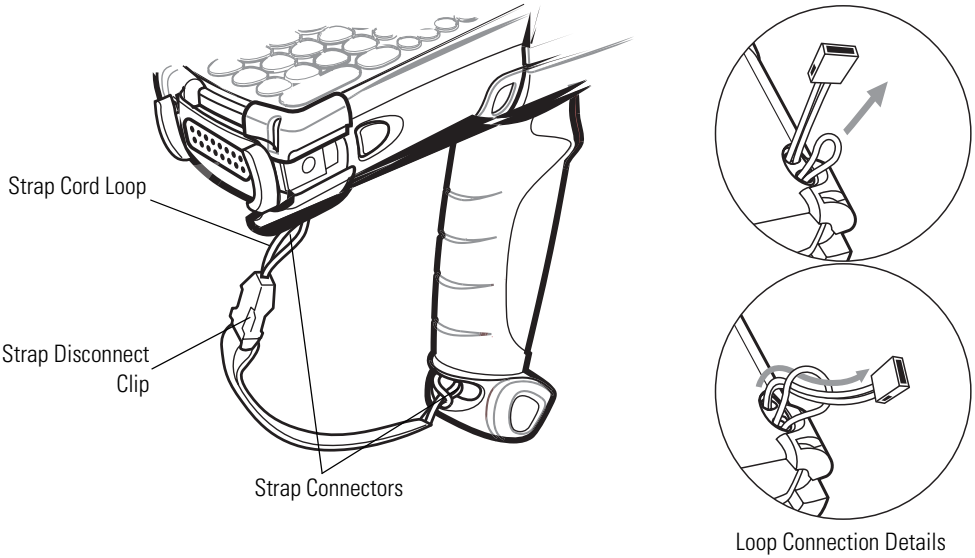


Figure 1-6. Reposition the Strap

Starting the Mobile Computer

Press the Power button to turn on the mobile computer. If the mobile computer does not power on, perform a cold boot. See *Resetting the Mobile Computer on page 2-62*.

Note

When a battery is fully inserted in a mobile computer for the first time, upon the mobile computer's first power up, the device boots and powers on automatically.

When the mobile computer is powered on for the first time, it initializes its system. The *Symbol* splash screen (Figure 1-7) appears for a short period of time followed by the *Microsoft® Windows® Powered Pocket PC* window.

Figure 1-7. Symbol Splash Window

Remove the stylus from the handle and tap the *Microsoft® Windows® Powered Pocket PC* window with the stylus to display *align screen* (Figure 1-8), where the screen is calibrated. Note that these windows also appear every time you perform a cold boot.

Calibrating the Screen

To calibrate the screen so the cursor on the touch screen aligns with the tip of the stylus:

1. Using the stylus carefully press and briefly hold the tip of stylus on the center of each target that appears on the screen.

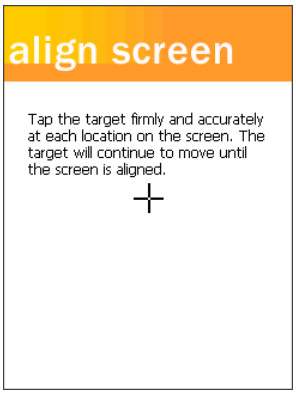


Figure 1-8. Align Screen

Note

To re-calibrate the screen at anytime, press **FUNC** + **Esc** on the mobile computer to launch the calibration screen application.

2. Follow the directions on the screen which lead you through a simple exercise illustrating how to use the stylus and pop-up menus.

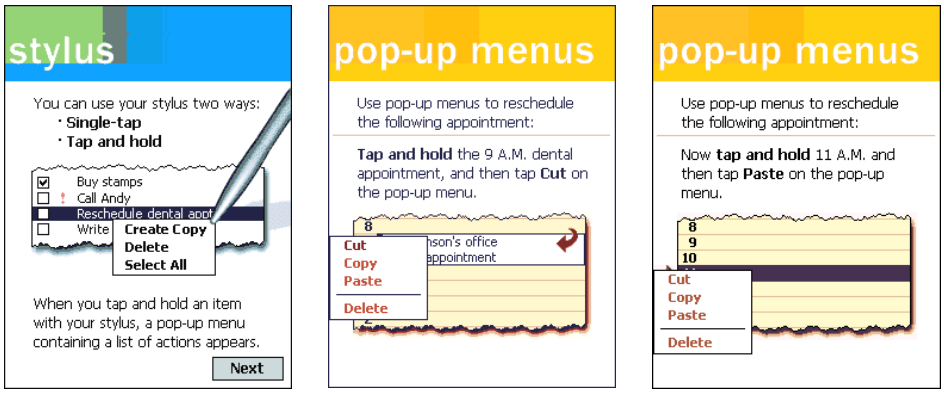


Figure 1-9. Using Pop-up Menus

3. Use the drop-down list to set your time zone, and tap **Next**.

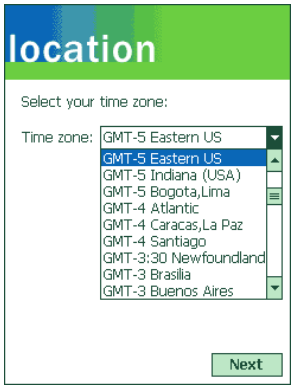


Figure 1-10. Setting Time Zone

4. Tap the *Complete* screen to complete the initial setup.

5. The *Today* screen appears. (See *Today Screen on page 2-33* for information about using the *Today* screen.)

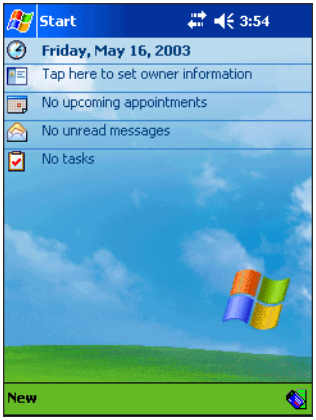


Figure 1-11. Today Screen

Setting Time and Date

When the mobile computer is powered on for the first time, and after a cold boot, tap *Start* - *Settings* - *System* tab - *Clock* icon to use the clock control panel applet to set the time zone, time and date.

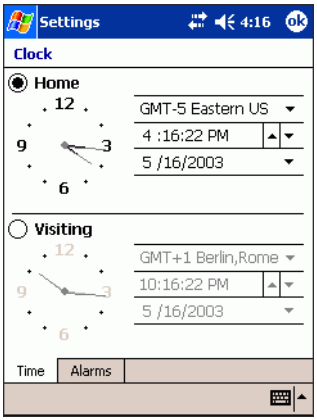


Figure 1-12. Setting Time and Date

Note

See *Clock on page 3-36* for details about setting time and date.

Checking Battery Status

To check whether the main battery or backup battery in the mobile computer is charged, tap *Start* - *Settings* - *System* tab - *Power* icon to display the *Battery Status* window.

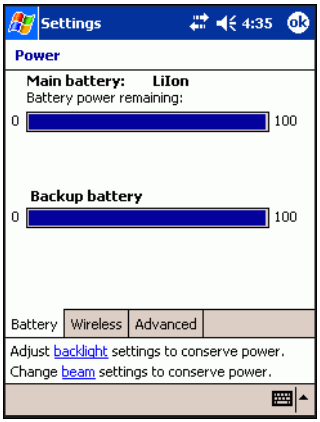


Figure 1-13. Battery Status Screen

To save battery power, set the mobile computer to turn off after a specified number of minutes. See *Power on page 3-44* to set power management options.

Configuring the Mobile Computer

See the following chapters to configure the mobile computer:

- To customize the mobile computer settings, see *Chapter 3, Settings*.
- To set up ActiveSync to synchronize the mobile computer with the host computer, see *Chapter 4, Communications*.
- To configure the mobile computer for Spectrum24, see *Chapter 5, Spectrum24 Configuration*.
- To set up AirBEAM to synchronize the mobile computer with the host server, see *Chapter 7, AirBEAM Smart*.
- To configure the mobile computer using the Rapid Deployment Client, see *Chapter 8, Rapid Deployment Client*.
- To install development software on the development PC, see *Chapter 11, Software Installation on Development PC*.
- To configure the mobile computer using the Terminal Configuration Manager, see *Chapter 12, Configuring the Mobile Computer*.

2 Operating

Contents

Introduction

This chapter explains the physical buttons and controls on the mobile computer, how to use the mobile computer, including instructions for powering on and resetting the mobile computer, using the stylus and a headset, entering information and scanning.

Keypads

The mobile computer has five interchangeable modular keypad configurations:

- 28-key keypad
- 43-key keypad
- 53-key keypad
- 3270 Emulator
- 5250 Emulator
- VT Emulator.

The modular keypads can be changed in the field, as necessary, to support specialized applications. See *Keypads on page 10-7* for installation and removal procedures.

For detailed keypad information, including ASCII values and VK codes, see *Appendix E, Keypad Maps*.

For information about using the soft keyboard input panel, see *Entering Information Using the Input Panel on page 2-45*.

28-Key Keypad

The 28-key keypad contains a **Power** button, application keys, scroll keys and function keys. The keypad is color-coded to indicate the alternate function key (blue) values. Note that keypad functions can be changed by an application so the mobile computer's keypad may not function exactly as described. See *Table 2-1 on page 2-6* for key and button descriptions and *Table 2-7 on page 2-29* for the keypad's special functions.

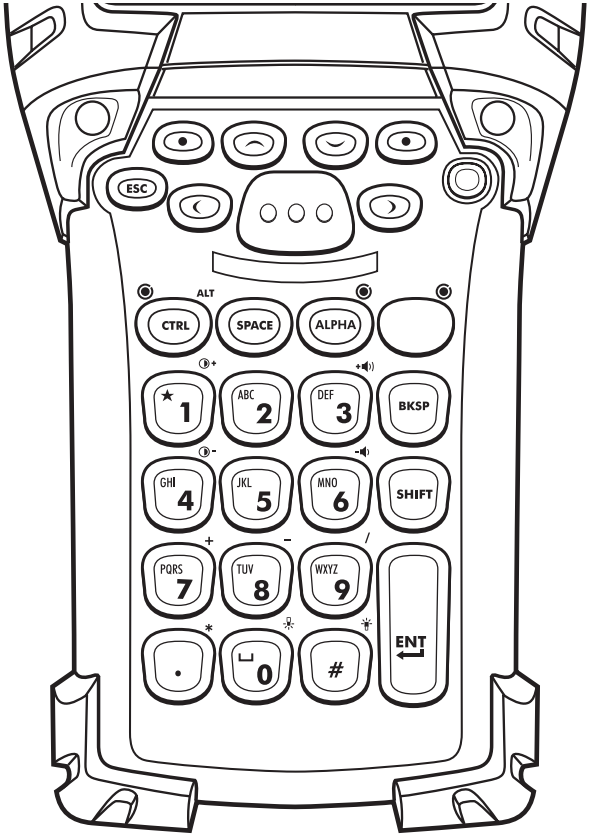


Figure 2-1. 28-Key Keypad

Table 2-1. 28-Key Descriptions

Key	Description
Power (red) 	Powers the mobile computer on and off. Performs a warm boot and a cold boot. See *Resetting the Mobile Computer on page 2-62* for information about performing a warn and cold boot.
Green/Red Dot 	To use a key as an application key (APP key) on the keyboard, a new keyboard remap table must be created and installed. However, the Green/Red dot keys can be remapped as APP keys through the registry. Create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD] "GreenKeyOverride" = dword: xx, where xx is the new APP key code. "RedKeyOverride" = dword: yy, where yy is the new APP key code. Copy the registry file to the \Platform folder, then cold boot the mobile computer. This sends an APP key code, instead of their original key codes, when the green or red dot key is pressed.
Scan (yellow) 	Scan key - used for scanning applications, this key has the same function as pulling the trigger.
Scroll Up and Down 	Moves up and down from one item to another. Increases/decreases specified values.
Scroll Left and Right 	Moves left and right from one item to another. Increases/decreases specified values.
ESC 	Exits the current operation.
One/Star 	Produces the number one in default state. Produces an asterisk in Alpha state.

Table 2-1. 28-Key Descriptions (Continued)

Key	Description
Alphanumeric 	In default state, produces the numeric value on the key. In Alpha state, produces the lower case alphabetic characters on the key. Each key press produces the next alphabetic character in sequence. For example, press and release the **ALPHA** key and then press the **4** key once to produce the letter 'g'; press and release the **ALPHA** key and then press the **4** key three times to produce the letter 'i'. When the **SHIFT** key is pressed in Alpha state, the upper case alphabetic characters on the key are produced. For example, press and release the **ALPHA** key, press and release the **SHIFT** key and then press the **4** key once to produce the letter 'G'; press and release the **ALPHA** key, press and release the **SHIFT** key and then press the **4** key three times to produce the letter 'I'.
SPACE/BKSP 	Space and backspace functions.
Control 	Press and release the **CTRL** key to activate the keypad alternate **CTRL** functions. The keypad LED lights.
Alpha 	Press and release the **ALPHA** key to activate the keypad alternate functions (shown on the keypad in blue). The keypad LED lights. Press and release the **ALPHA** key again to return to the normal keypad functions.
Function (blue) 	Press and release the blue function key to activate the keypad alternate functions (shown on the keypad in blue). The keypad LED lights.
Shift 	Press and release the **SHIFT** key to activate the keypad alternate **SHIFT** functions. Press and release the **SHIFT** key again to return to the normal keypad functions.

Table 2-1. 28-Key Descriptions (Continued)

Key	Description
Enter 	Executes a selected item or function. The default behavior of the **Enter** (**Return**) key sends an extra character, which causes a Microsoft Word or Notes application to exit. To make the applications work properly, create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD\#KeyKeypad] "SpecialEnterTabKey" = dword:0 where #keyKeypad = 28KEY, 43KEY or 53KEY (i.e., the number of keys on the keypad). Copy the registry file to the \Platform folder, then cold boot the mobile computer.
Period/Decimal Point 	In default state, produces a period for alpha entries and a decimal point for numeric entries. In function key state, produces an asterisk. When the **SHIFT** key is pressed in function key state, produces an asterisk.
Zero 	In default state, produces a zero. In Alpha state, produces a space.
Pound 	Produces a pound/number sign.

For detailed keypad information, including ASCII values and VK codes, see *Appendix E, Keypad Maps*.

For information about using the soft keyboard input panel, see *Entering Information Using the Input Panel on page 2-45*.

43-Key Keypad

The 43-key keypad contains a Power button, application keys, scroll keys and a function key. The keypad is color-coded to indicate the alternate function key (blue) values and the alternate ALPHA key (orange) values. Note that keypad functions can be changed by an application so the mobile computer's keypad may not function exactly as described. See *Table 2-2 on page 2-10* for key and button descriptions and *Table 2-7 on page 2-29* for the keypad's special functions.

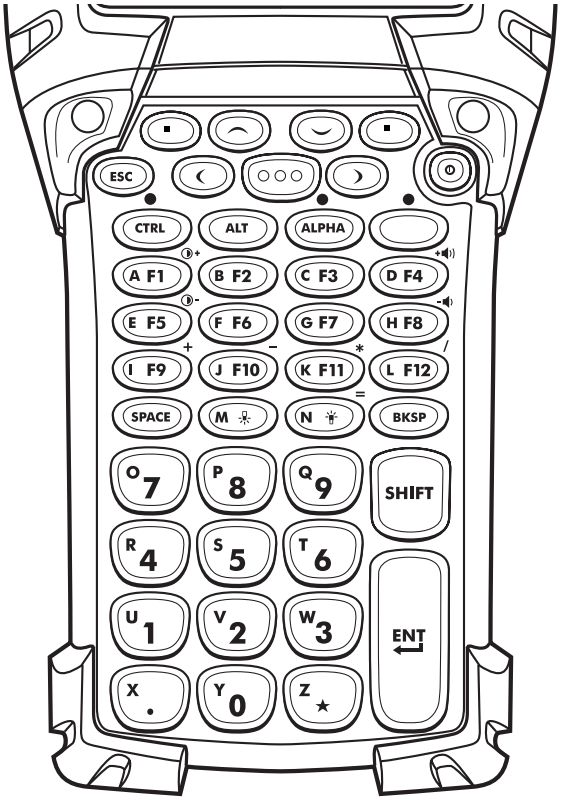


Figure 2-2. 43-Key Keypad

Table 2-2. 43-Key Descriptions

Key	Description
Power (red) 	Powers the mobile computer on and off. Performs a warm boot and a cold boot. See *Resetting the Mobile Computer on page 2-62* for information about performing a warn and cold boot.
Green/Red Dot 	To use a key as an application key (APP key) on the keyboard, a new keyboard remap table must be created and installed. However, the Green/Red dot keys can be remapped as APP keys through the registry. Create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD] "GreenKeyOverride" = dword: xx, where xx is the new APP key code. "RedKeyOverride" = dword: yy, where yy is the new APP key code. Copy the registry file to the \Platform folder, then cold boot the mobile computer. This sends an APP key code, instead of their original key codes, when the green or red dot key is pressed.
Scan (yellow) 	Scan key - used for scanning applications, this key has the same function as pulling the trigger.
Scroll Up and Down 	Moves up and down from one item to another. Increases/decreases specified values.
Scroll Left and Right 	Moves left and right from one item to another. Increases/decreases specified values.
ESC 	Exits the current operation.
SPACE/BKSP 	Space and backspace functions.
Numeric/Alpha  . . .	Number or alpha value depending on the state of the ALPHA key.

Table 2-2. 43-Key Descriptions (Continued)

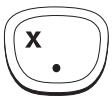
Key	Description
Alpha/Application 	These keys can have an application assigned to the function value and have an alpha value assigned when used with the ALPHA function key. **F6** and **F7** keys cannot be remapped and are dedicated by the Operating System to control volume level. When these keys are pressed, Shell.exe traps them and displays the volume adjustment window. To get these keys to an application, call GXOpenInput() at the beginning of the application and call GXCloseInput() at the end of the application. This redirects all of the key events to an application, including the **F6** and **F7** keys. **Note:** Other applications cannot receive any key event until GXCloseInput() is called. For example, if the customer is using the APP1 key to run Calc.exe, this is disabled during this period.
Function (blue) 	Press and release the blue function key to activate the keypad alternate functions (shown on the keypad in blue). The keypad LED lights.
Control 	Press and release the **CTRL** key to activate the keypad alternate **CTRL** functions. The keypad LED lights.
ALT 	Press and release the **ALT** key to activate the keypad ALT (alternate) functions. Press and release the **ALT** key again to return to the normal keypad functions.
ALPHA (orange) 	The default keypad mode is the num-lock (number lock) mode. Press the orange **ALPHA** key to de-activate the num-lock mode and to access the alternate **ALPHA** characters (shown on the keypad in orange).
Shift 	Press and release the **SHIFT** key to activate the keypad alternate SHIFT functions. Press and release the **SHIFT** key again to return to the normal keypad functions.
Period/Decimal Point 	Produces a period for alpha entries, a decimal point for numeric entries and the alphabetic character X when the ALPHA function key is activated.

Table 2-2. 43-Key Descriptions (Continued)

Key	Description
Star 	Produces an asterisk and the alphabetic character Z when the ALPHA function key is activated.
Enter 	Executes a selected item or function. The default behavior of the **Enter** (**Return**) key sends an extra character, which causes a Microsoft Word or Notes application to exit. To make the applications work properly, create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD\#KeyKeypad] "SpecialEnterTabKey" = dword:0 where #keyKeypad = 28KEY, 43KEY or 53KEY (i.e., the number of keys on the keypad). Copy the registry file to the \Platform folder, then cold boot the mobile computer.

For detailed keypad information, including ASCII values and VK codes, see *Appendix E, Keypad Maps*.

For information about using the soft keyboard input panel, see *Entering Information Using the Input Panel on page 2-45*.

53-Key Keypad

There are two physical configurations of the 53-key keypad, however both of the keypads are functionally identical. The 53-key keypad contains a Power button, application keys, scroll keys and function keys. The keypad is color-coded to indicate the alternate function key (blue) values. Note that keypad functions can be changed by an application so the mobile computer's keypad may not function exactly as described. See *Table 2-3 on page 2-14* for key and button descriptions and *Table 2-7 on page 2-29* for the keypad's special functions.

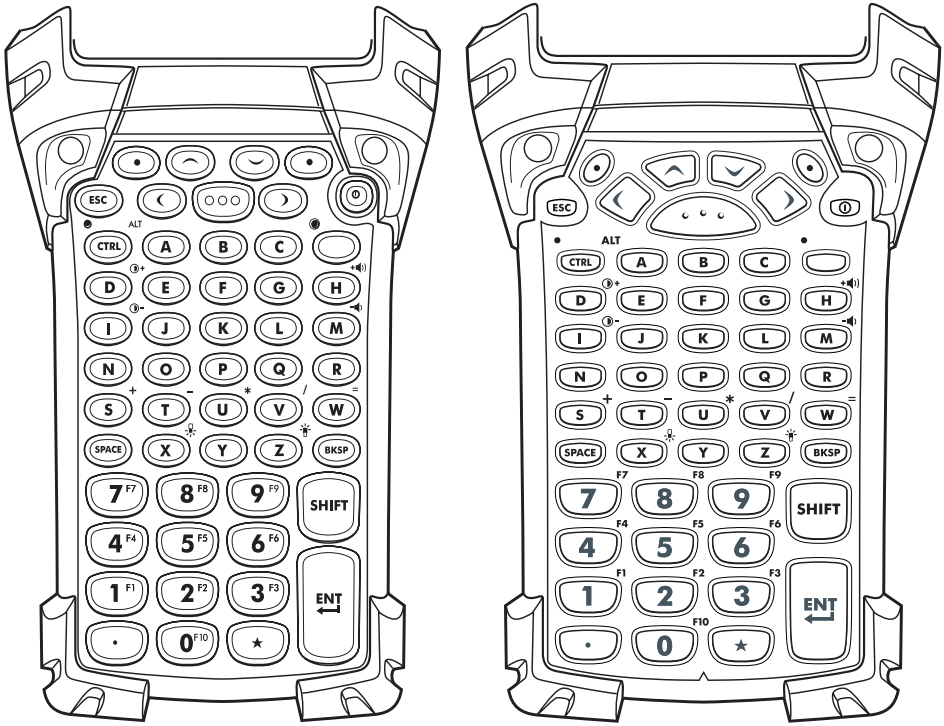


Figure 2-3. 53-Key Keypad

Table 2-3. 53-Key Descriptions

Key	Description
Power (red) 	Powers the mobile computer on and off. Performs a warm boot and a cold boot. See *Resetting the Mobile Computer on page 2-62* for information about performing a warn and cold boot.
Green/Red Dot 	To use a key as an application key (APP key) on the keyboard, a new keyboard remap table must be created and installed. However, the Green/Red dot keys can be remapped as APP keys through the registry. Create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD] "GreenKeyOverride" = dword: xx, where xx is the new APP key code. "RedKeyOverride" = dword: yy, where yy is the new APP key code. Copy the registry file to the \Platform folder, then cold boot the mobile computer. This sends an APP key code, instead of their original key codes, when the green or red dot key is pressed.
Scan (yellow) 	Scan key - used for scanning applications, this key has the same function as pulling the trigger.
Scroll Up and Down 	Moves up and down from one item to another. Increases/decreases specified values.
Scroll Left and Right 	Moves left and right from one item to another. Increases/decreases specified values.
ESC 	Exits the current operation.
Alpha 	Use the alpha keys for alphabetic characters.
SPACE/BKSP 	Space and backspace functions.

Table 2-3. 53-Key Descriptions (Continued)

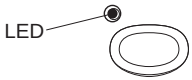
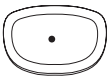
Key	Description
Numeric/Application 	Numeric value keys - can have applications assigned with function key(s). **F6** and **F7** keys cannot be remapped and are dedicated by the Operating System to control volume level. When these keys are pressed, Shell.exe traps them and displays the volume adjustment window. To get these keys to an application, call GXOpenInput() at the beginning of the application and call GXCloseInput() at the end of the application. This redirects all of the key events to an application, including the **F6** and **F7** keys. **Note:** Other applications cannot receive any key event until GXCloseInput() is called. For example, if the customer is using the APP1 key to run Calc.exe, this is disabled during this period.
Function (blue) 	Press and release the blue function key to activate the keypad alternate functions (shown on the keypad in blue). The keypad LED lights.
Control 	Press and release the **CTRL** key to activate the keypad alternate **CTRL** functions. The keypad LED lights.
Shift 	Press and release the **SHIFT** key to activate the keypad alternate **SHIFT** functions.Press and release the **SHIFT** key again to return to the normal keypad functions.
Period/Decimal Point 	Produces a period for alpha entries and a decimal point for numeric entries.
Star 	Produces an asterisk.

Table 2-3. 53-Key Descriptions (Continued)

Key	Description
Enter 	Executes a selected item or function. The default behavior of the **Enter** (**Return**) key sends an extra character, which causes a Microsoft Word or Notes application to exit. To make the applications work properly, create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD\#KeyKeypad] "SpecialEnterTabKey" = dword:0 where #keyKeypad = 28KEY, 43KEY or 53KEY (i.e., the number of keys on the keypad). Copy the registry file to the \Platform folder, then cold boot the mobile computer.

For detailed keypad information, including ASCII values and VK codes, see *Appendix E, Keypad Maps*.

For information about using the soft keyboard input panel, see *Entering Information Using the Input Panel on page 2-45*.

3270 Emulator Keypad

There are two physical configurations of the 3270 emulator keypad, however both of the keypads are functionally identical. The 3270 emulator keypad contains a Power button, application keys, scroll keys and a function key. The keypad is color-coded to indicate the alternate function key (blue) values. Note that keypad functions can be changed by an application so the mobile computer's keypad may not function exactly as described. See *Table 2-4 on page 2-18* for key and button descriptions and *Table 2-7 on page 2-29* for the keypad's special functions.

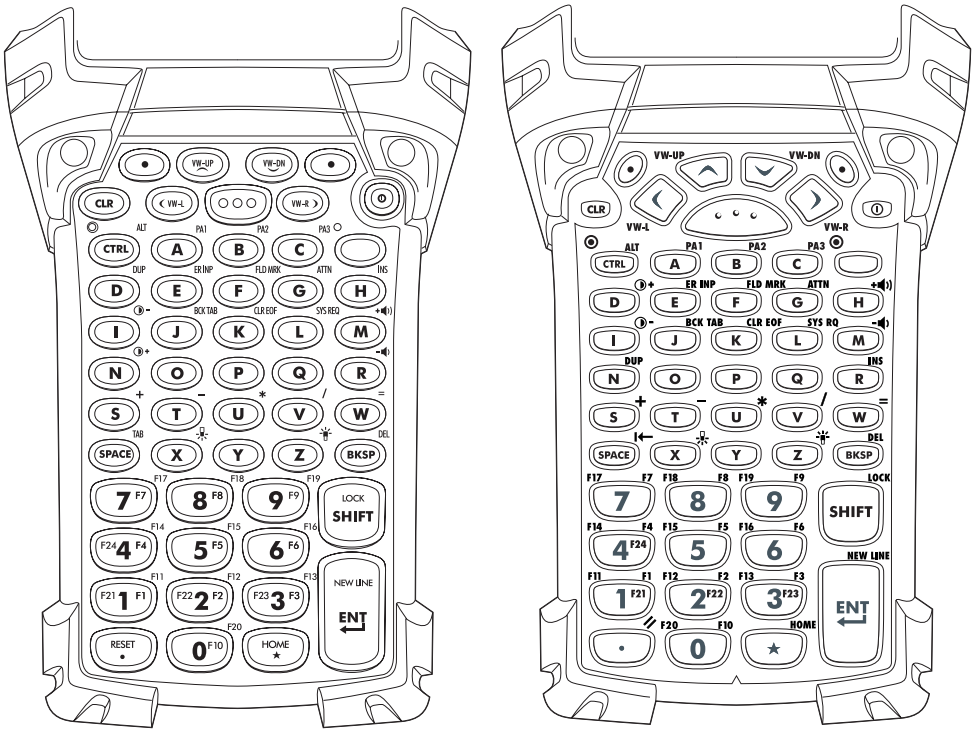


Figure 2-4. 3270 Emulator Keypad

Note

The 3270 emulator keypad is only used when the mobile computer is running the 3270 emulation software. When the mobile computer is not running the 3270 emulation software, the 3270 keypad functions are the same as a 53-key keypad.

Table 2-4. 3270 Emulator Descriptions

Key	Description
Power (red) 	Powers the mobile computer on and off. Performs a warm boot and a cold boot. See *Resetting the Mobile Computer on page 2-62* for information about performing a warn and cold boot.
Green/Red Dot 	To use a key as an application key (APP key) on the keyboard, a new keyboard remap table must be created and installed. However, the Green/Red dot keys can be remapped as APP keys through the registry. Create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD] "GreenKeyOverride" = dword: xx, where xx is the new APP key code. "RedKeyOverride" = dword: yy, where yy is the new APP key code. Copy the registry file to the \Platform folder, then cold boot the mobile computer. This sends an APP key code, instead of their original key codes, when the green or red dot key is pressed.
Scan (yellow) 	Scan key - used for scanning applications, this key has the same function as pulling the trigger.
Scroll Up and Down 	Moves up and down from one item to another. Increases/decreases specified values.
Scroll Left and Right 	Moves left and right from one item to another. Increases/decreases specified values.
CLR 	Exits the current operation.
Alpha 	Use the alpha keys for alphabetic characters.
SPACE/BKSP 	Space and backspace functions.

Table 2-4. 3270 Emulator Descriptions (Continued)

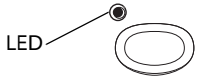
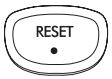
Key	Description
Application 	These keys can be assigned to an application. **F6** and **F7** keys cannot be remapped and are dedicated by the Operating System to control volume level. When these keys are pressed, Shell.exe traps them and displays the volume adjustment window. To get these keys to an application, call GXOpenInput() at the beginning of the application and call GXCloseInput() at the end of the application. This redirects all of the key events to an application, including the **F6** and **F7** keys. **Note:** Other applications cannot receive any key event until GXCloseInput() is called. For example, if the customer is using the APP1 key to run Calc.exe, this is disabled during this period.
Function (blue) 	Press and release the blue function key to activate the keypad alternate functions (shown on the keypad in blue). The keypad LED lights.
Control 	Press and release the CTRL key to activate the keypad alternate CTRL functions. The keypad LED lights.
Shift 	Press and release the SHIFT key to activate the keypad alternate SHIFT functions. Press and release the SHIFT key again to return to the normal keypad functions.
Period/Decimal Point 	Produces a period for alpha entries and a decimal point for numeric entries.
Star 	Produces an asterisk.

Table 2-4. 3270 Emulator Descriptions (Continued)

Key	Description
Enter 	Executes a selected item or function. The default behavior of the **Enter** (**Return**) key sends an extra character, which causes a Microsoft Word or Notes application to exit. To make the applications work properly, create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD\#KeyKeypad] "SpecialEnterTabKey" = dword:0 where #keyKeypad = 28KEY, 43KEY or 53KEY (i.e., the number of keys on the keypad). Copy the registry file to the \Platform folder, then cold boot the mobile computer.

For detailed keypad information, including ASCII values and VK codes, see *Appendix E, Keypad Maps*.

For information about using the soft keyboard input panel, see *Entering Information Using the Input Panel on page 2-45*.

5250 Emulator Keypad

There are two physical configurations of the 5250 emulator keypad, however both of the keypads are functionally identical. The 5250 emulator keypad contains a Power button, application keys, scroll keys and a function key. The keypad is color-coded to indicate the alternate function key (blue) values. Note that keypad functions can be changed by an application so the mobile computer's keypad may not function exactly as described. See *Table 2-5 on page 2-22* for key and button descriptions and *Table 2-7 on page 2-29* for the keypad's special functions.

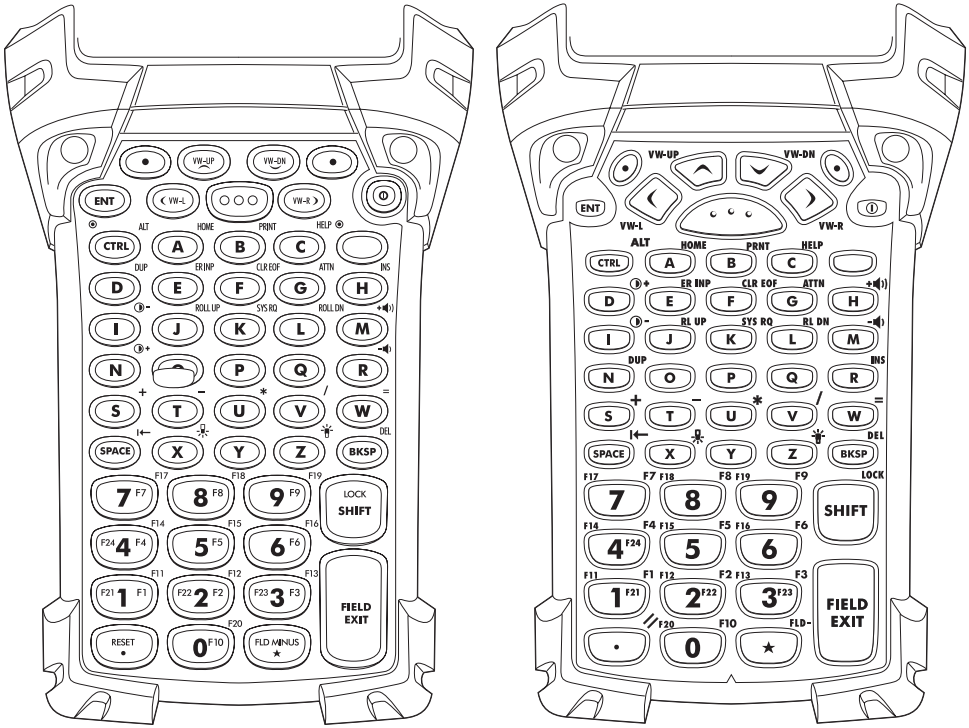


Figure 2-5. 5250 Emulator Keypad

Note

The 5250 emulator configuration is only used when the mobile computer is running the 5250 emulation software. When the mobile computer is not running the 5250 emulation software, the 5250 keypad functions are the same as a 53-key keypad.

Table 2-5. 5250 Emulator Descriptions

Key	Description
Power (red) 	Powers the mobile computer on and off. Performs a warm boot and a cold boot. See *Resetting the Mobile Computer on page 2-62* for information about performing a warn and cold boot.
Green/Red Dot 	To use a key as an application key (APP key) on the keyboard, a new keyboard remap table must be created and installed. However, the Green/Red dot keys can be remapped as APP keys through the registry. Create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD] "GreenKeyOverride" = dword: xx, where xx is the new APP key code. "RedKeyOverride" = dword: yy, where yy is the new APP key code. Copy the registry file to the \Platform folder, then cold boot the mobile computer. This sends an APP key code, instead of their original key codes, when the green or red dot key is pressed.
Scan (yellow) 	Scan key - used for scanning applications, this key has the same function as pulling the trigger.
Scroll Up and Down 	Moves up and down from one item to another.
Scroll Left and Right 	Moves left and right from one item to another.
ENT 	Exits the current operation.
Alpha 	Use the alpha keys for alphabetic characters.
SPACE/BKSP 	Space and backspace functions.

Table 2-5. 5250 Emulator Descriptions (Continued)

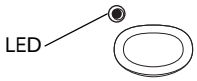
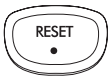
Key	Description
Application 	These keys can be assigned to an application. **F6** and **F7** keys cannot be remapped and are dedicated by the Operating System to control volume level. When these keys are pressed, Shell.exe traps them and displays the volume adjustment window. To get these keys to an application, call GXOpenInput() at the beginning of the application and call GXCloseInput() at the end of the application. This redirects all of the key events to an application, including the **F6** and **F7** keys. **Note:** Other applications cannot receive any key event until GXCloseInput() is called. For example, if the customer is using the APP1 key to run Calc.exe, this is disabled during this period.
Function (blue) 	Press and release the blue function key to activate the keypad alternate functions (shown on the keypad in blue). The keypad LED lights.
Control 	Press and release the CTRL key to activate the keypad alternate CTRL functions. The keypad LED lights.
Shift 	Press and release the SHIFT key to activate the keypad alternate SHIFT functions. Press and release the SHIFT key again to return to the normal keypad functions.
Period/Decimal Point 	Produces a period for alpha entries and a decimal point for numeric entries.
Star 	Produces an asterisk.

Table 2-5. 5250 Emulator Descriptions (Continued)

Key	Description
Enter 	Executes a selected item or function. The default behavior of the **Enter** (**Return**) key sends an extra character, which causes a Microsoft Word or Notes application to exit. To make the applications work properly, create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD\#KeyKeypad] "SpecialEnterTabKey" = dword:0 where #keyKeypad = 28KEY, 43KEY or 53KEY (i.e., the number of keys on the keypad). Copy the registry file to the \Platform folder, then cold boot the mobile computer.

For detailed keypad information, including ASCII values and VK codes, see *Appendix E, Keypad Maps*.

For information about using the soft keyboard input panel, see *Entering Information Using the Input Panel on page 2-45*.

VT Emulator Keypad

The VT emulator keypad contains a Power button, application keys, scroll keys and a function key. The keypad is color-coded to indicate the alternate function key (blue) values. Note that keypad functions can be changed by an application so the mobile computer's keypad may not function exactly as described. See *Table 2-6 on page 2-26* for key and button descriptions and *Table 2-7 on page 2-29* for the keypad's special functions.

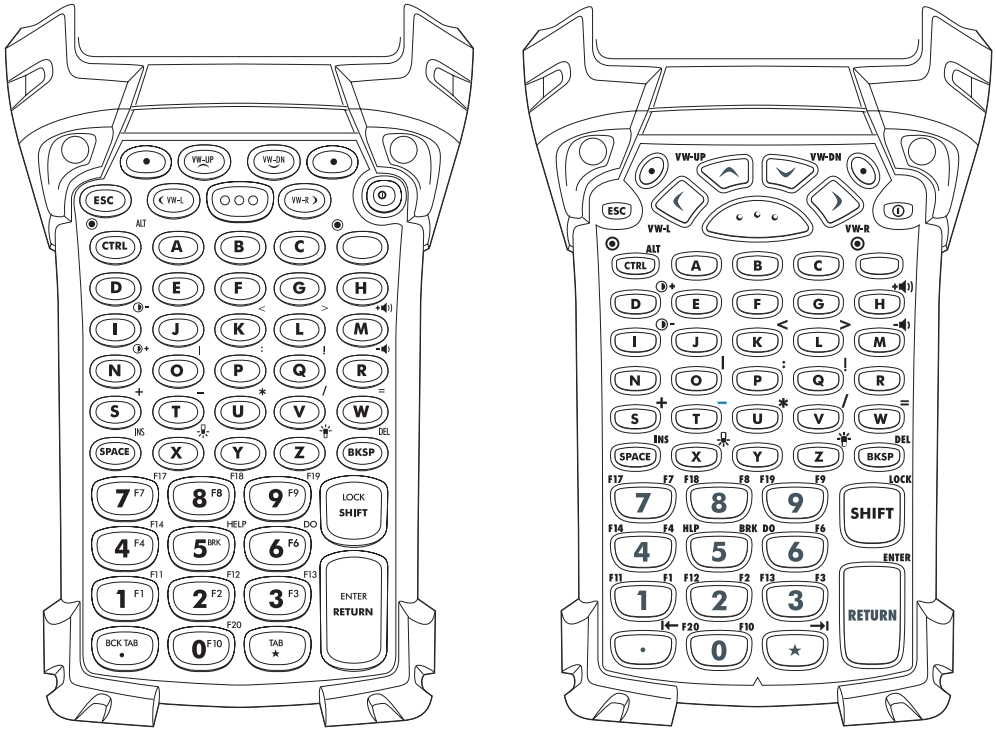


Figure 2-6. VT Emulator Keypad

Note

The VT emulator configuration is only used when the mobile computer is running the VT emulation software. When the mobile computer is not running the VT emulation software, the VT keypad functions are the same as a 53-key keypad.

Table 2-6. VT Emulator Descriptions

Key	Description
Power (red) 	Powers the mobile computer on and off. Performs a warm boot and a cold boot. See *Resetting the Mobile Computer on page 2-62* for information about performing a warn and cold boot.
Green/Red Dot 	To use a key as an application key (APP key) on the keyboard, a new keyboard remap table must be created and installed. However, the Green/Red dot keys can be remapped as APP keys through the registry. Create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD] "GreenKeyOverride" = dword: xx, where xx is the new APP key code. "RedKeyOverride" = dword: yy, where yy is the new APP key code. Copy the registry file to the \Platform folder, then cold boot the mobile computer. This sends an APP key code, instead of their original key codes, when the green or red dot key is pressed.
Scan (yellow) 	Scan key - used for scanning applications, this key has the same function as pulling the trigger.
Scroll Up and Down 	Moves up and down from one item to another.
Scroll Left and Right 	Moves left and right from one item to another.
ESC 	Exits the current operation.
Alpha 	Use the alpha keys for alphabetic characters.
SPACE/BKSP 	Space and backspace functions.

Table 2-6. VT Emulator Descriptions (Continued)

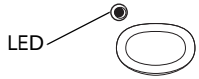
Key	Description
Application 	These keys can be assigned to an application. **F6** and **F7** keys cannot be remapped and are dedicated by the Operating System to control volume level. When these keys are pressed, Shell.exe traps them and displays the volume adjustment window. To get these keys to an application, call GXOpenInput() at the beginning of the application and call GXCloseInput() at the end of the application. This redirects all of the key events to an application, including the **F6** and **F7** keys. **Note:** Other applications cannot receive any key event until GXCloseInput() is called. For example, if the customer is using the APP1 key to run Calc.exe, this is disabled during this period.
Function (blue) 	Press and release the blue function key to activate the keypad alternate functions (shown on the keypad in blue). The keypad LED lights.
Control 	Press and release the CTRL key to activate the keypad alternate CTRL functions. The keypad LED lights.
Shift 	Press and release the SHIFT key to activate the keypad alternate SHIFT functions. Press and release the SHIFT key again to return to the normal keypad functions.
Period/Decimal Point 	Produces a period for alpha entries and decimal point for numeric entries.
Star 	Produces an asterisk.

Table 2-6. VT Emulator Descriptions (Continued)

Key	Description
Enter 	Executes a selected item or function. The default behavior of the **Enter** (**Return**) key sends an extra character, which causes a Microsoft Word or Notes application to exit. To make the applications work properly, create a registry file with the following entry: [HKEY_LOCAL_MACHINE\HARDWARE\DEVICEMAP\KEYBD\#KeyKeypad] "SpecialEnterTabKey" = dword:0 where #keyKeypad = 28KEY, 43KEY or 53KEY (i.e., the number of keys on the keypad). Copy the registry file to the \Platform folder, then cold boot the mobile computer.

For detailed keypad information, including ASCII values and VK codes, see *Appendix E, Keypad Maps*.

For information about using the soft keyboard input panel, see *Entering Information Using the Input Panel on page 2-45*.

Keypad Special Functions

The keypad special functions are color coded on the keypads. For example, on the 53-key keypad, the display backlight icon is blue indicating that the blue function key must be selected first to access the display backlight. On the 43-key keypad, the display backlight icon is white indicating that the display backlight is the default value for that key.

Mobile computers with color screens do not have contrast settings.

Table 2-7. Keypad Special Functions

Icon	28-Key Keystrokes	43-Key Keystrokes	53-Key, 3270, 5250, VT Keystrokes	Special Function
	Blue function key and **#** or Blue function key/ **SHIFT** and **#**	 key	Blue function key and **Z**	Turns on and off the display backlight.
	Blue function key and **0** or Blue function key/ **SHIFT** and **0**	 key	Blue function key and **X**	Turns on and off the keypad backlight.
	Blue function key and **1** or Blue function key/ **SHIFT** and **1**	Blue function key and **F1**	Blue function key and **D**	Monochrome units: Increases display contrast. Color units: Increases display backlight intensity.
	Blue function key and **4** or Blue function key/ **SHIFT** and **4**	Blue function key and **F5**	Blue function key and **I**	Monochrome units: Decreases display contrast. Color units: Increases display backlight intensity.
	Blue function key and **3** or Blue function key/ **SHIFT** and **3**	Blue function key and **F4**	Blue function key and **H**	Increases scan decode beeper volume.

Table 2-7. Keypad Special Functions

Icon	28-Key Keystrokes	43-Key Keystrokes	53-Key, 3270, 5250, VT Keystrokes	Special Function
	Blue function key and **6** or Blue function key/ **SHIFT** and **6**	Blue function key and **F8**	Blue function key and **M**	Decreases scan decode beeper volume.
ALT *	Blue function key and **CTRL**	Not Available	Blue function key and **CTRL**	Enables Alt keypad functions.

Use of display and keypad backlighting can significantly reduce battery life.

Mobile computers with color screens do not have contrast settings.

Using the Power Button

Press the red Power button to turn the mobile computer screen on and off (suspend mode). The mobile computer is on when the screen is on and the mobile computer is in suspend mode when the screen is off. For more information, see *Starting the Mobile Computer on page 1-15*.

The Power button is also used to reset the mobile computer by performing a warm or cold boot.

- Warm Boot (Soft Reset) - Resets the mobile computer.
- Cold Boot (Hard Reset) - Resets the mobile computer, removes all added applications and restores all factory default settings.

Applications that are added to the Application and Platform folders are not removed when a cold boot is performed on the mobile computer. Application and Platform folders are in flash memory.

For information about booting the mobile computer, see *Resetting the Mobile Computer on page 2-62*.

Using a Headset

You can use a stereo headset to listen to mono audio playback. To use a headset, plug the headset jack into the audio connector on the top of the mobile computer. Ensure that the mobile computer's volume is set appropriately before putting the headset on. When a headset is plugged into the jack, the speaker is muted.

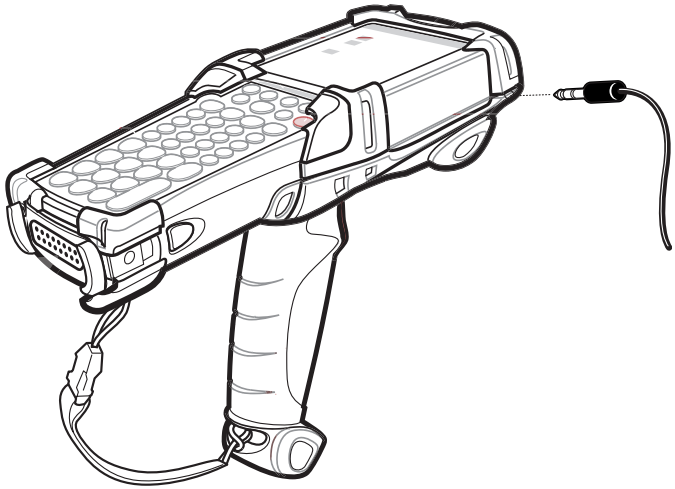


Figure 2-7. Using a Headset

Today Screen

When you turn on the mobile computer for the first time each day (or after 4 hours of inactivity), the *Today* screen appears. You can also display it by tapping *Start* - *Today*. On the *Today* screen, you can see important information for the day.

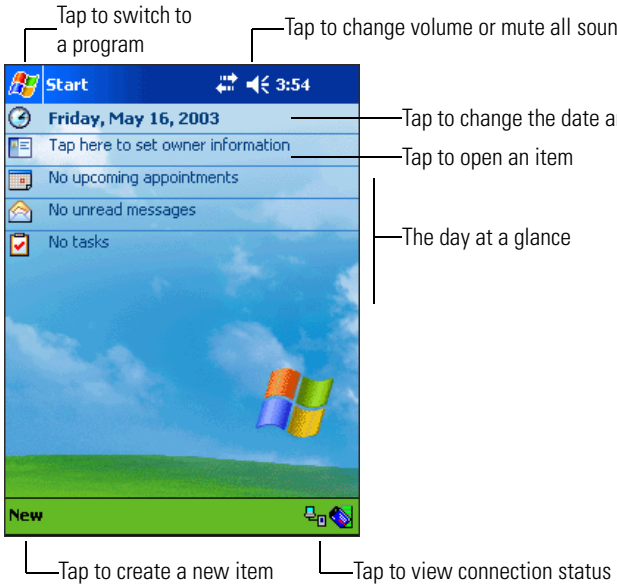


Figure 2-8. Today Screen

Note

The *Today* screen may vary depending on the mobile computer configuration.

The *Today* screen can be customized. Tap *Start* - *Settings* - *Today* icon. Use the *Appearance* tab to customize the background and the *Items* tab to change the list and order of items that appear on the screen.

Using the Navigation Bar and Command Bar

The navigation bar at the top of the screen displays the active program, various status icons (see Table 2-8) and current time. It also allows you to select programs and close screens.

Use the command bar (task tray) at the bottom of the screen to perform tasks in programs. The command bar includes menu names, buttons and the **Input Panel** button. It can also include icons of active radios or programs, where applicable (see Table 2-9).

To create a new item in the current program, tap *New*. To see the name of a button, hold the stylus on the button. Drag the stylus off the button so the command is not carried out.

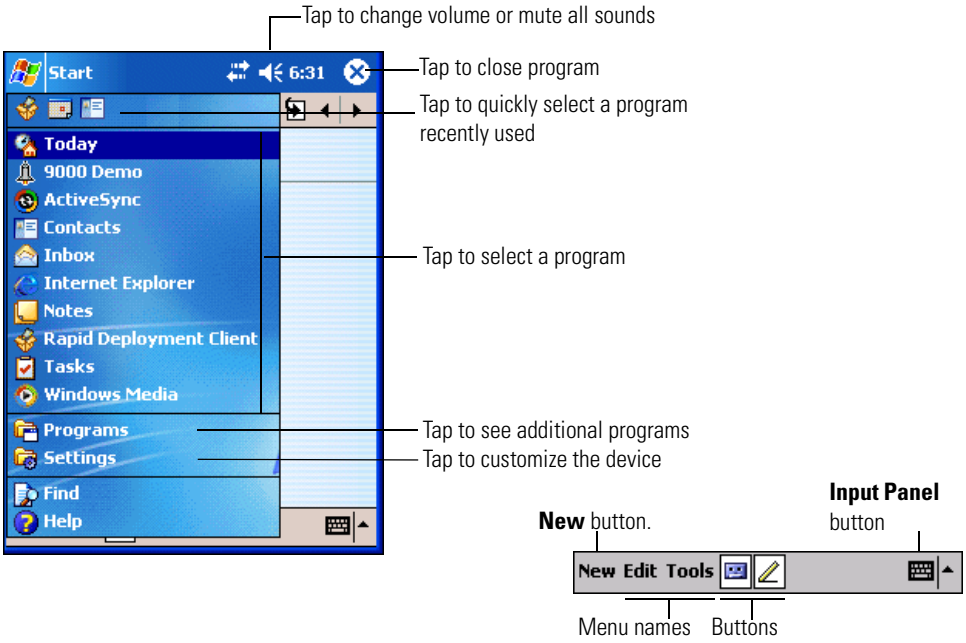


Figure 2-9. Screen Navigation

Status Icons

You may see the status icons listed in Table 2-8 on the navigation bar located at the top of the screen.

Table 2-8. Status Icons

Icon	Function	Description
	Speaker	Turns all sounds on and off.
	Battery	Backup battery is very low.
		Main battery is charging.*
		Main battery is low.
		Main battery is very low.
		Main battery is full.*
	Connectivity	Connection is active.
		Synchronization is occurring.
		No connection.
	Instant Message	Notification that one or more instant messages were received.
	E-Mail	Notification that one or more e-mail messages were received.
	Time and Next Appointment	Displays current time in analog or digital format.
	Multiple Notifications	There are more notification icons than can be displayed. Tap to display remaining icons.
* Only appears in the *Time and Next Appointment* dialog box.		

Task Tray Icons

You may see the task tray icons listed in Table 2-9 on the command bar located at the bottom of the screen.

Table 2-9. Task Tray Icons

Icon	Description
	The *Mobile Companion* icon appears in the task tray and indicates mobile computer signal strength. See *Chapter 5, Spectrum24 Configuration* for more information.
	The *Bluetooth* icon appears in the task tray and indicates that the Bluetooth radio is on. The icon disappears when the radio is off. The icon is for display purposes only. See *Chapter 6, Bluetooth Wireless Technology* for more information.
	The *ActiveSync* icon appears in the task tray and indicates an active connection between the mobile computer and the development PC. See *Using ActiveSync on page 4-21* for more information.

Speaker Icon

You can adjust the system volume using the *Speaker* icon in the Navigation bar.

1. Tap the *Speaker* icon. The *Volume* dialog box appears.

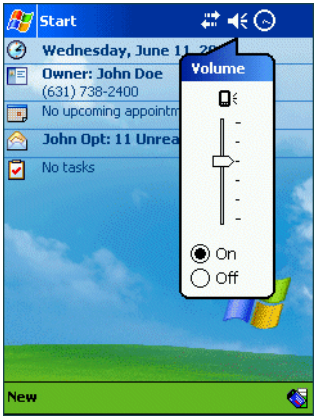


Figure 2-10. Volume Dialog Box

2. Tap and move the slide bar to adjust the volume.
3. Select the *On* or *Off* radio button to turn the volume on or off.

Note

The system volume can also be adjusted using the Sounds & Notifications window. See *Sounds & Notifications on page 3-23* for more information.

Battery Icon

Battery icons display on the *Navigation Bar* when the main battery or backup battery power falls below a predetermined level. A *Battery* dialog box also appears indicating the status of the main or backup battery.

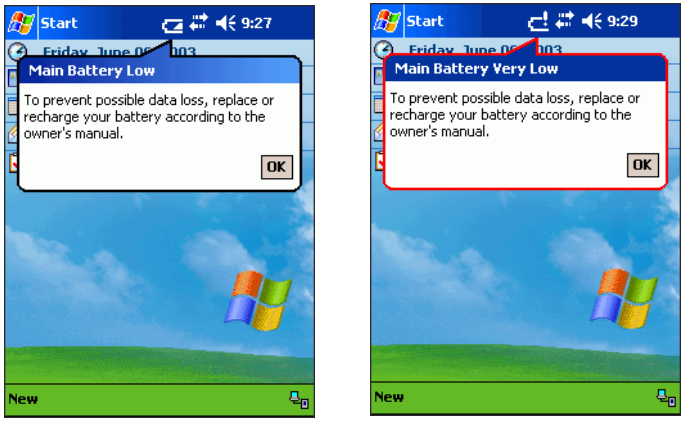


Figure 2-11. Battery Status Dialog Box

Note

The battery status can also be viewed using the *Power* window. See *Power on page 3-44* for more information.

Connectivity Icon

The *Connectivity* icon indicates the communication status of the mobile computer when it's connecting to the internet or host computer.

Figure 2-12. Connectivity Dialog Box

Time Icon

The *Time* icon displays the current time in a digital or analog format. To change the time format, tap and hold the *Time* icon until a menu appears. Select the format you want.

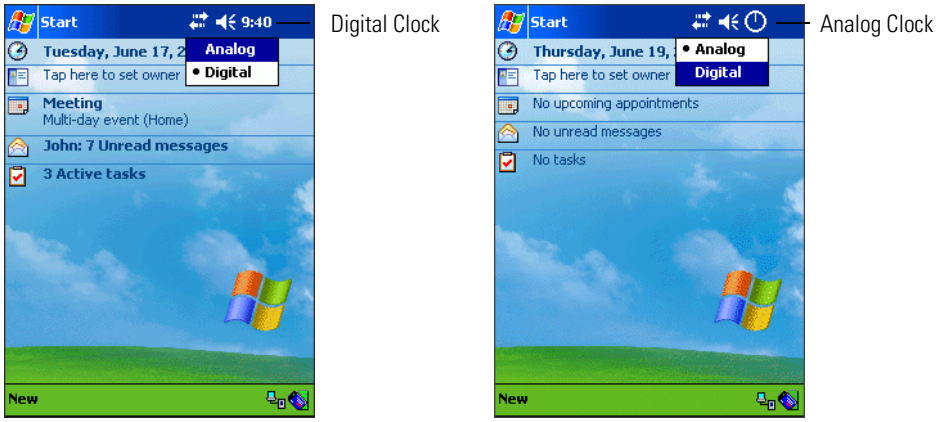


Figure 2-13. Time Icon Format Menu

To display current date, time and appointments:

1. Tap the *Time* icon to display the *Time and Next Appointment* dialog box.

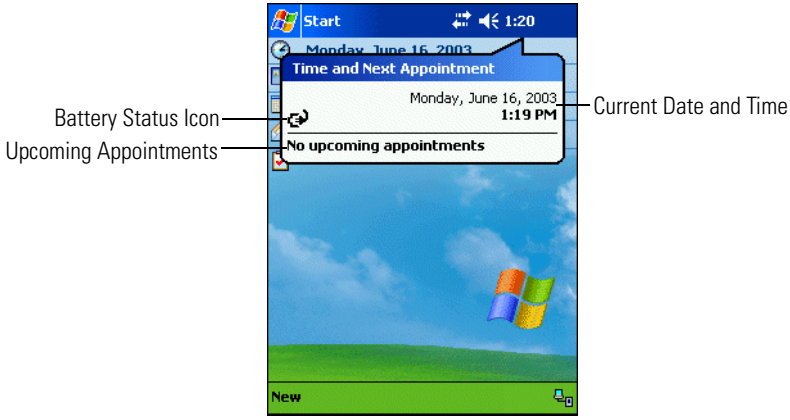


Figure 2-14. Time and Next Appointment Dialog Box

2. The dialog box displays the current date and time, the battery status and any upcoming appointments in the *Calendar*.

Instant Message Icon

The *Instant Message* icon notifies you when *MSN Messenger* has received a new incoming message. See *MSN® Messenger on page 9-27* for more information.

Figure 2-15. MSN Messenger Dialog Box

E-Mail Icon

The *E-Mail* icon notifies you when you have received incoming e-mails. See *Inbox on page 9-15* for more information.

Figure 2-16. New E-mail Messages Dialog Box

Multiple Notification Icon

The *Multiple Notification* icon appears when two or more message notifications occur. Tap the icon to display the multiple notification icons.

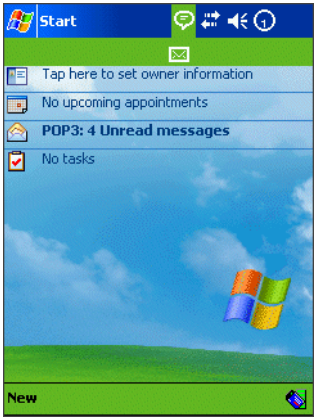


Figure 2-17. Multiple Notifications Icon

Selecting Programs

To select a program, tap *Start* - *Programs*, then the program name. (To select which programs appear on the *Program* menu, see *Chapter 3, Settings*.)

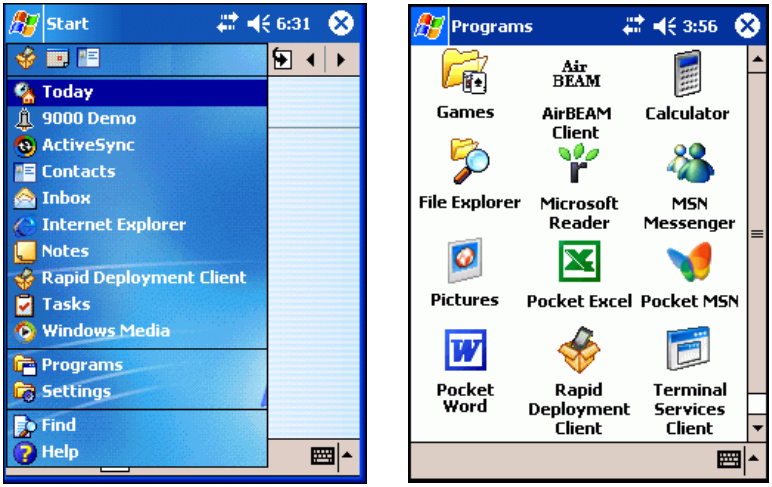


Figure 2-18. Start Menu

Note

Some programs have abbreviated labels for check boxes and drop-down list. To see the full label, hold the stylus on the label. Drag the stylus off the label so that the command is not carried out.

Using Pop-up Menus

With pop-up menus, you can quickly choose an action for an item. For example, use the pop-up menu in the contact list to delete a contact, make a copy of a contact, or send an e-mail message to a contact. The actions in the pop-up menus vary from program to program.

To access a pop-up menu, hold the stylus on the item you want to perform the action on. When the menu appears, lift the stylus, and tap the action to perform, or tap outside the menu to close it without performing an action.

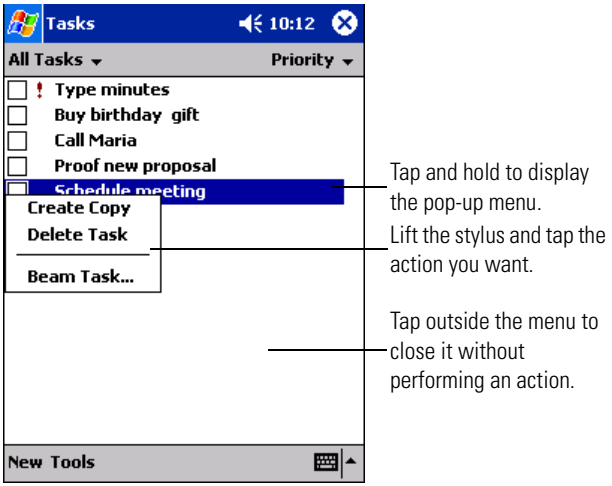


Figure 2-19. Pop-up Menu

Notifications

The mobile computer notifies you when you have something to do. For example, if you've set up an appointment in *Calendar*, a task with a due date in *Tasks*, or an alarm in *Clock*, you'll be notified in any of the following ways:

- a message box appears on the screen
- a sound, which you can set, is played.

To choose reminder types and sounds for the mobile computer, tap *Start* - *Settings* - *Personal* tab - *Sounds & Notifications* icon. Select the desired options. See *Sounds & Notifications on page 3-23* for more information.

Entering Information

To enter information, you may:

- Use the keypad. (See *Keypads on page 2-4* and *Appendix E, Keypad Maps* for keypad functions.)
- Use the input panel to enter typed text, either using the soft keypad or writing characters.
- Write directly on the screen.
- Draw pictures on the screen.
- Speak into the microphone to record a message.
- Scan bar code data into data fields (mobile computers with an integrated scanner only).
- Use the Imager to scan bar code data and capture still images (mobile computers with an integrated imager only).
- Use Microsoft ActiveSync to synchronize or copy information from the host computer to the mobile computer. For more information on ActiveSync, see *Chapter 4, Communications* or ActiveSync Help on the host computer.

Entering Information Using the Input Panel

Use the input panel to enter information in any program. You can either type using the soft keyboard or write using *Block Recognizer*, *Letter Recognizer*, or *Transcriber*. In any case, the characters appear as typed text on the screen.

To show or hide the input panel, tap the **Input Panel** button. Tap the arrow next to this button to view input methods.

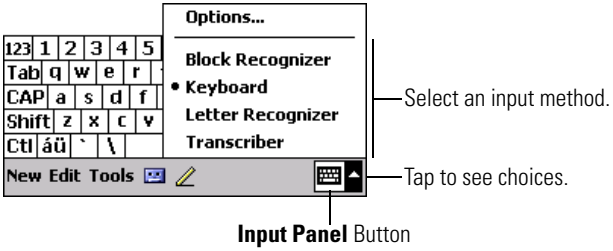


Figure 2-20. Input Panel Button

When you use the input panel, the mobile computer anticipates the word you are typing or writing and displays it above the input panel. When you tap the displayed word, it is inserted into the text at the insertion point. The more you use the mobile computer, the more words it learns to anticipate.

To change input settings, such as the number of words suggested at one time, select *Options* from the Input Panel menu, and tap the tabs to see each setting screen.

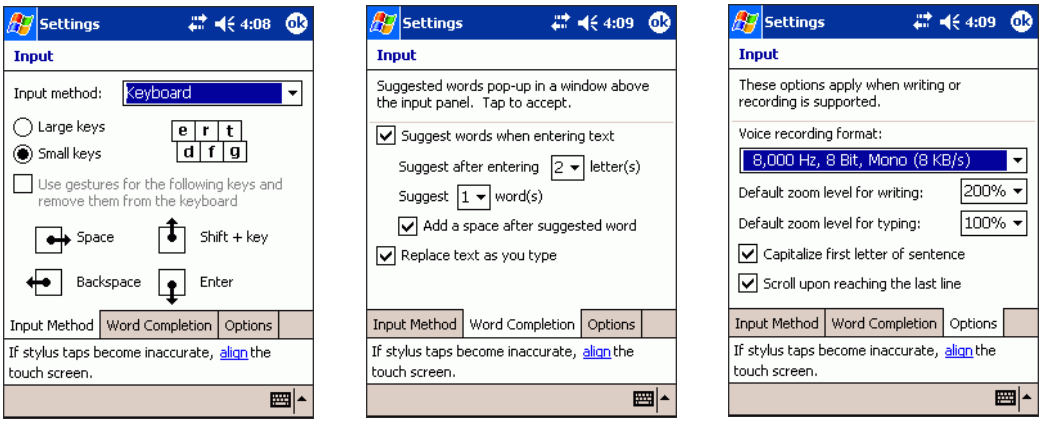


Figure 2-21. Input Panel Options

Using the Soft Keyboard

To type with the Soft Keyboard:

1. Tap the arrow next to the **Input Panel** button, then *Keyboard*.

2. On the Soft Keyboard, tap the keys with the stylus.

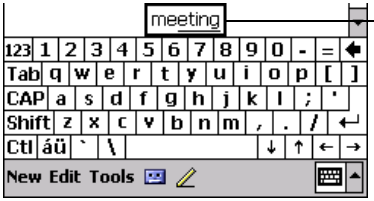


Figure 2-22. Soft Keyboard

Using the Block Recognizer

To use the Block Recognizer:

1. Tap the arrow next to the **Input Panel** button, then *Block Recognizer*.
2. Write a letter in the left side of the box, or a number in the right side, using special character strokes.

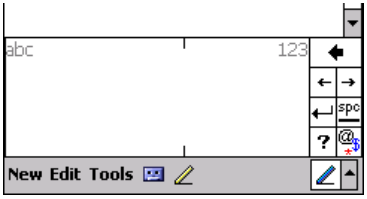


Figure 2-23. Block Recognizer

When you write a letter, it is converted to typed text on the screen. For specific instructions on using Block Recognizer, with Block Recognizer open, tap the question mark next to the writing area, or see *Chapter A, Block Recognizer*.

Using the Letter Recognizer

To use Letter Recognizer:

1. Tap the arrow next to the **Input Panel** button, then *Letter Recognizer*.

2. Write letters or numbers in the writing area, just as you would on paper. Write capital letters in the left side of the box, numbers in the right side, and lower case letters in the center.

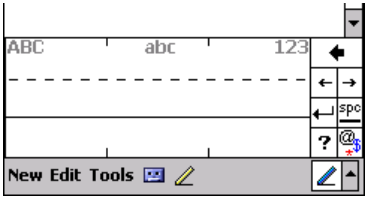


Figure 2-24. Letter Recognizer

When you write a letter, it is converted to typed text on the screen. For specific instructions on using Letter Recognizer, with Letter Recognizer open, tap the question mark next to the writing area.

Using the Transcriber

To use Transcriber:

1. Tap the arrow next to the **Input Panel** button, then *Transcriber*.

Figure 2-25. Transcriber

2. Write anywhere on the screen.

When you write anywhere on the screen, Transcriber changes the written characters to typed characters. For specific instructions on using Transcriber, with Transcriber open, tap the question mark under to the writing area.

Writing on the Screen

In any program that accepts writing, such as the Notes program and the *Notes* tab in Calendar, Contacts, and Tasks, you can use the stylus to write directly on the screen.

To write on the screen, tap the **Pen** button to switch to writing mode. Lines appear on the screen to guide you.

Figure 2-26. Writing on the Screen

Note

Some programs that accept writing do not have the **Pen** button. Refer to the documentation for that program to find out how to switch to writing mode.

Converting Writing to Text

To convert the writing to text, tap *Tools* - *Recognize*.

To convert certain words, select them before tapping *Recognize* on the *Tools* menu (or tap and hold the selected words, then tap *Recognize* on the pop-up menu). If a word is not recognized, it is left as writing.

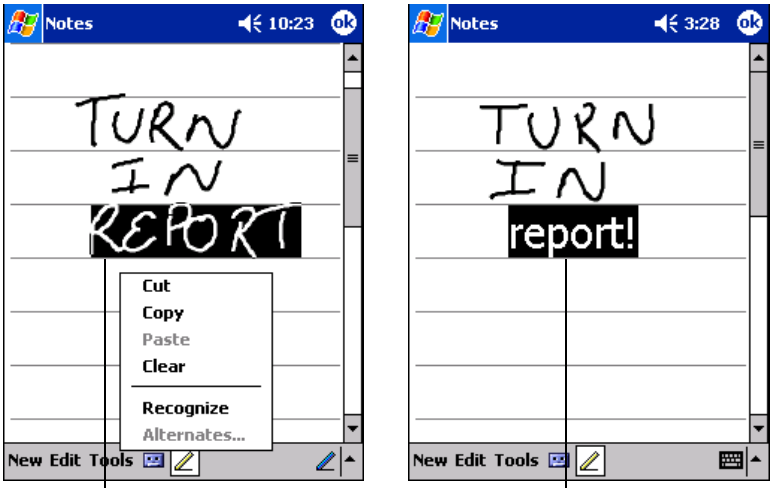


Figure 2-27. Writing on the Screen

If the conversion is incorrect, select different words from a list of alternates or return to the original writing. Tap and hold the incorrect word only. On the pop-up menu, tap *Alternates*. A list of alternate

words appears. Tap the word you want to use, or tap the writing at the top of the menu to return to the original writing.

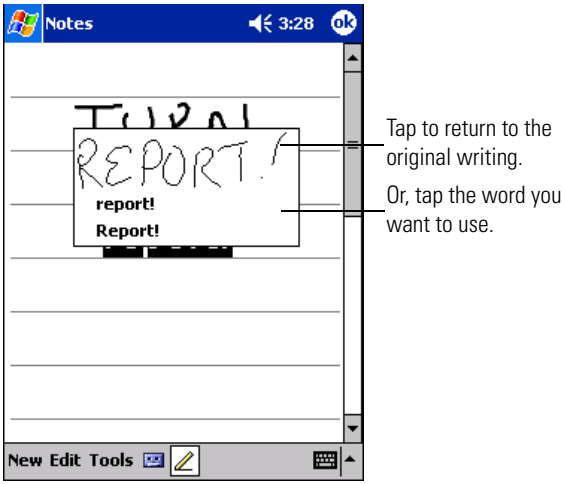


Figure 2-28. Alternate List

Writing Tips

- Write neatly.
- Write on the lines and draw descenders below the line. Cross off the "t" and write apostrophes below the top line so they are not confused with the word above. Write periods and commas above the line.
- For better recognition, try increasing the zoom level to 300% using the *Tools* menu.
- Leave large gaps between words so the mobile computer can easily tell where words begin and end.
- Hyphenated words, foreign words that use special characters such as accents, and some punctuation cannot be converted.
- If you add writing to a word to change it (such as changing a "3" to an "8") after you attempt to recognize the word, the writing you add is not included if you try to recognize the writing again.

Selecting Text

To edit or format typed text, select it by dragging the stylus across the text. Cut, copy, and/or paste text by holding the selected words then tapping an editing command on the pop-up menu, or by tapping the command on the *Edit* menu.

Selecting Writing

To select writing to edit or format:

1. Tap and hold the stylus next to the text you want to select until the insertion point appears.
2. Drag the stylus across the text.

If you accidentally write on the screen, tap *Edit - Undo Ink* and try again. You can also select text by tapping the **Pen** button to deselect it, then dragging the stylus across the screen.

You can cut, copy, and paste written text in the same way you work with typed text: tap and hold the selected words, then tap the command from the pop-up menu, or select the command from the *Edit* menu.

Drawing on the Screen

Drawing on the screen is similar to writing on the screen. To create a drawing, cross three ruled lines on the first stroke. A drawing box appears. Subsequent strokes in or touching the drawing box become part of the drawing. Drawings that do not cross three ruled lines are treated as writing.

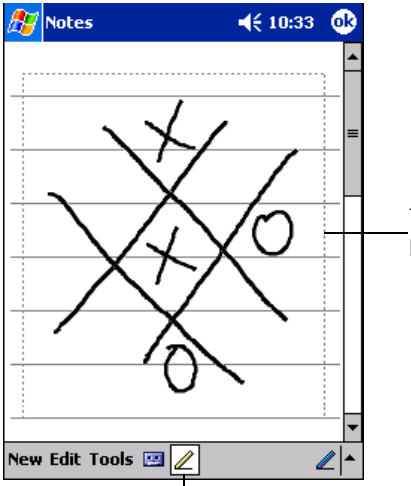


Figure 2-29. Drawing on the Screen

Note

To change the zoom level, select a zoom level from the Tools menu.

Selecting a Drawing

To select a drawing to edit or format, tap and hold the stylus on the drawing until the selection handle appears.

To select multiple drawings, deselect the **Pen** button, then drag to select the drawings you want.

To cut, copy, and paste drawings, tap and hold the selected drawing, then tap an editing command on the pop-up menu, or tap the command from the *Edit* menu. To resize a drawing, deselect the **Pen** button and drag a selection handle.

Recording a Message

You may record a message to capture thoughts, reminders, and phone numbers. In Calendar, Tasks, and Contacts, you can include a recording in the *Notes* tab. In the Notes program, you can either create a stand-alone recording or include a recording in a written note.

To create a recording:

1. Start the Notes application.
2. Tap the *Record* icon to begin recording.
3. Hold the mobile computer's microphone near your mouth or other source of sound.

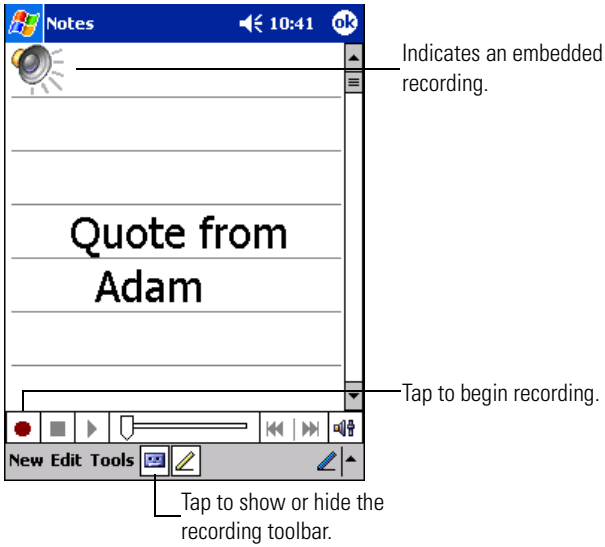


Figure 2-30. Recording Screen

4. When you are finished, tap the **Stop** button. The new recording appears in the note list or as an embedded icon.
5. To play a recording, tap it in the list or tap its icon in the note.

Using My Text

When using Inbox or MSN Messenger, use My Text to quickly insert preset or frequently used messages into the text entry area. To insert a message, tap *My Text* and tap a message.

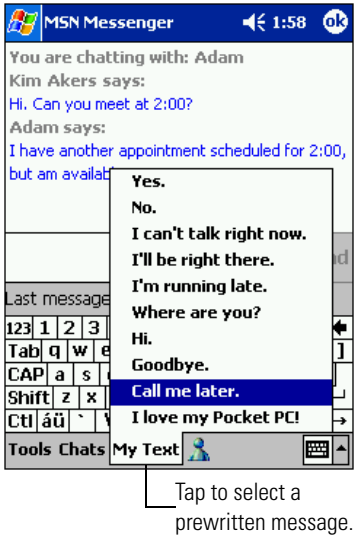


Figure 2-31. Using My Text

Note

You can add text after inserting a My Text message before sending it.

To edit a My Text message, tap *Tools - Edit - My Text Messages*. Select the message you wish to edit and make the changes.

Entering Information Using Keypads

The alphanumeric keypads produce the 26-character alphabet (A-Z), numbers (0-9), function keys and assorted characters. For detailed information about each keypad available for use with the mobile computer, see *Keypads on page 2-4*, *Keypad Special Functions on page 2-29* and *Appendix E, Keypad Maps*.

Entering Data

An integrated bar code scanner or imager on the mobile computer can scan data into data fields, using a scan or image application, in the same way data is entered via the keyboard. In addition, mobile computers with an integrated imager can capture and store still images. For more information, see *page B-13* and *Imager on page B-32*.

Finding Information

The Find feature locates information. Tap *Start* - *Find* to launch this feature. Enter the text you want to find, select a data type, then tap *Go*.

To find information taking up storage space on the mobile computer, select *Larger than 64 KB* from the *Type* drop-down list.

You can also use the File Explorer to find files and organize them into folders. Tap *Start* - *Programs* - *File Explorer* to launch Explorer.

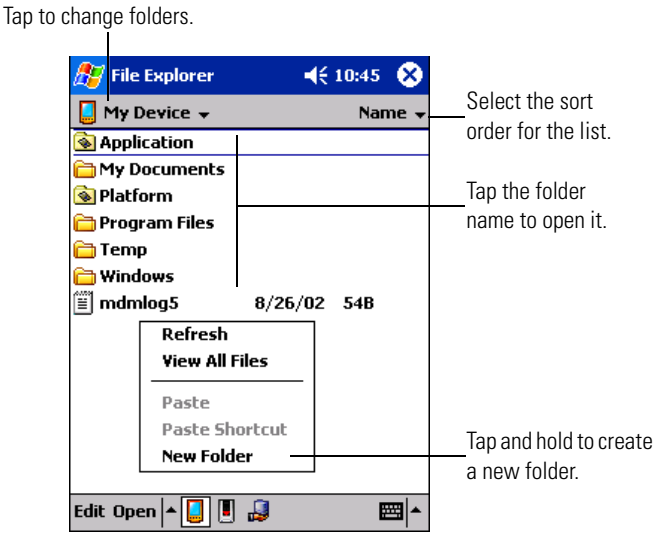


Figure 2-32. File Explorer

Note

To move files in File Explorer, tap and hold the item, then tap Cut or Copy and Paste on the pop-up menu.

Data Capture

Mobile computers with an integrated laser scanner allow you to collect data by scanning one dimensional bar codes.

Mobile computers with an integrated imager allow you to collect data by decoding one dimensional bar codes (including RSS) and two dimensional bar codes (including PDF417 and DataMatrix), and capture and download images to a host for a variety of imaging applications.

Mobile computers with RFID technology (MC906R-G) allow you to collect data by decoding in-range RFID tags that beam back to the mobile computer the information they contain.

Laser Scanning

Mobile computers with an integrated laser scanner have the following features:

- Reading of a variety of bar code symbologies, including the most popular linear, postal, and 1-D code types.
- Advanced intuitive laser aiming for easy point-and-shoot operation.

Imaging

Mobile computers with an integrated imager have the following features:

- Omnidirectional reading of a variety of bar code symbologies, including the most popular linear, postal, PDF417 and 2-D matrix code types.
- The ability to capture and download images to a host for a variety of imaging applications.
- Advanced intuitive laser aiming for easy point-and-shoot operation.

The imager uses digital camera technology to take a digital picture of a bar code, stores the resulting image in its memory and executes state-of-the-art software decoding algorithms to extract the data from the image.

Aiming the Imager

The mobile computer's integrated imager projects a laser aiming pattern (shown below) similar to those used on cameras. The aiming pattern is used to position the bar code or object within the field of view.

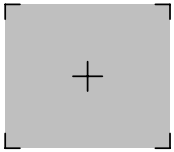


Figure 2-33. Laser Aiming Pattern

Operational Modes

Mobile computers with an integrated imager have two modes of operation: Decode Mode and Image Capture Mode. Both modes are activated by pulling the trigger.

Decode Mode

In this mode, upon pulling the trigger, the Imager attempts to locate and decode enabled bar codes within its field of view. The Imager remains in this mode as long as the trigger is pulled, or until a bar code is decoded.

Image Capture Mode

In this default mode, upon pulling the trigger, the Imager attempts to locate and decode enabled bar codes within its field of view. The Imager remains in this mode as long as the trigger is pulled, or until a bar code is decoded.

RFID (MC906R-G RFID Only)

While the trigger is pressed on MC906R-G mobile computers with RFID technology, the mobile computer interrogates all of the RFID tags within the radio frequency (RF) field of view. The mobile computer captures data from each new tag found. When the trigger is released, the mobile computer stops interrogating tags. In addition, RFID tag data can be stored on the mobile computer. Using the MC906R-G RFID sample application, tags that are read display in the main RFID *Tags* window (see *Figure C-24 on page C-35*).

Scanning Considerations

Typically, scanning is a simple matter of aim, scan/decode and a few quick trial efforts master it. However, two important considerations can be used to optimize any scanning performance:

- Range

  Any scanning device decodes well over a particular working range — minimum and maximum distances from the bar code. This range varies according to bar code density and scanning device optics.

  Scanning within range brings quick and constant decodes; scanning too close or too far away prevents decodes. Move the scanner closer and further away to find the right working range for the bar codes being scanned. However, the situation is complicated by the availability of various integrated scanning modules. The best way to specify the appropriate working range per bar code density is through a chart called a decode zone for each scan module. A decode zone simply plots working range as a function of minimum element widths of bar code symbols.

- Angle

  Scanning angle is important for promoting quick decodes. When laser beams reflect directly back into the scanner from the bar code, this specular reflection can "blind" the scanner.

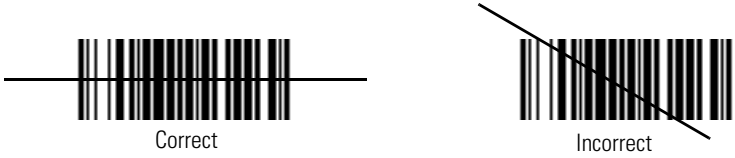
  To avoid this, scan the bar code so that the beam does not bounce directly back. But don't scan at too sharp an angle; the scanner needs to collect scattered reflections from the scan to make a successful decode. Practice quickly shows what tolerances to work within.

Contact the Symbol Support Center if chronic scanning difficulties develop. Decoding of properly printed bar codes should be quick and effortless.

Scanning Bar Codes

1. Ensure that a scan enabled application is loaded on the mobile computer.
2. Aim the scan exit window at the bar code.
3. Pull the trigger.
   - For mobile computers with a laser scanner, ensure the red scan beam covers the entire bar code. The red scan LED lights to indicate that the laser is on. The green scan LED lights and an audible beep sounds, by default, to indicate the bar code was decoded

successfully.



- For mobile computers with an imager, place the bar code in any orientation within the aiming pattern. Ensure the entire symbol is within the rectangular area formed by the brackets in the aiming pattern. The red laser aiming pattern turns on to assist in aiming. If necessary, the mobile computer turns on its red LED to illuminate the target bar code. The green scan LED lights and an audible beep sounds, by default, to indicate the bar code was decoded successfully.

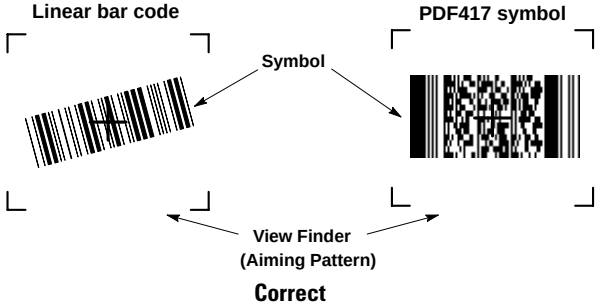


Figure 2-34. Bar Code Centered in Aiming Pattern

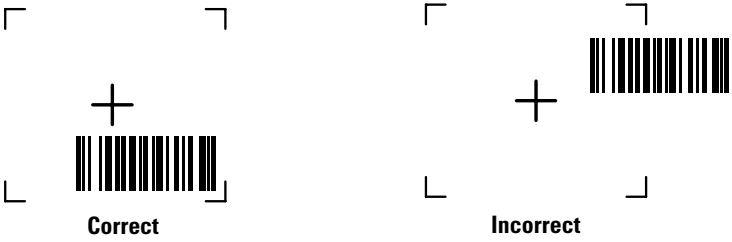


Figure 2-35. Bar Code Not Centered in Aiming Pattern

4. Release the trigger.

Note

Imager decoding usually occurs instantaneously. The mobile computer repeats the steps required to take a digital picture (image) of a poor or difficult bar code, as long as the trigger remains pulled.

Scanning Tips

Optimal scanning distance varies with bar code density and scanner optics.

- Hold the scanner farther away for larger symbols.
- Move the scanner closer for symbols with bars that are close together.

Note

Scanning procedures depend on the application and mobile computer configuration. An application may use different scanning procedures from the one listed above.

Reading RFID Tags

1. Ensure that an RFID tag reader enabled application is loaded on the mobile computer.
2. Aim the scan exit window at the tag.

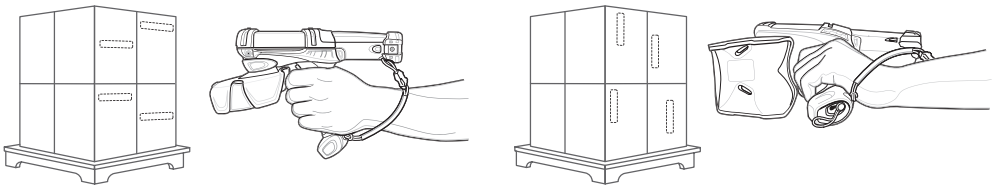


Figure 2-36. RFID Tag Reading

Note

For a successful tag read, the allowable read distance from the front of the mobile computer's scan exit window to the tag is .2 ft - 10 ft (.061 m to 3.1 m). Reader motion horizontally and/or vertically may enhance tag reading ability.

3. If necessary, position the mobile computer horizontally or vertically (as shown in Figure 2-36), depending on the orientation of the tag.
4. Pull the trigger.
5. An audible beep sounds, by default, and the Indicator LED bar flashes green one time to indicate the tag was decoded successfully.

6. Release the trigger.

Note

Tag decoding usually occurs instantaneously. The mobile computer repeats the steps required to read a tag as long as the trigger remains pulled. For more information about reading RFID tags and using MC906R-G RFID mobile computers, see *Appendix C, RFID Demo Program*.

Scan LED Indicator

The Indicator LED bar on the mobile computer provides a visual indication of the scan status. See *Figure 1-1 on page 1-3* for the location of the Indicator LED bar.

Table 2-10. Scan LED Indicators

LED Status	Indication
MC9000-G Series:	
Off	Not scanning.
Solid Red	Laser enabled, scanning/imaging in process.
Solid Green	Successful decode.
MC906R-G RFID:	
Off	Not scanning.
Flash Once Green	Successful decode.

Resetting the Mobile Computer

If the mobile computer stops responding to input, reset it. There are two reset functions, warm boot and cold boot. A warm boot restarts the mobile computer by closing all running programs.

A cold boot also restarts the mobile computer, but erases all stored records and entries in RAM. Data saved in flash memory or a memory card is not lost. In addition it returns formats, preferences and other settings to the factory default settings.

Perform a warm boot first. This restarts the mobile computer and saves all *stored* records and entries. If the mobile computer still does not respond, perform a cold boot.

Performing a Warm Boot

Hold down the Power button for approximately five seconds. As soon as the mobile computer starts to perform a warm boot release the Power button.

Performing a Cold Boot

A cold boot restarts the mobile computer and erases all user stored records and entries that are not saved in flash memory (Application and Platform folders) or a memory card. *Never perform a cold boot unless a warm boot does not solve the problem.*

*Do not hold down any key, button or the trigger, other than the **Power** button during a reset. Performing a cold boot restores formats, preferences and other settings to the default settings.*

Any data previously synchronized with a computer can be restored during the next ActiveSync operation. See *Chapter 4, Communications* for detailed ActiveSync instructions.

To perform a cold boot:

1. Press the primary battery release on the mobile computer (see *Figure 1-3 on page 1-8* and *Figure 1-4 on page 1-9*) to partially eject the battery from the mobile computer.
2. While the battery is partially released, press and hold the **Power** button and push the battery to fully re-insert it in the mobile computer. One audible click can be heard as the battery is fully inserted.
3. Continue to hold the **Power** button for approximately 15 - 17 seconds.

   As the unit cycles into a cold boot,}}} appears in the upper left corner of the display window, followed by the message *...Booting System.... .*
4. Release the **Power** button.
5. As the mobile computer initializes its system, the Symbol splash window (*Figure 1-7 on page 1-15*) appears for about 30 seconds.

Calibrate the screen. See *Calibrating the Screen on page 1-16* to calibrate the mobile computer screen.

3

Settings

Contents

Introduction

This chapter provides basic instructions for customizing the mobile computer by adjusting settings.

Adjusting Settings

To view available options for the mobile computer settings, tap *Start* - *Settings*. You can adjust settings in either the *Personal* tab or the *System* tab.

Personal Tab

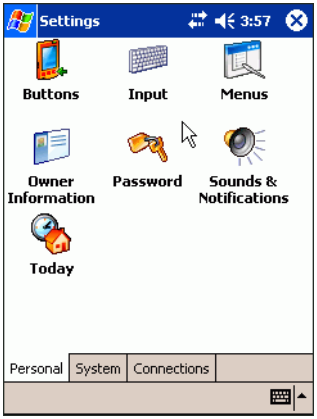


Figure 3-1. Settings - Personal Tab

Table 3-1 lists the applications available in the *Personal* tab.

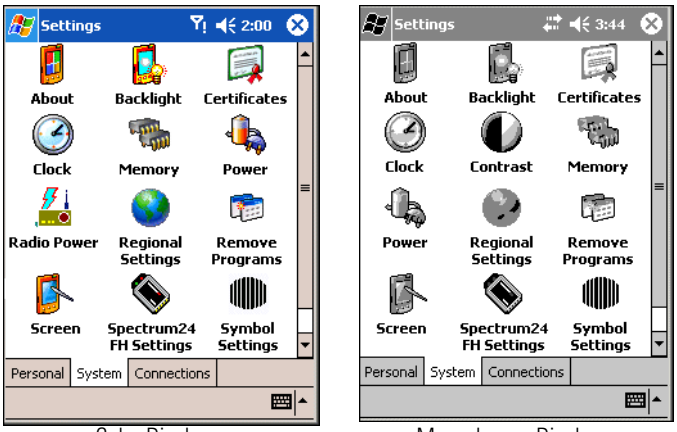
Table 3-1. Personal Tab Applications

Icon	Description
Buttons	Customize Up/Down key control. See *Buttons on page 3-11* for more information. (The *Program Buttons* tab in this window is currently not supported.)
Input	Switch input methods and set input options. See *Input on page 3-12* for more information.

Table 3-1. Personal Tab Applications (Continued)

Icon	Description
 Menus	Configure the items that appear in the *Start* menu. See *Menus on page 3-15* for more information.
 Owner Information	Change owner's personal profiles. See *Owner Information on page 3-17* for more information.
 Password	Change owner's password and set security options. See *Passwords on page 3-20* for more information.
 Sounds & Notifications	Select the type of actions for which you want to hear sounds and customize how you are notified about different events. See *Sounds & Notifications on page 3-23* for more information.
 Today	Customize the information displayed on the *Today* screen. See *Today on page 3-25* for more information.

System Tab



Color Display Monochrome Display

Figure 3-2. Settings - System Tab

Table 3-2 lists the applications available in the *System* tab.

Table 3-2. System Tab Applications

Icon	Description
About	Provides device information and name. See *About on page 3-27* for more information.
Backlight	Customize when and for how long the backlight should stay on. See *Backlight on page 3-30* for more information.
Certificates	View and modify digital certificates which are used by some applications for establishing trust for secure communications. See *Certificates on page 3-34* for more information.
Clock	Change date, time and time zone information. See *Clock on page 3-36* for more information.

Table 3-2. System Tab Applications (Continued)

Icon	Description
 Contrast	Adjust the contrast on the display (monochrome displays only). See *Contrast (Monochrome Devices Only) on page 3-40* for more information.
 Memory	Adjust the allocation of storage and program memory. See *Memory on page 3-41* for more information.
 Power	View battery status and change power management options. See *Power on page 3-44* for more information.
 Radio Power	Turn the power on and off for the 802.11b and Bluetooth radios. (where applicable). See *Radio Power on page 3-48* for more information. View Bluetooth version information (where applicable). See *Bluetooth Versions on page 3-49* for more information.
 Regional Settings	Change how numbers, currencies, dates, and times are displayed. See *Regional Settings on page 3-50* for more information.
 Remove Programs	Remove loaded programs from RAM. See *Remove Programs on page 3-53* for more information.
 Screen	Align the touch screen and enable ClearType fonts. See *Screen on page 3-54* for more information.
 Spectrum24 FH Settings	Change 802.11 Mobile Unit settings. See *Spectrum24 Frequency Hopping (FH) Settings (1 and 2 MB Radios) on page 5-36* for detailed information about Spectrum24 FH settings.

Table 3-2. System Tab Applications (Continued)

Icon	Description
Symbol Settings	Change settings unique to the mobile computer. See *Symbol Settings on page 3-55* for more information.

Connections Tab

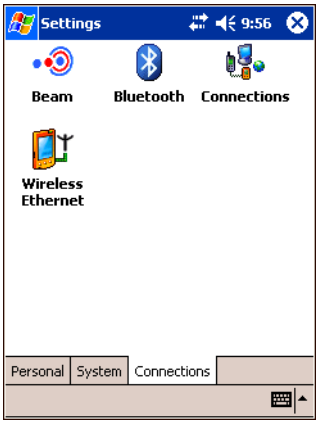


Figure 3-3. Settings - Connections Tab

Table 3-2 lists the applications available in the *System* tab.

Table 3-3. System Tab Applications

Icon	Description
Beam	Detects incoming Bluetooth beams. See *Chapter 6, Bluetooth Wireless Technology* for more information.
Bluetooth	Set up the Bluetooth radio to send and receive beams. See *Chapter 6, Bluetooth Wireless Technology* for more information.

Table 3-3. System Tab Applications (Continued)

Icon	Description
 Connections	Change connection information. See *Connecting to the Internet on a Wireless Network on page 4-21* for more information.
 Wireless Ethernet	Modify wireless Ethernet settings. See *Wireless Ethernet on page 3-59* for more information.

Buttons

Use the *Buttons* window - *Up/Down Control* tab to customize Up/Down key control.

Program Buttons

The *Program Buttons* tab is currently not supported. Refer to the *SMDK Help File for Symbol Mobile Computers* for information about keypad mapping.

Up/Down Control

To set the key repeat rate:

1. Tap *Start* - *Settings* - *Personal* tab - *Buttons* icon - *Up/Down Control* tab.

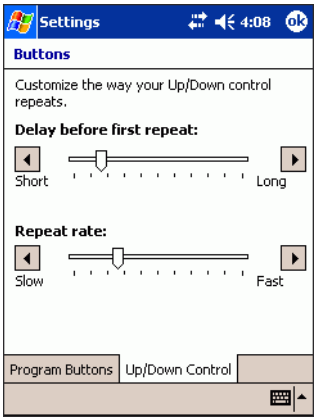


Figure 3-4. Buttons Window - Up/Down Control Tab

2. Adjust the *Delay before first repeat:* slide bar to change the time elapsed before scrolling begins.
3. Adjust the *Repeat rate* slide bar to change the time it takes to scroll from one item to the next.
4. Tap **ok**.

Input

Use the *Input* window to switch input methods and set input options.

Input Method

To select an input method:

1. Tap *Start* - *Settings* - *Personal* tab - *Input* icon - *Input Method* tab.

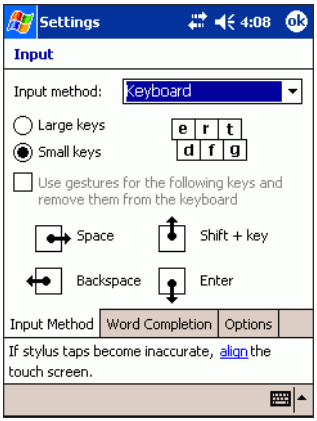


Figure 3-5. Input Window - Input Method Tab

2. From the *Input method:* drop-down list, select the input method.
3. Make any additional desired changes to the settings.
4. Tap **ok**.

Word Completion

To adjust how suggested words pop-up in a window above the input panel:

1. Tap *Start* - *Settings* - *Personal* tab - *Input* icon - *Word Completion* tab.

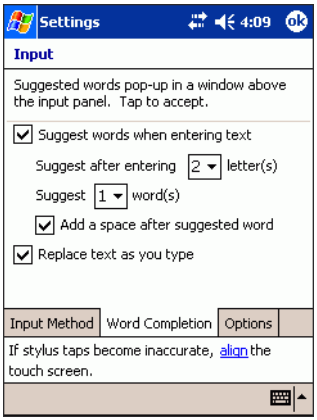


Figure 3-6. Input Window - Word Completion Tab

2. Make the desired changes to the settings.
3. Tap **ok**.

Options

To adjust the options for writing and recording:

1. Tap *Start* - *Settings* - *Personal* tab - *Input* icon - *Options* tab.

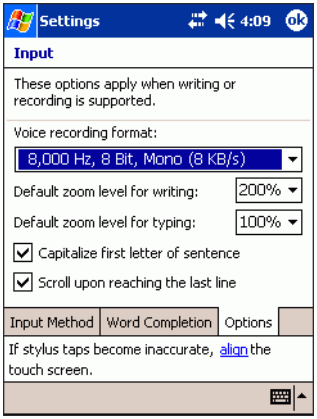


Figure 3-7. Input Window - Options tab

2. Make the desired changes to the settings.
3. Tap **ok**.

Menus

Use *Menus* window to change the items that appear in the *Start* menu.

Start Menu

To change the items that appear in the *Start* menu:

1. Tap *Start* - *Settings* - *Personal* tab - *Menus* icon - *Start Menu* tab.

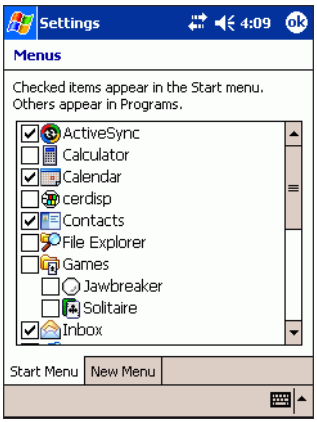


Figure 3-8. Menus Window - Start Menu Tab

2. Select the programs that you want to appear in the *Start* menu.
3. Tap **ok**.

You can create subfolders and shortcuts to appear under *Start* menu. In ActiveSync on the host computer, click *Explore*. Double-click *My Pocket PC*, double-click *Windows*, double-click *Start Menu*, and then create the folders and shortcuts that you want.

New Menu

To enable the *New* menu:

Tap *Start* - *Settings* - *Personal* tab - *Menus* icon - *New Menu* tab.

Figure 3-9. Menus Window - New Menu Tab

1. Select the *Turn on the New button menu* check box.
2. Select the items to appear on the menu.

   An arrow appears next to *New* in the command bar of certain programs such as Pocket Word, Pocket Excel, Contacts, Calendar, and Tasks. You can tap this arrow and then tap a new item to create.

3. Tap **ok**.

Owner Information

Use the *Owner Information* window to enter information about the owner. The information can be displayed when the mobile computer is turned on.

Identification

To enter personal information:

1. Tap *Start* - *Settings* - *Personal* tab - *Owner Information* icon - *Identification* tab.

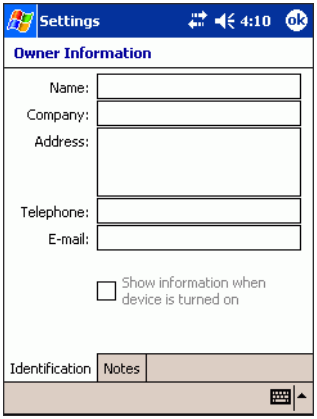


Figure 3-10. Owner Information Window - Identification Tab

2. Fill in or edit the data as desired.
3. To have this information display when you start the mobile computer, select the *Show information when device is turned on* check box.
4. Tap **ok**.

Notes

To add more information about the owner:

1. Tap *Start* - *Settings* - *Personal* tab - *Owner Information* icon - *Notes* tab.

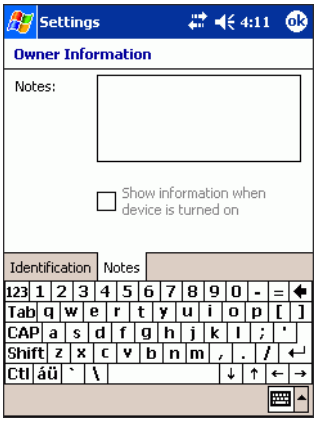


Figure 3-11. Owner Information Window - Notes Tab

2. Enter information in the *Notes:* box.
3. To have this information display when you start the mobile computer, select the *Show information when device is turned on* check box.
4. Tap **ok**.

After the information is entered and the *Show information when device is turned on* check boxes are selected, the *Welcome* window appears whenever the mobile computer is powered on. Tap the screen with the stylus to exit the *Welcome* window.

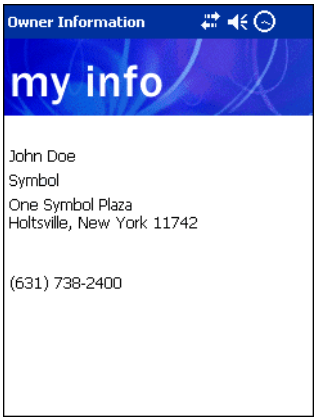


Figure 3-12. Welcome Window

Passwords

Use the *Password* window to set a password to disable unauthorized access to the mobile computer.

Password

If the device is configured to connect to a network, use a strong (difficult to figure out) password to help protect network security. Password cracking tools continue to improve and the computers used to crack passwords are more powerful than ever.

CAUTION

If you forget the password, or if the mobile computer has become corrupted and soft resetting doesn't work, you must perform a cold boot. Performing a cold boot erases all files and data that you have created, and programs you have installed.

1. Tap *Start* - *Settings* - *Personal* tab - *Password* icon - *Password* tab.

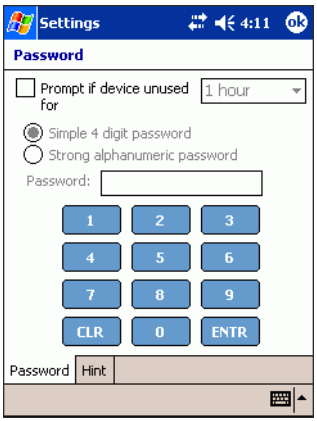


Figure 3-13. Password Window - Password Tab

2. Select *Prompt if device unused for* check box to enable password protection.
3. From the drop down list, select a time value for the protection to take affect after non-use.
4. Select either *Simple 4 digit password* or *Strong alphanumeric password* radio button to set a password.
5. For a simple password, In the *Password* field, enter a four digit password.
6. For a stronger password:

a. In the *Password:* field, enter a seven character password. A strong password must contain at least seven characters that are a combination of uppercase and lowercase letters, numerals, and punctuation.

Figure 3-14. Alphanumeric Password

b. In the *Confirm:* field, re-enter the password.

7. Tap **ok**.

Hint

To set hint so that you can remember the password:

1. Tap *Start* - *Settings* - *Personal* tab - *Password* icon - *Hint* tab.

Figure 3-15. Password Window - Hint Tab

2. In the text box, enter a password hint that would remind you of the password you set.
3. Tap **ok**.

Sounds & Notifications

Use the *Sounds & Notifications* window to set event sounds and volume options.

Volume

To adjust the system volume and enable event sounds:

1. Tap *Start* - *Settings* - *Personal* tab - *Sounds & Notifications* icon - *Volume* tab.

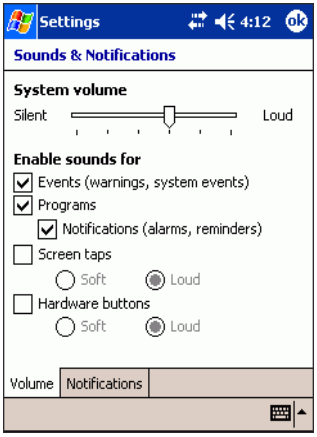


Figure 3-16. Sounds & Notifications Window - Volume Tab

2. Use the slide bar to change the system volume.
3. Select the desired *Enable Sound* options.

Note

Turning off sounds saves power and prolongs battery life.

4. Tap **ok**.

Notifications

On the Notifications tab, you can customize how you are notified about different events.

1. Tap *Start* - *Settings* - *Personal* tab - *Sounds & Notifications* icon - *Notifications* tab.

Figure 3-17. Sounds & Notifications Window - Notifications Tab

2. Select the event name from the *Select an event list* drop-down list.
3. Select the *Play sound* check box to enable the sound notification.
4. Select a sound from the drop-down list.
5. Tap **ok**.

Today

Use the *Today* window to customize the *Today* screen.

Appearance

To change the appearance of the *Today* screen:

1. Tap *Start* - *Settings* - *Personal* tab - *Today* icon - *Appearance* tab.

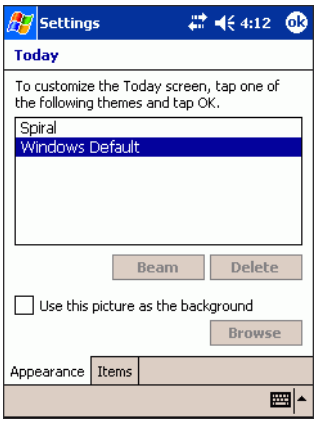


Figure 3-18. Today Window - Appearance Tab

2. Select the desired theme for the *Today* screen background. To use your own background, select *Use this picture as the background* check box and tap **Browse** to locate the desired file on the mobile computer.
3. To beam a theme to another mobile computer, select the desired theme and tap **Beam**. (See *Chapter 6, Bluetooth Wireless Technology* for detailed information.)
4. To delete a theme, select the desired theme and tap **Delete**.
5. Tap **ok**.

Items

To select items that appear on the *Today* screen:

1. Tap *Start* - *Settings Personal* tab - *Today* icon - *Appearance* tab.

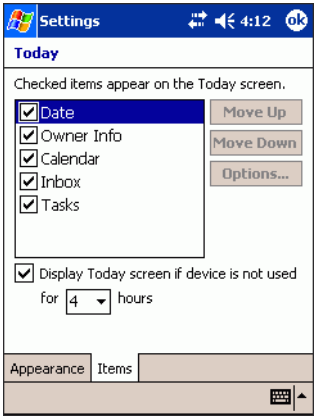


Figure 3-19. Today Window - Items Tab

2. Select the items you want to appear on the *Today* screen. To customize the information further, select an information type, and then tap **Options** (not available for all information types).
3. Tap **ok**.

About

Use the *About* window to view general system properties, change memory settings, input device name and view copyright information.

Version

The *Version* tab view displays general system settings:

1. Tap *Start* - *Settings* - *System* tab - *About* icon - *Version* tab.

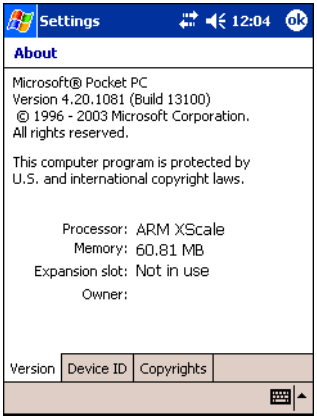


Figure 3-20. About Window - Version Tab

2. Tap **ok**.

Device ID

The *Device ID* tab allows you to customize the name and description of the mobile computer:

1. Tap *Start* - *Settings* - *System tab* - *About* icon - *Device ID* tab.

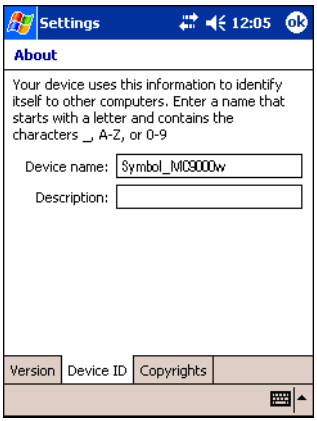


Figure 3-21. About Window - Device ID Tab

2. In the *Device name:* field, enter a name for the mobile computer. Ensure that you do not use spaces.
3. In the *Description:* field, enter a description for the mobile computer.
4. Tap **ok**.

Copyrights

The *Copyrights* tab allows you to view any relevant copyright information.

1. Tap *Start* - *Settings* - *System tab* - *About* icon - *Copyrights* tab.

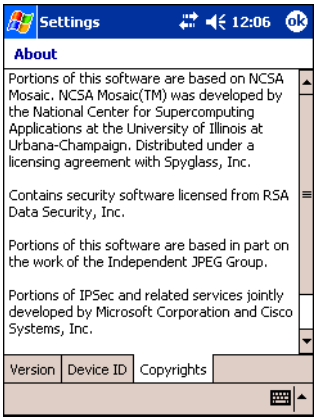


Figure 3-22. About Window - Copyrights Tab

2. Tap **ok**.

Backlight

Use the *Backlight* window to conserve battery power, to turn off the backlight when the mobile computer is idle and to adjust the brightness level. You also have options to turn on the backlight when you tap the screen or press a key.

Battery Power

To set the backlight settings when using battery power:

1. Tap *Start* - *Settings* - *System* tab - *Backlight icon* - *Battery Power* tab.

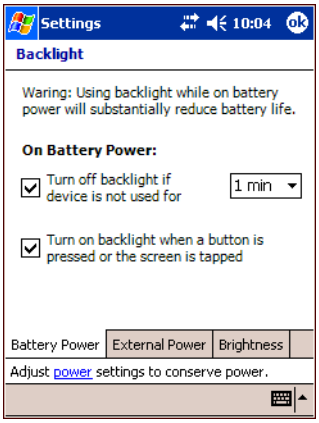


Figure 3-23. Backlight Window - Battery Power Tab

2. Make the desired selections. See Table 3-4 for backlight settings.
3. Tap **ok**.

Display contrast (monochrome units) and display backlight intensity (color units) can also be controlled using the keypad. See *Table 2-7 on page 2-29* for the keypads' special functions.

Note

When you perform a cold boot all settings selected in this view return to the default settings. The settings are maintained after a warm boot.

Table 3-4. Battery Power Backlight Settings

Status	Conditions of light On/Off	Default (Cold Boot)
On Battery Power	Select the *Turn off backlight if device is not used for* check box to turn off the backlight after a certain period of time has passed unused. Period of time can be selected from the list. Available timings are 10 sec, 30 sec, 1 min, 2 min, 3 min, 4 min and 5 min.	Check box is selected. Default time is one minute.
	Select the *Turn on backlight when a button is pressed or the screen is tapped* check box to turn on the backlight when a key is pressed or the screen is tapped.	Check Box is selected.

To change screen brightness level, see *Brightness on page 3-33*.

External Power

To set the backlight settings when using external AC power:

1. Tap *Start* - *Settings* - *System* tab - *Backlight icon* - *External Power* tab.

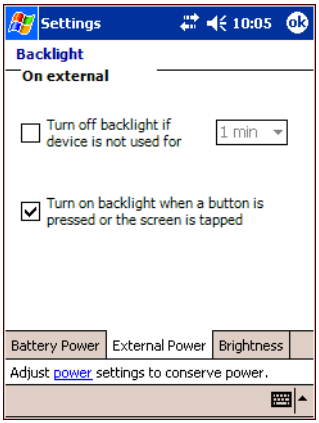


Figure 3-24. Backlight Window - External Power Tab

2. Make the desired selections. See Table 3-5 for backlight settings.
3. Tap **ok**.

Table 3-5. External Power Backlight Settings

Status	Conditions of light On/Off	Default (Cold Boot)
On External Power	Select the *Turn off backlight if device is not used for* check box to turn off the backlight after a certain period of time has passed unused. Period of time can be selected from the list. Available timings are 1 min, 2 min, 3 min, 4 min, 5 min, 6 min, 7 min, 8 min, 9 min and 10 min.	Check Box is not selected. Default time is one minute.
	Select the *Turn on backlight when a button is pressed or the screen is tapped* check box to turn on the backlight when a key is pressed or the screen is tapped.	Check Box is selected.

Brightness

To set the screen's brightness level:

1. Tap *Start* - *Settings* - *System* tab - *Backlight icon* - *Brightness* tab.

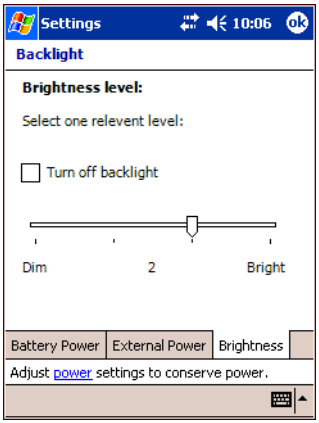


Figure 3-25. Backlight Window - Brightness Tab

2. Select the *Turn off backlight* check box to cancel the touch screen's backlight feature.

   or

   Use the stylus to drag the brightness control to the desired brightness level.

3. Tap **ok**.

Note

When you perform a cold boot all settings selected in this view return to the default settings. The settings are maintained after a warm boot.

Certificates

On the mobile computer you can add and delete public key certificates. These certificates help establish your identity when you are logging onto a secured network, such as a corporate network. Certificates also help establish the identity of other computers, such as servers, with which you connect. This helps prevent unauthorized users from accessing the mobile computer and information.

You can store two types of certificates on the mobile computer: personal certificates that establish your identity, and root certificates that establish the identity of servers with which you connect. The mobile computer may include a set of pre installed certificates. For information about viewing and deleting certificates, see the sections below.

Personal

1. Tap *Start* - *Settings* - *System* tab - *Certificates* icon - *Personal* tab.

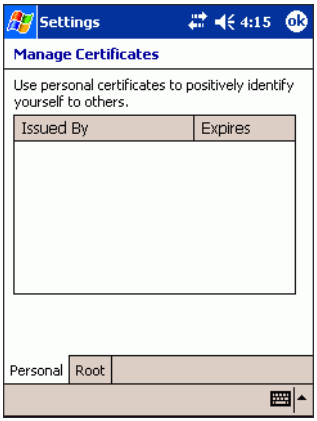


Figure 3-26. Certificates Window - Personal Tab

   The list box displays the name of the certificate issuer and the expiration date.

2. To view more information about a certificate, select it from the list box.
3. To delete a certificate, tap and hold it in the list box, and then tap *Delete*.
4. Tap **ok**.

Root

1. Tap *Start* - *Settings* - *System* tab - *Certificates* icon - *Root* tab.

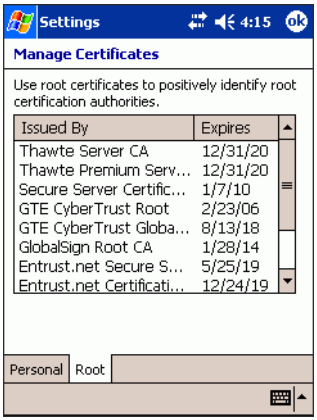


Figure 3-27. Certificates Window - Root Tab

The list box displays the name of the certificate issuer and the expiration date.

2. To view more information about a certificate, select it from the list box.
3. To delete a certificate, tap and hold it in the list box, and then tap *Delete*.
4. Tap **ok**.

Clock

Use the *Clock* window to change the date, time, time zone and set alarms.

Time

To set the date, time and time zone:

1. Tap *Start* - *Settings* - *System* tab - *Clock* icon - *Time* tab.

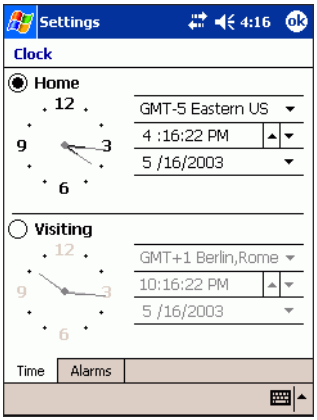


Figure 3-28. Clock Window - Time Tab

2. Select the *Home* radio button.
3. Select the current time zone from the time zone drop-down list.
4. To set the hour:
   a. Tap on the hour field and use the up and down arrows to the right of the time to adjust the hour.

   or

   b. On the clock face, tap and drag the hour hand to the current hour.
5. To set the minutes:
   a. tap on the minute field and use the up and down arrows to the right of the time to adjust the minutes

   or

   b. On the clock face, tap and drag the minute hand to the current minutes.

6. To set the date, tap in the date field.
7. Tap the down arrow to the right of the date field. The calendar appears.

Figure 3-29. Calendar

8. To select the month and year, tap the arrows to the right or left of the month until the current month displays.
9. Tap the day of the month. The calendar disappears.
10. Tap **ok**.

If you visit a particular time zone often, set it as your *Visiting* time zone so that you can quickly see the correct date and time.

A clock displays on the Navigation bar. To view the current date and time, tap the *Time* icon to see today's date. See *Time Icon on page 2-40* for more information.

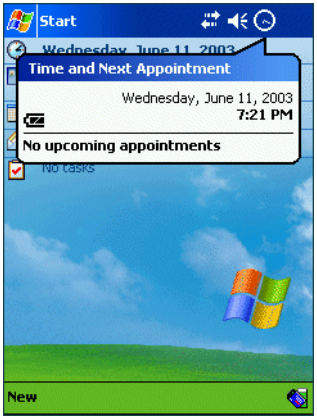


Figure 3-30. Time and Next Appointment Message

To switch from analog to digital clock display, tap and hold the *Time* icon. Select *Analog* or *Digital*.

Alarms

You can use the mobile computer as a travel alarm clock by setting a wake-up alarm.

1. Tap *Start* - *Settings* - *System* tab - *Clock* icon - *Alarms* tab.

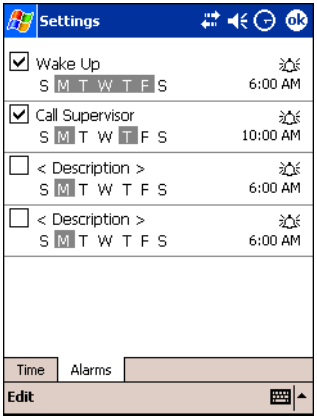


Figure 3-31. Clock Window - Alarms Tab

2. In the *Description* field, enter a name for the alarm.
3. Tap the letter(s) representing the day(s) of the week that the alarm be enabled.
4. Tap the bell icon to set alarm features. The alarm settings window appears.

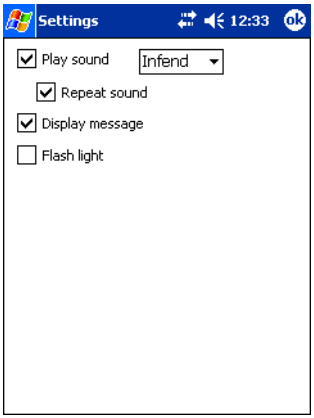


Figure 3-32. Alarm Settings Window

5. Select the *Play sound* check box to enable a sound when the alarm starts.
6. From the drop-down list, select the sound that plays when the alarm goes off.
7. Select *Repeat sound* check box to repeat the sound notification.
8. Select *Display message* check box to enable a message to appear on the screen when the alarm goes off.
9. Tap **ok**.
10. Tap the time field to set the alarm time. The clock window appears.

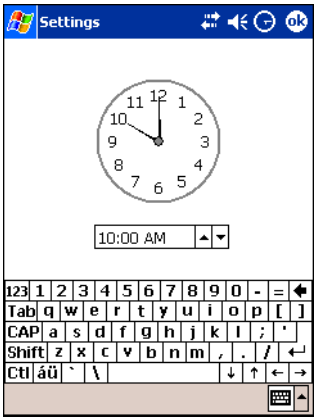


Figure 3-33. Alarm Clock Setting Window

11. Use the time field and arrow buttons to set the time.
12. Tap **ok**.
13. Set up to three more alarms.
14. Tap **ok**.
15. To change the way the date or time is displayed on the mobile computer, see *Regional Settings on page 3-50*.

Contrast (Monochrome Devices Only)

Use the *Contrast* window to change the date, time, time zone and set alarms.

To adjust the contrast on the display:

1. Tap *Start* - *Settings* - *System* tab - *Contrast* icon.

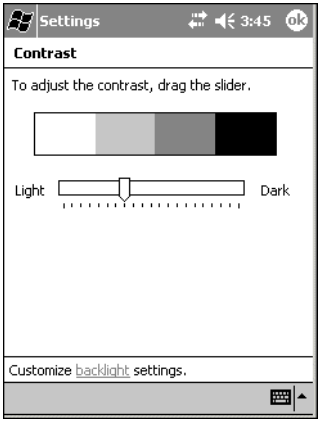


Figure 3-34. Contrast Window

2. Use the stylus to drag the slider to adjust the contrast on the screen.
3. Tap **ok** to exit.

Memory

Use the *Memory* window to adjust RAM allocation, view storage card memory usage and stop active programs.

Main

To temporarily adjust the allocation of storage and program memory:

1. Tap *Start* - *Settings* - *System* tab - *Memory* icon - *Main* tab.

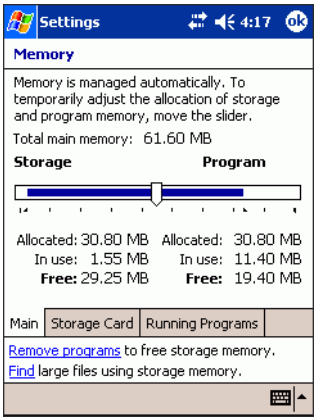


Figure 3-35. Memory Window - Main Tab

2. To adjust RAM allocation move the slider to allocate more memory for programs or storage. If you don't have enough space for a file, increase the amount of storage memory. If the mobile computer is running slowly, try increasing the amount of program memory.
3. Tap **ok**.

Note

Resetting the mobile computer can make additional storage or program memory available. If you continue to experience memory problems, reset the mobile computer.

Programs supplied with the mobile computer are located in ROM and remain after a cold boot. Programs you install are located in RAM and need to be reinstalled after a cold boot. If you have trouble reinstalling programs, adjust RAM allocation.

Storage Card

The *Storage Card* tab displays how much memory is available in a partition in the mobile computer.

1. Tap *Start* - *Settings* - *System* tab - *Memory* icon - *Storage Card* tab.

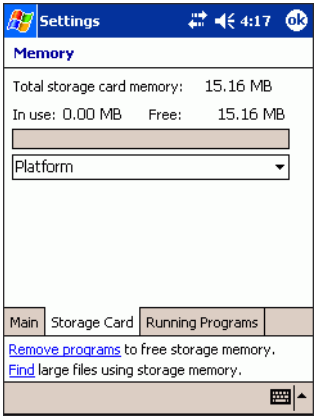


Figure 3-36. Memory Window - Storage Card Tab

2. Tap the drop-down list and then the name of the storage card or Flash File partition whose information you want to view. Minimally, the drop-down list always includes the *Platform* and *Application* partition.
3. Tap **ok**.

Running Programs

The *Running Programs* tab displays the list of currently active programs.

1. Tap *Start* - *Settings* - *System* tab - *Memory* icon - *Running Programs* tab.

Figure 3-37. Memory Window - Running Programs Tab

   The *Running Program List:* lists all running (active) programs.

2. To stop an active program, select the program from the *Running Program List:* list and tap **Stop**.
3. To display an active program, select the program from the *Running Program List:* list box and tap **Activate**.
4. To stop all active programs tap **Stop All**.
5. Tap **ok**.

Power

Use the *Power* window to view the status of the main and backup batteries and set power management options.

Battery

To check the main battery and backup battery status:

1. Tap *Start* - *Settings* - *System* tab - *Power* icon - *Battery* tab.

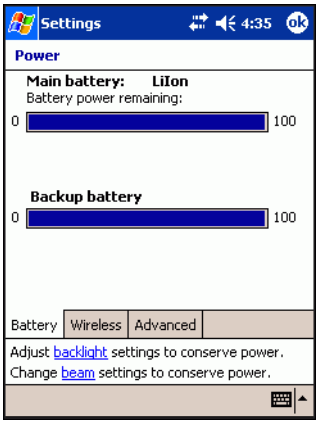


Figure 3-38. Power Window - Battery Tab

The *Battery* tab provides general information about battery conditions. The amount of useful operating time remaining varies depending on battery type and how you use the mobile computer.

2. Tap **ok**.

Wireless

To turn the mobile computer's wireless capabilities on:

1. Tap *Start* - *Settings* - *System* tab - *Power* icon - *Wireless* tab.

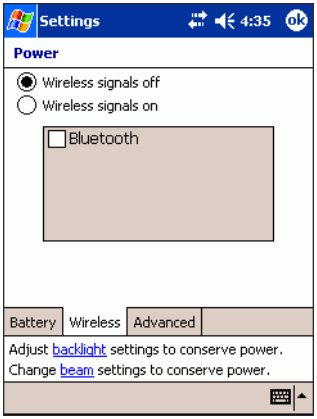


Figure 3-39. Power Window - Wireless Tab

2. Select *Wireless signals on* radio button.
3. In the list box, select the wireless device check box.
4. Tap **ok**.

To turn the mobile computer's wireless capabilities off, select the *Wireless signals off* radio button.

Advanced

You can select options for turning off the mobile computer to conserve battery power. To conserve the most power, select the option to turn off the device after 3 minutes or less.

Note

To optimize display performance, do not leave the display turned on to a fixed image for an extended period of time. Turn the mobile computer off, or use a screen saver when the mobile computer is not in use. Use the mobile computer Power Settings to automatically turn off the display when the unit is not in use, or use a screen saver application.

1. Tap *Start* - *Settings* - *System* tab - *Power* icon - *Advanced* tab.

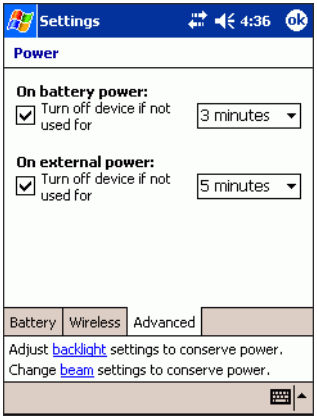


Figure 3-40. Power Window - Advanced Tab

2. Select *On battery power: Turn off device if not used for* check box.
3. Select time value from the drop-down list.
4. Select *On external power: Turn off device if not used for* check box.
5. Select time value from the drop-down list.
6. Tap **ok**.

Optimizing Battery Life

You want the batteries to last as long as possible, especially when you're on the road. Under normal conditions, you can get many hours of use from a single charge. Here are a few tips to help you get the most of the battery:

- Use external power whenever possible, especially when:
  - Using the backlight.
  - Connecting to a host computer.
  - Using accessories.
- Set the mobile computer to turn off when idle. While on battery power, the mobile computer automatically turns off, or suspends operation, if you don't touch the keyboard or use the stylus for three minutes. Maximize battery life by shortening this time.
- Turn off sounds you don't need. By default, the mobile computer produces sounds in response to a number of events, such as warnings, appointments, and key presses. To optimize battery life, turn off any sounds you don't need. See *Sounds & Notifications on page 3-23* for instructions.

When batteries are low, a battery icon appears in the Navigation bar. See *Status Icons on page 2-35* for more information.

Radio Power

Use the *Radio Power* window to turn the power on and off for the 802.11b, Bluetooth and WWAN radios (where applicable).

Note

Available radio power options are based on the configuration of the mobile computer.

Any changes made in this window do NOT persist after a cold boot. Changes do persist after a warm boot.

To turn radio power on and off:

1. Tap *Start* - *Settings* - *System* tab - *Radio Power* icon.

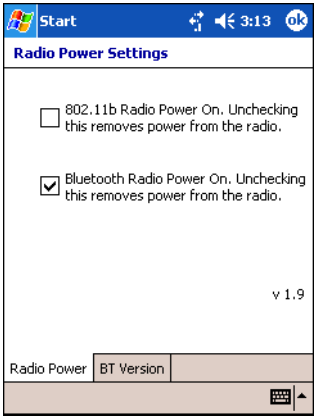


Figure 3-41. Radio Power Window

2. Select the check box for the radio to power on. Deselect the check box for the radio to power off.

3. Tap **ok**.

Bluetooth Versions

Tap the *BT Version* tab to view the versions of Bluetooth radio hardware and software on the mobile computer.

Note

The *BT Version* tab is only available in mobile computers with Bluetooth wireless technology.

1. Tap *Start* - *Settings* - *System* tab - *Radio Power* icon - *Bluetooth* tab.

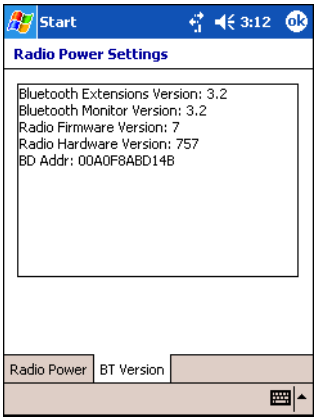


Figure 3-42. Bluetooth Versions Window

2. Tap **ok** to exit.

Regional Settings

With regional settings, you can change the way the mobile computer displays dates, times, currency amounts, large numbers, and numbers with decimal fractions. You can also choose the metric or U.S. system of measurement.

You can also choose from a large number of input locales. When you switch to another input locale, some programs offer special features, such as font characters or spell checkers designed for different languages.

1. Tap *Start* - *Settings* - *System* tab - *Regional Settings* icon - *Region* tab.

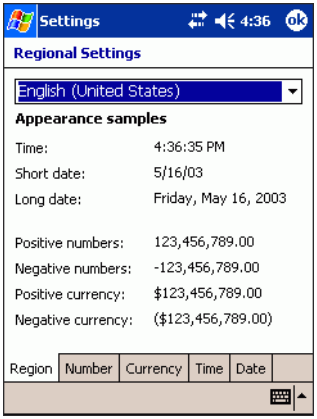


Figure 3-43. Regional Settings Window - Region Tab

2. From the drop-down list, select the country in which you are currently located.

3. Select the *Number* tab.

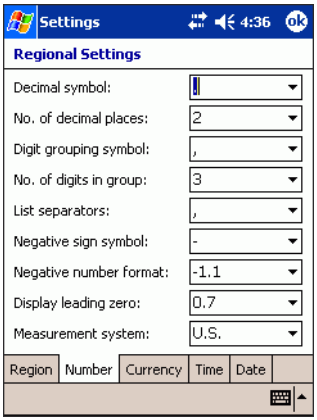


Figure 3-44. Regional Settings Window - Number Tab

4. Select the desired options. The characteristics available are determined by the region selected on the *Region* tab.
5. Select the *Currency* tab.

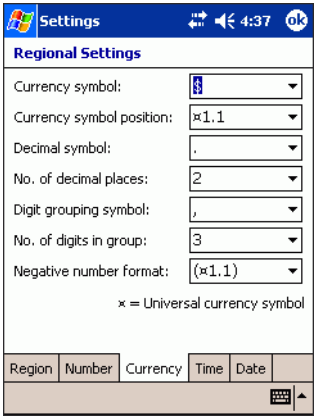


Figure 3-45. Regional Settings Window - Currency Tab

6. Select the desired options. The characteristics available are determined by the region selected on the *Regional* tab.

7. Select the *Time* tab.

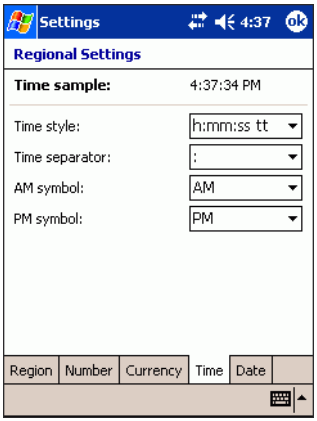


Figure 3-46. Regional Settings Window - Time Tab

8. Select the desired options. The characteristics available are determined by the region selected on the *Region* tab.
9. Select the *Date* tab.

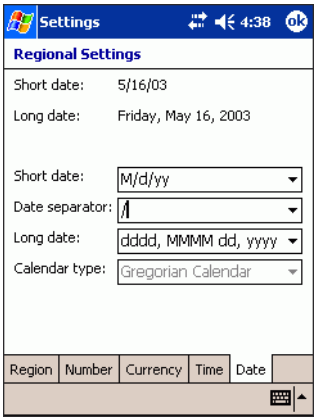


Figure 3-47. Regional Settings Window - Date Tab

10. Select the desired options. The characteristics available are determined by the region selected on the *Region* tab.
11. Tap **ok**.

Remove Programs

Use the *Remove Programs* window to remove programs that were loaded onto the mobile computer:

1. Tap *Start* - *Settings* - *System* tab - *Remove Programs* icon.

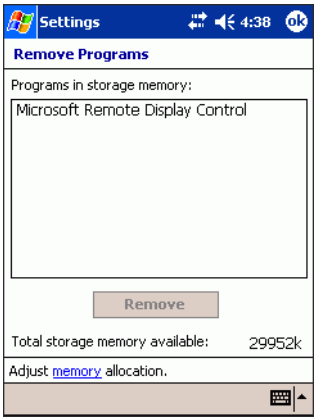


Figure 3-48. Remove Programs Window

2. From the *Programs in storage memory:* list box, select the program you want to remove.
3. Tap **Remove**.

Note

You can only remove programs that you have installed in RAM.

4. Tap **ok**.

Screen

Use the *Screen* window to align the screen and to enable ClearType fonts.

1. Tap *Start* - *Settings* - *System* tab - *Screen* icon.

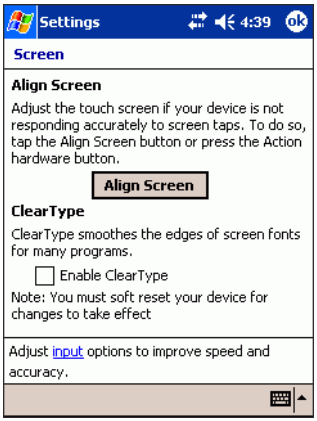


Figure 3-49. Screen Window

2. Tap **Align Screen**.
3. The *align screen* appears. Tap each target with the stylus and following the on-screen messages.
4. Select the **Enable ClearType** check box to enable easier reading of text in programs that support ClearType.
5. Tap **ok**.

Symbol Settings

Use the *Symbol Settings* window to set specific settings for the mobile computer.

Wakeups

The mobile computer can be configured to wakeup from sleep mode.

1. Tap *Start* - *Settings* - *System* tab - *Symbol Settings* icon - *Wakeups* tab.

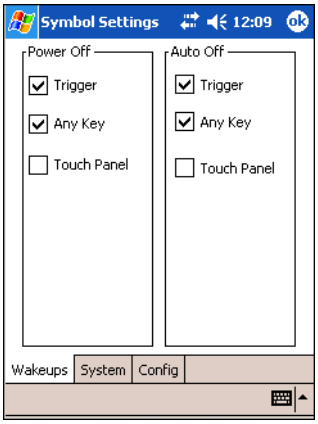


Figure 3-50. Symbol Settings Window - Wakeups Tab

2. Select the *Trigger, Any Key and/or Touch Panel* check box in the *Power Off or Auto Off* list box. See Table 3-6 for a list of wakeup conditions settings.
3. Tap **ok**.

Note

Only the default (Trigger and Any Key) wakeup condition settings are retained after a cold boot. However, all settings are maintained after a warm boot.

Table 3-6. Wakeup Conditions

Status	Description	Action	Conditions for wakeup
Power Off	When the mobile computer goes into sleep mode by pressing the Power button, these actions wake the mobile computer up.	Trigger	Trigger button is pressed.
		Any Key	Any key on the keypad is pressed.
		Touch Panel	Touch screen is tapped.

Table 3-6. Wakeup Conditions (Continued)

Status	Description	Action	Conditions for wakeup
Auto Off	When the mobile computer goes into sleep mode by an automatic power-off function, these actions wake the mobile computer up.	Trigger	Trigger button is pressed.
		Any Key	Any key on the keypad is pressed.
		Touch Panel	Touch screen is tapped.

System

The *System* tab displays mobile computer system data.

1. Tap *Start* - *Settings* - *System* tab - *Symbol Settings* icon - *System* tab.

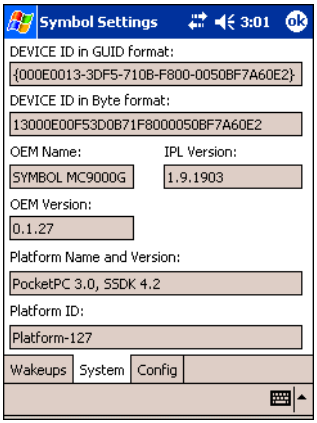


Figure 3-51. Symbol Setting Window - System Tab

2. In the *System* tab you can view the system data listed in *Table 3-7*.

Table 3-7. System Tab Data

Item	Description	Format
DEVICE ID in GUID format	128-bit unique identifier guaranteed across all mobile computers with Windows® Mobile 2003 Software for Pocket PCs.	GUID is a Microsoft defined format.

Table 3-7. System Tab Data

Item	Description	Format
DEVICE ID in Byte format	128-bit unique identifier guaranteed across all mobile computers with Windows® Mobile 2003 Software for Pocket PCs	Byte order
OEM Name	Name of manufacturer's device.	XXXXXX (where X is an alphanumeric character)
IPL Version	Version of IPL.	X.XX (where X is an alphanumeric character)
OEM Version	Manufacturer's version.	X.XX (where X is an alphanumeric character)
Platform Name and Version	Platform and Version of Platform.	PocketPC 3.0, SSDK 4.2
Platform ID	Version of platform hex image.	XXXXXX (where X is an alphanumeric character)

3. Tap **ok**.

Config

The *Config* tab displays mobile computer options installed in the device.

1. Tap *Start* - *Settings* - *System* tab - *Symbol Settings* icon - *Config* tab.

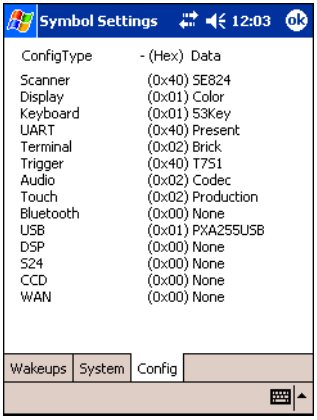


Figure 3-52. Symbol Settings Window - Config Tab

2. In the *Config* tab you can view the configuration data.
3. Tap **ok**.

Connections

Use the *Configure Network Adapters* window to modify IP and server addresses for a wireless Ethernet connection.

Wireless Ethernet

The mobile computer can be configured for a wireless Ethernet connection.

1. Tap *Start* - *Settings* - *Connections* tab - *Wireless Ethernet* icon. The *Configure Network Adapters* window appears.

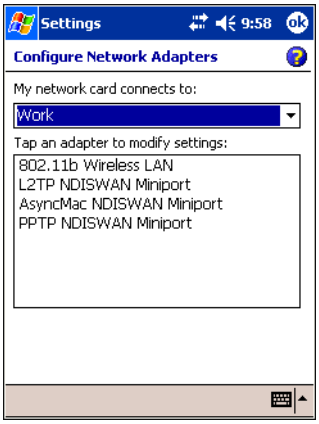


Figure 3-53. Configure Network Adapters Window

2. In the *My network card connects to:* drop-down list, select the appropriate connection.

3. In the *Tap an adapter to modify settings:* list, select the adapter to modify. The *IP address* window displays.

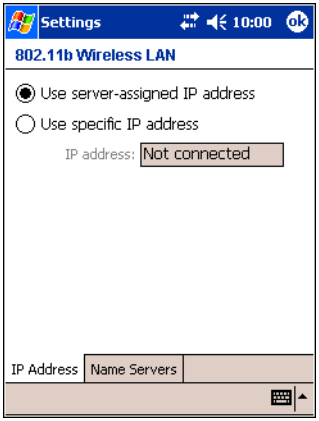


Figure 3-54. Wireless Ethernet - IP Address Window

4. In the *IP address* window, select the appropriate radio button:
   - to *Use a server-assigned IP address*

   or

   - to *Use a specific IP address*.
     If *Use a specific IP address* is selected, enter the IP address, Subnet mask, and Default gateway, as needed.
5. Tap the *Name Servers* tab. The *Name Servers* window appears.

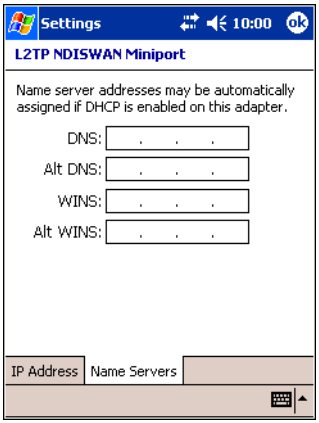


Figure 3-55. Wireless Ethernet - Name Servers Window

6. Enter the appropriate DNS, Alt DNS, WINS, and Alt WINS server addresses.
7. Tap **ok**.

Figure 3-56. Adapters

8. Tap **ok** to confirm the setup.
9. Tap **ok** to exit.

4 Communications

Contents

Introduction

The mobile computer is capable of communicating with a number of hosts, including development computers, serial devices, printers, etc. The available accessories serve as essential data communication devices, enabling the information to be synchronized on the mobile computer with the information on the host device using ActiveSync. With the appropriate accessory and software, the mobile computer can establish a number of connection types, such as a serial connection, a USB connection and an Ethernet connection.

For an Ethernet connection, use the Four Slot Ethernet Cradle.

For a serial or USB connection, use one of the accessories listed below.

- Single Slot Serial/USB Cradle
- Cable Adapter Module (CAM)
- Magnetic Stripe Reader (MSR).

This chapter provides information on installing the appropriate communication software and setting up the appropriate accessory to enable communication between the mobile computer and the host device. For more information about the accessories available for the mobile computer, see *Chapter 10, Accessories*.

Installing Communication Software

To successfully communicate with the various host devices Microsoft ActiveSync (version 3.7 or higher) must be installed on the host computer.

Installing ActiveSync

Use ActiveSync (version 3.7 or higher) to synchronize the information on the mobile computer with the information on the host computer. Changes made on the mobile computer or host computer appear in both places after synchronization.

ActiveSync software:

- Allows the user to work with mobile computer-compatible host applications on the host computer. ActiveSync replicates data from the mobile computer so data can be viewed, entered and modified on the mobile computer with the host application.
- Synchronize files between the mobile computer and host computer. The files are automatically converted to the correct format.

- Back up the data stored on the mobile computer. Synchronization is a one-step procedure that ensures the data is always safe and up-to-date.
- Copy (rather than synchronize) files between the mobile computer and host computer.
- Control when synchronization occurs by selecting a synchronization mode, e.g., set to synchronize continually while the mobile computer is connected to the host computer, or set to only synchronize on command.
- Select the types of information to synchronize and control how much data is synchronized.

To install ActiveSync on the host computer:

1. Download the latest version of the software from the Microsoft web site at http://www.microsoft.com. Refer to the installation and RAS instructions included with the ActiveSync software.
2. Set up a partnership via the ActiveSync connection using a serial or USB connection to the host computer.

Microsoft recommends installing ActiveSync on the host computer before connecting the mobile computer.

Setting up a Partnership

After ActiveSync installation is complete, the ActiveSync Setup Wizard helps the user to connect the mobile computer to the host computer, set up a partnership to synchronize information between the mobile computer and host computer and customize synchronization settings.

Before setting up a partnership between the mobile computer and host computer, see the communication setup sections in this chapter for detailed information about Serial, USB and Ethernet communication setups.

To set up a partnership:

1. If the *Get Connected* window does not appear on the host computer, select *Start - Programs - Microsoft ActiveSync - File - Get Connected*.

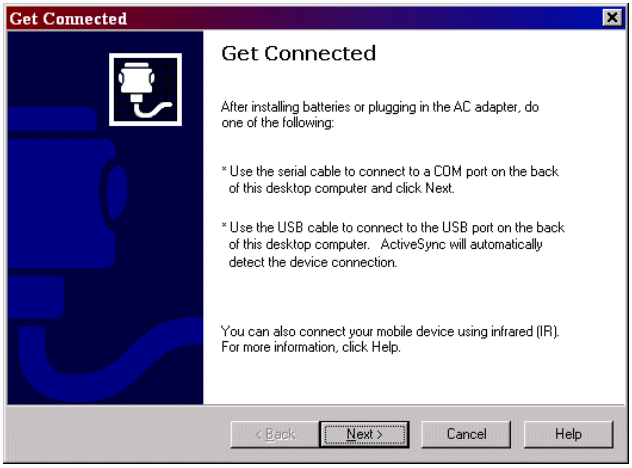


Figure 4-1. Get Connected Window

2. Connect the mobile computer to the host computer using the appropriate Serial connection (see *Chapter 10, Accessories*).
3. On the host computer, select **Next** in the *Get Connected* window.

4. The host computer and the mobile computer attempt to synchronize. The *New Partnership* window appears.

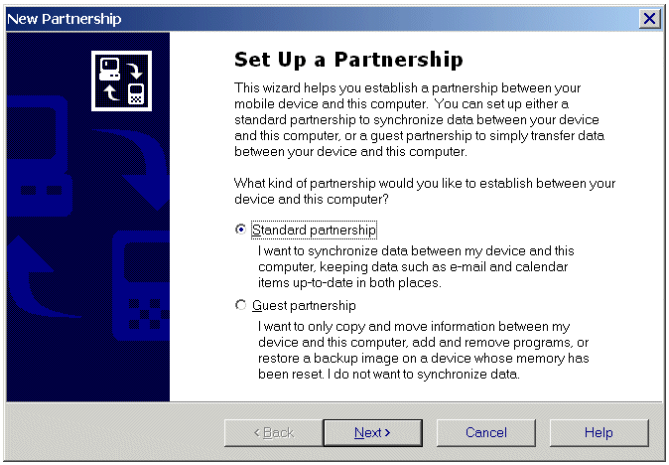


Figure 4-2. New Partnership Window

5. Click the *Standard partnership* radio button and then select **Next**. The *New Partnership/ Specify how to synchronize data* window appears.

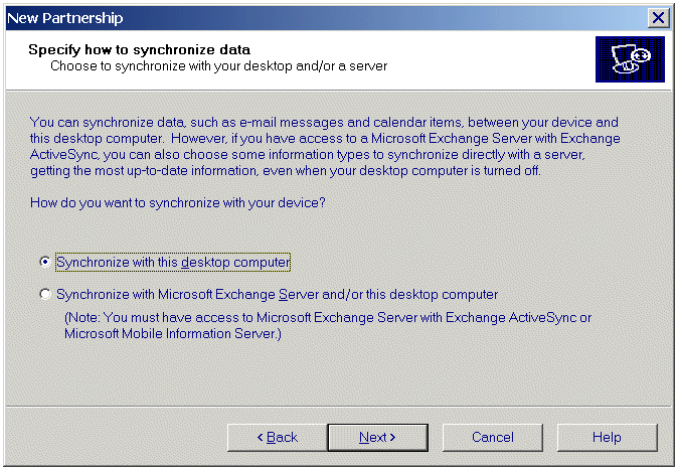


Figure 4-3. How To Sync Window

6. Click the *Synchronize with this desktop computer* radio button and select **Next**. The *New Partnership/Select Number of Partnerships* window appears.

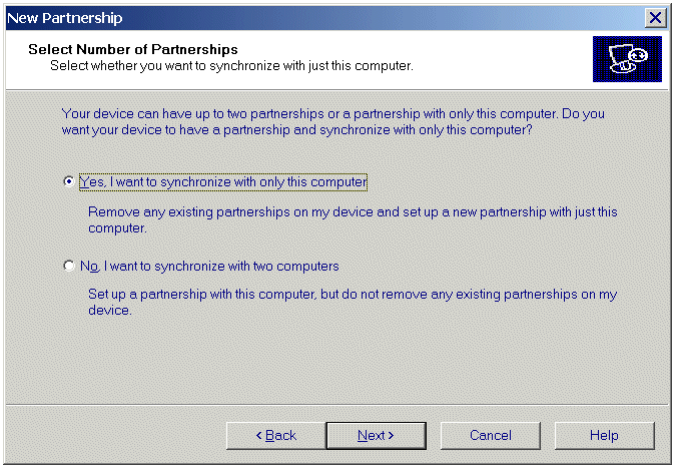


Figure 4-4. How To Sync Window

7. Click the *Yes, I want to synchronize with only this computer* radio button and then select **Next**. The *New Partnership/Select Synchronization Settings* window appears.

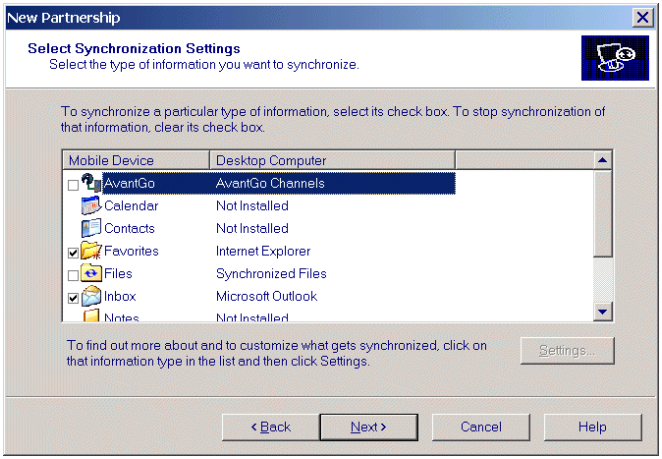


Figure 4-5. Select Synchronization Settings Window

8. To synchronize a particular type of information, select its check box. To stop synchronization of that information, clear its check box.

9. Select **Next**. The *New Partnership/Setup Complete* window appears.

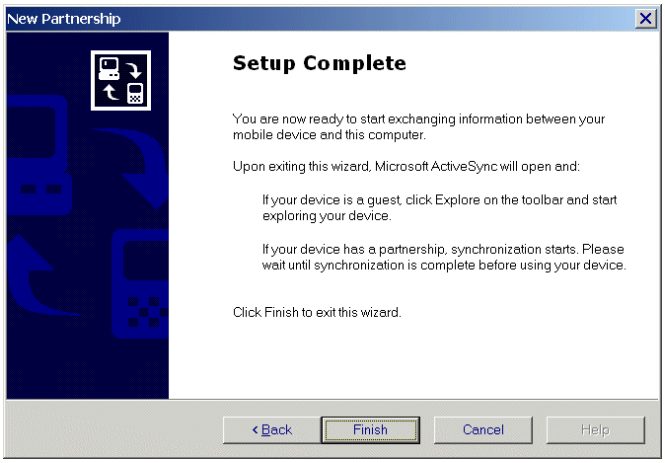


Figure 4-6. Setup Complete Window

10. Select **Finish**. The *Microsoft ActiveSync* window appears showing the connection status and the data synchronized.

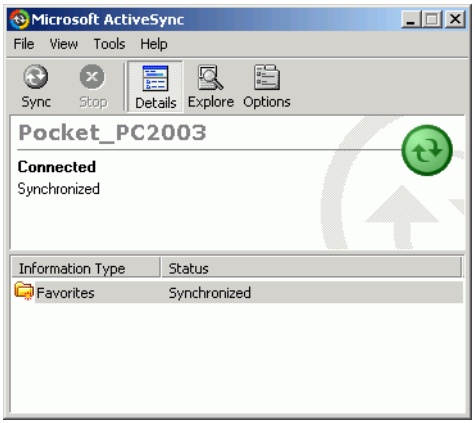


Figure 4-7. ActiveSync Connected Window

During the first synchronization, information stored on the host computer is copied to the mobile computer. When the copy is complete and all data is synchronized, the mobile computer can be disconnected from the host computer.

Note

The first ActiveSync operation must be performed with a local, direct connection.
To retain partnerships after a cold boot, capture partnership registry information in a .reg file and save it in the Flash File System. Refer to the SMDK Help File for Symbol Mobile Computers for details.

For more information about using ActiveSync, start ActiveSync on the host computer and refer to the ActiveSync Help.

Serial Communication Setup

Note

For serial communication using accessories that can communicate with either a serial or USB connection, connect only the serial cable. Do not connect both the serial and USB cables. If both serial and USB communication cables are required, the host computer's USB port must be disabled in ActiveSync before serial communication can be enabled.

Setting Up a Connection on the Mobile Computer

1. On the mobile computer tap *Start* - *ActiveSync* to display the *ActiveSync* window.

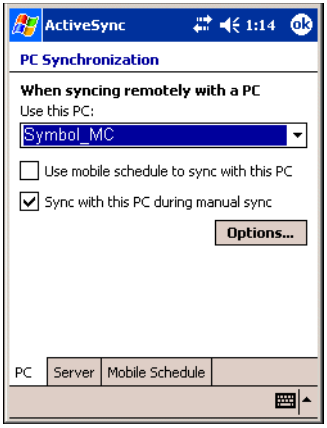


Figure 4-8. ActiveSync Window

2. Tap *Tools - Options* on the *ActiveSync* window to display the *PC Synchronization* window - *PC* tab.

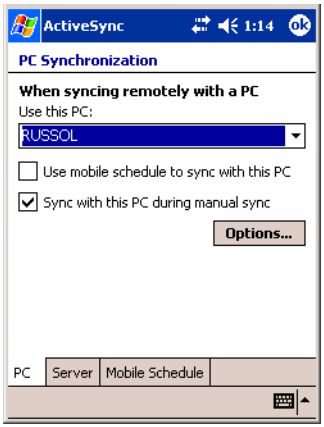


Figure 4-9. PC Synchronization Window -PC Tab

3. Tap **Options** to display the *PC Synchronization Options w*indow.

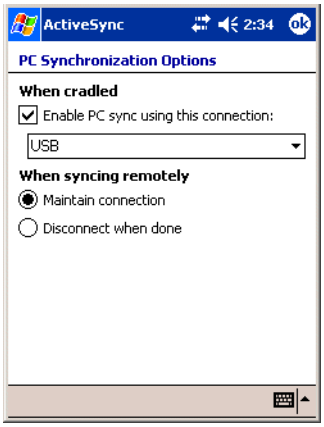


Figure 4-10. PC Synchronization Options Window

4. Select the *Enable PC sync using this connection:* check box.
5. Select the connection (e.g., serial COM port, USB) for synchronization from the drop-down list. The default connection for synchronization is USB.
6. Select the *Maintain connection* radio button.

7. Tap **ok** to exit the *PC Synchronization Options w*indow and tap **ok** to exit the *PC Synchronization* window.
8. Ensure that ActiveSync is installed on the host computer and a partnership was created. See *Installing ActiveSync on page 4-3* and *Setting up a Partnership on page 4-5*.

Setting Up a Connection on the Host Computer

1. Select *Start - Programs - Microsoft ActiveSync* on the host computer, if it is not already running. The *Microsoft ActiveSync* window appears.

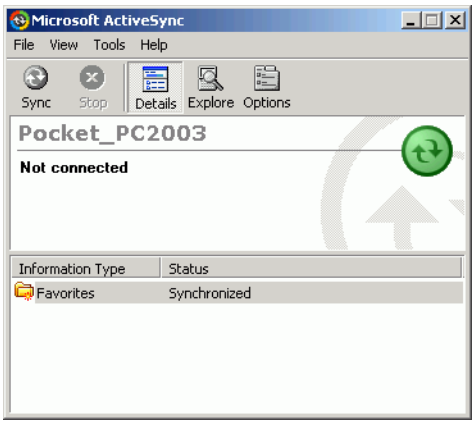


Figure 4-11. ActiveSync - Not Connected

Note

Every mobile computer should have a unique device name. Never try to synchronize more than one mobile computer to the same name. See *Device ID on page 3-28* for instructions on changing the device name.

2. In the *ActiveSync* window, select *File - Connection Settings*. The *Connection Settings window* appears.

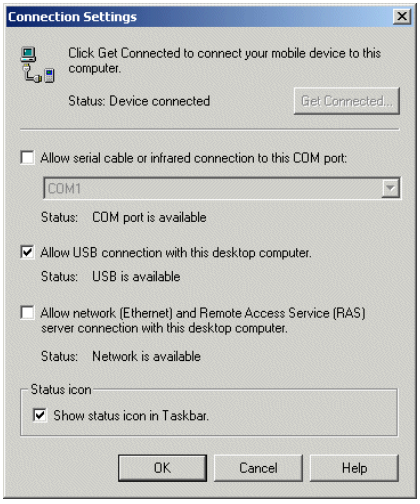


Figure 4-12. Connection Settings Window

3. In the *Connection Settings* window, select the appropriate check box for the type of connection being used. If using a serial connection, select the COM port from the drop-down list.

Note

If serial, USB and Ethernet communication connections are used, all check boxes can be selected to avoid having to update this window for different connections. However, if the same serial COM port is used for ActiveSync and TCM, the serial COM port must be deselected in this window for it to be available for TCM downloads.

4. Select the *Show status icon in taskbar* check box
5. Tap **OK** to save any changes made.
6. Ensure the accessory being used to communicate is connected to the host computer and the appropriate power source (see *Chapter 10, Accessories* for connection setups).

Note

The accessory requires a dedicated port. It cannot share a port with any other device. Refer to the host computer user manual supplied to locate the USB ports.

7. Connect the mobile computer to the accessory being used for communication.
8. Power on the mobile computer.
9. If a partnership was already created between the host computer and mobile computer, synchronization occurs automatically upon connection.

Ethernet Communication Setup

To establish a connection between the mobile computer and the host computer to communicate over an Ethernet network, perform the following:

- Install MobileDox Cradle Manager
- Install eConnect
- Mobile computer configuration
- Host computer configuration
- DHCP server configuration
- Cradle configuration.

Installing MobileDox Cradle Manager

MobileDox Cradle Manager is used only when establishing a connection using the Four Slot Ethernet cradle.

The Cradle Management software features:

- View cradles that are attached to the network via MobileDox Net
- View cradle status
- Modify cradle settings including:
  - IP address settings
  - DNS and WINS settings
  - Identification settings
  - USB port specific settings
- Restart cradles connected to the network via MobileDox Net
- Update the firmware of MobileDox Net.

To install the Cradle Management Software on the host computer, download the latest version of the software from http://devzone.symbol.com. Refer to the instructions included with the software.

Installing eConnect

eConnect is used only when establishing a connection using the Four Slot Ethernet cradle.

To install eConnect on the mobile computer:

1. Ensure ActiveSync is installed and running on the host computer (*Installing ActiveSync on page 4-3*). Ensure a partnership was established between the host computer and the mobile computer (see *Setting up a Partnership on page 4-5*).
2. Download the latest version of the eConnect software from http://devzone.symbol.com to the host computer.
3. On the host computer, display the ActiveSync Explorer and copy the .cab file to the *My Pocket PC* Temp folder.
4. On the mobile computer, locate the .cab file in the *File Explorer* Temp folder.
5. Tap the eConnect .cab file once to install eConnect.
6. The .cab file is removed from the *File Explorer* Temp folder automatically when the installation is complete.
7. Tap **X** to close *File Explorer*.
8. Warm boot the mobile computer to add the *eConnect* icon to the *Settings* - *System* tab.

eConnect is reinstalled automatically after a cold boot.

9. On the mobile computer tap *Start* - *Settings* - *System* tab and tap the *eConnect* icon to display the *Settings* - *eConnect* window.

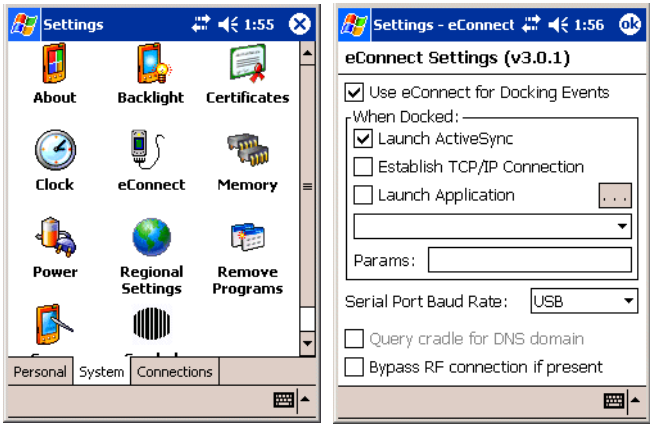


Figure 4-13. Settings Windows

10. Confirm that the *Serial Port Baud Rate:* value is set to *USB*. If it is not set to *USB* then use the drop-down menu and tap *USB*.
11. Tap **ok** to exit the *Settings- eConnect* window and tap **X** to exit the *Settings* window.

Host Computer Configuration

The host computer must be setup with the appropriate communication software and connection settings. Follow the steps below using Microsoft ActiveSync software on both the mobile computer and the host computer.

To configure the host computer:

1. Download and install ActiveSync. See *Installing ActiveSync on page 4-3*.
2. Configure the connection settings. The host computer must be configured for TCP/IP network communications.
   a. Click the *ActiveSync* icon
   b. Click on *File* - *Connection settings*
   c. In the *Connection settings* dialog box, select the *Allow Network (Ethernet) and Remote Access Service (RAS) server connection with this desktop computer* option.
   Other options may be selected, for example, *Allow serial cable or infrared connection to this COM port*.
3. Click **OK**.

Note

Before communicating through an Ethernet connection, create a partnership between the mobile computer and the host computer via a USB connection. See *Setting up a Partnership on page 4-5* for detailed instructions.

DHCP Server Configuration

If you use a DHCP server to distribute IP addresses and other network parameters, the server setup should include the following:

- IP address pool (1 or 5 IP address per cradle)
- Router/gateway address
- One or more DNS server addresses
- One or more WINS server addresses
- Subnet mask.

Note

To assign the initial cradle IP address, you can either use a DHCP server, as shown above, or use the MobileDox Cradle Manager (see *Installing MobileDox Cradle Manager on page 4-13*). The DHCP server is the preferred method.

Cradle Configuration

The MobileDox Cradle Manager allows you to setup the Device IP Address and modify cradle settings. See *Installing MobileDox Cradle Manager on page 4-13* for instructions to download and install the software.

See *Figure 10-7 on page 10-15* for instructions on Four Slot Ethernet cradle connections.

Setting the Device IP Address

By default, the cradle uses DHCP to obtain its IP address. However, if DHCP fails, the Cradle Manager can assign an IP address.

Note

This is used if the cradle is connected to the network, but fails to appear in MobileDox. Enter the hardware device (MAC) address to locate the cradle and assign it a new IP address.

To set the IP address:

1. Launch the MobileDox Cradle Manager on the host computer.
2. Click *File - Set IP Address of Unlisted Device*. The Set IP Address window appears:

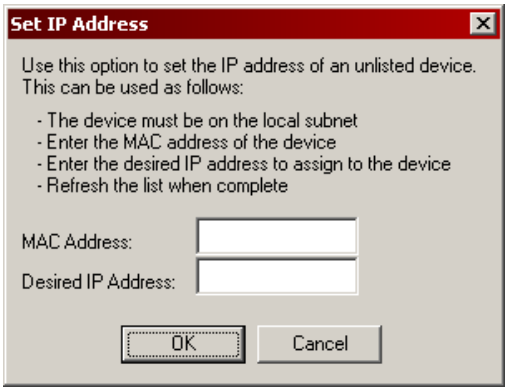


Figure 4-14. Set IP Address Window

3. Enter the appropriate MAC Address and IP address.
4. Click **OK**.

Modifying Cradle Settings

1. Launch the MobileDox Cradle Manager on the host computer.
2. Select the name of the cradle you want to configure from the list.
3. Click *Device - Modify Settings*.
4. Use the *General Settings* tab to modify the identification settings of the cradle.

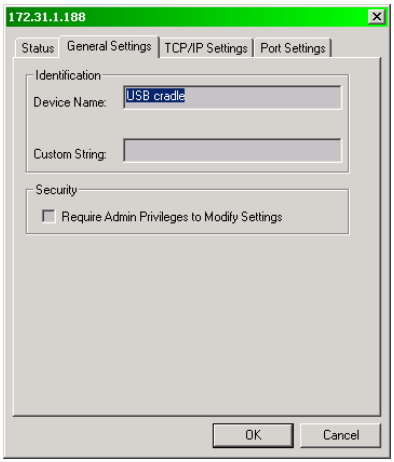


Figure 4-15. Cradle Settings Window - General Settings Tab

Table 4-1. Cradle Settings - General Settings Fields

Field	Description
Device Name	A text string used to describe the MobileDox device. Any 15-character string may be entered.
Custom String	A text string for any desired usage (examples are: location, asset ID, etc.). Any 15-character string may be entered.
Require Admin Privileges to Modify Settings check box	Selecting this check box requires users to have administrative privileges in order to modify MobileDox settings. Administrative privileges are validated using standard Windows authentication.

5. Use the *TPC/IP Settings* tab to modify the DNS and WINS identification settings of the cradle.

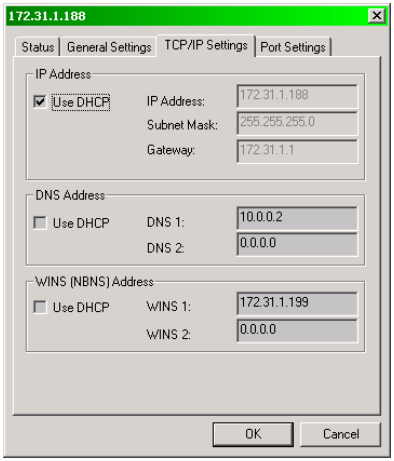


Figure 4-16. Cradle Settings Window - TCP/IP Settings Tab

Table 4-2. Cradle Settings - TCP/IP Settings Fields

Field	Description
Use DHCP	If check box is selected, necessary information is retrieved from the DHCP server. If check box is not selected, static configuration is used (information needs to be entered).
IP Address	The IP address that the MobileDox uses when communicating on the network.
Subnet Mask	The subnet mask that the MobileDox uses when communicating on the network.
Gateway Address	The IP address that the MobileDox uses to send non-local IP network data.
DNS Address	The IP address of a server(s) that can resolve Internet names into IP addresses.
WINS Address	The IP address of a server(s) that can resolve Windows network names into IP addresses. This field must be populated correctly when using ActiveSync.

6. Use the *Port Settings* tab to modify the USB port settings of the cradle.

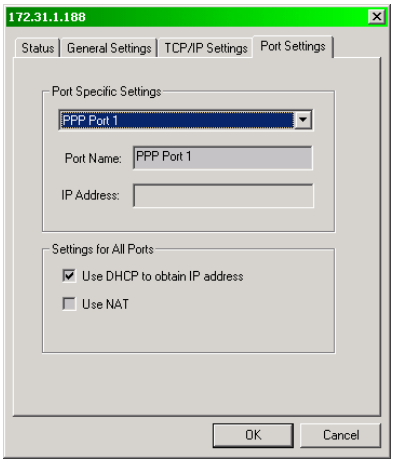


Figure 4-17. Cradle Settings Window - Port Settings Tab

Table 4-3. Cradle Settings - Port Settings Fields

Field	Description
Port Name	A text string used to describe the device attached to the port. Any 15-character string can be entered. You can specify up to four port names, one for each of the cradle's slots.
IP Address	The IP address assigned to the cradled device. There should be one IP address per cradle slot. This box is disabled for all devices if DHCP is used to obtain the IP address.
Use DHCP to obtain IP Address check box	The cradle uses DHCP to obtain an IP address for the handheld. Unchecking this selection allows the cradle to use Static IP address for the handheld.
Use NAT check box	The cradle uses Network Address Translation (NAT) when forwarding handheld traffic onto the network. No IP addresses are necessary for the handhelds. This must be disable when using ActiveSync.

7. Click **OK**.

Using ActiveSync

1. Review the configuration of the cradle using the MobileDox Cradle Manager.
   a. A WIN server must be present on your network. Ensure that the WINS Address provided in the TCP/IP Settings tab matches the IP address of the WIN server on your network.
   b. Ensure that the *Use NAT* check box is not selected in the Port Settings tab.
2. Insert the mobile computer into the cradle. The mobile computer displays a succession of dialog boxes appear, indicating the status of the connection. Also the ActiveSync icon on the host computer's system tray turns green to indicate that the host computer and the mobile computer are communicating.

Connecting to the Internet on a Wireless Network

The MC9010-G and MC9050-G can connect to the Internet across a wireless network. To set up a wireless connection:

1. Tap the *Mobile Companion* icon on the task tray. The *Mobile Companion* menu appears.

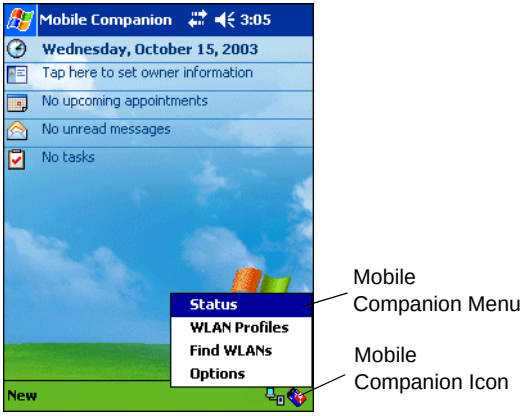


Figure 4-18. Mobile Companion Menu

2. Tap *Find WLANs*. The *Mobile Companion* window appears.

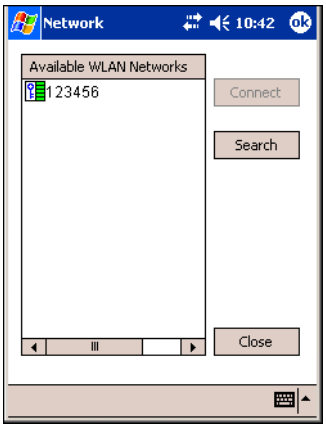


Figure 4-19. Mobile Companion Window

3. The mobile computer tries to locate Access Points (APs) in the area. When it locates a wireless LAN(s), the ESSID name displays in the *Available WLAN Networks* list.
4. Tap the ESSID name and then tap **Connect**.
5. The Mobile Companion *Mode* tab appears.

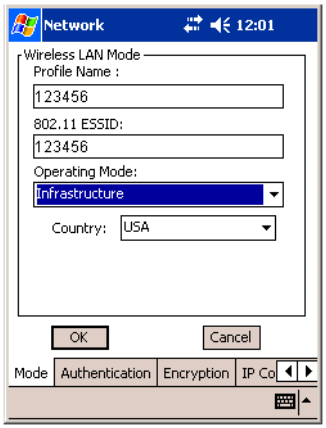


Figure 4-20. Mobile Companion - Mode Tab

6. The profile name and ESSID name appears in the respective fields.
7. In the *Operating Mode:* list, select *Infrastructure*.

8. Tap the *Authentication* tab.

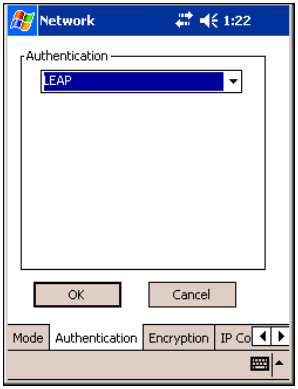


Figure 4-21. Mobile Companion - Authentication Tab

9. Select an Authentication (None, Kerberos, LEAP, EAP-TLS or PEAP) from the *Authentication* drop-down list that may be needed on the wireless network.
10. Tap the *Encryption* tab.

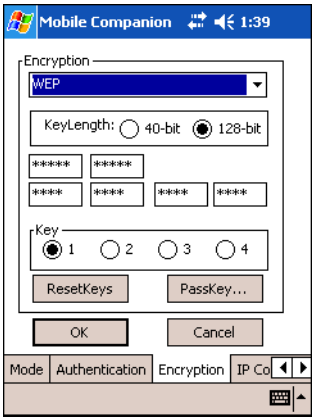


Figure 4-22. Mobile Companion - Encryption Tab

11. Select the encryption algorithm used on the wireless network: Open System, WEP or TKIP WPA).

Note

If an Authentication and/or Encryption scheme is selected, enter the required data in the fields that appear in the window. See the network administrator for this information.

12. Tap the *IP Config* tab.

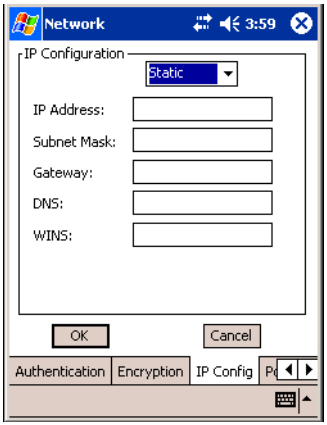


Figure 4-23. Mobile Companion - IP Config Tab (DHCP)

13. Select either *DHCP* or *Static* from the *IP Type* drop-down list.
14. If you select Static IP, enter the required data in the fields that appear in the window. See the network administrator for this information.
15. Tap **ok**.
16. Tap **ok**.
17. The Mobile Companion wireless status icon should indicate that the mobile computer is connected to the AP. If the status icon does not indicate that the mobile computer is connected to the AP, see the network administrator.

18. Tap *Start* - *Settings* - *Connections* tab - *Connections* icon - *Advanced* tab.

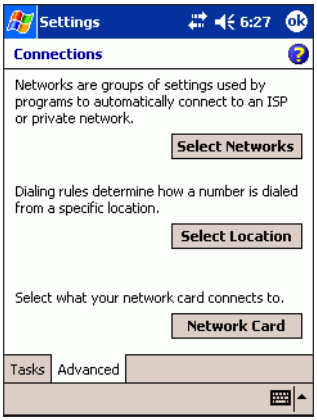


Figure 4-24. Connections Window - Advanced Tab

19. Tap **Network Card**. The *Configure Network Adapters* window appears.

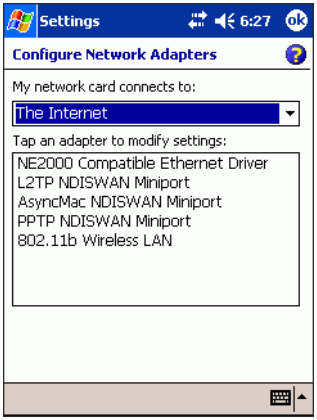


Figure 4-25. Configure Network Adapters Window

20. Select *The Internet* from the *My network card connects to:* drop-down list.
21. Tap **ok**.

22. Tap *Start - Programs - Internet Explorer*. The *Pocket Internet Explorer* window appears.

Figure 4-26. Pocket Internet Explorer Window

23. In the address bar, enter the URL for a web site.

5

Spectrum24 Configuration

Contents

Introduction

Wireless LANs allow mobile computers to communicate wirelessly and to send captured data "real time" to a host device. Before a mobile computer can be used on a Spectrum24 LAN, your facility must be set up with the equipment required to run the wireless LAN and the mobile computer must be properly configured. Refer to the documentation that came with your Access Points (APs) for instructions on setting up the required hardware.

The mobile computer Network Adapter settings and Spectrum24 settings configure and monitor the wireless connection. The *Mobile Companion* icon appears in the task tray and indicates mobile computer signal strength as follows:

Icon	Status
	Excellent signal strength
	Very good signal strength
	Good signal strength
	Fair signal strength
	Poor signal strength
	Out-of-network range (not associated)

Mobile Companion

The *Mobile Companion* utility is used to configure the mobile computer's wireless network settings. The *Mobile Companion* utility starts automatically and appears as an icon on the task tray. The status icon changes in real-time to reflect the signal strength and availability of the adapter and the wireless network. Tap the icon on the task tray to open the *Mobile Companion* menu.

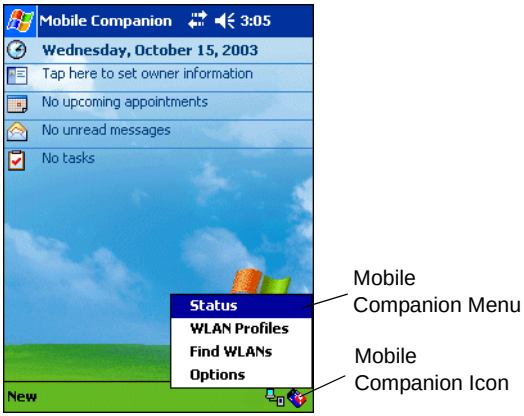


Figure 5-1. Mobile Companion Menu

When the menu opens, select *Status*, *WLAN Profiles, Find WLANs* or *Options* from menu.

Table 5-1. Mobile Companion Menu Descriptions

Menu Item	Description
Status	Displays the current status and information for the wireless connection. (See *Status on page 5-22* for more information.) *Signal* tab view - displays radio signal transmission strength from the adapter (using its current profile) to the associated AP. *Info* tab view - displays mobile computer's software, driver, firmware and hardware versions, as well as country information for the current WLAN profile. *IP Status* tab view - displays network address information. *Ping* tab view - displays signal strength data, data rate and conduct data transmission tests between the mobile computer and associated AP or client. *APs* tab view - displays APs with the same ESSID within the current WLAN profile. *Peers* tab view - displays the BSSIDs, power modes, transmit rates and data rates of other networked clients within the Ad Hoc (peer-to-peer) network. When in *Ad Hoc* operating mode, the *Peers* tab view displays instead of the *APs* tab.

Table 5-1. Mobile Companion Menu Descriptions (Continued)

Menu Item	Description
WLAN Profiles	Displays the current profiles and allows the user to add, edit and delete profiles. (See *Changing Profiles on page 5-31* for more information.)
Find WLANs	Displays a list of Spectrum24 networks (APs and networked peers) available to the mobile computer for association. The networks are listed by their ESSID. To the right of each network is a signal strength icon. Networks with a signal strength of Good (three green bars out of five) or better should be considered for connection. Tap a network and tap **Connect** to interoperate with the AP representing that network. Once connected, the *Mode*, *Authentication*, *Encryption*, *IP Config* and *Power* tab views display the ESSID, security settings, network address information and power consumption level set for that network. (See *Finding WLANs on page 5-5* for more information.)
Options	Displays settings for system sounds, AP and mobile computer association capabilities, profile roaming options, as well as the password protecting the Mobile Companion utility. (See *Setting Options on page 5-28* for more information.)

Finding WLANs

A completed profile is a set of mobile computer configuration settings that can be used in different locations to connect to a Spectrum24 network. Creating different profiles is a good way of having pre-defined mobile computer operating parameters available for use in various Spectrum24 network environments.

Select *Find WLANs* from the *Mobile Companion* menu to locate the APs in the area. The *Mobile Companion* window displays the available WLAN networks.

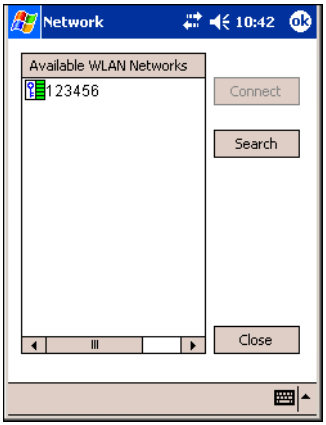
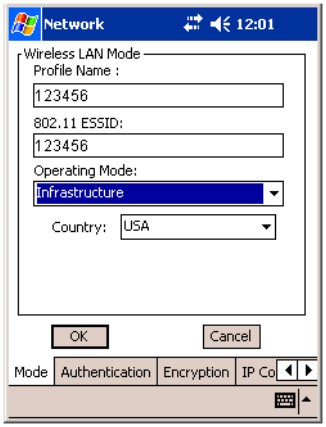
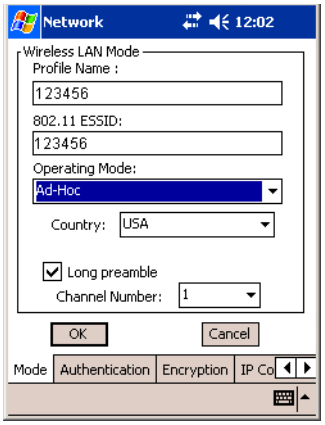


Figure 5-2. Available WLAN Networks

1. Select an available WLAN network from the list box.
2. Tap **Connect**. The *Mode* tab appears.



Infrastructure Mode



Ad Hoc Mode

Figure 5-3. Mobile Companion - Mode Tab

Mode

On the *Mode* tab, enter Profile Name, 802.11 ESSID, Operating Mode and Country settings.

Table 5-2. Mode Tab Fields

Field	Description
Profile Name	Populated with the name and (WLAN) identifier of the network connection. You can change the *Profile Name:* if desired. Use the *Profile Name* field to enter the name of the mobile computer profile used to transmit with either an AP or another networked computer.
802.11 ESSID	Populated with the name and (WLAN) identifier of the network connection. The ESSID is the 802.11 Extended Service Set Identifier. The ESSID is 32-character (maximum) string identifying the WLAN. The ESSID assigned to the mobile computer is required to match the AP ESSID for the mobile computer to communicate with the AP.

Table 5-2. Mode Tab Fields (Continued)

Field	Description
Operating Mode	Select the operating mode from the *Operating Mode:* drop-down list. Infrastructure: Select *Infrastructure* to enable the mobile computer to transmit and receive data with an AP. Infrastructure is the mobile computer default mode when Mobile Companion initially appears. Ad Hoc: Select *Ad Hoc* to enable the mobile computer to form its own local network where mobile computers communicate peer-to-peer without APs using a shared ESSID. Select the *Long preamble* check box if the mobile computer and its profile are using a long preamble when transmitting data. A long preamble is approximately 8 bytes of the packet header attached to the packet prior to transmission. Devices in Ad Hoc mode are required to use the same preamble length to interoperate. The mobile computer initiating the Ad Hoc network sets the channel (using the *Channel* drop-down list) used by each peer in the Ad Hoc network.
Country	Select the country of operation for the mobile computer from the *Country:* drop-down list. This ensures the mobile computer is using country code information compatible with the country code data used by the associated AP.

Authentication

Select the *Authentication* tab to configure server-based authentication. Select one of the following Authentication options from the *Authentication* drop-down list.

- None - Default setting when authentication is not required on the network. The client adapter does not use any authentication scheme when Open System is selected on the Encryption tab.
- Kerberos (see Table 5-3)
- LEAP (see Table 5-4)
- EAP-TLS (see Table 5-5)
- PEAP (see Table 5-5).

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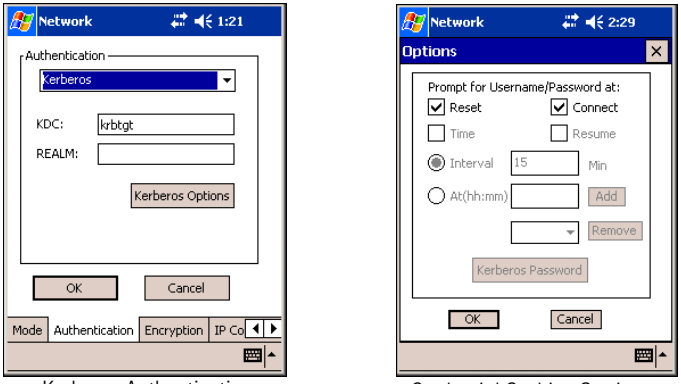


Kerberos Authentication

Credential Caching Settings (Kerberos Options)

Figure 5-4. Mobile Companion - Authentication Tab (Kerberos)

Table 5-3. Authentication Tab Fields - Kerberos

Authentication	Description
Kerberos (see Figure 5-4)	Kerberos is a different form of 128-bit data security. An adapter is required to have its request for access point resources authenticated with a Kerberos server before the server permits the access point to transmit and receive data with the associated adapter. When Kerberos is selected, the *KDC* and *Realm* entry fields appear. The *KDC* field should remain with the default KDC name (krbtgt) unless it is changed in the server. Enter the name of the server that hosts the Kerberos KDC in the *Realm* field. The KDC is located on a server and maintains information about the access points and users it supports. The KDC also permits the transmission and receipt of data once the credentials of the user are verified. Tap **Kerberos Options** to configure different caching modes for Kerberos credentials. When connecting to a Kerberos supported profile, the system can prompt for the associated user name and password at specified instances during the authentication process. Caching of credentials is optional.

Table 5-3. Authentication Tab Fields - Kerberos (Continued)

Authentication	Description
	Kerberos Options: Select any combination of the following Kerberos Credential Caching settings: Reset: When selected, the system prompts the user for the username and password upon a warm boot. Connect: When selected, the system prompts the user for login information when the system initiates a connection to the ESSID. Time: When selected, the system requests a user name and password after the specified time parameter. Available time parameters are specified as an *Interval* (in minutes) or *At (hh:mm)* a specified time (chosen with the pull-down menu). If a time option is not selected, authentication continues without a user name and password verification. Resume: When enabled, the system prompts the user for username and password after the system is suspended and subsequently resumed. If disabled, the system prompts for a username and password only if the user's credentials are not in the registry.

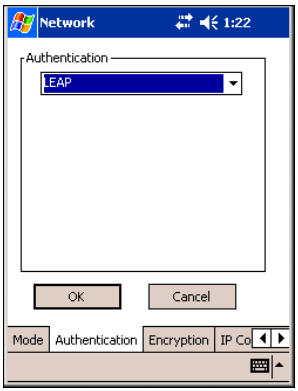


Figure 5-5. Mobile Companion - Authentication Tab (LEAP)

Table 5-4. Authentication Tab Fields - LEAP

Authentication	Description
LEAP (see Figure 5-5)	Select this option to enable LEAP authentication. LEAP is founded on mutual authentication. The AP and the mobile computer attempting to connect to it require authentication before access to the network is permitted.

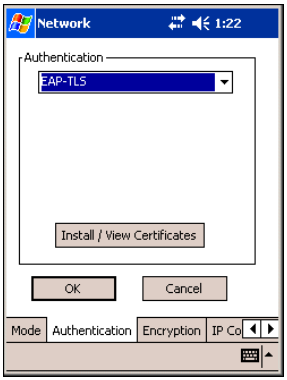
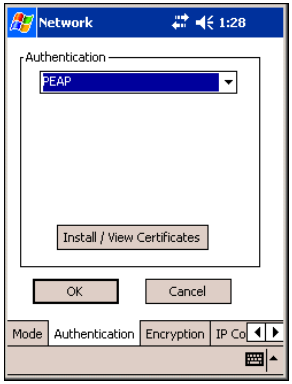


Figure 5-6. Mobile Companion - Authentication Tab (EAP-TLS)



PEAP Authentication

Figure 5-7. Mobile Companion - Authentication Tab (PEAP)

Table 5-5. Authentication Tab Fields - EAP/TLS and PEAP

Authentication	Description
EAP/TLS (see Figure 5-6)	EAP/TLS is an authentication scheme through IEEE 802.1x. It authenticates users and ensures only valid users can connect to the network. It also restricts unauthorized users from accessing transmitted information. EAP/TLS achieves this through secure authentication certificates.
PEAP (see Figure 5-7)	Select this option to enable PEAP authentication. This method uses a digital certificate to verify and authenticate a user's identity.

Note

When the mobile computer is associated to an EAP or PEAP WLAN, the Microsoft window shown in Figure 5-8 may be available for Spectrum24 radio configurations. Use only the Mobile Companion Utility, located on the tasktray of the *Today* screen, to configure the Spectrum24 radio.

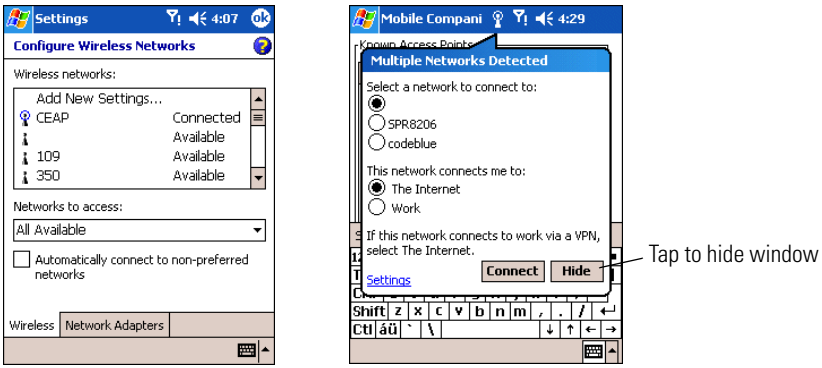


Figure 5-8. Microsoft Spectrum24 Configuration Windows

Installing and View Certificates

The steps that follow explain how to install a user certificate (EAP-TLS only) and a server certificate needed for EAP-TLS and PEAP authentication.

1. On the *EAP-TLS* or *PEAP* Authentication window, tap **Install/View Certificates**.

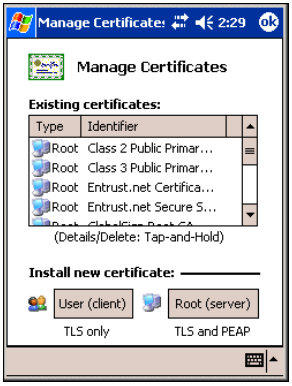


Figure 5-9. Manage Certificates

2. Tap **User (client)** on the *Manage Certificates* window to request the retrieval of a User Certificate (EAP-TLS only).

Figure 5-10. EAP-TLS Install User Certificate

3. Enter the *User:*, *Password:* and *Server:* information in their respective text boxes.
4. Tap **Retrieve**.
5. A *Progress* dialog appears to indicate the status of the certificate retrieval.
6. Tap **ok** to exit.
7. On the *Manage Certificates* window, tap **Root (server)** to request the installation of a Server Certificate (EAP-TLS and PEAP).

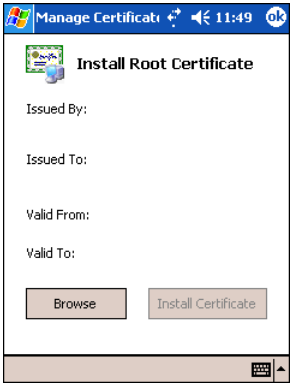


Figure 5-11. EAP-TLS/PEAP Install Root Certificate

Note

The Server Certificate must be downloaded to the mobile computer prior to installation.

8. Tap **Browse** to locate the Server Certificate on the mobile compuer.

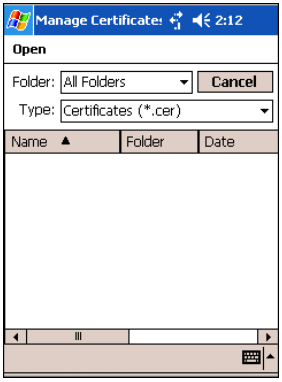


Figure 5-12. EAP-TLS/PEAP Browse Server Certificate

9. Select *All Files (*.*)* from the *Type:* drop-down list.
10. In the list of certificates, select (tap) the certificate to install. (Tapping a certificate to install displays the *Install Root Certificate* window.)
11. On the *Install Root Certificate* window (Figure 5-11), tap **Install Certificate**.
12. Tap **ok** to exit.

13. To retrieve information about any installed certificate, tap and hold a certificate in the list and select *Details* from the menu.

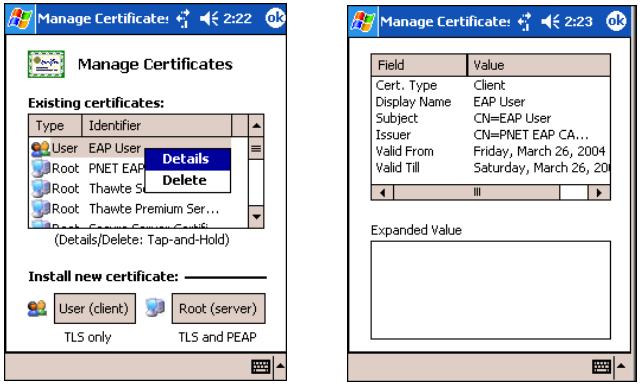


Figure 5-13. Certificates Details

14. To display expanded details about a particular field, tap a field in the list.

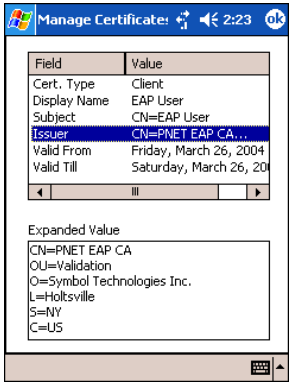


Figure 5-14. Expanded Details

15. Tap **ok** to exit.

Encryption

Select the *Encryption* tab to set the adapter profile security level by configuring the encryption scheme and corresponding keys.

1. Select an option (Open System, WEP, TKIP (WPA)) from the *Encryption* drop-down list. See *Table 5-6 on page 5-16* for Encryption option descriptions.

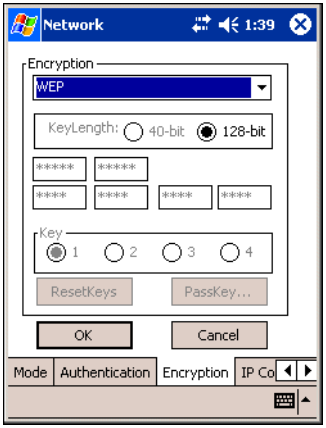


Figure 5-15. Mobile Companion - Encryption Tab

The absence of a physical connection makes wireless links vulnerable to information theft. Encryption is an efficient method of preventing data theft and improving data security.

The AP and the mobile computer are required to use the same encryption algorithm to associate and transmit data. If an AP is set to Open System and an adapter is set to 40-bit or 128-bit, no association takes place. Similarly, if an adapter is set to Open System and an AP is set to 40-bit or 128-bit, no association takes place.

If an AP is set to 40-bit and an adapter is set to 128-bit, the adapter can associate to the AP, but no data transmission and reception can take place.

Table 5-6. Encryption Tab Fields

Encryption	Description
Open System	Use the Open System option as the default setting when no data packet encryption is needed over the network. Selecting this option provides no security for the data being transmitted over the network. The window displays only the **OK** and **Cancel** buttons.

Table 5-6. Encryption Tab Fields (Continued)

Encryption	Description
WEP	Select WEP for the adapter to use the WEP keys for encryption. The window displays several radio buttons and edit buttons to configure the WEP keys. Select 40-bit or 128-bit key lengths (128-bit is the default). WEP keys are manually entered in the edit boxes. Only the required number of edit boxes for a key length is displayed (10 Hex digit value for 40-bit keys, 26 Hex digit values for 128-bit keys). Use the *Key* radio buttons to configure the four WEP keys. The adapter uses the selected key. Tap **ResetKeys** to set the encryption key to the default values. Note: The default Hex digit keys are visible any time they are used. As a security precaution after setting the key values for the network, the digits are replaced with asterisks * within the Encryption key fields. If the associated access point is using an optional Passkey, the "active" adapter WLAN profile is required to use one as well. The Passkey is a plain text representation of the WEP keys displayed in the Encryption property window. The Passkey provides an easy way to enter WEP key data without having to remember the entire 40-bit (10 character) or 128-bit (26 character) Hex digit string. Tap **Passkey** to display the Passkey screen. Enter an easy-to-remember 4 to 32 character string to be used as the WEP algorithm. Click **OK**. The access point transforms the Passkey string into a set of four WEP keys using MD5 algorithms and displays them in the WEP fields. These are the new WEP keys for the adapter profile. Once displayed in the WEP key fields, the adapter profile behaves as if the keys were entered manually.
TKIP (WPA)	Select this option for the client adapter to use Wireless Protected Access (WPA) via TKIP. Manually enter the pre-shared keys in the edit boxes. Tap **ClearKey** to clear all previous keys and enter new key values. Tap **Passkey** to display the Passkey screen. Enter an easy-to-remember 8 to 63 character string.

IP Config

Select the *IP Config* tab to configure the following mobile computer profile network address parameters: IP address, subnet, gateway, DNS and WINS. Changes made within the *IP Config* tab only impact the profile selected in the *Mode* tab and do not impact the network address parameters configured for other profiles.

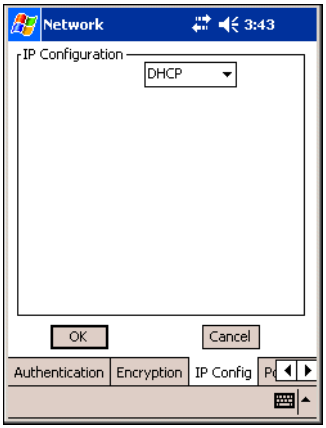


Figure 5-16. Mobile Companion - IP Config Tab (DHCP)

- Select Dynamic Host Configuration Protocol (*DHCP*) from the *IP Type* drop-down list to obtain a leased IP address and network configuration information from a remote server. DHCP is the default setting for the mobile computer profile. When DHCP is selected, the IP address fields are read-only.

- Select *Static* to manually assign the IP, subnet mask, default gateway, DNS and WINS addresses used by the mobile computer profile.

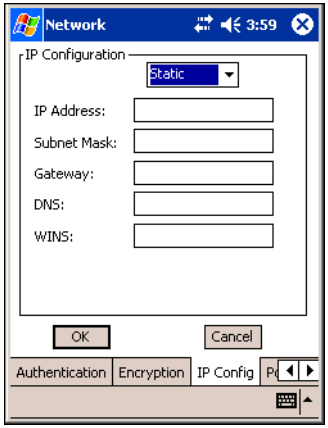


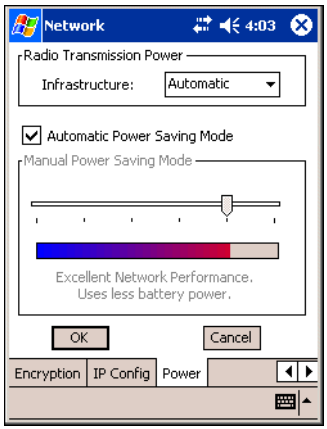
Figure 5-17. Mobile Companion - IP Config Tab (Static)

Table 5-7. IP Config Tab Fields

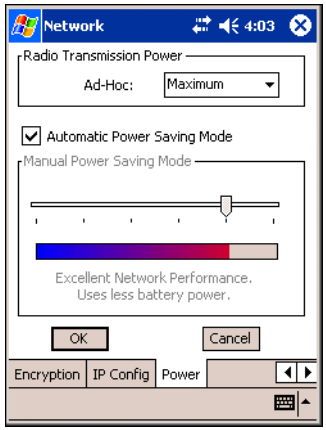
Field	Description
IP Address	The Internet is a collection of networks with users that communicate with each other. Each communication carries the address of the source and destination networks and the particular machine within the network associated with the user or host computer at each end. This address is called the IP address (Internet Protocol address). Each node on the IP network must be assigned a unique IP address that is made up of a network identifier and a host identifier. Enter the IP address as a dotted-decimal notation with the decimal value of each octet separated by a period, for example, 192.168.7.27.
Subnet Mask	Most TCP/IP networks use subnets in order to effectively manage routed IP addresses. Having an organization's network divided into subnets allows it to be connected to the Internet with a single shared network address, for example, 255.255.255.0.
Gateway	The default gateway is a device that is used to forward IP packets to and from a remote destination.
DNS	The Domain Name System (DNS) is a distributed Internet directory service. DNS is used mostly to translate domain names and IP addresses. It is also used to control Internet email delivery. Most Internet service requires DNS to operate properly. If DNS is not configured, Web sites cannot be located and/or email delivery fails.
WINS	WINS is a Microsoft® Net BIOS name server. WINS eliminates the broadcasts needed to resolve computer names to IP addresses by providing a cache or database of translations.

Power

1. Select the *Power* tab to set the *Radio Transmission Power* level and the *Power Saving Modes* for the mobile computer profile.



Infrastructure Mode



Ad Hoc Mode

Figure 5-18. Mobile Companion - Power Tab

Adjusting the *Radio Transmission Power* level enables you to expand or confine the transmission area with respect to other wireless devices that could be operating nearby. Reducing a coverage area in high traffic areas improves transmission quality by reducing the number of noises in that coverage area.

Table 5-8. Power Tab Fields

Field	Description
Radio Transmission Power In Infrastructure mode	There are two transmission power options: Select *Automatic* to use the AP power level. *Automatic* is the default mode for mobile computers operating in Infrastructure mode. Select *Power Plus* to set the mobile computer transmission power one level higher than the level set for the AP.

Table 5-8. Power Tab Fields (Continued)

Field	Description
In Ad Hoc mode	There are five transmission power options: Select *Maximum* power to set the mobile computer to the highest transmission power level. Select *Maximum* power when operating in highly reflective environments and areas where other devices could be operating nearby. Additionally, use the maximum power level when attempting to communicate with devices at the outer edge of a coverage area. Select *50%*, *25%* or *10%* to set the transmit power level to that percentage of the maximum power level. Select *Minimum* power to set the mobile computer to the lowest transmission power level. Use the minimum power level when communicating with other devices in very close proximity. Additionally, select minimum power in instances where little or no radio interference from other devices is anticipated.
Automatic Power Saving Mode	Switches to *Best Network Performance* when an AC power supply is detected. If a battery is used, an appropriate setting between *Best Network Performance* and *Acceptable Network Performance* is automatically chosen based on a real-time analysis of network usage. The *Automatic Power Saving Mode* is the default setting and extends the operating time before the battery is recharged.
Manual Power Saving Mode	Allows you to select a performance level suited to intended operation. There are six settings ranging from the *Best Network Performance* (using the most battery power) to *Acceptable Network Performance* (using the least battery power). A network performance description is displayed for each power range.

2. Tap **OK** to implement power consumption changes for the mobile computer profile.

Status

To view the status of the wireless network connection, select *Status* from the *Mobile Companion* menu.

1. Select the *Signal* tab to display a real-time graph of the signal quality of the mobile computer to the associated AP (Infrastructure Mode only). The number of times the mobile computer has roamed to and from APs, the current data rate and the network status are displayed. Signal quality is an indicator of how clearly the adapter can hear the associated AP.

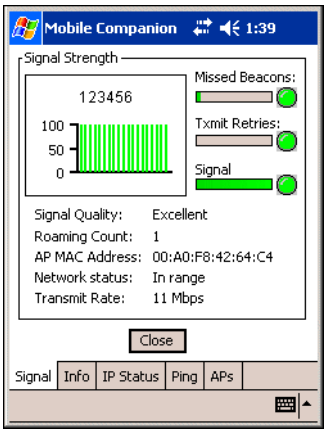


Figure 5-19. Mobile Companion - Signal Tab

Note

The Signal tab is view only and is not available if the current operating mode is Ad Hoc.

Table 5-9. Signal Fields

Field	Description
Missed Beacons	Displays the amount of beacons (uniform system packets broadcast by the AP to keep the network synchronized) missed by the mobile computer. The fewer the missed beacons the better the signal. As long as the LED to the right of the graph is green the AP association is not jeopardized by an excess of missed AP beacons. If the LED is Red, an association with a different AP could be warranted to reduce the amount of missed beacons and improve the signal.

Table 5-9. Signal Fields (Continued)

Field	Description
Txmit Retries (Transmit Retries)	Displays the number of data packets retransmitted by the mobile computer. The fewer transmit retries the stronger the signal. As long as the LED to the right of the graph is green the AP association is not jeopardized. If the LED is red, an association with a different AP could be warranted to reduce the amount of transmit retries and improve the signal.
Signal	Displays the Relative Signal Strength Indicator (RSSI) of the signal transmitted between the AP and mobile computer. As long as the LED to the right of the graph is green the AP association is not jeopardized. If the LED is red, an association with a different AP could be warranted to improve the signal.

2. Select the *Info* tab to view the mobile computer's current software and driver revision data as well as the operating parameters of the current profile.

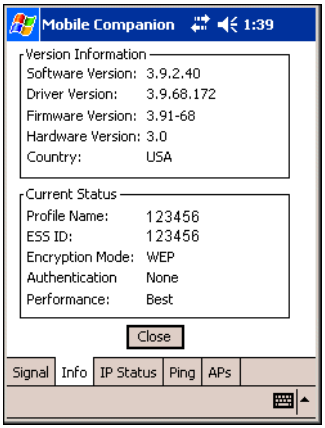


Figure 5-20. Mobile Companion - Info Tab

Note

The Version and Current Status information on this window may differ from the actual screen on the mobile computer.

Table 5-10. Info Fields

Field	Description
Version Information	Displays Mobile Companion software, driver, firmware and hardware versions as well as country information. This data is consistent for the mobile computer regardless of which mobile computer profile is the current profile.
Current Status	Displays the mobile computer's current Profile Name, ESSID and Encryption mode. Mobile computer performance is displayed using a verbal indicator of signal strength. Mobile computer operating information differs depending on which profile was enabled as the current profile.

3. Select the *IP Status* tab to view the mobile computer's network address information. Unlike the *IP Config* tab in Finding WLANs, the *IP Status* tab is view only with no user-configurable data fields.

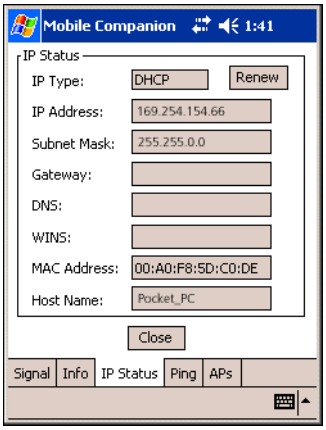


Figure 5-21. Mobile Companion - IP Status Tab

Table 5-11. IP Status Fields

Field	Description
IP Type	If DHCP was selected from the *IP Config* tab, leased IP address and network address data displays for the mobile computer. If Static was selected, the values displayed were input manually in the *IP Config* tab on page 5-19.
IP Address	The Internet is a collection of networks with users that communicate with each other. Each communication carries the address of the source and destination networks and the particular machine within the network associated with the user or host computer at each end. This address is called the IP address. Each node on the IP network must be assigned a unique IP address that is made up of a network identifier and a host identifier. Enter the IP address as a dotted-decimal notation with the decimal value of each octet separated by a period, for example, 192.168.7.27.
Subnet Mask	Most TCP/IP networks use subnets in order to effectively manage routed IP addresses. Having an organization's network divided into subnets allows it to be connected to the Internet with a single shared network address, for example, 255.255.255.0.
Gateway	The gateway is a device that is used to forward IP packets to and from a remote destination.
DNS	The Domain Name System (DNS) is a distributed Internet directory service. DNS is used mostly to translate domain names and IP addresses. It is also used to control Internet e-mail delivery. Most Internet service requires DNS to operate properly. If DNS is not configured, Web sites cannot be located or e-mail delivery fails.
WINS	WINS is a Microsoft Net BIOS name server. WINS eliminates the broadcasts needed to resolve computer names to IP addresses by providing a cache or database of translations.
MAC Address	An IEEE 48-bit address the mobile computer is assigned at the factory that uniquely identifies the adapter at the physical layer.
Host Name	Displays the name of the mobile computer.

1. Tap **Renew** to refresh the information displayed (through a DHCP request) within the *IP Status* tab.
2. Select the *Ping* tab to send and receive ICMP ping packets across the network to the specified IP address.

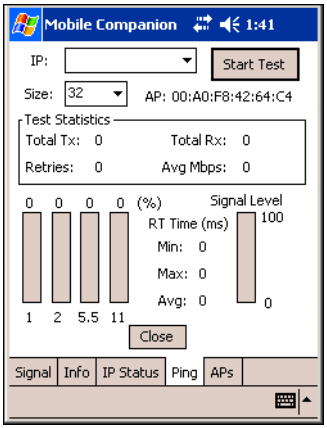


Figure 5-22. Mobile Companion - Ping Tab

3. Select or enter a target device IP address from the *IP* drop-down list.
4. Select the size of the packet transmission from the *Size* drop-down list.
5. Tap **Start Test** to begin the ping test.
6. Tap **Stop Test** to terminate the ping test.

   The average mega-bits per second, signal strength, data rate currently in use, test statistics and round trip (RT) times are displayed for each test. The associated AP MAC address is also displayed. The signal strength level and the data transmission rate are displayed in real-time bar graphs.

7. Select the *APs* tab to view APs with the same ESSID as the mobile computer's profile.

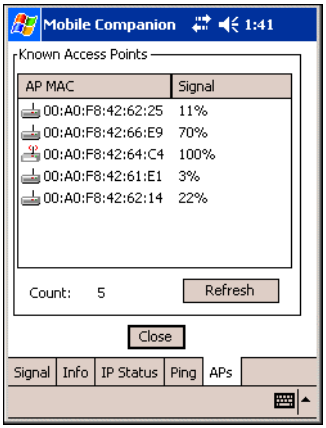


Figure 5-23. Mobile Companion - APs Tab

The associated AP displays a radio wave radiating from its antenna to indicate its associated status. Tapping on the icon displays a menu with *Set Mandatory* and *Set Roaming* options.

Selecting the *Set Mandatory* item prohibits the mobile computer from associating with a different AP. The letter *M* displays on top of the icon when the *Set Mandatory* option is selected.

Selecting *Set Roaming* allows the mobile computer to roam to any AP with a better signal. These settings are temporary and never saved to the registry.

Tap **Refresh** to update the list of the APs with the same ESSID. A signal strength value of 32 is the highest possible. The *APs* tab only displays when Infrastructure is selected as the mobile computer operating mode from the *Mode* tab.

8. If the mobile computer is in Ad Hoc mode, select the *Peers* tab to display the BSSID or MAC addresses of the other mobile computers in the network, their operating mode (PSP or CAM), their transmit rate, their supported data rate and the length of time an adapter was out of the Ad Hoc network. Tap **Refresh** to update the *Peers* tab to the latest Ad Hoc network performance and mobile computer membership data.

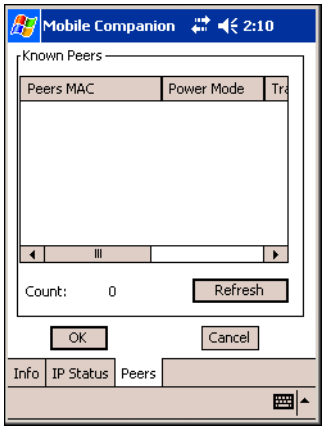


Figure 5-24. Mobile Companion - Peers Tab

Setting Options

Select *Options* from the Mobile Companion menu to access AP and Ad-Hoc networks, disable profile roaming and enable system sounds.

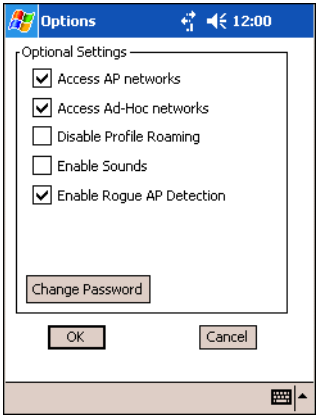


Figure 5-25. Mobile Companion - Option Settings

1. Select the *Access AP networks* check box to display available AP networks and their signal strength within the *Available WLAN Networks* (see *Finding WLANs on page 5-5*). These are the APs available to the mobile computer profile for association. If this option was previously disabled, refresh the *Available WLAN Networks* window to display the AP networks available to the mobile computer.
2. Select the *Access Ad-Hoc networks* check box to display available peer (adapter) networks and their signal strength within the *Available WLAN Networks*. These are peer networks available to the mobile computer profile for association. If this option was previously disabled, refresh the *Available WLAN Networks* window to display the Ad Hoc networks available to the mobile computer.
3. Select the *Disable Profile Roaming* check box to configure the adapter WLAN profile not to roam to the next available WLAN profile when the mobile computer moves out of range of the current WLAN profile.
4. Select the *Enable Sounds* check box to initiate an audible signal when performing a ping test and associating with an AP. The tones are important to notify users if the pinging is received or if the mobile computer has roamed to another AP.
5. Select the *Enable Rogue AP Detection* check box to inform the system of unauthorized APs on the network. (Symbol infrastructure is required.)

Mobile Companion has a password protection feature. When Mobile Companion initially appears, the password is off by default.

6. To create a password for the first time, change an existing password. or delete a password tap **Change Password**.

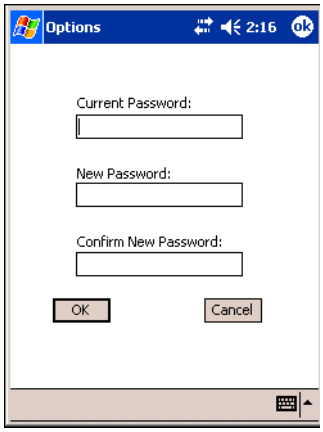


Figure 5-26. Mobile Companion - Password Window

a. To create a password for the first time, leave the *Current Password:* text box empty and enter the new password in the *New Password:* and *Confirm New Password:* text boxes. Tap **OK**.

b. To change an existing password, enter the current password in the *Current Password:* text box, enter the new password in the *New Password:* and *Confirm New Password:* text boxes.Tap **OK**.

c. Delete the password, in this case enter the current password in the Current Password edit box and leave the New Password and Confirm Password edit boxes empty.

Note

Passwords are case sensitive and can not exceed 10 characters.

Changing Profiles

Select *WLAN Profiles* from the *Mobile Companion* menu to view, connect to, create and edit a profile. A completed profile is a set of adapter configuration settings that can be used in different locations to connect to a wireless network. Creating different profiles is a good way of having pre-defined operating parameters available for use in various network environments. When the *WLAN Profiles* window initially appears, existing profiles appear in the *WLAN Profiles* list box.

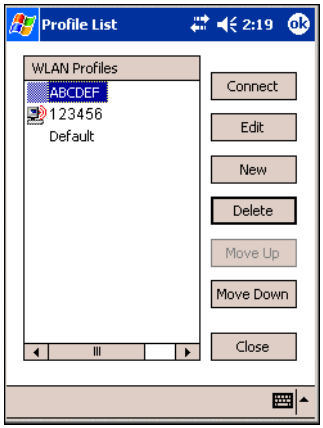


Figure 5-27. Mobile Companion - WLAN Profiles

Select a profile from the list box and tap **Connect** to set that profile as the active profile. Once selected, the mobile computer is using the authentication, encryption, ESSID, IP Config and power consumption settings initially configured for that profile.

Editing a Profile

Select a profile from the list box and tap **Edit** to display the *Mode* tab where the ESSID and operating mode can be changed for the profile. Use the *Encryption*, *IP Config and Power* tabs as necessary to edit the profile power consumption and security parameters.

Creating a New Profile

Tap **New** to display the *Mode* tab wherein the profile name and ESSID can be set. Use the *Encryption*, *IP Config* and *Power* tabs as required to set security, network address information and power consumption level for the new profile.

Deleting a Profile

Select a profile to delete from the list box and tap **Delete** to remove the selected profile.

Ordering Profiles

Select a profile from the list box and tap **Move Up** or **Move Down** to order the profile. If the current profile association is lost, Mobile Companion attempts to associate with the first profile in the list and then the next until a new association is achieved.

Profile Roaming must be enabled.

Using LEAP for Wireless Network Security

LEAP is a security protocol that provides authentication and encryption for wireless networks. Authentication is provided through the use of user names and passwords. There are multiple options for caching of these credentials available to the administrator of the device through the registry.

There are multiple password caching options used for LEAP. The methods are:

- Save the password in the registry.
- Save the password until a warm boot (soft reset), but not saved in the registry. This method also has a timeout available.
- The username and password are never saved. Any change of status (roam or suspend/ resume) will require that the user login.

The default is set to cache the password until a warm boot, with no timeout. If a different password caching option is desired, the S24Profiles.reg registry file in the Platform folder must be re-configured.

Configuring Advanced Password Options

All password caching options are configured in the file S24Profiles.reg, located in the Platform folder. When the configuration is completed, cold boot the mobile computer for the changes to take effect. The file must be edited on a PC and copied back onto the device after editing is complete. The section of this file which needs editing reads "[HKEY_LOCAL_MACHINE\Comm\NETWLAN1\Parms]."

Cache the Password

To cache the password, edit the registry file using a text editor with the following changes:

1. Change the LCachePwd value from 1 to 0:
   LCachePwd = dword:0

2. Uncomment the UNAME and UPwd values (deleting the semicolons at the beginning of each line):

   UNAME = myLEAPUserName

   UPwd = myLEAPPassword

3. Change *myLEAPUserName* and *myLEAPPassword* to the correct username and password. Note that the user name and password should be in quotes. If a domain name is required, this can be entered in the user name as: *domain\username*.

A backslash is used and most setups do not require a domain name even if Microsoft Windows® NT/2000 domains are used.

4. After changing the S24Profiles.reg file, copy the file onto the mobile computer into the Platform using ActiveSync and overwriting the old file. Then, cold boot the mobile computer for the changes to take effect.

Cache the Password until a Warm Boot

Cache the password until a warm boot is the default setting. A timeout value can also be set in the registry. The timeout forces the user to enter the username and password after a power-on if the device had not gone through the LEAP authentication processes after the set period of time. Normally, the device goes through the LEAP authentication process at every power-up and every time it roams between APs.

The timeout setting can be set in minutes using hexadecimal in the registry file. The default setting of zero disables the timeout feature. To change the timeout setting, edit the registry file using a text editor (e.g., Notepad) as follows:

1. Ensure the "LCachePwd" value is set to dword:1.

   LCachePwd = dword:1

2. If a timeout is desired, change the LTimeoutMinutes value from 00000000 to a desired value. Examples are provided in the registry file. The following example is for 240 minutes which is represented as 000000F0 in hexadecimal.

   LTimeoutMinutes = dword:000000F0

3. Ensure that the *UNAME* and *UPwd* lines are commented out by putting a semicolon at the beginning of each line.

4. After these changes are made to the S24Profiles.reg file, the file must be copied onto the mobile computer. Copy the file into the Platform folder of the device using ActiveSync, overwriting the old file. Once this is done, cold boot the mobile computer for the changes to take effect.

Prevent Password Cache

To prevent password caching, edit the registry file using a text editor with the following changes:

1. Change the LCachePwd value from 1 to 2:

   LCachePwd=dword:2

2. Ensure that the *UNAME* and *UPwd* lines are commented out by putting a semicolon at the beginning of each line.
3. After the changes are made use ActiveSync to copy the S24Profiles.reg file (overwriting the old file) onto the mobile computer's Platform folder. Then cold boot the mobile computer for the changes to take effect.

LEAP Usage

After LEAP setup is complete, the only noticeable difference is the password dialog box. If the caching method selected requires a user name and password, then they appear when required. If the user name is an NT domain user, the domain can be entered in the domain field if necessary (not normally required).

Enterprise Level Wi-Fi Protected Access

The T3.9.3 wireless component set was developed to provide Enterprise Level Wi-Fi Protected Access (WPA) with Full Authentication and associated Credential Caching based on the Meetinghouse AEGIS Client. These features, as well as earlier wireless features, are available through either the Mobile Companion application (see *Mobile Companion on page 5-4*), or through the Meetinghouse AEGIS Security Client application.

It is strongly recommended that wireless profiles be created and maintained in one application only and not shared. Profile roaming should be disabled in the application that is not being used.

AEGIS Security Client

The AEGIS Security Client is an implementation of the client side of the IEEE 802.1X - Port Based Network Access Control protocol. 802.1X access control provides improved security for both wired and wireless networks. It solves the problem of key distribution in wireless LANs by using public key authentication and encryption between Wireless Access Points and roaming stations to exchange dynamic WEP keys. The Client supports both wireless (802.11b) and Ethernet interfaces.

Additional information and support for the Meetinghouse AEGIS Client is available from the Meetinghouse Data Communications website at: http://www.mtghouse.com.

Spectrum24 Frequency Hopping (FH) Settings (1 and 2 MB Radios)

Note FH settings are not supported on MC906R-G RFID mobile computers.

The *Spectrum24 FH Settings* tabs are used to configure the mobile computer's wireless network settings for frequency hopping. Tap *Start* - *Settings* -*System* tab - *Spectrum24 FH Settings* icon to display the Symbol Spectrum24 FH settings window.

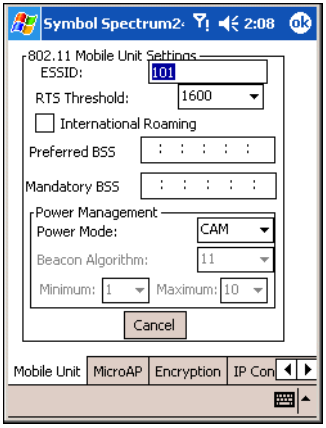


Figure 5-28. Mobile Unit Tab

Table 5-12. Spectrum24 FH Tab Descriptions

Tab	Description
Mobile Unit	The *Mobile Unit* tab configures the mobile computer ESSID, power management, RTS threshold, International Roaming capability and AP options, see *Mobile Unit Tab on page 5-38*.
MicroAP	The *MicroAP* tab sets the mobile computer to operate as an AP and establishes a single-cell wireless network, see *MicroAP Tab on page 5-39*.
Encryption	The *Encryption* tab sets the WLAN adapter to make the wireless link less vulnerable to information theft, see *Encryption Tab on page 5-41*.
IP Config	The *IP Config* tab configures the mobile computer profile network address parameters (IP address, subnet, gateway, DNS and WINS) (see *IP Config Tab on page 5-42*).

Table 5-12. Spectrum24 FH Tab Descriptions (Continued)

Tab	Description
WLAN Adapter	The *WLAN Adapter* tab sets the hardware and radio settings. The password protection feature is turned on and off from the WLAN Adapter tab, see *WLAN Adapter Tab on page 5-43*.

Mobile Unit Tab

Use the *Mobile Unit* tab to configure the mobile computer ESSID, power management, RTS threshold, International Roaming capability and AP options.

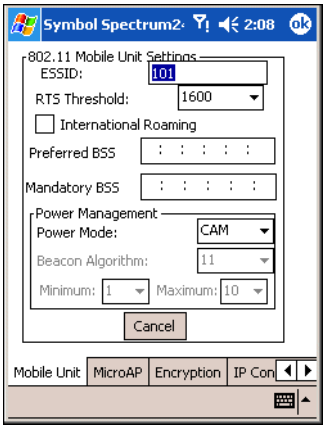


Figure 5-29. Mobile Unit Tab

Table 5-13. Mobile Unit Tab Fields

Field	Description
ESSID	Use the *ESSID* field to set the 802.11 Extended Service Set Identifier. The ESSID is a 32-character string (maximum) address identifying the wireless LAN. The ESSID assigned to the mobile computer is required to match the AP ESSID for the two devices to associate.
RTS Threshold	Use the *RTS Threshold* drop-down list to select the data transmission size at which the mobile computer alerts the AP with a Request To Send (RTS) signal prior to transmission. Once the mobile computer receives a Clear To Send (CTS) signal from the AP, the mobile computer transmits the data packet. Establishing an RTS threshold in advance of sending large volumes of data helps ensure data transmission with little interference.
International Roaming	Check the *International Roaming* check box to enable the mobile computer to associate with APs with different country codes.
Preferred BSS	Use the *Preferred BSS* field to enter the IEEE MAC address of the AP where the mobile computer prefers to associate. The mobile computer assigns a higher priority to this AP when transmitting over the network.
Mandatory BSS	Use the *Mandatory BSS* field to enter the IEEE MAC address of the AP where the mobile computer is required to associate. The mobile computer associates to only this AP when communicating on the network. Enter an AP MAC address to associate to an AP that has a compatible ESSID.

Table 5-13. Mobile Unit Tab Fields (Continued)

Field	Description
Power Mode	A Spectrum24 radio has two main power consumption modes, Continuous Aware Mode (CAM) and Power Save Poll (PSP) mode. Use the *Power Mode* drop-down list to specify the power mode to be used by the radio. CAM provides the best performance but uses the most power. CAM is the preferred mode for devices running on AC power. PSP saves significant amounts of power over CAM and is the preferred mode for devices running on battery power.

MicroAP Tab

Use the *MicroAP* tab to configure the mobile computer to operate as an AP. The MicroAP establishes a single-cell wireless network for devices in mobile unit mode.

Each MicroAP requires a unique ESSID. MicroAP cells can coexist as separate individual networks within the same site without interference. The MicroAP does not roam, but it does support roaming.

The mobile computer in MicroAP mode operates in CAM, and supports devices operating in both PSP and CAM. The MicroAP supports up to 16 mobile computers.

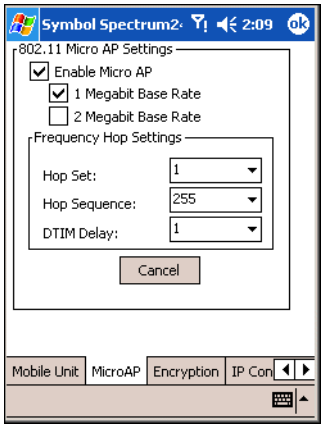


Figure 5-30. MicroAP Tab

Table 5-14. MicroAP Tab Fields

Field	Description
Enable MicroAP	Tap the *Enable MicroAP* check box to support MicroAP operations. Tap the *1 or 2 Megabit Base Rate* check boxes to specify the data rate within the MicroAP cell. A MicroAP and the mobile computer are required to use the same data rate.
Frequency Hop Settings	Tap the *Frequency Hop Settings* drop-down list to establish the Hop Set, Hop Sequence and DTIM Delay to be used within the MicroAP cell.

Encryption Tab

Use the *Encryption* tab for configuring encryption settings. The absence of a physical connection makes wireless links vulnerable to information theft. Encryption is an efficient method of preventing data theft and improving data security. The firmware supports Open System and Shared Key (40-bit) Encryption algorithms.

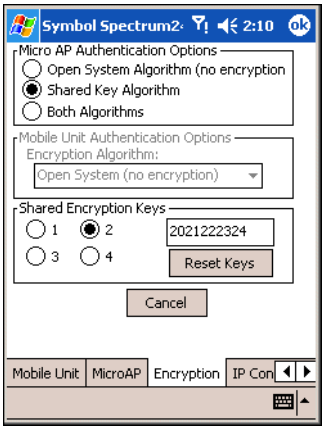


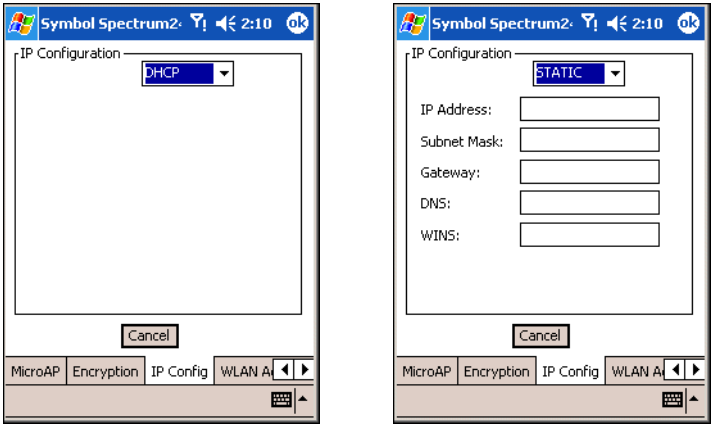
Figure 5-31. Encryption Tab

Table 5-15. Encryption Tab Fields

Field	Description
MicroAP Authentication Options	A MicroAP can use Open System Algorithm, Shared Key Algorithm or both. If Shared Key is enabled and Open System is not, the MicroAP grants access to adapters that have Shared Key enabled and are using the correct Encryption Key algorithm. Adapters using Open System cannot associate to the MicroAP when the MicroAP has Shared Key enabled. Only when the MicroAP is using Open System can Open System mobile computers associate to it.
Encryption Algorithm	Use the *Encryption Algorithm* drop-down list to select the adapter Encryption algorithm. The Open System algorithm (default setting) does not encrypt packets over the network. Select Open System to disable Encryption for the WLAN adapter and allow for the transmission and receipt of data with no security.
Shared Encryption Key	Use the Shared Encryption Key option to enable 40-bit Encryption. Select the Encryption Index key radio button (to be used for the mobile computer) and enter 10 hex digits for each key used. Tap **ok** to save and implement the encryption key data. Select an Encryption Index key radio button and tap **Reset Keys** to clear the entries in the *Shared Encryption Key* fields.

IP Config Tab

Use the *IP Config* tab to configure the following mobile computer profile network address parameters: IP address, subnet, gateway, DNS and WINS.



DHCP Static

Figure 5-32. IP Config Tab

Table 5-16. IP Config Tab Fields

Field	Description
IP Configuration	Select Dynamic Host Configuration Protocol (*DHCP*) from the *IP Type* drop-down list to obtain a leased IP address and network configuration information from a remote server. DHCP is the default setting for the mobile computer profile. When DHCP is selected, the IP address fields are read-only.
	Select *Static* to manually assign the IP, subnet mask, default gateway, DNS and WINS addresses used by the mobile computer profile

WLAN Adapter Tab

Use the *WLAN Adapter* tab to configure hardware and radio settings. Use the *Card Type: PCMCIA* to specify the antenna type and the *Radio Link Rate* radio buttons to specify the data rate supported.

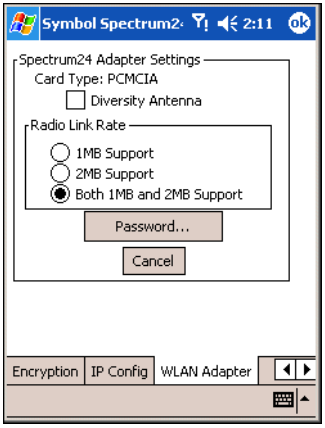


Figure 5-33. WLAN Adapter Tab

Table 5-17. WLAN Adapter Tab Fields

Field	Description
Diversity Antenna	Select *Diversity Antenna* if dual antenna support is required. Diversity improves communication in highly reflective environments. Do not select diversity if a secondary antenna is not being used. Using diversity in a single antenna application can cause poor wireless network performance.
Radio Link Rate	Use the *Radio Link Rate* radio buttons to specify the data rate supported. The mobile computer can use 1MB, 2MB or both. If *Both 1MB and 2MB Support* is selected, the mobile computer defaults to a 1 Mbps data rate if a 2 Mbps data rate cannot be established.
Password	Spectrum24 FH settings has a password protection feature that can be turned on and off from the *WLAN Adapter* tab. When the Spectrum24 FH program is initially launched, the password is off (default).

To create a new password for the Spectrum24 FH pages:

1. Tap **Password...** from the *WLAN Adapter* tab.

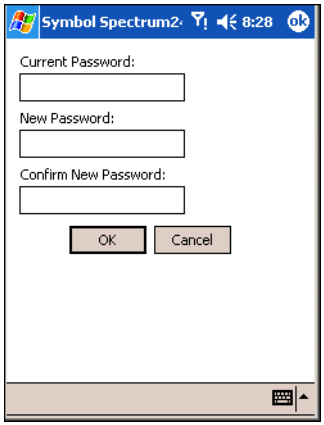


Figure 5-34. Spectrum 24 FH Password Window

2. Enter the case-sensitive password (10 characters maximum) in the *New Password:* field.
3. Enter the password in the *Confirm New Password:* field.
4. Tap **OK**.
5. The new password is required the next time Spectrum24 FH is accessed.

To change an existing password:

1. Tap **Password...** from the *WLAN Adapter* tab.
2. Enter the current password in the *Current Password:* field.
3. Enter a new password in the *New Password:* and *Confirm New Password:* fields.
4. Tap **OK**.

To disable an existing password:

1. Tap **Password...** from the *WLAN Adapter* tab.
2. Enter the current password in the *Current Password:* field and leave the *New Password:* and *Confirm New Password:* fields blank.
3. Tap **OK**.

Configuring the S24 DS (11 Mb) Radio Using a Registry File

Default settings for the Spectrum24 radio card can be set on the mobile computer using registry (.reg) files. There are two registry files: Spectrum24DS.reg contains the global registry settings for Mobile Companion and S24Profiles.reg contains the profile specific and operating registry settings for Mobile Companion.

A sample S24Profiles.reg file is provided as part of the DCP for MC9000w. Edit the file using a text editor. Refer to notes in the sample file for the key information that can be modified.

Save this text file as S24Profiles.reg. Use ActiveSync to copy this file to the *Platform* folder on the mobile computer. Once this file is loaded onto the mobile computer, these settings are restored after a cold boot.

Configuring the S24 FH (2 Mb) Radio Using a Registry File

Default settings for the Spectrum24 radio card can be set on the mobile computer using registry (.reg) files. There is one registry file (FHDOTNET.reg) that contains the global registry settings, profile specific and operating registry settings for Network Interface Card Task Tray Applet (NICTT).

A sample FHDOTNET.reg file is provided as part of the DCP for MC9000w. Edit the file using a text editor. Refer to notes in the sample file for the key information that can be modified.

Save this text file as FHDOTNET.reg in order to override the existing reg file on the mobile computer. Use ActiveSync to copy this file to the Platform folder on the mobile computer. Once this file is loaded onto the mobile computer, these settings are restored after a cold boot.

6

Bluetooth Wireless Technology

Contents

Introduction

Bluetooth wireless technology is not available on MC906R-G RFID mobile computers.

Devices equipped with *Bluetooth* wireless technology can communicate without wires, using frequency-hopping spread spectrum (FHSS) RF to transmit and receive data in the 2.4 GHz Industry Scientific and Medical (ISM) band (802.15.1). Bluetooth wireless technology is specifically designed for short-range (30 feet/10 meters) communications and low power consumption.

Mobile computers with Bluetooth capabilities can exchange information (e.g., files, appointments and tasks) with other Bluetooth enabled devices such as phones, printers, access points and other mobile computers. In addition, a dial-up modem connection can be created between the Bluetooth mobile computer and a Bluetooth enabled phone. The Bluetooth phone can then be used as a modem.

Symbol mobile computers with *Bluetooth* wireless technology use the Microsoft Bluetooth stack. To program Bluetooth within the mobile computer refer to the Microsoft Embedded Visual C++ help.

Turning the Bluetooth Radio Mode On and Off

Turn off the Bluetooth radio mode to save power or if entering an area with radio restrictions (e.g., an airplane). When the mode is off, the mobile computer can not be seen or connected to by other Bluetooth devices. Turn on the Bluetooth radio mode to exchange information with other Bluetooth devices (within range). Communicate only with Bluetooth radios in close proximity.

To achieve the best battery life in mobile computers with multiple radios, turn off the radios that are not being used. This can be accomplished via the DevicePowerNotify() API (refer to the SMDK Help File for Symbol Mobile Computers), or via the 9000 Demo Control Panel application. (The 9000 Demo program can be obtained from the Symbol Web site.)

There are no Power Management APIs to call for the Bluetooth radio. The Microsoft stack mode APIs cause the Bluetooth radio power state to directly correspond to the stack mode. BthSet/GetMode() APIs cause the correct radio power state based on the stack's mode (e.g., Mode Off = Power Off). The mobile computer's User Interfaces for stack mode control both stack state and power state (see *Power Window - Wireless Tab on page 3-45*, *Bluetooth Window - Mode Tab on page 6-5* and *Connectivity Dialog Box on page 6-5*). A *Bluetooth* icon appears in the command bar at the bottom of the screen (task tray) to indicate that the Bluetooth radio is on. The *Bluetooth* icon disappears when the radio is off. The *Bluetooth* icon is for display purposes only.

BthGetMode() should be monitored after resuming the mobile computer. It can take approximately 30 seconds until the stack finishes initialization. It is recommended that BthGetMode() is checked before performing a Bluetooth related task to ensure that another process or application has not changed the Bluetooth mode.

Bluetooth Power States

Cold Boot

When a cold boot is performed on the mobile computer, Bluetooth turns off after initialization (which takes a few moments). It is normal to see the *Bluetooth* icon appear and disappear, as well as a wait cursor, when initialization proceeds in all modes.

Warm Boot

When a warm boot is performed on the mobile computer, Bluetooth returns to the last state after initialization.

Suspend

When the mobile computer suspends, Bluetooth turns off.

When the mobile computer is placed in suspend mode, the Bluetooth radio mode powers off and the piconet (Bluetooth connection) is dropped (see *Table 13-2 on page 13-9* for more information). When the mobile computer resumes, it take approximately 10 seconds for the Bluetooth radio driver to re-initialize the radio.

Resume

When the mobile computer resumes, Bluetooth turns on if it was on prior to suspend.

Turning the Bluetooth Radio Mode Off

1. Tap *Start* - *Settings* - *Connections* tab - *Bluetooth* icon - *Mode* tab.

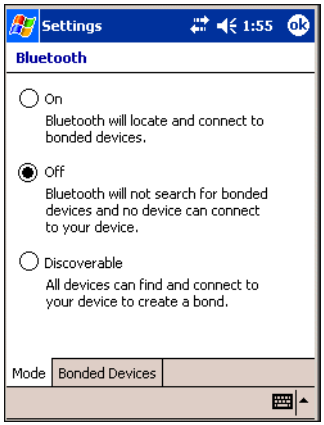


Figure 6-1. Bluetooth Window - Mode Tab

2. Select the *Off* radio button to turn the Bluetooth radio transmitter off.
3. Tab **ok** to return to the *Connections* tab.

or

1. Tap ⇄ on the navigation bar at the top of the screen to display the *Connectivity* dialog box.

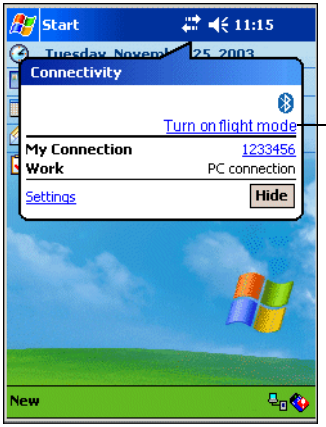


Figure 6-2. Connectivity Dialog Box

2. Tap *Turn on flight mode* to turn the Bluetooth radio transmitter off.

Turning the Bluetooth Radio Mode On

1. Tap *Start* - *Settings* - *Connections* tab - *Bluetooth* icon - *Mode* tab.
2. Select the *On* radio button or the *Discoverable* radio button to turn the Bluetooth radio transmitter on.
   - In *On* mode, the mobile computer is connectable allowing it to locate and connect to bonded Bluetooth devices within range (30 feet/10 meters). In this mode, the mobile computer can detect other devices without allowing other devices to detect the mobile computer.
   - In *Discoverable* mode, the mobile computer can be seen and connected to by other devices allowing all Bluetooth devices within range (30 feet/10 meters) to detect the mobile computer and attempt to beam information to it and/or establish a bond. In this mode, other Bluetooth devices can detect the mobile computer whether or not a bond was created, however, in order to receive a beam form another device it must be accepted on the mobile computer.

or

1. Tap on the navigation bar at the top of the screen to display the *Connectivity* dialog box.

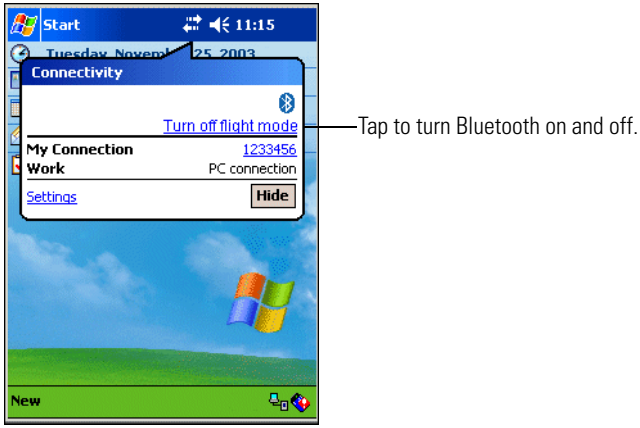


Figure 6-3. Connectivity Dialog Box

2. Tap *Turn off flight mode* to turn the Bluetooth radio transmitter on.

Adaptive Frequency Hopping

Adaptive Frequency Hopping (AFH) is a method of avoiding fixed frequency interferers. AFH can be used with Bluetooth voice. All devices in the piconet (Bluetooth network) must be AFH-capable in order for AFH to work. There is no AFH when connecting and discovering devices. Avoid making Bluetooth connections and discoveries during critical 802.11b communications. AFH for Bluetooth can be broken-down into four main sections:

- Channel Classification - A method of detecting an interference on a channel-by-channel basis, or pre-defined channel mask.
- Link Management - Coordinates and distributes the AFH information to the rest of the Bluetooth network.
- Hop Sequence Modification - Avoids the interference by selectively reducing the number of hopping channels.
- Channel Maintenance - A method for periodically re-evaluating the channels.

When AFH is enabled, the Bluetooth radio "hops-around" (instead of through) the 802.11b high-rate channels. AFH coexistence allows Symbol mobile computers to operate in any infrastructure.

The Bluetooth radio in this mobile computer operates as a Class 2 device power class. The maximum output power is 2.5mW and the expected range is 32.8 feet (10 meters). A definitive definition of ranges based on power class is difficult to obtain due to power and device differences, and whether one measures open space or closed office space.

It is not recommended to perform Bluetooth wireless technology inquiry when high rate 802.11b operation is required.

Discovering Bluetooth Device(s)

Follow the steps below to discover and create bonds with other Bluetooth devices. The mobile computer can receive information from discovered devices, without creating a bond. However, once bonded, an exchange of information between the mobile computer and a bonded device occurs automatically when the Bluetooth radio in turned on.

Bonding with Discovered Device(s)

A bond is a relationship created between the mobile computer and another Bluetooth device in order to exchange information in a secure manner. Creating a bond involves entering the same PIN on the

two devices to bond. Once a bond is created, and the Bluetooth radios are turned on, the devices recognize the bond and are able to exchange information without re-entering a PIN.

To bond with a discovered Bluetooth device:

1. Ensure that the Bluetooth device being looked for is in discoverable mode.
2. Ensure that the two devices are within 30 feet (10 meters) of one another.
3. Tap *Start* - *Settings* - *Connections* tab.

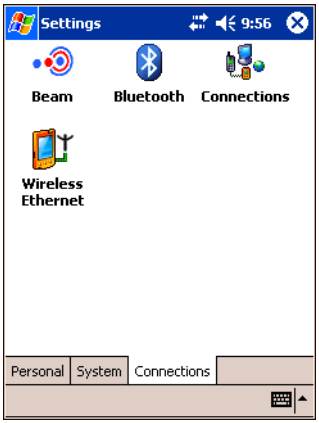


Figure 6-4. Settings Window - Connections Tab

4. Tap *Bluetooth* icon - *Bonded Devices* tab.

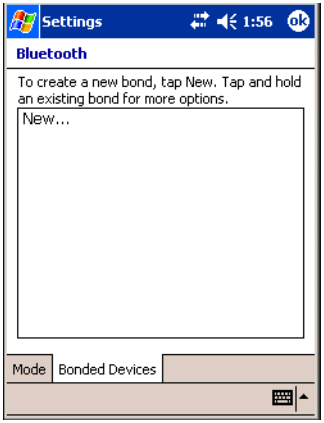


Figure 6-5. Bluetooth Window - Bonded Devices Tab

5. Tap *New...* . The mobile computer searches for other Bluetooth devices and displays them in the list.

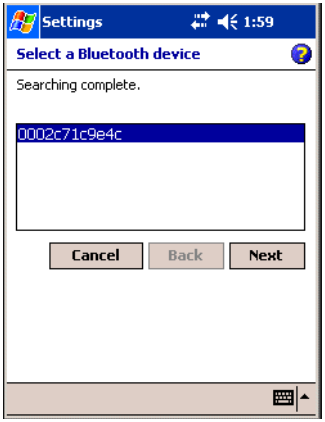


Figure 6-6. Select a Bluetooth Device Window

6. In the list, tap the device with which to create a bond and then tap **Next**.

Figure 6-7. Enter Device Bluetooth PIN Window

Note

If the device to which the mobile computer is bonding does not appear in the list, ensure it is turned on, in discoverable mode, and within range (30 feet/ 10 meters) of the mobile computer.

7. In the *Device PIN:* text box, enter a PIN (between 1 and 16 characters) and tap **Next**. The mobile computer sends the PIN request to the device for bonding.
8. When prompted, the same PIN must be entered on the other device. When the PIN is entered correctly on the other device, the *Name the Bluetooth Device* window appears.

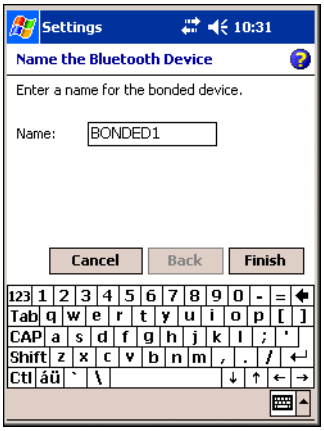


Figure 6-8. Name the Bluetooth Device Window

9. In the *Name:* text box, edit the name of the other device, if desired.
10. Tap **Finish**. The bonded device appears in the list.

Figure 6-9. Bluetooth Bonded Devices Window

Renaming a Bonded Device

If it is necessary to rename a bonded device, it can be done from the *Bluetooth Bonded Devices* window.

1. Tap *Start* - *Settings* - *Connections* tab - *Bluetooth* icon - *Bonded Devices* tab.
2. Tap and hold the device to rename. In the pop-up menu, select *Rename*.

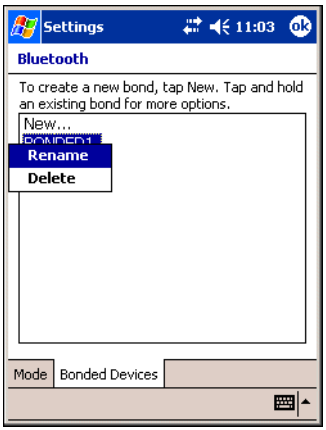


Figure 6-10. Rename Device Selection Dialog Box

3. The *Rename bonded device* window appears.

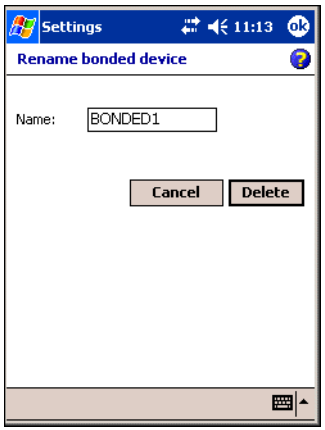


Figure 6-11. Rename Bonded Device Window

4. Enter a new name for the bonded device in the *Name:* text box. Tap **ok**.

Note

Tap **Delete** in this window to delete a bonded device.

Deleting a Bonded Device

If it is no longer necessary to connect with a device, delete it from the *Bluetooth Bonded Devices* window.

1. Tap *Start* - *Settings* - *Connections* tab - *Bluetooth* icon - *Bonded Devices* tab.
2. Tap and hold the device to delete. In the pop-up menu, select *Delete*.

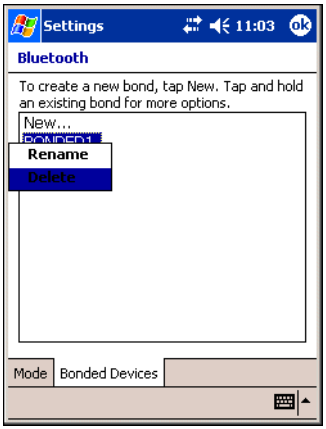


Figure 6-12. Delete Device

3. A confirmation dialog appears. Tap **Yes**.

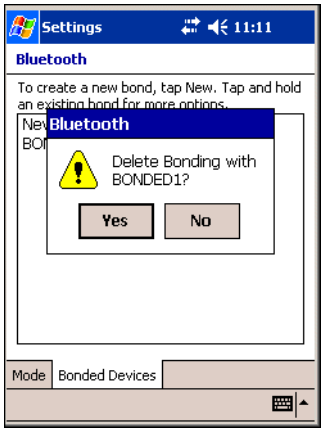


Figure 6-13. Delete Device Confirmation Dialog Box

Receiving Incoming Beams

By default, the mobile computer detects incoming Bluetooth beams and prompts the user to accept them. Clear the *Receive all incoming beams* check box to prevent the mobile computer from detecting or receiving beams.

To turn off incoming beams:

1. Tap *Start* - *Settings* - *Connections* tab - *Beam* icon.

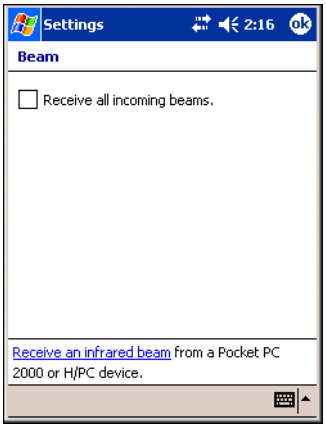


Figure 6-14. Beam Window

2. Tap the *Receive all incoming beams* check box to clear the box.
3. Tap **ok**.

Note

Ensure the *Receive all incoming beams* check box is checked to receive all incoming beams.

Accepting a Bond

1. Ensure that the Bluetooth device is turned on and in discoverable mode.
2. When prompted to bond with the other device, tap **OK**.

Figure 6-15. Accept a Bond Request Window

3. In the *Device PIN:* text box, enter the same PIN that was entered on the device requesting the bond. The PIN must be between 1 and 16 characters.

Figure 6-16. Enter Device Bluetooth PIN Window

4. Tap **Next**.

5. In the *Name*: text box, edit the name of the device requesting the bond, if desired.

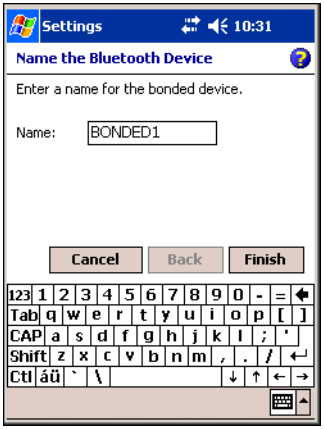


Figure 6-17. Name the Bluetooth Device Window

6. Tap **Finish**.
7. The bond is created and the mobile computer can now exchange information with the other device.

Beaming Information

The mobile computer can beam information such as an appointment in Calendar, a task in Tasks, a contact card in Contacts or a file in File Explorer. To beam information to another device:

Sending an Appointment or Task

1. Ensure the other Bluetooth device is set up to receive an appointment or task.
2. Tap *Start* - *Today* to display the *Today* screen.

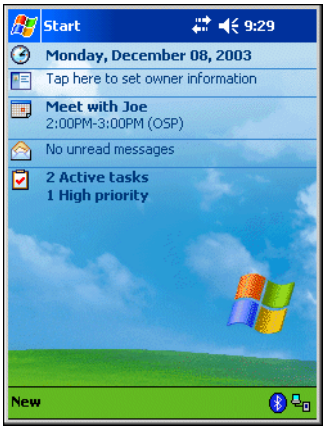
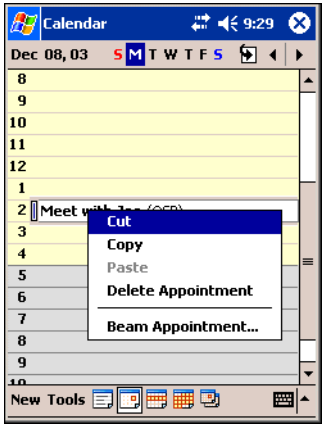


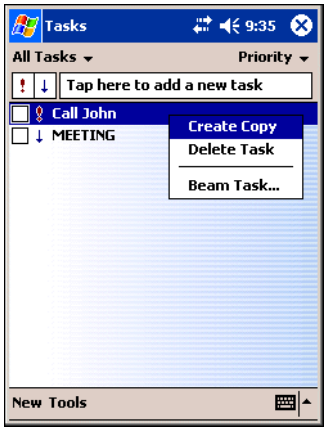
Figure 6-18. Today Screen

3. On the *Today* screen, tap either an appointment or a task to beam.

4. Tap and hold the appointment or task to send. In the pop-up menu, select *Beam Appointment.../Task... .*



Calendar Appointment Window



Task Window

Figure 6-19. Appointment/Task Windows

5. The mobile computer begins to search for Bluetooth devices within range.

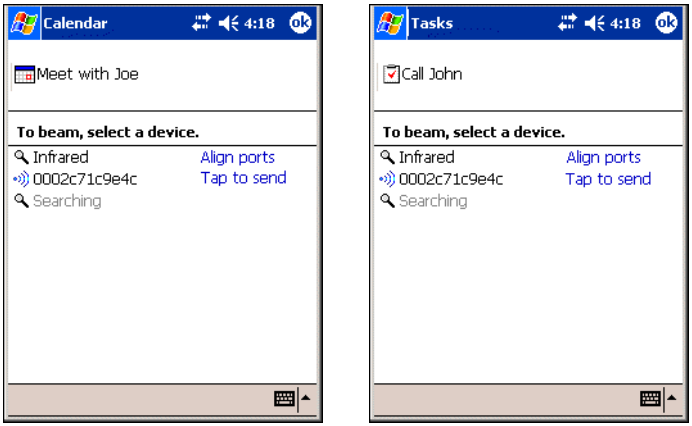


Figure 6-20. Calendar/Tasks Windows - Beam

Note

If the mobile computer is bonded to a device but it does not appear in the list, ensure it is turned on, in discoverable mode, and within range (30 feet/10 meters) of the mobile computer. In addition, ensure the mobile device's Bluetooth radio is turned on.

6. On the *Calendar* or *Tasks* window, tap *Tap to send* to the Bluetooth device receiving the appointment or task. (Tap *Pending* to cancel.)
7. The mobile computer processes and sends the file(s).

Sending a Contact

1. Ensure the other Bluetooth device is set up to receive a contact.
2. Tap *Start* - *Contacts*. The *Contacts* window appears.
3. Tap and hold the contact(s) to send. In the pop-up menu, select *Beam Contact...* .

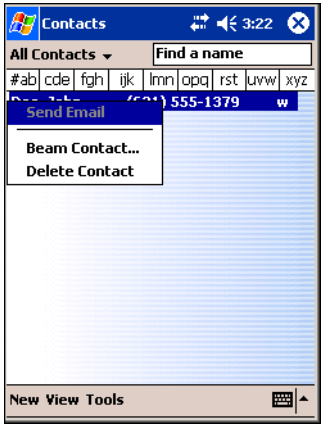


Figure 6-21. Contact Window

4. The mobile computer begins to search for Bluetooth devices within range.

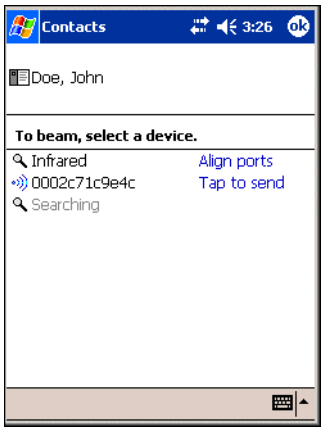


Figure 6-22. Contacts Window - Beam

Note

If the mobile computer is bonded to a device but it does not appear in the list, ensure it is turned on, in discoverable mode, and within range (30 feet/10 meters) of the mobile computer. In addition, ensure the mobile device's Bluetooth radio is turned on.

5. On the *Contacts* window, tap *Tap to send* to the Bluetooth device receiving the contact. (Tap *Pending* to cancel.)
6. The mobile computer processes and sends the file(s).

Sending a File

1. Ensure the other Bluetooth device is set up to receive a file.
2. Tap *Start* - *Programs* - *File Explorer* icon to search for a file to send.
3. Tap and hold the file(s) to send. In the pop-up menu, select *Beam File...* .

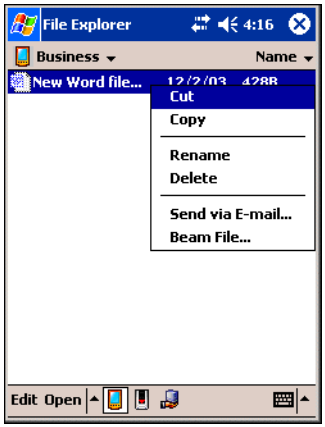


Figure 6-23. File Explorer Window

4. The mobile computer begins to search for Bluetooth devices within range.

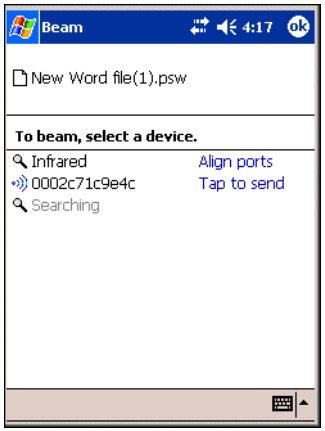


Figure 6-24. File Window - Beam

If the mobile computer is bonded to a device but it does not appear in the list, ensure it is turned on, in discoverable mode, and within range (30 feet/10 meters) of the mobile computer. In addition, ensure the mobile device's Bluetooth radio is turned on.

5. On the *File* window, tap *Tap to send* to the Bluetooth device receiving the file(s). (Tap *Pending* to cancel.)
6. The mobile computer processes and sends the file(s).

Bluetooth Communications

To use a phone that has Bluetooth capabilities as a modem for the mobile computer, create a Bluetooth modem connection on the mobile computer and send information to the phone using Bluetooth. The phone relays the information over the phone line and sends back to the mobile computer any information that was requested over the connection. Once a modem connection is created to the Bluetooth phone, it can be reused.

Prior to creating a connection, ensure the following:

- Bluetooth phone is turned on.
- Bluetooth phone is discoverable. (Some phones may also need to be pairable in order to accept a bonding request. For more information, refer to the phone documentation.)
- Mobile computer's and phone's Bluetooth radios are turned on.
- Mobile computer and phone are within range of each other (30 feet/10 meters).

Dial-up to the Network

Complete the following steps to create a new Bluetooth connection. Before setting up dial-up networking, obtain dial-up information and other necessary settings for the office network or ISP.

1. Tap *Start* - *Settings* - *Connections* tab - *Connections* icon. The Connections window appears.

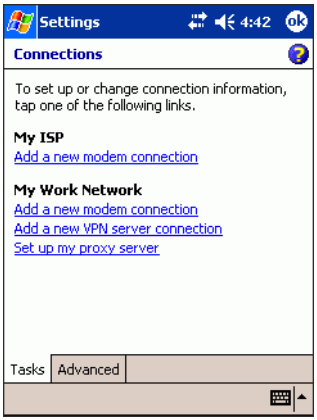


Figure 6-25. Connections Window

2. Tap the *Advanced* tab.

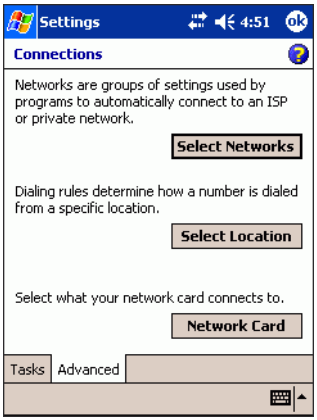


Figure 6-26. Connections - Advanced Tab

3. Tap **Select Networks**. The *Network Management* window appears.

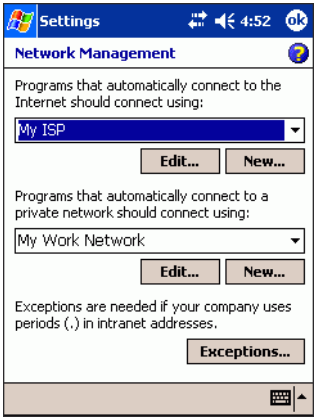


Figure 6-27. Network Management Window

4. In the top drop-down list, select *My ISP*.
5. In the bottom drop-down list, select *My Work Network*.
6. Tap **ok**.
7. Tap the *Tasks* tab.

8. Tap *Add a new modem connection* under *My ISP*. The *My Connection* window appears.

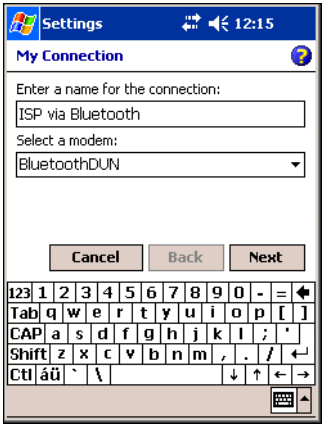


Figure 6-28. My Connection Window

9. In the *Enter a name for the connection:* text box, enter a name, such as *ISP via Bluetooth*.
10. In the *Select a modem:* drop-down list, select *BluetoothDUN*.
11. Tap **Next**.

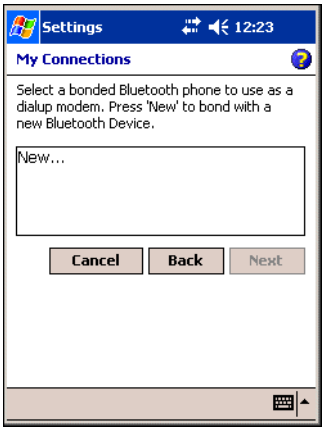


Figure 6-29. New Dial-Up Window

12. Ensure the Bluetooth phone is discoverable. Tap *New...* . The mobile computer searches for other Bluetooth devices and displays them in the list.

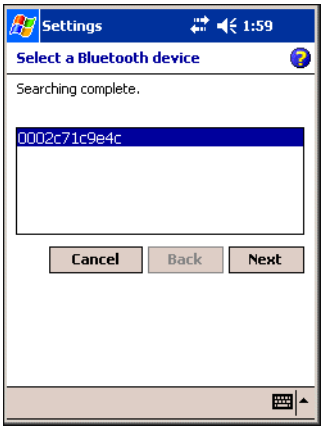


Figure 6-30. Select Bluetooth Device Window

13. In the list, select the device and then tap **Next**.

Figure 6-31. Enter Bluetooth Device PIN Window

14. In the *Device PIN:* text box, enter a PIN (between 1 and 16 characters) and tap **Next**. The mobile computer sends the PIN request to the phone. When prompted, enter the same PIN on the phone.

15. In the *Name*: text box, edit the name of the device requesting the bond, if desired.

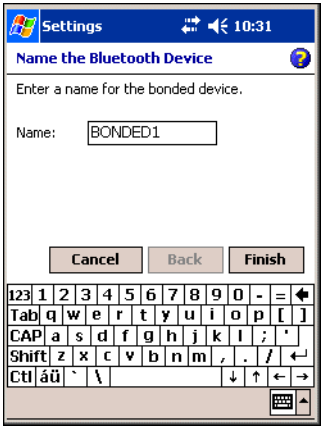


Figure 6-32. Name the Bluetooth Device Window

16. Tap **Finish**.
17. Enter the dial-up number exactly how it should be dialed. Include the country and area code as required.

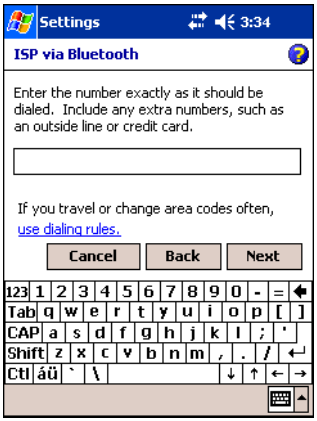


Figure 6-33. Enter Dial-Up Number Window

18. Tap **Next**.

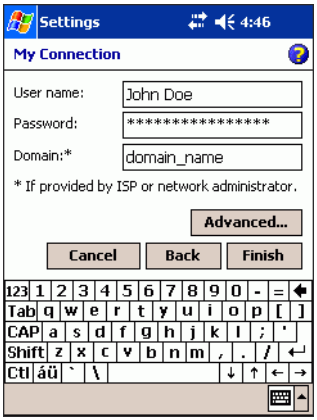


Figure 6-34. My Connection Window

19. In the *User name:* text box, enter the user name for this connection.
20. In the *Password:* text box, enter the password for this connection.
21. In the Domain: text box, enter the domain for this connection, if required.
22. Tap **Advanced**. The *Advanced* window appears.

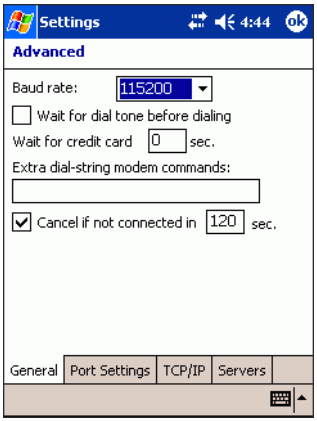


Figure 6-35. Advanced Window - General Tab

23. Tap the *General* tab.

24. In the *Baud Rate:* drop-down list, select *115200*.
25. Un-check the *Wait for dial tone before dialing* check box.
26. If the network uses DHCP, tap **ok**.
27. If IP addresses are required, tap the *TCP/IP* and *Servers* tabs to enter the necessary settings. Tap **ok**.

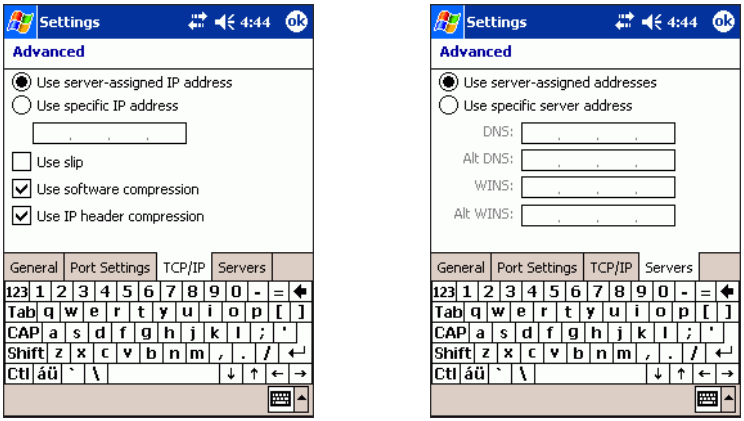


Figure 6-36. Advanced Window - TCP/IP and Servers Tabs

28. Tap **Finish**.
29. Tap the *Connection* icon in the navigation bar at the top of the screen. An "X" indicates that the mobile computer is not connected.

30. The *Connectivity* dialog box appears with the dial-up connection just created. Verify the phone number, then tap the phone number.

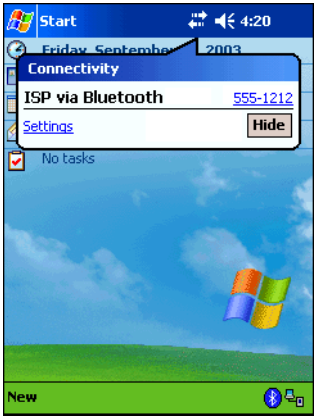


Figure 6-37. Connecting to a Bluetooth Phone

Note

Multiple connections may be listed. Tap on the phone number of the connection to dial.

31. Depending on the phone and connection settings, entering a passkey and/or a password may be required before the phone starts to dial.

32. If the dial-up password was not saved, the *Network Log On* screen appears.

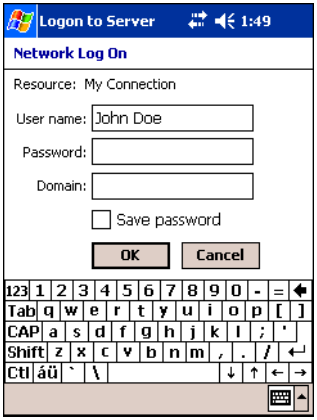


Figure 6-38. Network Log On Window

33. Enter the Password and tap **ok**.
34. The device begins dialing.

Figure 6-39. Dialing the Bluetooth Phone

Dial Automatically from an Application

After a dial-up connection is set up, the Connection Manager automatically tries to connect whenever Pocket Internet Explorer, Pocket Inbox, or any other program that uses a dial-up connection is used.

To dial automatically:

1. Start the program that uses a dial-up connection. Enter a request for receiving and/or transmitting information (e.g., in *Pocket Internet Explorer*, enter a new URL and tap "Go"). The mobile computer automatically tries to connect.

If the phone number or dialing location is wrong, tap *Settings*. Tap *Manage existing connections* and edit the properties of the connection.

2. Depending on the phone and connection settings, entering a passkey and/or a password may be required before the phone starts to dial.
3. If the dial-up password was not saved, the *Network Log On* screen may appear. Enter the Password and tap **ok**.
4. When the mobile computer starts calling, the call status can be seen on both the mobile computer and phone display. After the mobile computer connects, it receives/transmits the information as requested (e.g., *Pocket Internet Explorer* displays the requested web site).

Bluetooth LAN Access

This section explains how to use dial-up networking to access a Bluetooth-enabled LAN access point (AP) for a network connection. To use this method for LAN access, ensure the Bluetooth AP supports communication as a Bluetooth dial-up modem. With this method of communication the Internet Explorer can be used to connect to the server.

The steps required to create a Bluetooth-enabled LAN connection via APs are similar to creating a new dial-up. A valid telephone number and other advanced settings for the office network or ISP are not required.

Connecting to a Bluetooth Access Point

1. Tap *Start* - *Settings* - *Connections* tab - *Connections* icon. The Connections window appears.

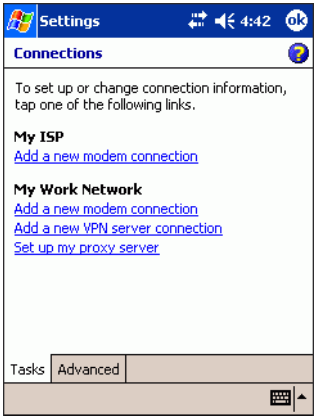


Figure 6-40. Connections Window

2. On the *Tasks* tab, tap *Add a new modem connection* under *My ISP*. The *My Connection* window appears.

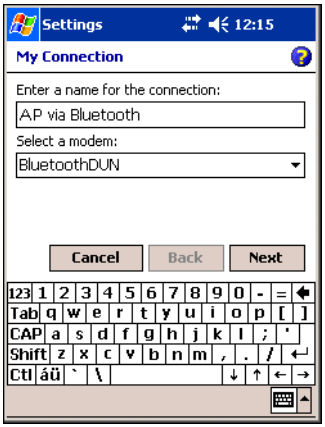


Figure 6-41. My Connection Window

3. In the *Enter a name for the connection:* text box, enter a name, such as *AP via Bluetooth*.
4. In the *Select a modem:* drop-down list, select *BluetoothDUN*.

5. Tap **Next**.

Figure 6-42. New Dial-Up Window

6. Ensure the Bluetooth AP is discoverable. Tap *New...* . The mobile computer searches for other Bluetooth devices and displays them in the list.

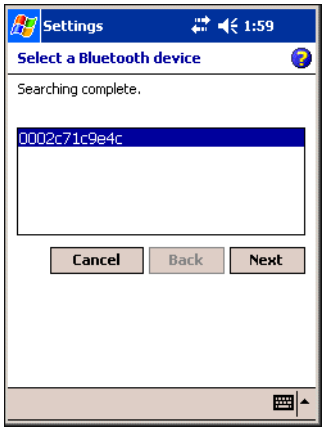


Figure 6-43. Select Bluetooth Device Window

7. In the list, select the appropriate Bluetooth AP and then tap **Next**.

Figure 6-44. Enter Bluetooth Device PIN Window

8. In the *Device PIN:* text box, enter the PIN (between 1 and 16 characters) the AP is set to and tap **Next**. The mobile computer sends the PIN request to the AP.
9. In the *Name:* text box, edit the name of the AP, if desired.
10. Tap **Finish**.
11. In the **My Connections** list, tap the phone, and then **Next**.

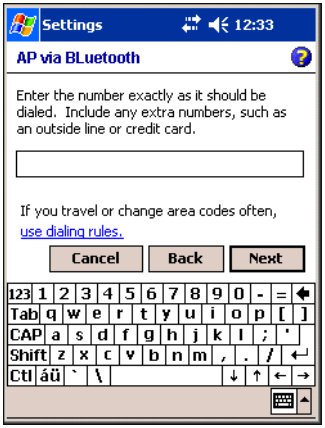


Figure 6-45. Enter Dial-Up Number

12. Enter any string of numbers.

Note

An actual telephone number is not required however, the Bluetooth AP must support connections as Bluetooth modem.

13. Tap **Next**.

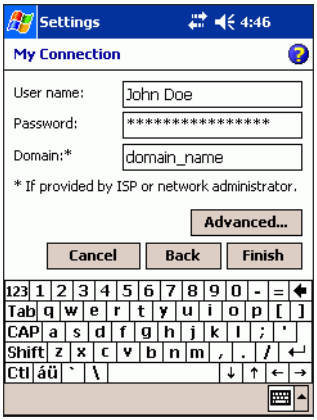


Figure 6-46. My Connection Window

14. In the *User name:* text box, enter the user name for this connection.
15. In the *Password:* text box, enter the password for this connection.
16. In the Domain: text box, enter the domain for this connection, if required.
17. Tap **Finish**.
18. Tap the *Connection* icon in the navigation bar at the top of the screen. An "X" indicates that the mobile computer is not connected.

19. The *Connectivity* dialog box appears with the AP connection just created. Tap the phone number to start connecting.

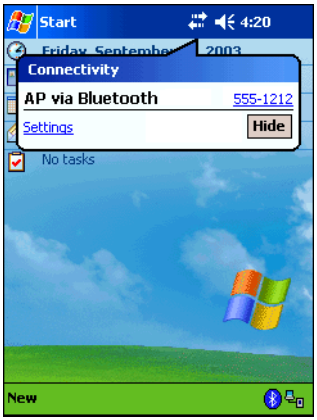


Figure 6-47. Connecting to a Bluetooth AP

Note

Multiple connections may be listed. Tap on the phone number of the AP connection.

20. Depending on the AP and connection settings, entering a passkey and/or a password may be required.

21. If a password is required and it was not saved, the *Network Log On* screen appears.

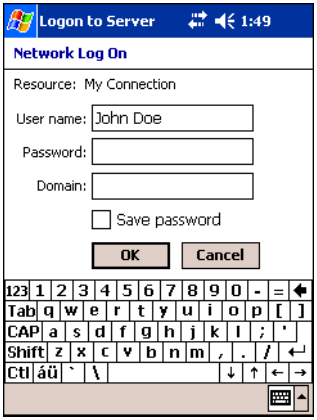


Figure 6-48. Network Log On Window

22. Enter the Password and tap **ok**.
23. The mobile computer attempts to connect to the AP.

Figure 6-49. Connecting Dialog Box

Automatic Connection

Some Bluetooth enabled phones allow automatic connections to be set up with devices they have successfully bonded with, without requiring a password to be entered manual for each connection attempt. To set up automatic connections between the phone and the mobile computer, follow the appropriate instructions below for the specific phone.

1. Motorola Timeport 270C:
   a. On the phone, press **MENU**.
   b. Scroll to *Settings*, then press **SELECT**.
   c. Scroll to *Connection*, then press **ON**.
   d. On *Bluetooth Link*, press **SELECT**.
   e. Scroll to *Devices*, then press **SELECT**.
   f. Choose the mobile computer, then press **EDIT**.
   g. Scroll to *Access:Ask*, then press **CHANGE**.
   h. Scroll to *Automatic*, then press **SELECT**. Press **DONE**.
2. Nokia 3650/7650:
   a. On the phone, press **MENU**.
   b. Scroll to *Connectivity*, then press **Options**.
   c. The *Open* option should be highlighted. Press **Select**.
   d. The *Bluetooth* option should be highlighted. Press **Options**.
   e. The *Open* option should be highlighted. Press **Select**.
   f. Scroll to the right tab to access the *Paired* devices list. Highlight the mobile computer, then press **Options**.
   g. Scroll to *Set as authorised*, then press **Select**.
   h. In the confirmation screen, press **Yes**.
3. Nokia 6310/8910/8910i:
   a. On the phone, press **MENU**.
   b. Scroll to *10 Bluetooth*, then press **SELECT**.
   c. Scroll to *4 View Paired Devices*, then press **SELECT**.
   d. Highlight the *Pocket PC*, then press **OPTIONS**.
   e. Scroll to *3 Request Connection Authorization*, then press **NO**.

Creating a Bluetooth Virtual COM Port

There are two ways to write an RFCOMM application. The first is by creating a virtual legacy COM port. The second is through Winsock. Microsoft recommends using Winsock.

The sample code that follows demonstrates how to create a Bluetooth virtual COM port.

```
// Begin
SetCursor(LoadCursor(NULL, IDC_WAIT));   // Set a wait cursor
memset (&pp, 0, sizeof(pp));             // Clear the PORTEMUPortParams
                                         // structure.
pp.uiportflags = RFCOMM_PORT_FLAGS_KEEP_DCD;
                                         // DCD ON while in piconet
pp.channel = 1;                          // Set to either an explicit server channel, or, for a server
                                         // application that wants the server channel to be
                                         //autobound, to RFCOMM_CHANNEL_MULTIPLE.
pp.flocal = FALSE;                       // Set to FALSE for a client port that is used
                                         // to creating outgoing connections.

// pp.imtu should be set to something other than the default, if data payload size is larger than
// 128 /bytes. For further information on this structure, refer to the Microsoft Help.

GetBA(_T("53594D421722"), &pp.device);   // ** Set your slave's BDADDR here
nIndex =  8;                             // This must be the same as the COM port number.

// For devices that expose the stream interface, the drivers are DLL files. Each driver is initialized by
// a call to the RegisterDevice function. The Device Manager calls this function on behalf of the
// driver. However, applications can load their own special-purpose stream interface, in which case
// they also call this function to register the driver.

h = RegisterDevice(_T("COM"), nIndex, _T("btd.dll"), (DWORD)&pp);

if (h != NULL)
{
        // Success!
        hComPort = InitSerial(TEXT("COM8:"), CBR_115200);          // Init port.
        if (hComPort == NULL)
        {
        // Failure!
#ifdef DEBUG
```

```
            LogData(_T("Failed to open Comport, trying again"));
#endif
            hComPort = InitSerial(TEXT("COM8:"), CBR_115200);    // Init port.
            }

            // Perform serial operations here...
}
#ifdef DEBUG
else
{
            // Failure!
            LogData(_T("Failed to register Comport device"));
}
#endif

SetCursor(LoadCursor(NULL, NULL));                              // Clear the wait cursor

// End
*************************************************************************

      FUNCTION:    GetBA
      PROTOTYPE:   int GetBA (WCHAR *pp, BT_ADDR *pba)
      PURPOSE:     Form the BDADDR in a way the PORTEMUPortParams structure understands.
*************************************************************************

/int GetBA (WCHAR *pp, BT_ADDR *pba)
{
      // Bump pointer through any leading spaces
      while (*pp == ' ')
            ++pp;

      for (int i = 0 ; i < 4 ; ++i, ++pp)
      {
            if (!iswxdigit (*pp))
                  return(FALSE);

            int c = *pp;
            if (c >= 'a')
```

```
                c = c - 'a' + 0xa;
        else if (c >= 'A')
                c = c - 'A' + 0xa;
        else c = c - '0';

        if ((c < 0) || (c > 16))
                return(FALSE);

        *pba = *pba * 16 + c;
    }

    for (i = 0; i < 8 ; ++i, ++pp)
    {
        if (!iswxdigit (*pp))
                return(FALSE);

        int c = *pp;
        if (c >= 'a')
                        c = c - 'a' + 0xa;
        else if (c >= 'A')
                        c = c - 'A' + 0xa;
        else c = c - '0';

        if ((c < 0) || (c > 16))
                        return(FALSE);

        *pba = *pba * 16 + c;
    }

    if ((*pp != ' ') && (*pp != '\0'))
                        return(FALSE);
    else
                        return(TRUE);
}
```

Bluetooth Printing

The mobile computer supports Bluetooth printers that support a serial port profile. Printing to a Bluetooth printer requires a print-enabled application to be installed on the mobile computer.

7

AirBEAM Smart

Contents

Introduction

The AirBEAM Smart product allows specially designed software packages to be transferred between a host server and Symbol wireless handheld devices. Before transfer, AirBEAM Smart checks and compares package version, so that only updated packages are loaded.

AirBEAM Smart resides on radio-equipped client devices, and allows them to request, download, and install software, as well as to upload files and status data. Both download and upload of files can be accomplished in a single communications session. The ability to transfer software over a radio network can greatly reduce the logistical efforts of client software management.

In an AirBEAM Smart system, a network-accessible host server acts as the storage point for the software transfer. The AirBEAM Smart Client uses the industry standard FTP or TFTP file transfer protocols to check the host system for updates, and if necessary, to transfer updated software.

For more detailed information about AirBEAM Smart, refer to the AirBEAM® Smart Windows® CE Client Product Reference Guide (p/n 72-63060-xx).

AirBEAM Package Builder

In a typical distributed AirBEAM system, software to be transferred is organized into packages. In general, an AirBEAM package is simply a set of files that are assigned attributes both as an entire package and as individual component files. The package is assigned a version number, and the transfer occurs when an updated version is available.

An AirBEAM package can optionally contain developer-specified logic to be used to install the package. Installation logic is typically used to update client device flash images or radio firmware. Examples of common AirBEAM packages would include packages for custom client application software, radio firmware and AirBEAM Smart Client software.

Once these packages are built, they are installed on the host server for retrieval by the handheld device. The AirBEAM Package Builder is a utility used to define, generate and install AirBEAM packages to a server. The packages are then loaded from the server onto a client device equipped with an AirBEAM Smart Client executable.

For detailed instructions on how to define, generate and install AirBEAM packages to the server, refer to the *AirBEAM Package Builder Product Reference Guide*, p/n 72-55769-xx.

AirBEAM Smart Client

The AirBEAM Smart Client is installed on the handheld mobile computer. It is configured with the server access information, the names of the packages to be downloaded and other controlling parameters. When the AirBEAM Smart Client is launched, the device connects to the specified FTP server and checks the packages it is configured to look for. If the package version was updated, the client requests the transfer.

AirBEAM License

The AirBEAM Smart Client is a licensed software product. The AirBEAM Smart Client's version synchronization functionality is enabled through a license key file that is stored on the client device. The license key file can be built into AirBEAM Smart Client's image, or downloaded in a special AirBEAM package.

The AirBEAM license key file contains a unique key and a customer specific banner that is displayed when the AirBEAM Smart Client version synchronization logic is invoked.

Configuring the AirBEAM Smart Client

1. Tap *Start - Programs - AirBEAM Smart Client*. The *AirBEAM Smart CE* window appears.
2. Tap *File - Configure*. The *AirBEAM* configuration window appears.

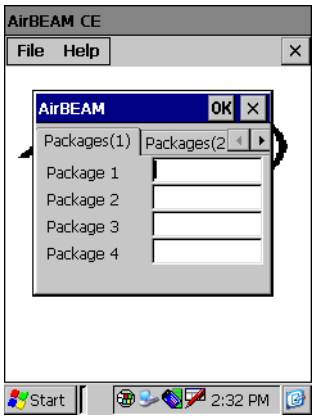
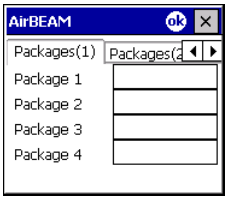


Figure 7-1. AirBEAM Configuration Window

The configuration window is used to view and edit AirBEAM Smart Client configurations. This dialog box has six tabs that you can modify - Packages(1), Packages(2), Server, Misc(1), Misc(2) and Misc(3).

Packages(1) Tab

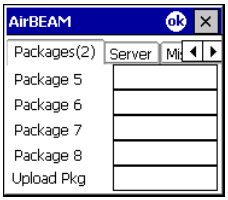


This tab is used to specify the package name of the first four of eight packages that are to be loaded during the AirBEAM synchronization process. The specified package name must correspond to a package that is available on the specified package server.

Field	Description
Package 1	Package name of the first of eight packages. This is an optional field.
Package 2	Package name of the second of eight packages. This is an optional field.
Package 3	Package name of the third of eight packages. This is an optional field.
Package 4	Package name of the fourth of eight packages. This is an optional field.

No inadvertent trailing spaces should be entered on the Packages(1) tab. Information entered in these fields are case and space sensitive.

Packages(2) Tab



This tab is used to specify the package name of the last four of eight packages that are to be loaded during the AirBEAM synchronization process. The specified package name must correspond to a package that is available on the specified package server.

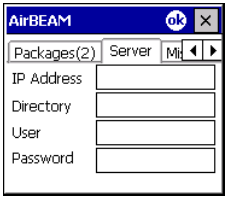
Field	Description
Package 5	Package name of the fifth of eight packages. This is an optional field.
Package 6	Package name of the sixth of eight packages. This is an optional field.
Package 7	Package name of the seventh of eight packages. This is an optional field.
Package 8	Package name of the eighth of eight packages. This is an optional field.
Upload Pkg	Package name of a package that is to be processed for “upload files” during the AirBEAM synchronization process. The specified package name must correspond to a package that is available on the specified package server. This is an optional field.

Note

No inadvertent trailing spaces should be entered on the Packages(2) tab. Information entered in these fields are case and space sensitive.

Server Tab

This tab is used to specify the configurations of the server to which the client connects during the package synchronization process.



.

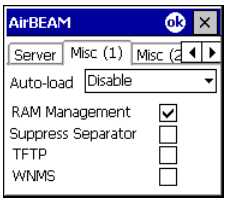
Field	Description
IP Address	The IP Address of the server. It may be a host name or a dot notation format.
Directory	The directory on the server that contains the AirBEAM package definition files. All AirBEAM package definition files are retrieved from this directory during the package synchronization process.
User	The FTP user name that is used during the login phase of the package synchronization process.
Password	The FTP password that corresponds to the FTP user specified in the **User** field. The specified password is used during the login phase of the package synchronization process.

Note

No inadvertent trailing spaces should be entered on the Server tab. Information entered in these fields are case and space sensitive.

Misc(1) Tab

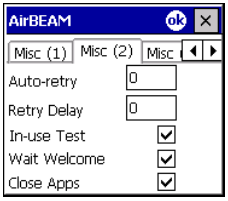
This tab is used to configure various miscellaneous features.



Field	Description
Auto-load	This drop-down list is used to specify how the AirBEAM Smart Client is to be invoked automatically when the client device is rebooted. The selections are: **Disable**: the AirBEAM Smart Client is not invoked automatically during the boot sequence. **Interactive**: the AirBEAM Smart Client is invoked automatically during the boot sequence. The package synchronization process is started automatically. The *Synchronization Dialog* box appears, and the user is required to press the **OK** button when the process is complete. **Non-interactive**: the AirBEAM Smart Client is invoked automatically during the boot sequence. The package synchronization process is started automatically. The *Synchronization Dialog* box is displayed, but the user is not required to tap **OK** when the process is complete. The *Synchronization Dialog* box terminates automatically. **Background**: the AirBEAM Smart Client is invoked automatically during the boot sequence. The package synchronization process is started automatically. Nothing is displayed while the synchronization process is occurring.
RAM Management	This check box specifies whether the automatic RAM management is enabled during the package synchronization process. If enabled, RAM management logic is invoked when there is not enough free disk space to download a package. The RAM management logic attempts to remove any discardable AirBEAM packages resident on the client.
Suppress Separator	This check box specifies whether the automatic insertion of a file path separator character should be suppressed when the client generated server package definition file names. When enabled, the parameter also disables the appending of .apd to the package. This feature is useful for AS/400 systems, in which the file path separator character is a period. When this feature is enabled, the server directory (Directory) and package name (Package 1, Package 2, Package 3, and Package 4) are appended "as is" when building the name for the server package definition file. When this feature is disabled, a standard file path separator is used to separate the server directory (Directory) and package name (Package 1, Package 2, Package 3, and Package 4) when building the name for the server package definition file. In addition, an .apd extension is appended automatically.
TFTP	This check box specifies whether the TFTP protocol is to be used to download files. By default, the AirBEAM Smart Client uses the FTP protocol.
WNMS	This check box specifies whether the AirBEAM Smart Client uploads a WNMS information file at the end of each version synchronization.

Misc(2) Tab

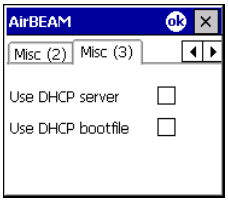
This tab is used to configure various miscellaneous features.



Field	Description
Auto-retry	This field is used to specify whether the AirBEAM Smart Client automatically retries if there is a failure during the synchronization process. If this feature is enabled, the AirBEAM Smart Client displays a popup dialog indicating the attempt of a retry. The popup dialog is displayed for the number of seconds specified in the *Retry Delay* field. The valid values for this field are: **-1**: the AirBEAM Smart Client automatically retries indefinitely. **0**: the AirBEAM Smart Client does not automatically retry. **-0**: the AirBEAM Smart Client automatically retries up to the number of times specified.
Retry Delay	This field specifies the amount of time, in seconds, that the AirBEAM Smart Client delays before automatically retrying after a synchronization failure.
In-use Test	This check box specifies whether the AirBEAM Smart Client tests to determine if a file is in-use before downloading. If the *In-use Test* feature is enabled, the AirBEAM Smart Client downloads a temporary copy of any files that are in-use. If any temporary in-use files are downloaded the AirBEAM Smart Client automatically resets the client to complete the copy of the in-use files. If the *In-use Test* feature is disabled, the synchronization process fails (-813) if any download files are in-use.
Wait Welcome	This check box specifies whether the AirBEAM Smart Client waits for the WELCOME windows to be completed before automatically launching the synchronization process after a reset.
Close Apps	This check box specifies whether the AirBEAM Smart Client automatically attempts to close non-system applications prior to resetting the mobile unit. If enabled the AirBEAM Smart Client sends a WM_CLOSE message to all non-system applications before resetting the mobile unit. This feature offers applications the opportunity to prepare (i.e. close open files) for the pending reset.

Misc(3) Tab

This tab is used to configure various miscellaneous features.



Field	Description
Use DHCP server	This check box control specifies whether the AirBEAM Smart Client uses the DHCP response option 66 to specify the *IP address* of the FTP/TFTP server. If enabled, special RF network registry settings are required to force the DHCP server to return the "TFTP server name" field (option 66). The special RF network registry settings are included, but commented out, in the radio network registry initialization files (essid_xxxx_yy.reg).
Use DHCP bootfile	This check box control specifies whether the AirBEAM Smart Client uses the DHCP response option 67 to specify the *Package* and *Package 1* parameters. If enabled, special RF network registry settings are required to force the DHCP server to return the "Bootfile name" field (option 67). The special RF network registry settings are included, but commented out, in the radio network registry initialization files (essid_xxxx_yy.reg).

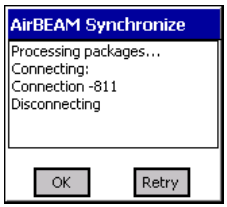
Synchronizing with the Server

When the synchronization process is initiated, the AirBEAM Smart Client attempts to open an FTP session using the AirBEAM Smart Client configuration. Once connected, the client processes the specified packages. Packages are loaded only if the server version of a given package is different from the version loaded on the client. Once the upload process is complete, the AirBEAM Smart Client closes the FTP session with the server.

The AirBEAM Smart Client can launch an FTP session with the server either manually, when initiated by the user, or automatically.

Manual Synchronization

1. Configure the AirBEAM Smart Client. See *Configuring the AirBEAM Smart Client on page 7-4*.
2. From the main *AirBEAM CE* window, tap *File - Synchronize*.
3. Once connected, the AirBEAM Synchronize window appears.
   - The Status List displays status messages that indicate the progress of the synchronization process.
   - Tap **OK** to return to the Main Menu. This button remains inactive until the synchronization process is complete.
   - Tap **Retry** to restart the synchronization process. This button is activated only if there is an error during the synchronization process.



Automatic Synchronization

The AirBEAM Smart Client can be configured to launch automatically using the Misc(1) Preference tab (see *Misc(1) Tab on page 7-7*). When setting automatic synchronization, use the Auto-load drop-down list to specify how the AirBEAM Smart Client should be invoked automatically when the client device is rebooted. See *Misc(1) Tab on page 7-7* for instructions on enabling Auto Sync.

AirBEAM Staging

The AirBEAM Smart staging support is intended to speed up and simplify the process of staging custom or updated operating software onto mobile devices directly from manufacturing. The staging support is part of the AirBEAM Smart CE Client that is integrated into the mobile computer.

The AirBEAM Smart support works by defaulting the AirBEAM Client configuration to a known set of values and launching the AirBEAM Smart package download logic. A staging environment, including an RF network, FTP server and AirBEAM packages must be setup. Ideally a staging network and server should be setup to match the default AirBEAM Staging client configuration.

The AirBEAM Smart staging utility is invoked from the Applications directory (tap *Start - Programs - File Explorer - Application*).

The AirBEAM Staging support provides several benefits:

- Many devices can be simultaneously loaded over the RF network.
- The AirBEAM staging utility provides a simple single dialog user interface that is used to quickly start the software installation process.

8 Rapid Deployment Client

Contents

Introduction

The Rapid Deployment (RD) Client facilitates software downloads to a mobile computer from a Mobility Services Platform (MSP) Console's FTP server. The MSP Console is a web-based interface to the wireless infrastructure monitoring and management tools provided by the MSP Lite or MSP Enterprise server.

When software packages are transferred to the FTP server, the mobile computer on the wireless network can download them to the mobile computer. The location of software packages are encoded in RD bar codes. When the mobile computer scans a bar code(s), the software package(s) is downloaded from the FTP server to the mobile computer. A single RD bar code can be scanned by multiple mobile computers.

Note

For detailed information about the MSP Console, MSP Lite/MSP Enterprise servers and creating RD bar codes, refer to the MSP Users Guide.

Rapid Deployment Window

The *Rapid Deployment* window displays bar code scan status and provides features for resetting and exiting the application.

To access the *Rapid Deployment* window tap *Start* - *Rapid Deployment Client* or *Start* - *Programs* - *Rapid Deployment Client* icon.

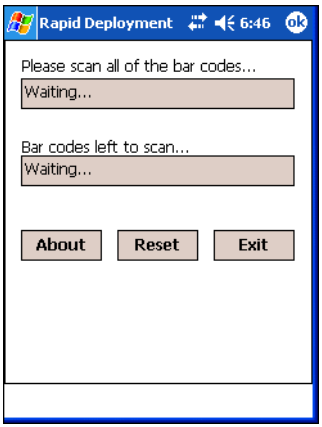
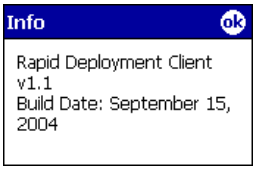
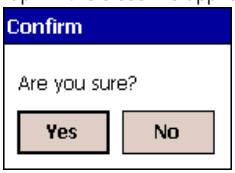


Figure 8-1. Rapid Deployment Window

Table 8-1. Rapid Deployment Window

Text Box/Button	Description
Please scan all of the bar codes...	This text box displays the status of a scanned bar code. *Waiting* - indicates the mobile computer is ready to scan a bar code. *OK* - indicates the mobile computer successfully scanned a bar code. (The Indicator LED bar on the mobile computer turns green and a beep sounds). If there are no bar codes left to scan, the *Rapid Deployment Configuring* window displays (see Figure 8-3).
Bar codes left to scan...	This text box displays a list of any remaining bar codes to scan (1-D bar codes only). When all required bar codes are scanned successfully, the *Rapid Deployment Configuring* window displays (see Figure 8-3).
About	Tap **About** to display the *Rapid Deployment Client Info* window. 
Reset	Tap **Reset** to remove any previously scanned data.
Exit	Tap **Exit** to close the application. A confirmation window displays:  Tap **Yes** to exit or **No** to return to the *Rapid Deployment* window. Note: If the application is exited prior to scanning all required bar codes, any scanned data collected up to that point is lost.

Scanning RD Bar Codes

When the mobile computer scans and successfully decodes a single or multiple RD bar codes, the data encoded in the bar code can:

- Reset the mobile computer's connection profile. A connection profile is a set of Mobile Companion parameters that the mobile computer uses to access the wireless network.
- Initiate downloads of one or more software packages from an FTP server to the mobile computer.

Note

Currently, RD only recognizes AirBEAM software packages. See *Chapter 7, AirBEAM Smart* for more information.

To scan an RD bar code:

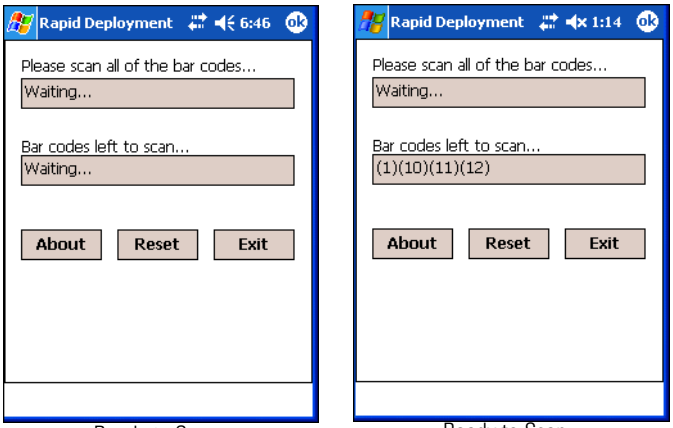
1. Obtain the appropriate RD bar code(s) from the MSP Administrator.
2. Launch the RD application on the mobile computer by tapping:

   Start - Rapid Deployment Client

   or

   Start - Programs - Rapid Deployment Client icon.

   The *Rapid Deployment* window displays.



Ready to Scan
No Bar Codes Left to Scan

Ready to Scan
Bar Codes 1, 10, 11, 12 Left to Scan

Figure 8-2. Rapid Deployment Window

3. Scan the appropriate bar code(s) to complete the configuration and/or download. For information about scanning with the mobile computer, see *Data Capture on page 2-57*.
   a. A PDF417 bar code (2-D bar code) can contain all download data in a single bar code. In this case, only one bar code may be required to scan.
   b. Multi-part linear bar codes (1-D bar codes) can require scanning several bar codes. Bar codes can be scanned in any order. The text box under *Bar codes left to scan...* shows the remaining bar codes to scan (see Figure 8-2).
4. After all appropriate bar codes are scanned successfully, the mobile computer connects to the server and the *Rapid Deployment Configuring* window displays while network settings are configured.

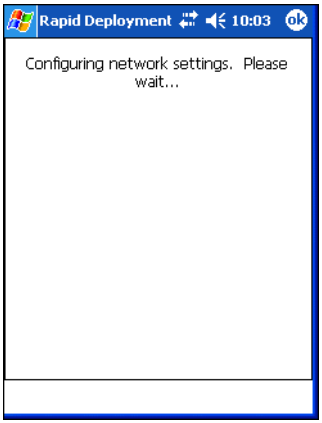


Figure 8-3. Rapid Deployment Window - Configuring

Note

If the mobile computer cannot connect to the server, it continues to retry until the user cancels (exits) the application. If failure to connect to the server persists, see the MSP Administrator.

5. When configuration is complete:
   a. The *Today* screen displays (see *Figure 1-11 on page 1-18*).
   b. A new Mobile Companion profile is created on the mobile computer from the data encoded in the bar code(s) scanned. See *Mobile Companion on page 5-4* for more information about wireless profiles.
   c. The designated package(s) are downloaded from the FTP server.

9

Applications

Contents

Introduction

The mobile computer includes Calendar, Contacts, Tasks, Inbox, and Notes applications. You can use these programs individually or together. For example, e-mail addresses stored in Contacts can be used to address e-mail messages in Inbox.

Using ActiveSync, you can synchronize information in these applications between the host computer and the mobile computer. Each time you synchronize, ActiveSync compares the changes you made on the mobile computer and host computer and updates both with the latest information. For information on using ActiveSync, see *Chapter 4, Communications*, and ActiveSync Help on the host computer.

You can switch to any of these programs by tapping them on the *Start* menu.

Calendar

Use Calendar to schedule appointments such as meetings. You can view appointments in different ways (Agenda, Day, Week, Month, and Year) and easily change views using the *View* menu.

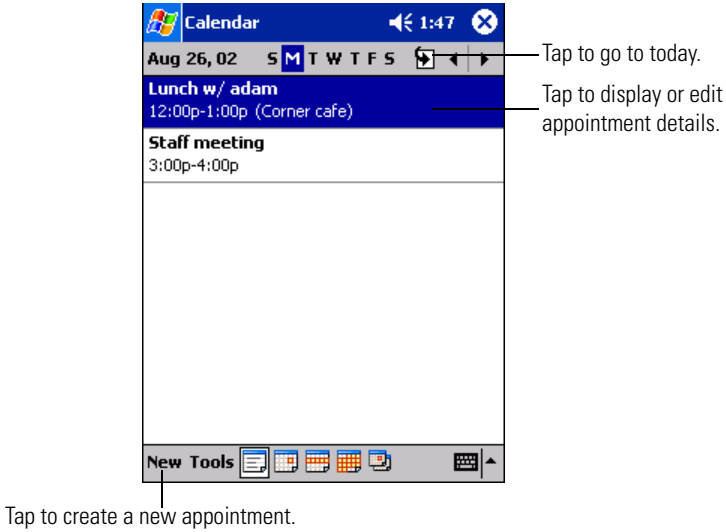


Figure 9-1. Calendar Application

Note

You can customize the Calendar display, such as changing the first day of the week, by tapping Tools - Options.

Creating Appointments

To create an appointment:

1. Tap *Start* - *Calendar* to open the application.
2. If you are in Day or Week view, tap the desired date and time for the appointment.

3. Tap *New*.

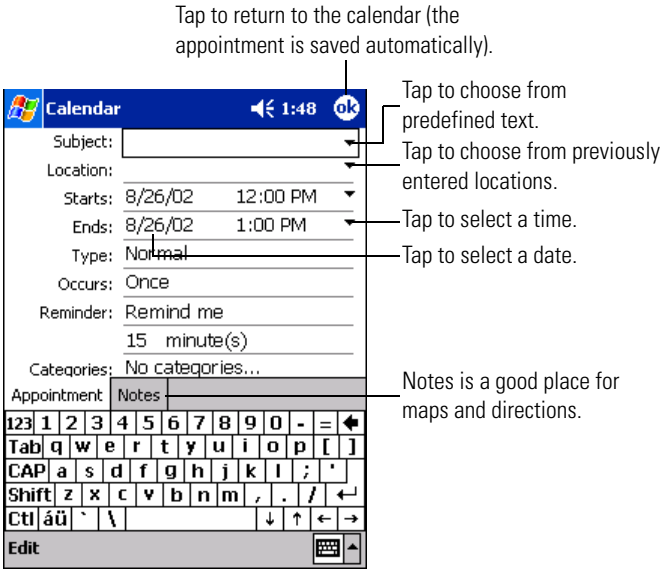


Figure 9-2. Entering an Appointment

4. Using the input panel, enter the subject and a location. Tap first to select the field.
5. If needed, tap the date and time to change them.
6. Enter other desired information. Hide the input panel to see all available fields.
7. To add notes, tap the *Notes* tab. You can enter text, draw, or create a recording. For more information on creating notes, see *Notes on page 9-13*.
8. When finished, tap **OK** to return to the Calendar.

Note

If you select *Remind me* in an appointment, the mobile computer notifies you according to the options set in Start - Settings - Personal tab -Sounds & Notifications.

Using the Summary Screen

When you tap an appointment in Calendar, a summary screen appears. Tap *Edit* to change the appointment.

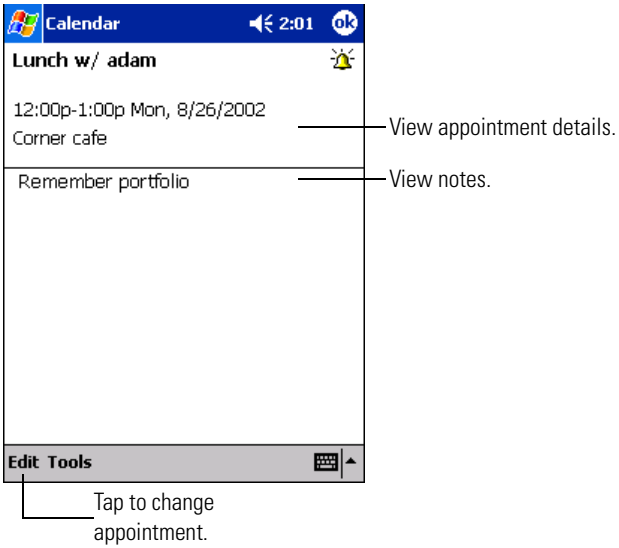


Figure 9-3. Appointment Summary Screen

Creating Meeting Requests

You can use Calendar to set up meetings with users of Outlook or Pocket Outlook. The meeting notice is created automatically and sent either when you synchronize Inbox or when you connect to the e-mail server. Indicate how you want meeting requests sent by tapping *Tools - Options*. If you send and receive e-mail messages through ActiveSync, select *ActiveSync*.

To schedule a meeting:

1. Create an appointment.
2. In the appointment details, hide the input panel, then tap *Attendees*.
3. From the list of e-mail addresses you've entered in Contacts, select the meeting attendees.

The meeting notice is created and placed in the Outbox folder. For more information on sending and receiving meeting requests, refer to Calendar Help and Inbox Help on the mobile computer.

Contacts

Contacts maintains a list of associates and friends so you can easily locate information at home or on the road. Using Bluetooth or an infrared (IR) port (if available), you can share Contacts information with other users.

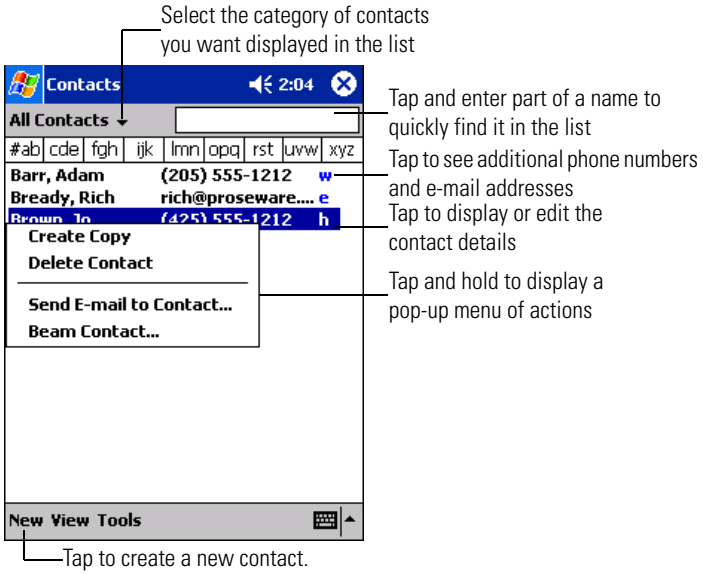


Figure 9-4. Contact Application

Note

To change the way information is listed, tap Tools - Options.

To create a contact:

1. Tap *Start - Contacts to open the application.*

2. Tap *New*.

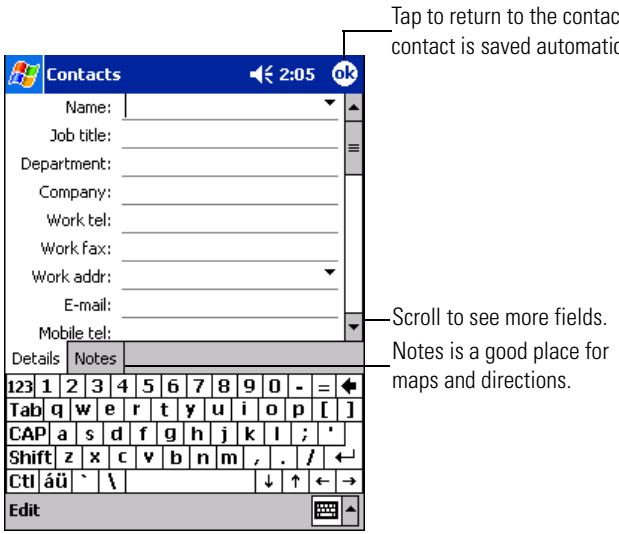


Figure 9-5. Creating a Contact

3. Using the input panel, enter a name and other contact information. Scroll down to see all fields.
4. To assign the contact to a category, scroll to and tap *Categories*. Select a category from the drop-down list. In the contact list, you can display contacts by category.
5. To add notes, tap the *Notes* tab. You can enter text, draw, or create a recording. For more information on creating notes, see *Notes on page 9-13*.
6. When finished, tap **OK** to return to the contact list.

You may find a contact in one of four ways:

- In the contact list, enter a contact name in the box under the navigation bar. To show all contacts again, clear text from the box or tap the button to the right of the box.
- In the contact list, tap the category list (labeled All Contacts by default) and select the type of contact to display. To show all contacts again, select *All Contacts*. To view a contact not assigned to a category, select *None*.
- To view the names of companies contacts work for, in the contact list, tap *View - By Company*. The number of contacts that work for that company appears to the right of the company name.

- Tap *Start - Find*, enter the contact name, select *Contacts* for the type, then tap *Go*.

Using the Summary Screen

When you tap a contact in the contact list, a summary screen appears. Tap *Edit* to change the information.

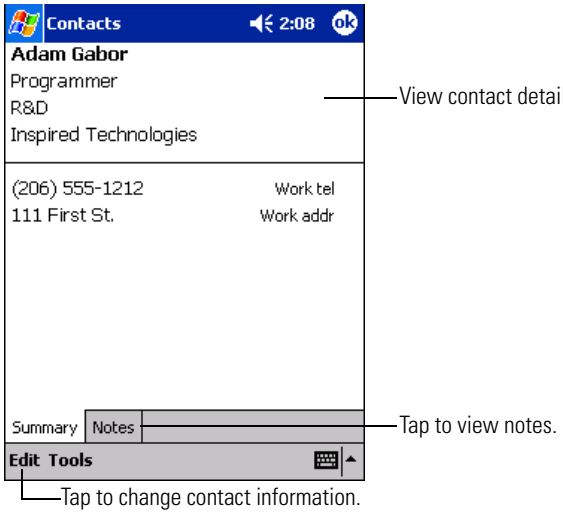


Figure 9-6. Contacts Summary Screen

Tasks

Use Tasks to keep a “to do” list.

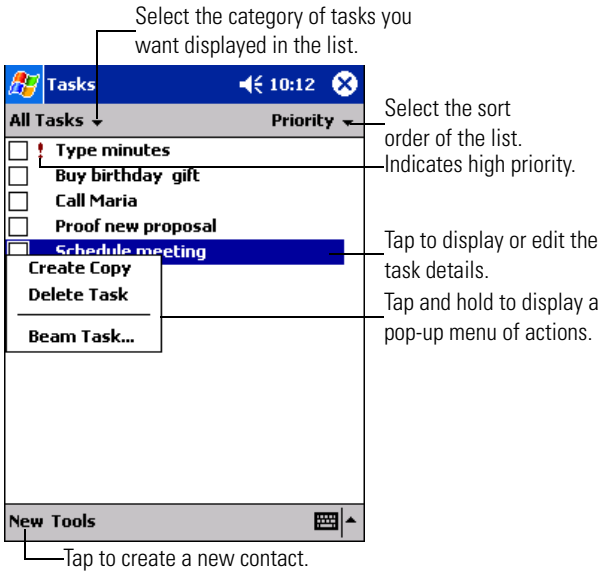


Figure 9-7. Task Application

Note

To change the way information displays in the list, tap Tools - Options.

To create a task:

1. Tap *Start* - *Tasks* to open the application.

2. Tap *New*.

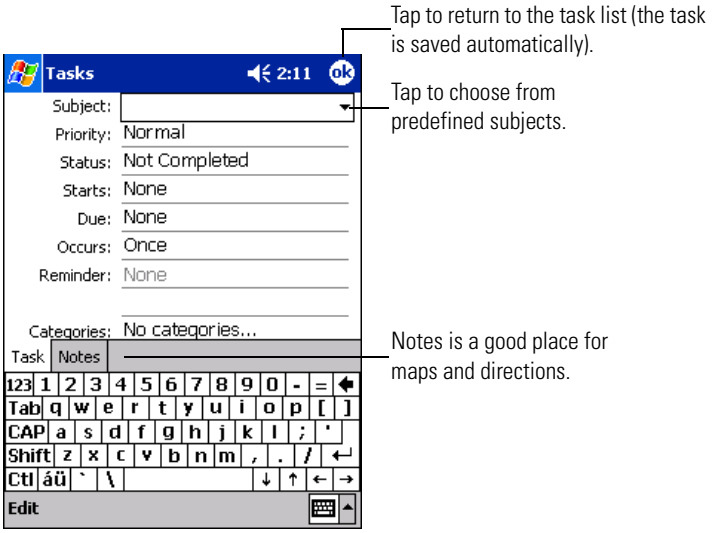


Figure 9-8. Creating a Task

3. Using the input panel, enter a description in the *Subject* field.
4. You can enter a start date and due date or enter other information by first tapping the field. If the input panel is open, hide it to see all available fields.
5. To assign the task to a category, tap *Categories* and select a category from the list. In the task list, you can display tasks by category.
6. To add notes, tap the *Notes* tab. You can enter text, draw, or create a recording. For more information on creating notes, see *Notes on page 9-13*.
7. Tap **OK** to return to the task list.

Note

To create a task with only a subject, tap Tools - Entry Bar. Then tap in the *Tap here to add a new task* field and enter task information.

Using the Summary Screen

When you tap a task in the task list, a summary screen appears. To change the task, tap *Edit*.

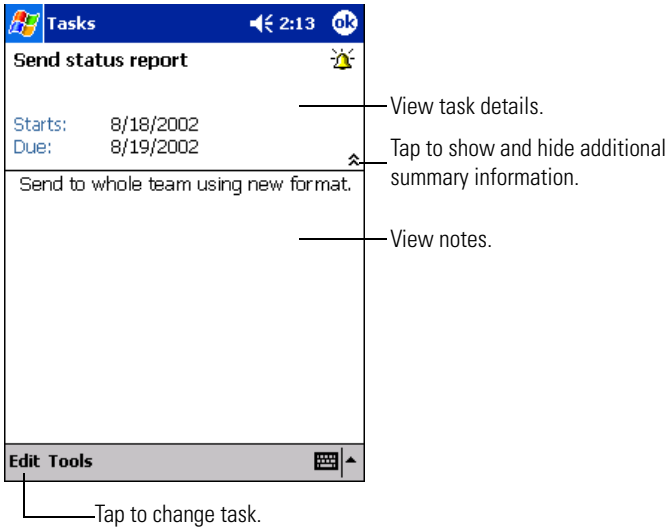


Figure 9-9. Task Summary Screen

Notes

Capture thoughts, reminders, ideas, drawings, and phone numbers with Notes. You can create a written note or a recording. You can also include a recording in a note. If a note is open when you create the recording, it is included in the note as an icon. If the note list is displayed, it is created as a stand-alone recording.

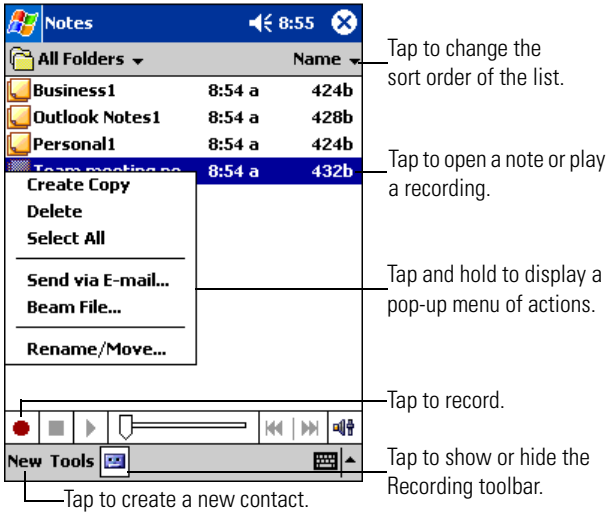


Figure 9-10. Notes Application

To create a note:

1. Tap *Start* - *Notes* to open the application.
2. Tap *New*.

3. Create a note by writing, drawing, typing, and recording. For more information about using the input panel, writing and drawing on the screen, and creating recordings, see *Chapter 2, Operating*.

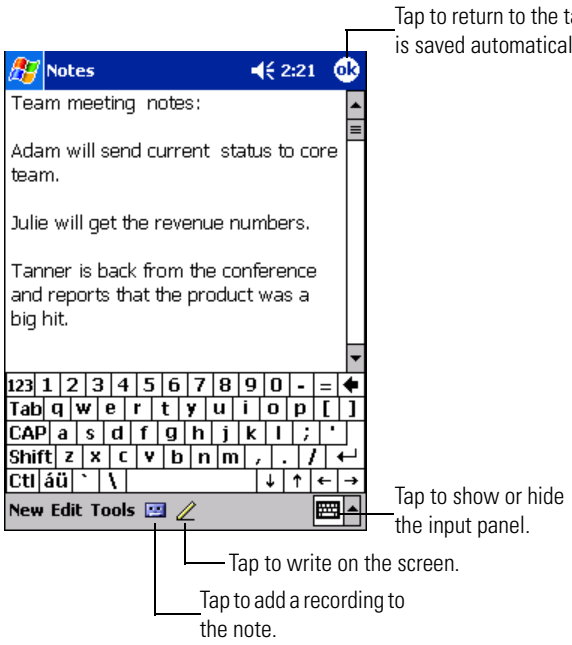


Figure 9-11. Creating a Note

Inbox

Use Inbox to send and receive e-mail messages in the following ways:

- Synchronize e-mail messages with Microsoft Exchange or Outlook on the host computer.
- Send and receive e-mail messages by connecting directly to an e-mail server through an Internet service provider (ISP) or a network.

Synchronizing E-mail Messages

To synchronize e-mail messages, first enable Inbox synchronization in ActiveSync options. For information on enabling Inbox synchronization, refer to ActiveSync Help on the host computer.

During synchronization:

- E-mail messages are copied from the Inbox folder of Exchange or Outlook on the host computer to the ActiveSync folder on the mobile computer. By default, you receive messages from the last three days only, the first 100 lines of each message, and file attachments of less than 100 Kb in size.
- E-mail messages in the Outbox folder on the mobile computer are transferred to Exchange or Outlook, then sent from those programs.
- E-mail messages in subfolders must be selected in ActiveSync on the host computer to be transferred.

Connecting Directly to an E-mail Server

You can set up a connection to an e-mail server to send and receive e-mail messages using a network connection and Inbox on the mobile computer.

The ISP or network must use a POP3 e-mail server and an SMTP gateway.

When you connect to the e-mail server, new messages are downloaded to the mobile computer Inbox folder, messages in the mobile computer Outbox folder are sent, and messages that were deleted on the e-mail server are removed from the mobile computer Inbox.

Messages that you receive directly from an e-mail server are linked to the e-mail server rather than the host computer. When you delete a message on the mobile computer, it's also deleted from the e-mail server the next time you connect.

You can work online or offline. When working online, you read and respond to messages while connected to the e-mail server. Messages are sent as soon as you tap *Send*, which saves space on the mobile computer.

When working offline, once you've downloaded new message headers or partial messages, you can disconnect from the e-mail server, then decide which messages to download completely. The next time you connect, Inbox downloads the complete messages you've marked for retrieval and sends the messages you've created.

You can use multiple e-mail services to receive messages. For each e-mail service you intend to use, first set up and name the e-mail service. If you use the same service to connect to different mailboxes, set up and name each mailbox connection.

Setting Up an E-mail Service

In Inbox on the mobile computer, tap *Accounts*, then *New Account*. Follow the instructions in the wizard on the screen. For an explanation of a screen, tap *Start*, then *Help*.

When finished, tap *Accounts*, then *Connect* to connect to the e-mail server. For more information on using the Inbox program, see *Inbox on page 9-15*.

Using the Message List

Messages you receive display in the message list box. By default, the most recently received messages are listed first.

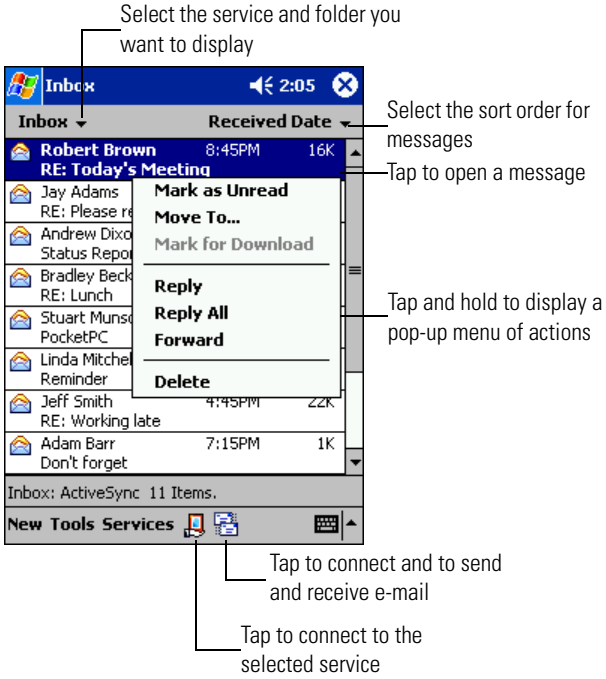


Figure 9-12. Inbox Application

When you receive a message, tap it in the list box to open it. Unread messages display in bold.

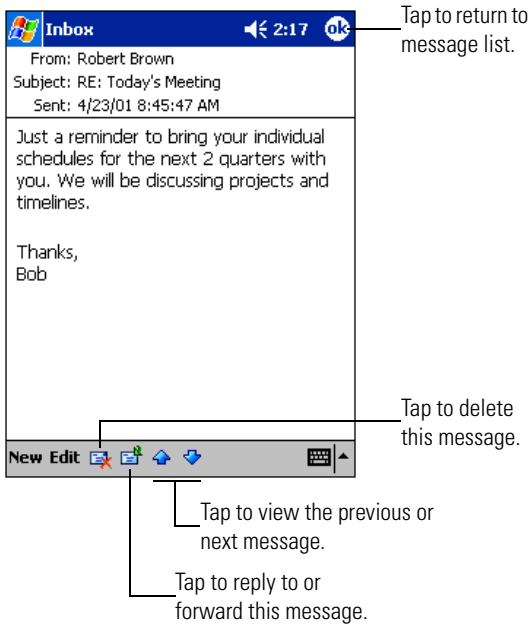


Figure 9-13. Viewing a Message

When you connect to the e-mail server or synchronize with the host computer, Inbox downloads by default only messages from the last three days, the first 100 lines of each new message, and file attachments of less than 100 KB in size. The original messages remain on the e-mail server or the host computer.

You can mark the messages that you want to retrieve completely the next time you synchronize or connect to the e-mail server. In the message list, tap and hold the message you want to retrieve. On the pop-up menu, tap *Mark for Download*. The icons in the Inbox message list indicates message status.

You specify downloading preferences when you set up the service or select synchronization options. You can change them at any time:

- Change options for Inbox synchronization using ActiveSync options. For more information, refer to ActiveSync Help.

- Change options for direct e-mail server connections in Inbox on the mobile computer. Tap *Tools* - *Options*. On the *Accounts* tab, tap the account you want to change. Tap and hold the account and select *Delete* to remove it.

Creating E-mail Messages

To create an e-mail message:

1. Tap *New*.
2. In the *To* field, enter an e-mail or SMS address of one or more recipients, separating each with a semicolon, or select a name from the contact list by tapping the *Address Book* icon. All e-mail addresses entered in the e-mail fields in Contacts appear in the Address Book.

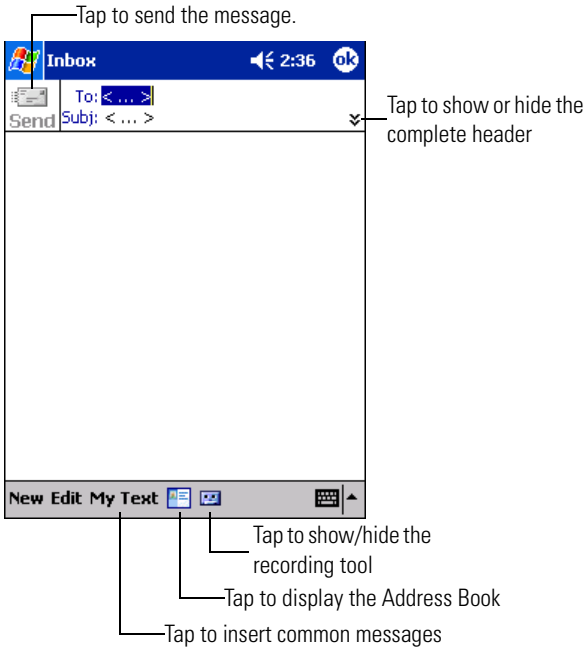


Figure 9-14. Creating a Message

3. Enter the message. To enter preset or frequently used messages, tap *My Text* and select a message.
4. Tap *Send* when you're finished. If you're working offline, the message is transferred to the Outbox folder and sent the next time you synchronize.

If you are sending an SMS message and want to know if it was received, tap *Edit - Options*, and select the *Request SMS text message delivery notification* check box before sending the message.

Managing E-mail Messages and Folders

By default, messages are displayed in one of five folders for each account you've created: Inbox, Deleted Items, Drafts, Outbox, and Sent Items. The Deleted Items folder contains messages that have been deleted on the mobile computer. The behavior of the Deleted and Sent Items folders depends on the options you selected. In the message list, tap *Tools - Options*. On the *Message* tab, select the options.

To organize messages into additional folders, tap *Tools - Manage Folders* to create new folders. To move a message to another folder, in the message list, tap and hold the message, then tap *Move to* on the pop-up menu.

Folder Behavior with ActiveSync and Direct Connection to Server

The behavior of the folders you create depends on whether you are using ActiveSync, SMS, POP3, or IMAP4.

- If you use ActiveSync, e-mail messages in the Inbox folder in Outlook are automatically synchronized with the mobile computer. You can select to synchronize additional folders by designating them for ActiveSync. The folders you create and the messages you move are mirrored on the server. For example, if you move two messages from the Inbox folder to a folder named Family, and you have designated Family for synchronization, the server creates a copy of the Family folder and copies the messages into that folder. You can then read the messages while away from the host computer.
- If you use SMS, messages are stored in the Inbox folder.
- If you use POP3 and you move e-mail messages to a folder you created, the link is broken between the messages on the mobile computer and their copies on the mail server. The next time you connect, the mail server notes the messages missing from the mobile computer Inbox and deletes them from the server. This prevents you from having duplicate copies of a message, but it also means that you no longer have access to messages moved to folders created from anywhere except the mobile computer.
- If you use IMAP4, the folders you create and the e-mail messages you move are mirrored on the server. Therefore, messages are available to you anytime you connect to the mail server, whether it is from the mobile computer or host computer. This synchronization of folders occurs whenever you connect to the mail server, create new folders, or rename/delete folders when connected.

Pocket Word

Pocket Word works with Microsoft Word on the host computer to give you access to copies of documents. You can create new documents on the mobile computer, or copy documents from the host computer to the mobile computer. Synchronize documents between the host computer and the mobile computer so that you have the most up-to-date information in both locations.

To create a new document in Pocket Word, such as a letter, meeting minutes, or a trip report, tap *Start - Programs - Pocket Word - New* icon. A blank document appears. Or, if you've selected a template for new documents in the *Options* dialog box, that template appears with appropriate formatting applied. You can open only one document at a time; when you open a second document, you'll be asked to save the first. You can save a document in a variety of formats, including Word (.doc), Pocket Word (.psw), Rich Text Format (.rtf), and Plain Text (.txt).

Pocket Word contains a list of the files stored on the mobile computer. Tap a file in the list to open it. To delete, make copies of, or send a file, tap and hold a file in the list. Then, select the appropriate action on the pop-up menu.

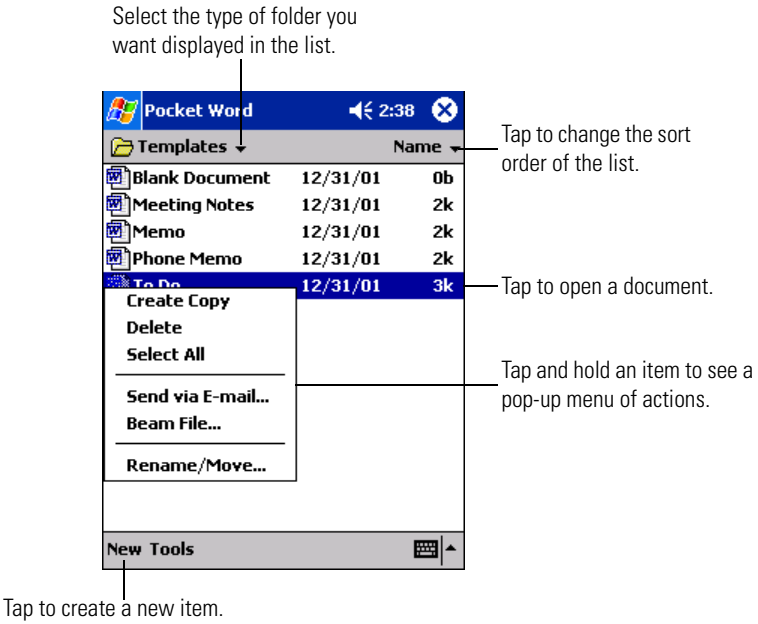


Figure 9-15. Using Pocket Word

You can enter information in Pocket Word in one of four modes (writing, drawing, typing, and recording) displayed on the *View* menu. Tap the *Show/Hide Toolbar* icon on the command bar to show or hide each mode's toolbar.

To change the zoom magnification, tap *View* - *Zoom*. Select the percentage. Select a higher percentage to enter text and a lower one to see more of the document.

If you're opening a Word document created on a host computer, tap *View* - *Wrap to Window* to see the entire document.

Typing Mode

Use the input panel to enter typed text into a document. See *Entering Information on page 2-45* for more information.

To format or edit text, select the text using the stylus instead of the mouse to drag across the text. To search a document for the text you want, tap *Edit* - *Find/Replace*.

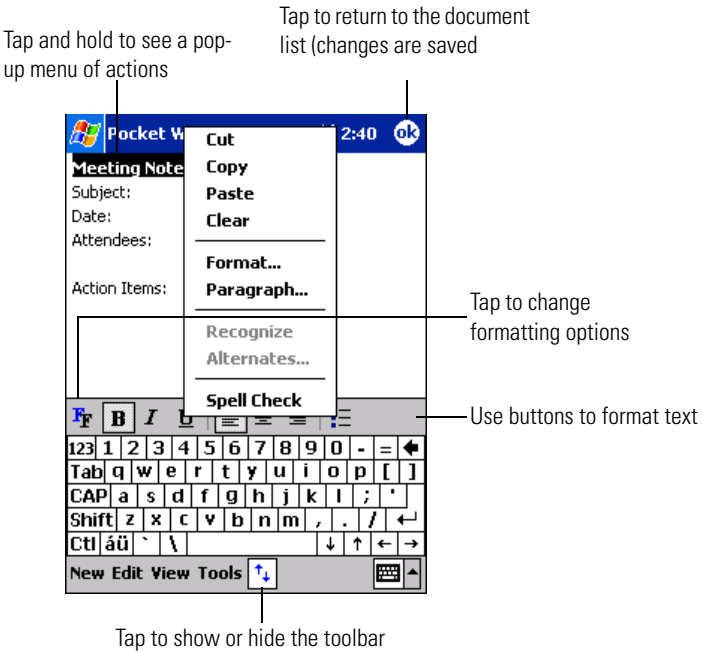


Figure 9-16. Formatting Text

Writing Mode

In writing mode, use the stylus to write directly on the screen. Ruled lines are displayed as a guide, and the zoom magnification increases to allow you to write more easily. For more information, see *Writing on the Screen on page 2-48*.

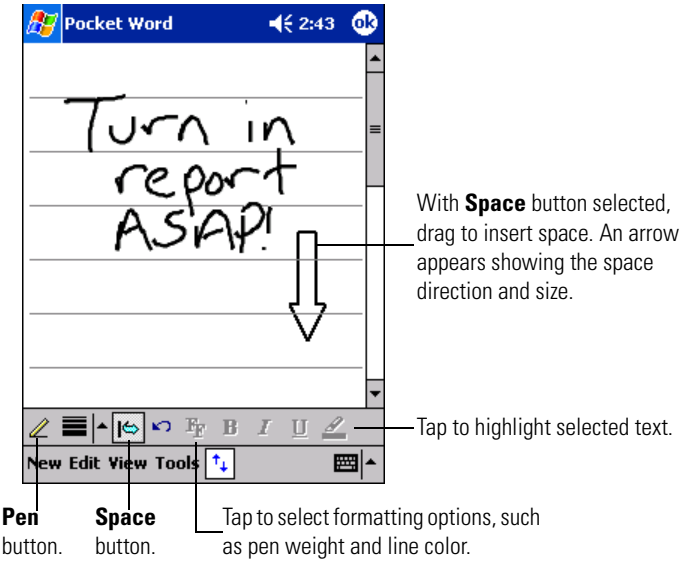


Figure 9-17. Writing on the Screen in Pocket Word

If you cross three ruled lines in a single stylus stroke, the writing becomes a drawing, and can be edited and manipulated as described in the following section.

Written words are converted to graphics (metafiles) when a Pocket Word document is converted to a Word document on the host computer.

Drawing Mode

In drawing mode, use the stylus to draw on the screen. Gridlines appear as a guide. When you lift the stylus after the first stroke, a drawing box indicates the boundaries of the drawing. Every subsequent

stroke within or touching the drawing box becomes part of the drawing. For more information, see *Drawing on the Screen on page 2-53*.

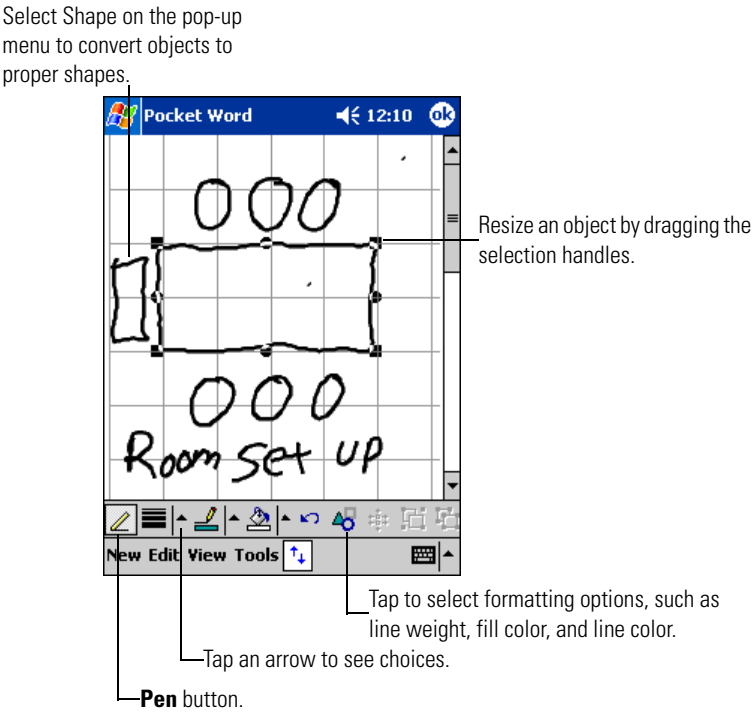


Figure 9-18. Drawing on the Screen in Pocket Word

Recording Mode

In recording mode, you may embed a recording into the document. Recordings are saved as .wav files. For more information, see *Recording a Message on page 2-54*.

For more information on using Pocket Word, tap *Start - Help*.

Pocket Excel

Pocket Excel works with Microsoft Excel on the host computer to provide easy access to copies of workbooks. You can create new workbooks on the mobile computer, or copy workbooks from the host computer to the mobile computer. Synchronize workbooks between the host computer and the mobile computer so you have up-to-date content in both locations.

To create a new workbook in Pocket Excel, such as an expense report or mileage log, tap *Start - Programs - Pocket Excel - New*. A blank workbook appears. Or, if you've selected a template for new workbooks in the *Options* dialog box, that template appears with appropriate text and formatting already provided. You can open only one workbook at a time; when you open a second workbook, you'll be asked to save the first. You can save a workbook in a variety of formats, including Pocket Excel (.pxl) and Excel (.xls).

Pocket Excel lists the files stored on the mobile computer. Tap a file in the list to open it. To delete, make copies of, or send a file, tap and hold a file in the list, then select the appropriate action from the pop-up menu.

Pocket Excel provides fundamental spreadsheet tools, such as formulas, functions, sorting, and filtering. To display the toolbar, tap *View - Toolbar*.

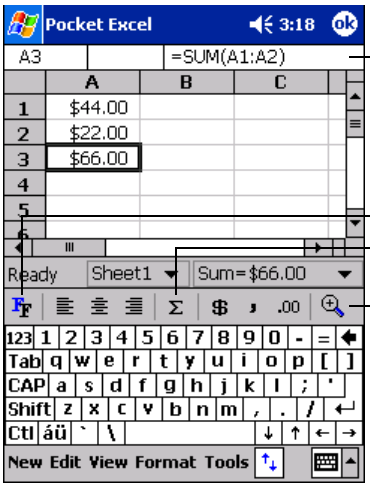


Figure 9-19. Using Pocket Excel

If a workbook contains sensitive information, you can protect it with a password. Open the workbook, tap *Edit - Password*. Every time you open the workbook, you must enter the password, so choose one easy for you to remember but hard for others to guess.

Tips for Working in Pocket Excel

When working in large worksheets in Pocket Excel:

- View in full-screen mode to see as much of the worksheet as possible. Tap *View* - *Full Screen*. To exit full-screen mode, tap *Restore*.
- Show and hide window elements. Tap *View*, then the elements you want to show or hide.
- Freeze panes on a worksheet. First select the cell where you want to freeze panes. Tap *View* - *Freeze Panes*. You may want to freeze the top and leftmost panes in a worksheet to keep row and column labels visible as you scroll through a sheet.
- Split panes to view different areas of a large worksheet. Tap *View* - *Split*. Drag the split bar to where you want it. To remove the split, tap *View* - *Remove Split*.
- Show and hide rows and columns. To hide a row or column, select a cell in that row or column. Tap *Format* - *Row* or *Column* - *Hide*. To show a hidden row or column, tap *Tools* - *Go To*, then type a reference that is in the hidden row or column. Tap *Format* - *Row* or *Column* - *Unhide*.

For more information on using Pocket Excel, tap *Start* - *Help*.

MSN® Messenger

With the MSN Messenger instant messaging program on the mobile computer you can:

- see who is online
- send and receive instant messages
- have instant message conversations with groups of contacts.

To use MSN Messenger, you need a Microsoft Passport™ account or a Microsoft Exchange e-mail account. You need a Passport to use MSN Messenger Service. If you have a Hotmail® or MSN account, you already have a Passport. Once you have either a Microsoft Passport or a Microsoft Exchange account, you can set up an account.

To switch to MSN Messenger, tap *Start - Programs - MSN Messenger* icon.

Setting Up An Account

Before you can connect, set up the Passport or Exchange account and sign in:

1. Tap *Tools - Options*.
2. Enter an e-mail address and password.
3. Tap **Sign In**.

If you use MSN Messenger on the host computer, contacts automatically appear on the mobile computer.

Working with Contacts

The MSN Messenger window is divided into Online and Not Online categories. From this view, while connected, you can chat, send e-mail, block the contact from chatting with you, or delete contacts from the list using the pop-up menu.

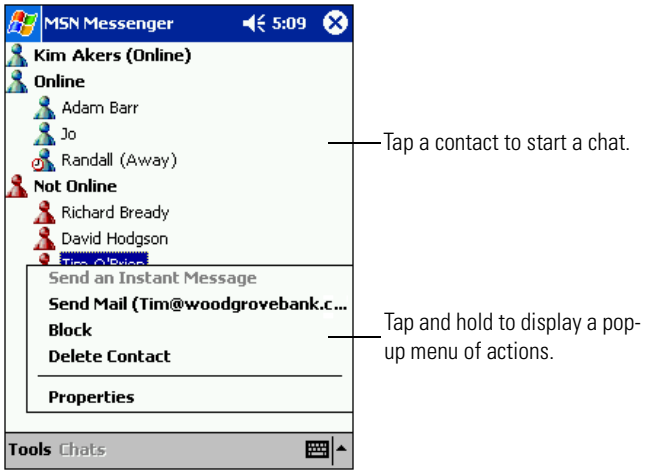


Figure 9-20. MSN Messenger Contacts

Note

To see others online without being seen, tap Tools - My Status - Appear Offline. You appear offline but remain on the blocked contact's list.

To unblock a contact, tap and hold the contact, then tap Unblock on the pop-up menu.

Chatting with Contacts

Tap a contact name to open a chat window. Enter the message in the text entry area at the bottom of the screen, or tap *My Text* to enter a preset message, and tap **Send**. To invite another contact to a multi-user chat, tap *Tools* - *Invite* and tap the contact you want to invite.

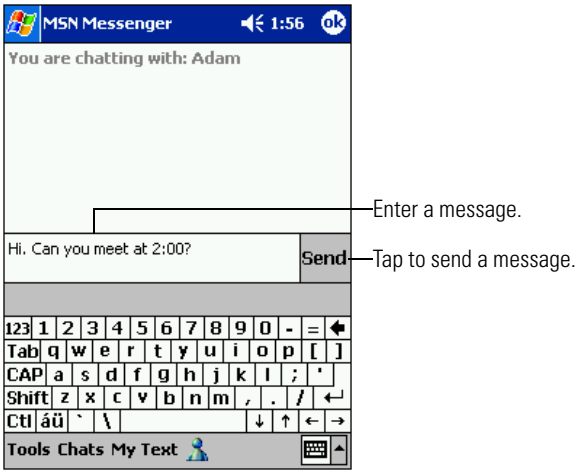


Figure 9-21. Sending a Message

To switch back to the main window without closing a chat, tap *Contacts*. To revert back to the chat window, tap *Chats* and select the person you were chatting with.

To know if the contact you are chatting with is responding, look for the message under the text entry area.

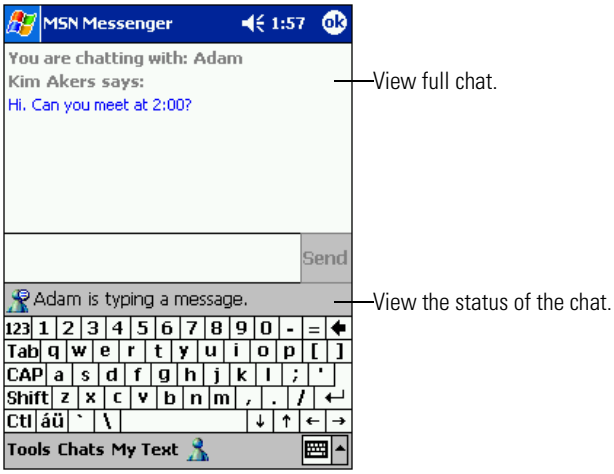


Figure 9-22. Receiving a Message

For more information on using MSN Messenger, tap *Start - Help*.

Windows Media Player

With Windows Media Player on the mobile computer you can play digital audio and video files that are stored on the mobile computer. To switch to Windows Media Player, tap *Start* - *Windows Media*.

Figure 9-23. Using Windows Media Player

Use the host computer to copy digital audio and video files to the mobile computer. The mobile computer can play Windows Media and MP3 files.

For more information on using Windows Media Player, tap *Start* - *Help*.

Microsoft Reader

Use Microsoft Reader to read eBooks on the mobile computer. Download books to the host computer from a favorite eBook Web site. Then, use ActiveSync to copy the book files to the mobile computer. The books appear in the Reader Library, where you can tap them in the list to open them.

Each book consists of a cover page, an optional table of contents, and the pages of the book. You can:

- Page through the book by using the Up/Down control on the device or by tapping the page number on each page.
- Annotate the book with highlighting, bookmarks, notes, and drawings.
- Search for text and look up definitions for words.

To switch to Microsoft Reader, tap *Start - Programs - Microsoft Reader*.

Getting Books on the Device

You can download book files from the Web. Just visit a favorite eBook retailer and follow the instructions to download the book files. Use ActiveSync to download the files from the host computer to the mobile computer as described in the Read Me file in the MSReader folder.

Using the Library

The Library is the Reader home page; it displays a list of all books stored on the mobile computer. To open the Library:

1. On the Reader command bar, tap **Library**.
2. On a book page, tap the book title, and then tap *Library* on the pop-up menu.

3. To open a book, tap its title in the *Library* list box.

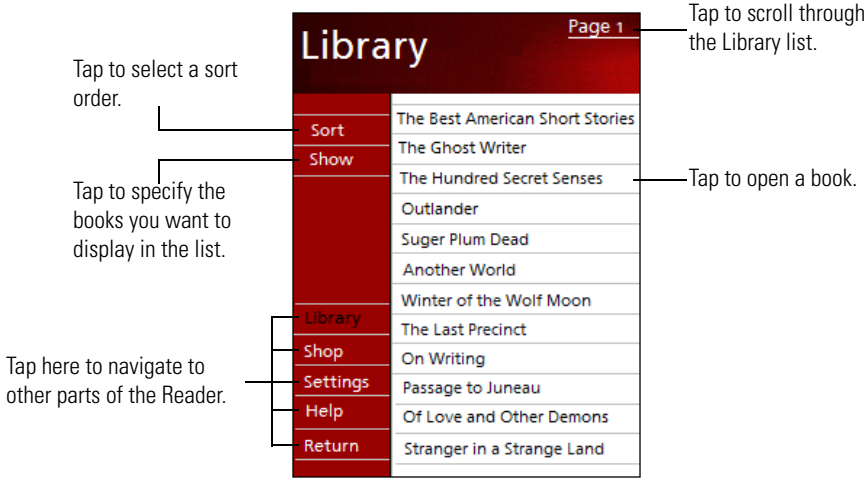


Figure 9-24. Using Windows Library

Reading a Book

Each book consists of a cover page, an optional table of contents, and the pages of the book. Navigation options are listed in the bottom portion of the cover page.

The first time you open a book, you'll probably want to go to the first page or to the table of contents, if there is one. Subsequently, whenever you open the book, you'll be automatically taken to the last page read.

In addition to the text, each book page includes a page number and book title.

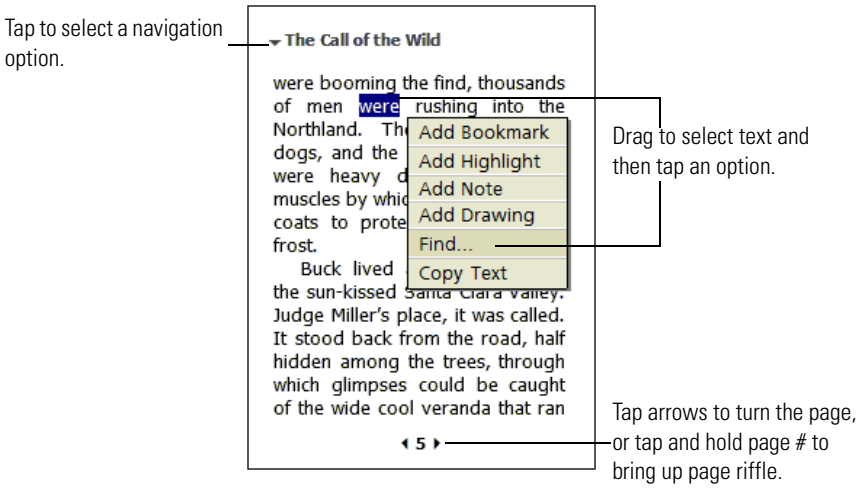


Figure 9-25. Reading a Book

You can also page through a book using the Up/Down arrow keys on the keypad of the mobile computer.

Using Reader Features

Reading a book electronically gives you several options not available with paper books. These options are available from any book page.

- Select text by dragging across the text on the page. Then, tap an option on the pop-up menu, as described here:
  - Search for Text. Find text in a book by tapping Find on the pop-up menu. Enter the word you want to search for, and tap the desired Find option. Reader highlights found text on the page. To close Find, tap outside the box. To return to the original page, tap the title and then tap *Return* on the pop-up menu.
  - Copy Text. You can copy text from books that support this feature into any program that accepts text. On a book page, select the text you want to copy. Then, tap *Copy Text* on the pop-up menu. The text can be pasted into the program you choose.
  - Bookmarks. When you add a bookmark to a book, a color-coded bookmark icon appears in the right margin. You can add multiple bookmarks to a book. Then, from anywhere in the book, tap the bookmark icon to go to the bookmarked page.

  - Highlights. When you highlight text, it appears with a colored background.
  - Notes. When you attach a note to text, you enter the text in a note pad that appears on top of the book page. A *Note* icon displays in the left margin. To show or hide the note, tap the icon.
  - Drawings. When you add a drawing, a *Drawing* icon appears in the bottom-left corner of the page, and drawing tools appear across the bottom of the page. Draw by dragging the stylus.
- To see a list of a book's annotations, including bookmarks, highlights, text notes, and drawings, tap *Annotations Index* on the book's cover page. You can tap an entry in the list to go to the annotated page.

Removing a Book

When you finish reading a book, you can delete it to conserve space on the mobile computer. If a copy of the book is stored on the host computer, you can download it again at any time.

To remove a book from the device, tap and hold the title in the Library list, and then tap *Delete* on the pop-up menu.

For more information on using Microsoft Reader, tap *Start - Help*.

Pocket Internet Explorer

With Microsoft Pocket Internet Explorer, you can view Web or Wireless Application Protocol (WAP) pages in the following ways:

- During synchronization with the host computer, download favorite links and mobile favorites stored in the Mobile Favorites subfolder in Internet Explorer on the host computer.
- Connect to an Internet service provider (ISP) or network and browse the Web. First create the connection (see *Connecting to the Internet on a Wireless Network on page 4-21*).

To select Pocket Internet Explorer, tap *Start* - *Internet Explorer*.

Mobile Favorites

Items stored in the Mobile Favorites subfolder in the Favorites folder in Internet Explorer on the host computer are synchronized with the mobile computer. This folder was created automatically when you installed ActiveSync.

Favorite Links

Synchronization updates the list of favorite links both in the Mobile Favorites folder on the host computer and in Pocket Internet Explorer on the mobile computer. Unless you mark the favorite link as a mobile favorite, only the link is downloaded to the mobile computer; you must connect to the ISP or network to view the content. For more information on synchronization, refer to ActiveSync Help on the host computer.

Creating Mobile Favorites

If you are using Microsoft Internet Explorer 5 or later on the host computer, you can download mobile favorites. Synchronizing mobile favorites downloads Web content to the mobile computer so you can view Web pages while disconnected from the ISP and host computer.

Use the Internet Explorer plug-in installed with ActiveSync to create mobile favorites:

1. In Internet Explorer on the host computer, click *Tools* - *Create Mobile Favorite*.
2. To change the link name, enter a new name in the *Name* field.
3. If desired, select a desired update schedule in *Update*.
4. Click **OK**. Internet Explorer downloads the latest version of the Web page to the host computer.

5. To download the pages linked to the mobile favorite you just created, in Internet Explorer on the host computer, right-click the mobile favorite, then click *Properties*. On the *Download* tab, specify the number of links deep you want to download. To conserve mobile computer memory, only go one level deep.
6. Synchronize the mobile computer and host computer. Mobile favorites stored in the Mobile Favorites folder in Internet Explorer are downloaded to the mobile computer.

   If you did not specify an update schedule in step 3, you must manually download content to keep the information updated on the host computer and mobile computer. Before synchronizing, in Internet Explorer on the host computer, click *Tools - Synchronize*. Note the last time content was downloaded to the host computer; if necessary, manually download content.

   You can add a button to the Internet Explorer toolbar for creating mobile favorites. In Internet Explorer on the host computer, click *View - Toolbars - Customize*.

Saving Memory on the Mobile Computer

Mobile favorites take up storage memory on the mobile computer. To minimize the amount of memory used:

- In the settings for the Favorites information type in ActiveSync options, turn off pictures and sounds or stop some mobile favorites from downloading. For more information, refer to ActiveSync Help.
- Limit the number of downloaded linked pages. In Internet Explorer on the host computer, right-click the mobile favorite you want to change, then select *Properties*. On the *Download* tab, specify 0 or 1 for the number of linked pages to download.

Using AvantGo Channels

AvantGo is a free interactive service that gives you access to personalized content and thousands of popular Web sites. Subscribe to AvantGo channels directly from the mobile computer, then synchronize with the host computer, or connect to the Internet to download the content. For more information, visit the AvantGo Web site.

To sign up for AvantGo:

1. In ActiveSync options on the host computer, turn on synchronization for the AvantGo information type.

2. In Pocket Internet Explorer on the mobile computer, tap the *Favorites* icon to display a list of favorites.
3. Tap *AvantGo Channels*.
4. Tap **Activate**.
5. Follow the directions on the screen. You must synchronize the mobile computer with the host computer, then tap **My Channels** to complete setup.

When synchronization is complete, tap *AvantGo Channels* in the list of favorites to see a few of the most popular channels. To add or remove channels, tap *Add* or *Remove*.

Using Pocket Internet Explorer

With Pocket Internet Explorer, you can browse mobile favorites and channels downloaded to the mobile computer without connecting to the Internet. You can also connect to the Internet through an ISP or a network connection and browse the Web.

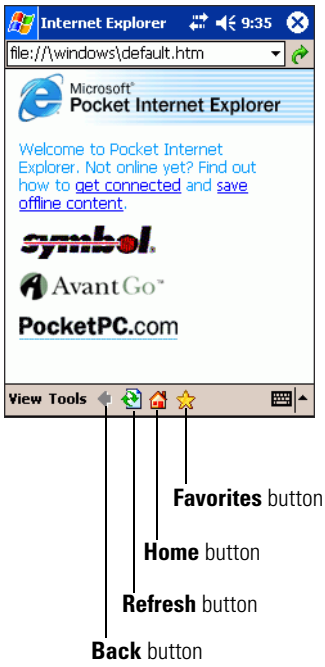


Figure 9-26. Pocket Internet Explorer

To view mobile favorites and channels, tap the *Favorites* icon to display the list of favorites, then tap the page to view.

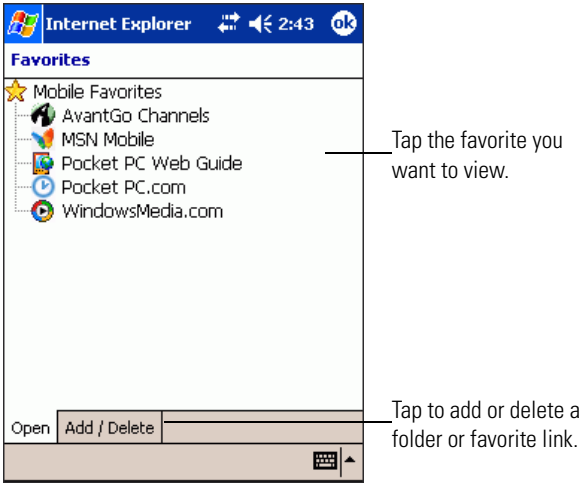


Figure 9-27. Mobile Favorites

The page downloaded during the last synchronization with the host computer displays. If the page is not on the mobile computer, the favorite is dimmed. Synchronize with the host computer again to download the page to the mobile computer, or connect to the Internet to view the page.

Browsing the Web

1. Connect to the ISP or network using a Spectrum24 connection; see *Connecting to the Internet on a Wireless Network on page 4-21*.
2. Once connected, go to a specific Web page in one of the following ways:
   - Tap *Favorites*, then tap the favorite you want to view.
   - In the address bar at the top of the screen, enter the Web address and tap the go button or tap the arrow to choose from previously entered addresses.

Note

If you select Pocket Internet Explorer before setting up the network connections, a screen may appear allowing you to proceed to the connection settings screen. After you select the settings, you return to Pocket Internet Explorer.

To add a favorite link while using the mobile computer, go to the Web page you want to add, tap and hold on the page, and tap Add to Favorites.

Pictures

Use *Pictures* to view .jpg format pictures stored on the mobile computer, send pictures to others, view a slideshow of pictures or set a picture as the background on the *Today* screen.

Copy Pictures to the Device

You can copy .jpg pictures from the PC and view them in *Pictures*.

Copy the picture files from the PC to the My Pictures folder, within the My Documents folder on the mobile computer. For more information on copying files from the PC to the mobile computer, refer to ActiveSync Help on the PC.

Edit Pictures

You can rotate, crop, zoom, and adjust the brightness and color contrast of .jpg pictures.

1. Tap  to rotate a picture 90 degrees counter-clockwise.
2. Tap  to crop a picture by dragging and selecting the crop area. Tap outside of the box to stop cropping.
3. Tap  to display the Zoom panel, from which you can zoom in or out of a picture, or return a picture to full-screen size.
4. Tap *Edit - Brightness and Contrast* to adjust the brightness and contrast levels of a picture.

Send Pictures

You can send a .jpg picture to others as an e-mail attachment. The picture is resized to approximately 30 KB, making it easier to send over wireless connections.

1. In Pictures, tap the picture you want to send as an e-mail attachment.
2. Tap *Tools - Send via E-mail* to create an e-mail message with the picture attached.

Set Picture as Background

You can use one of your own .jpg pictures as the background on the *Today* screen, and specify how you want it displayed on the screen, such as adjusting the transparency level.

1. In Pictures, tap the picture you want to set as the background.
2. Tap *Tools - Set as Today Wallpaper*.

View Pictures

Using Pictures, you can view thumbnails of .jpg pictures stored in the My Pictures folder and select a picture that you want to see in full-screen view.

1. In Pictures, tap the thumbnail of the picture you want to view.
2. Tap  to view pictures stored on a storage card.
3. Tap  to view pictures stored in the My Pictures folder.

View Slideshow of Pictures

You can view .jpg pictures as a slideshow. Pictures displays slides of the pictures shown in thumbnail view with 5-second intervals between slides.

1. In Pictures, tap  to view pictures as a slideshow.
2. Tap anywhere on the screen to display the Slideshow toolbar, which you can use to pause the slideshow, rotate the view, and more.
3. Press the left/right controls to move forward or backward through the slides.

10 Accessories

Contents

Introduction

Series 9000 accessories provide a wide variety of product support capabilities. Accessories include cradles, keypads, Magnetic Stripe Reader (MSR) and Cable Adapter Module (CAM) snap-ons, four slot spare battery charger, headphone, Multimedia Card (MMC), Secure Device (SD) card, Universal Battery Charger (UBC) adapter, wall mounting bracket and shelf slide.

Keypads

- Optional keypads include the interchangeable modular application specific keypads listed below. The modular keypads can be changed in the field as necessary to support specialized applications.
  - 28-key keypad
  - 43-key keypad
  - 53-key keypad
  - 3270 Emulator keypad
  - 5250 Emulator keypad
  - VT Emulator keypad.

Cradles

- Single Slot Serial/USB cradle charges the mobile computer main battery and a spare battery. It also synchronizes the mobile computer with a host computer through either a serial or a USB connection.
- Four Slot Charge Only cradle charges the mobile computer main battery.
- Four Slot Ethernet cradle charges the mobile computer main battery and synchronizes the mobile computer with a host computer through an Ethernet connection.

Miscellaneous

- Four Slot Spare Battery Charger charges up to four mobile computer spare batteries.
- Headphone can be used in noisy environments.
- Modem Module enables data communication between the mobile computer and a host computer, remotely through the phone lines, and synchronizes information between the mobile computer and a host computer.
- Multimedia Card (MMC) provides secondary non-volatile storage. (An SD card may also be used.)
- UBC adapter adapts the UBC for use with the MC9000 batteries.
- Wall Mounting Bracket and Shelf Slide can be used for wall mounting applications.

Snap-on Modules

- MSR snaps on to the mobile computer and adds magstripe read capabilities.
- CAM snaps on to the mobile computer and is used to connect cables to the mobile computer.

Both of the snap on modules use the cables listed below:

- AC line cord (country-specific) and power supply, charges the mobile computer.
- Auto charge cable, charges the mobile computer using a vehicle's cigarette lighter.
- DEX cable, connects the mobile computer to a vending machine.
- Serial cable, adds serial communication capabilities.
- USB cable, adds USB communication capabilities.
- Printer cable, adds printer communication capabilities.

Keypads

The mobile computer has interchangeable modular keypads. The modular keypads can be changed in the field as necessary to support specialized applications.

CAUTION

Do not remove the keypad while the mobile computer is on and do not operate the mobile computer with the keypad detached. Follow proper Electro-Static Discharge (ESD) precautions to avoid damaging the MMC and SD card. Proper ESD precautions include, but are not limited to, working on an ESD mat and ensuring that the operator is properly grounded.

Replacing the Keypad

1. Suspend the mobile computer.
2. Remove the two keypad screws. Slide the keypad down and lift up.

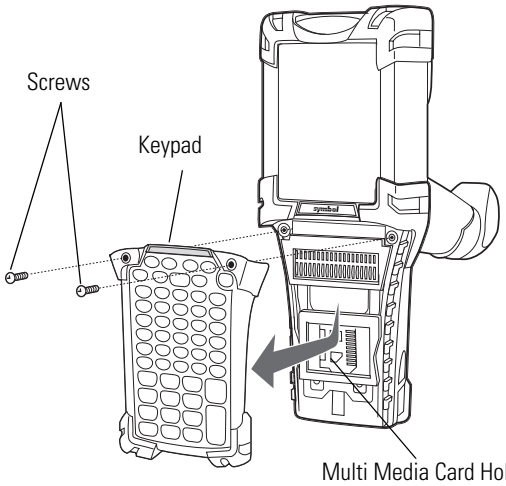


Figure 10-1. Removing the Keypad

CAUTION

Do not apply more than 4 in-lbs of torque when tightening the keypad screws.

3. Replace the keypad and re-attach using the two screws.

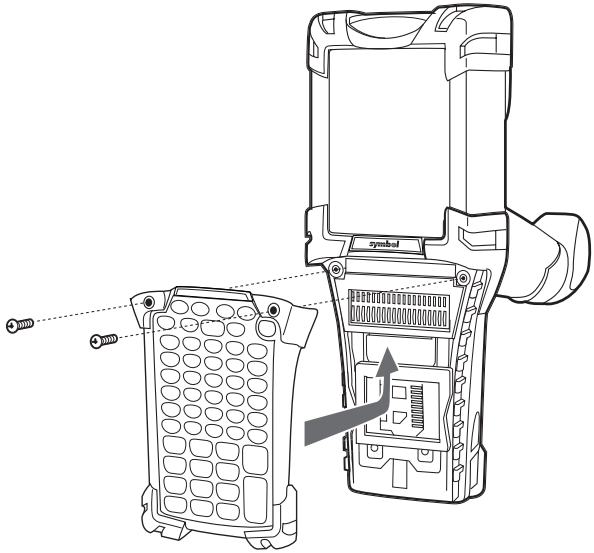


Figure 10-2. Installing the Keypad

4. Perform a cold boot.

Multi Media Card (MMC) / Secure Device (SD) Card

The MMC provides secondary non-volatile storage. The MMC is located under the keypad (see Figure 10-1).

Note

SD cards are inter-operable with MMC cards and can also be used in MC9000 mobile computers.

CAUTION

Do not remove the keypad while the mobile computer is on and do not operate the mobile computer with the keypad detached. Follow proper ESD precautions to avoid damaging the MMC/SD. Proper ESD precautions include, but are not limited to, working on an ESD mat and ensuring that the operator is properly grounded.

To insert the MMC/SD:

1. Suspend the mobile computer.
2. Remove the two keypad screws and slide the keypad down and lift off (see *Figure 10-1 on page 10-7*).
3. Lift the MMC/SD retaining door.
4. Position the MMC/SD, with the contacts down, into the MMC/SD holder. The MMC/SD corner notch fits into the holder only one way. Snap the retaining door closed.

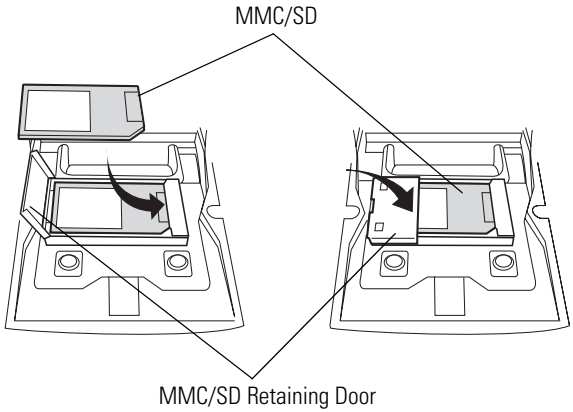


Figure 10-3. Inserting the MMC/SD

Do not apply more than 4 in-lbs of torque when tightening the keypad screws.

5. Replace the keypad and re-attach using the two screws (see *Figure 10-2 on page 10-8*).

Single Slot Serial/USB Cradle

This section describes how to set up and use a single Single Slot Serial/USB cradle (Figure 10-4) with the mobile computer. For serial and USB communication setup procedures see *Chapter 4, Communications*.

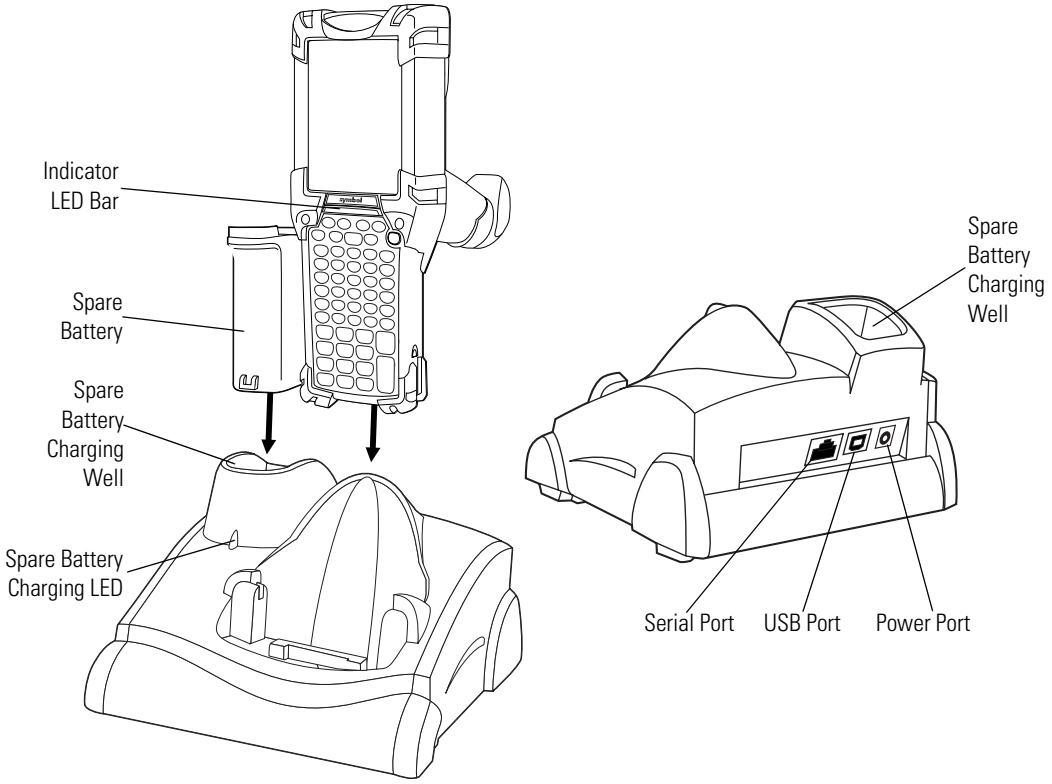


Figure 10-4. Single Slot Serial/USB Cradle

The Single Slot Serial/USB Cradle has the following attributes:

- Provides 15VDC power for operating the mobile computer.
- Provides serial and USB ports for data communication between the mobile computer and a host computer or other serial devices (e.g., a printer).
- Synchronizes information between the mobile computer and a host computer. (With customized or third party software, it can also be used to synchronize the mobile computer with corporate databases.)

- Charges the mobile computer's battery.
- Charges a spare battery.

Setup

Note

The cradle requires a dedicated port on the host.

Select either serial or USB for communications. Do not connect the cradle to both serial and USB ports.

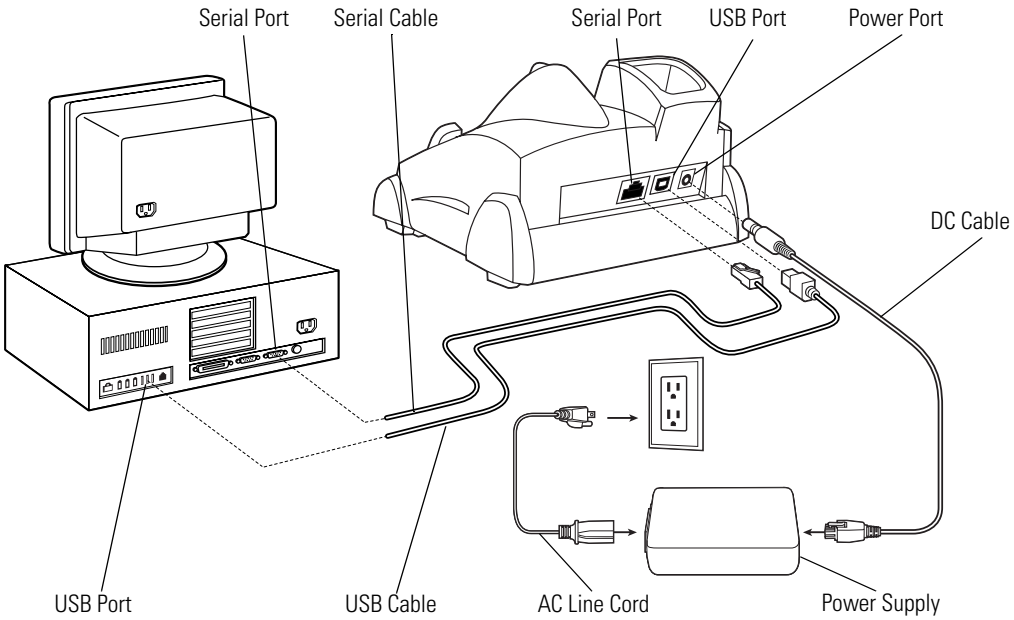


Figure 10-5. Single Slot Cradle Power/Serial/USB Connections

Battery Charging Indicators

The the Single Slot Serial/USB Cradle can charge the mobile computer's main battery and a spare battery simultaneously.

The mobile computer's amber charge LED, located in the Indicator LED Bar (see *Figure 1-1 on page 1-3*), shows the status of the battery charging in the mobile computer. See *Table 1-1 on page 1-11* for charging status indications.

The amber spare battery charging LED on the cradle (see *Figure 10-4 on page 10-11*) shows the status of the spare battery charging in the cradle. See Table 10-1 for charging status indications.

Batteries usually charge in less than four hours.

Table 10-1. Spare Battery LED Charging Indicators

Spare Battery LED (on cradle)	Indication
Off	No spare battery in well; spare battery not placed correctly; cradle is not powered.
Fast Blinking Amber	Error in charging; check placement of spare battery.
Slow Blinking Amber	Spare battery is charging.
Solid Amber	Charging complete.

Four Slot Ethernet Cradle

This section describes how to set up and use a Four Slot Ethernet cradle (Figure 10-6) with the mobile computer. For cradle communication setup procedures see *Ethernet Communication Setup on page 4-13*.

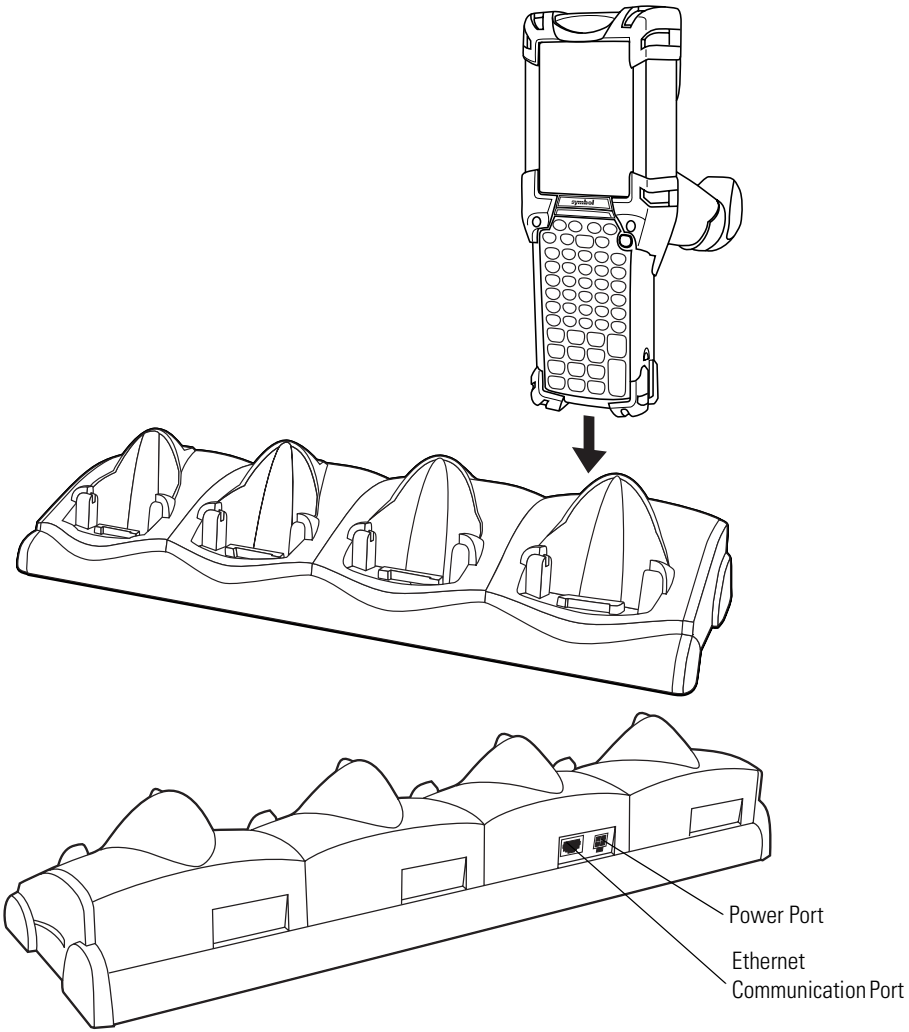


Figure 10-6. Four Slot Ethernet Cradle

The Four Slot Ethernet cradle has the following attributes:

- Provides 12VDC power for operating the mobile computer.
- Enables data communication between the mobile computer (up to four) and a host computer, over an Ethernet network (using a standard 10Base-T Ethernet cable).
- Synchronizes information between the mobile computer and a host computer. (With customized or third party software, it can also be used to synchronize the mobile computer with corporate databases.)
- Simultaneously charges up to four batteries in the mobile computer.

Setup

Note

The Ethernet cradle must be connected to a power source and to an Ethernet Hub (when applicable).

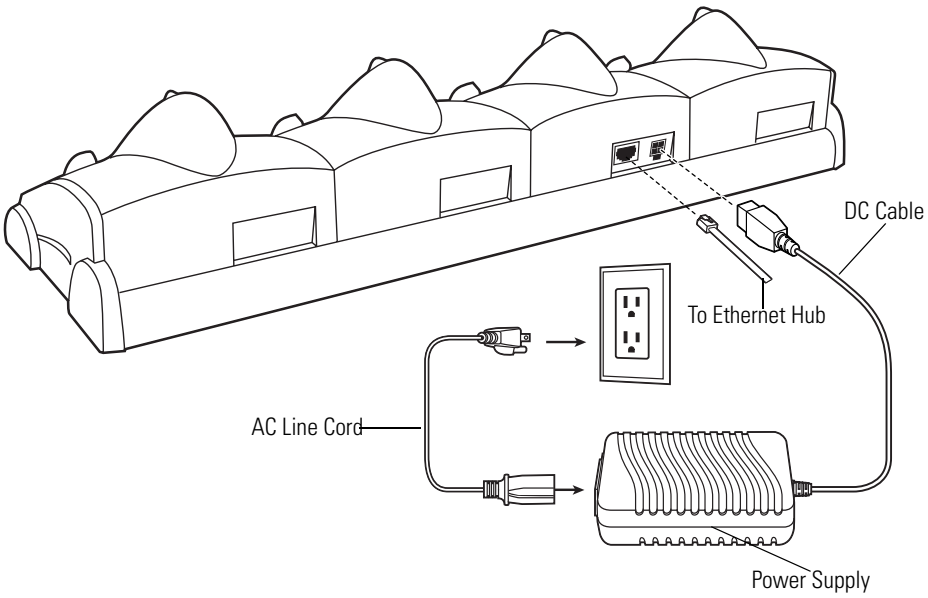


Figure 10-7. Four Slot Ethernet Cradle Power Connection

Battery Charging Indicators

The mobile computer's amber charge LED, located in the Indicator LED Bar (see *Figure 1-1 on page 1-3*), shows the status of the battery charging in the mobile computer. See *Table 1-1 on page 1-11* for charging status indications.

The battery usually charges in less than four hours.

Four Slot Charge Only Cradle

This section describes how to set up and use a Four Slot Charge Only cradle (Figure 10-8) with the mobile computer.

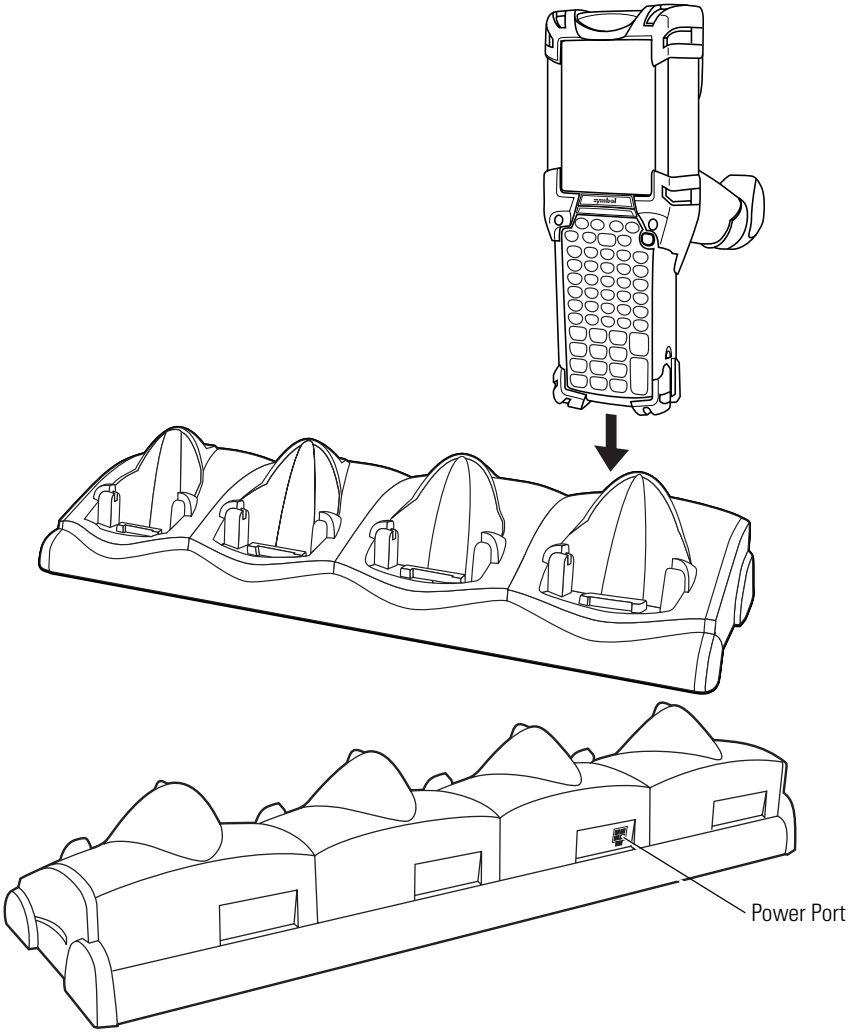


Figure 10-8. Four Slot Charge Only Cradle

The Four Slot Charge Only cradle has the following attributes:

- Provides 12VDC power for operating the mobile computer.
- Simultaneously charges up to four batteries in the mobile computer.

Setup

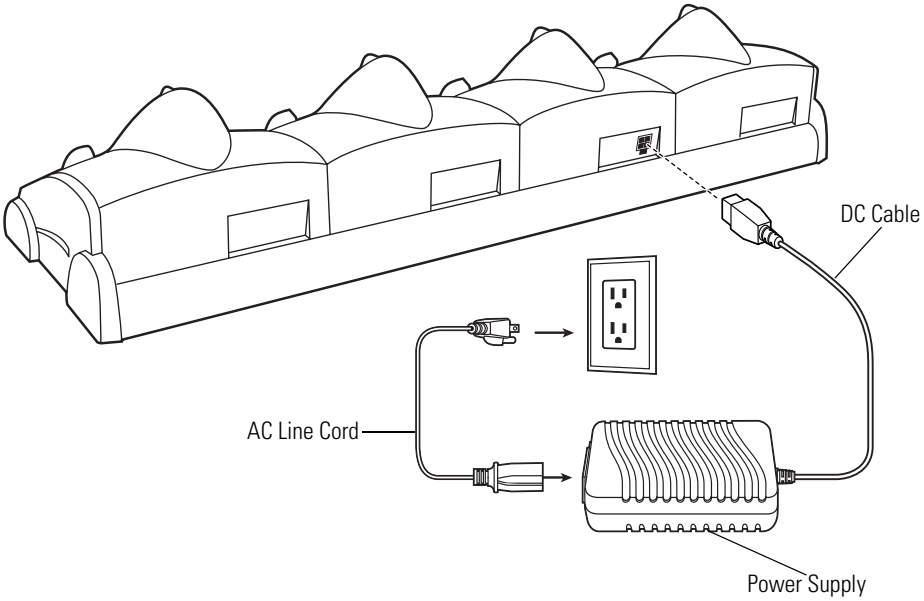


Figure 10-9. Four Slot Charge Only Cradle Power Connection

Battery Charging Indicators

The mobile computer's amber charge LED, located in the Indicator LED Bar (see *Figure 1-1 on page 1-3*), shows the status of the battery charging in the mobile computer. See *Table 1-1 on page 1-11* for charging status indications.

The battery usually charges in less than four hours.

Four Slot Spare Battery Charger

This section describes how to set up and use the Four Slot Spare Battery Charger (Figure 10-4) to charge up to four MC9000-G spare batteries.

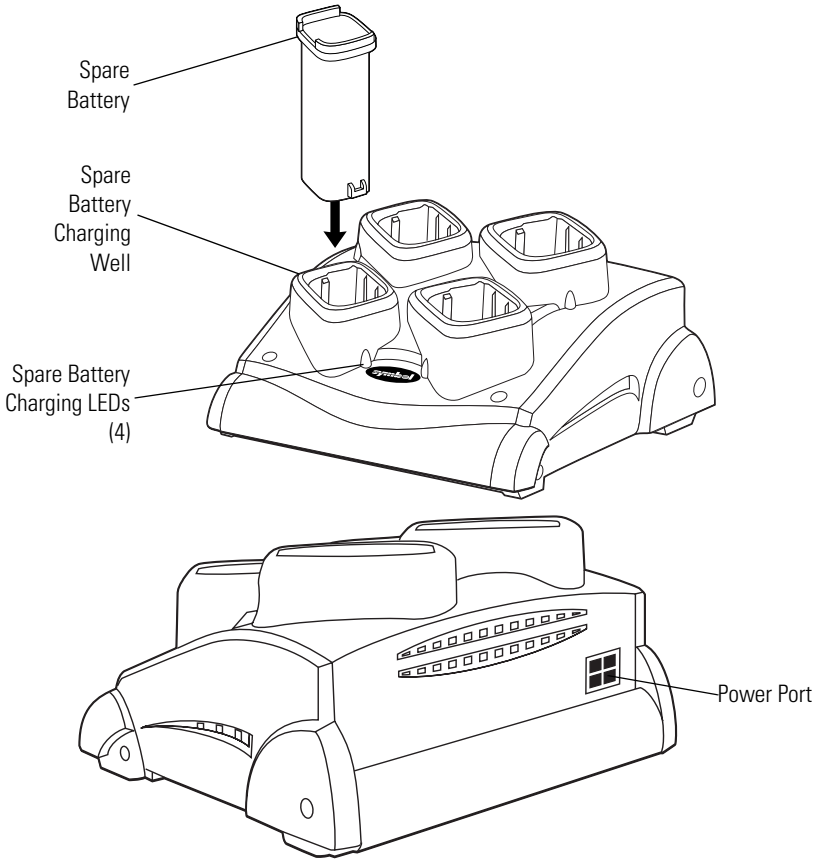


Figure 10-10. Four Slot Spare Battery Charger

Setup

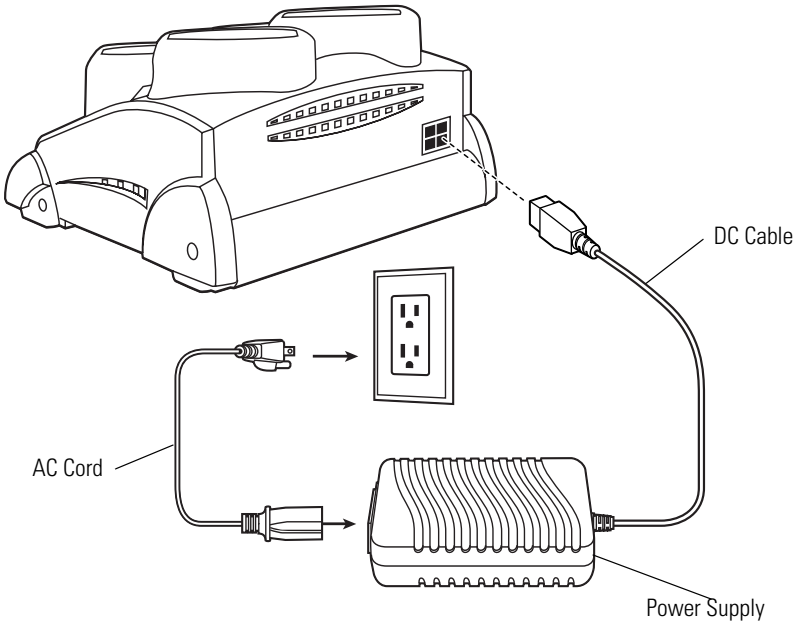


Figure 10-11. Four Slot Spare Battery Charger Power Connection

Spare Battery Charging with the Four Slot Spare Battery Charger

1. Connect the charger to a power source as shown in Figure 10-11.
2. Insert the battery into a spare battery charging slot and gently press down on the battery to ensure proper contact.

Battery Charging Indicators

An amber LED is provided on each battery charging well (see *Figure 10-10 on page 10-19*). See Table 10-2 for charging status indications.

The battery usually charges in less than four hours.

Table 10-2. Spare Battery LED Charging Indicators

LED	Indication
Off	No spare battery in slot; spare battery not placed correctly; cradle is not powered.
Fast Blinking Amber	Error in charging; check placement of spare battery.

Table 10-2. Spare Battery LED Charging Indicators (Continued)

LED	Indication
Slow Blinking Amber	Spare battery is charging.
Solid Amber	Charging complete.

Magnetic Stripe Reader

This section describes how to set up and use the snap-on MSR with the mobile computer. The MSR snaps on to the bottom of the mobile computer and can be easily removed when not in use.

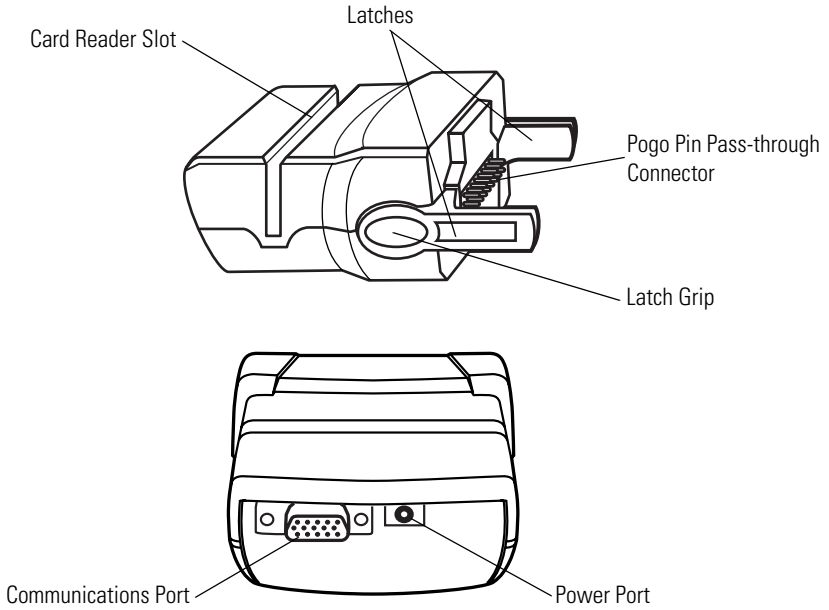


Figure 10-12. Magnetic Stripe Reader

When attached to the mobile computer, the MSR has the following attributes:

- Provides power for operating the mobile computer, with the appropriate power connection.
- Allows the mobile computer to capture data from magnetic stripe cards. (To download MSR data capture software, visit: http://devzone.symbol.com.)
- Provides serial connection through the serial pass-through port for communication with a serial device, such as a host computer. For communication setup procedures, see *Serial Communication Setup on page 4-9*.
- Provides USB connection through the USB pass-through port for communication with a USB device, such as a host computer. For communication setup procedures, see *Serial Communication Setup on page 4-9*.
- Charges the mobile computer's battery, when used with the appropriate power supply.

Attaching and Removing

To attach, snap the MSR onto the bottom of the mobile computer.

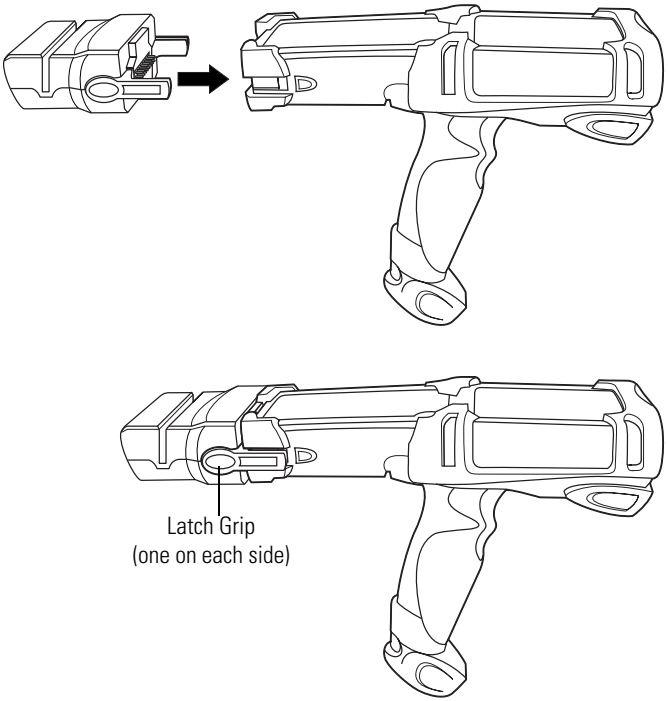


Figure 10-13. Attaching the MSR

To remove, squeeze the latch grips and pull the MSR from the mobile computer.

Note

Remove the MSR from the bottom of the mobile computer before using a cradle for charging and communication.

Setup

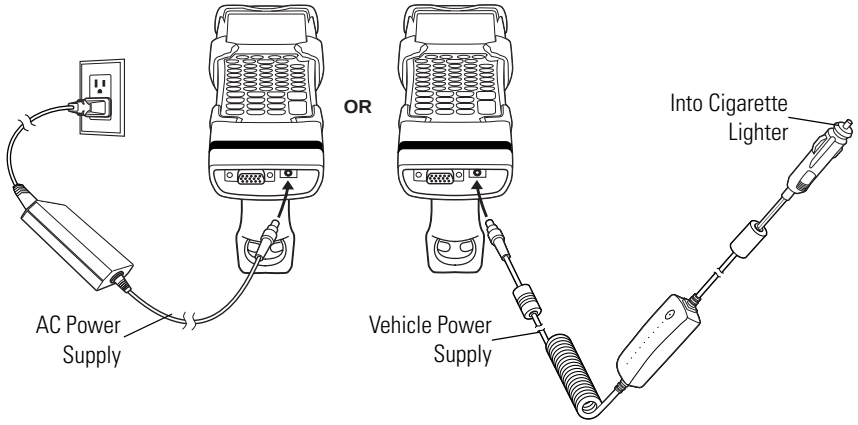


Figure 10-14. MSR Power Connection

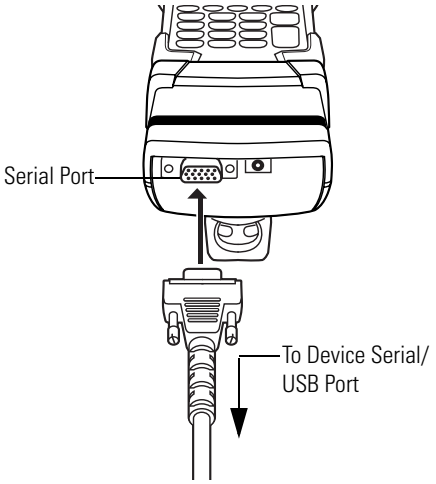


Figure 10-15. MSR Serial/USB Connection

Battery Charging Indicators

To charge the mobile computer's battery through the MSR, connect the power supply to the MSR (see *Figure 10-14 on page 10-23*), then attach the MSR to the mobile computer. The mobile computer begins charging automatically.

Batteries must be charged within the 32° to 104° F (0° to +40° C) ambient temperature range.

The mobile computer's amber charge LED, located in the Indicator LED Bar (see *Figure 1-1 on page 1-3*), shows the status of the battery charging in the mobile computer. See *Table 1-1 on page 1-11* for charging status indications.

The battery usually charges in less than four hours, if the mobile computer is not in use.

Serial/USB Connection

The MSR can connect to and communicate with a serial/USB device, such as a printer or host computer, through its serial port. See *Serial Communication Setup on page 4-9* for the host computer communication setup procedure.

To connect the MSR to a serial/USB device, connect one end of the serial device cable into the serial port on the MSR and the other end into the serial/USB port on the device.

Using the MSR

The *MSR9000* sample application is designed to work with the MSR. This sample application illustrates how an application should handle MSR inputs (see *MSR 9000 on page B-10*).

The MSR does not need to be attached to the power supply to read magnetic stripes.

To use the MSR:

1. Attach the MSR to the mobile computer (see *Attaching and Removing on page 10-22*).
2. Power on the mobile computer.
3. Tap *Start - 9000 Demo - Test Apps - MSR 9000* or *MSR Cameo* to start the sample application.

4. Swipe the magnetic stripe card through the MSR, ensuring the magnetic stripe on the card faces the mobile computer. The card may be swiped in either direction, from left to right or from right to left. For best results, gently press down on the card while swiping to ensure contact with the bottom of the reader.

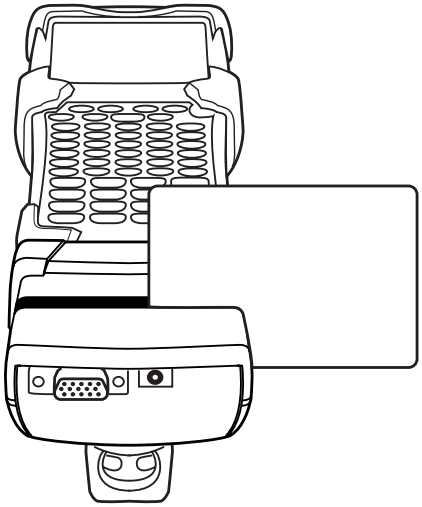


Figure 10-16. Magnetic Stripe Card Swiping

Cable Adapter Module

This section describes how to set up and use the snap-on CAM with the mobile computer. The CAM snaps on to the bottom of the mobile computer and can be easily removed when not in use.

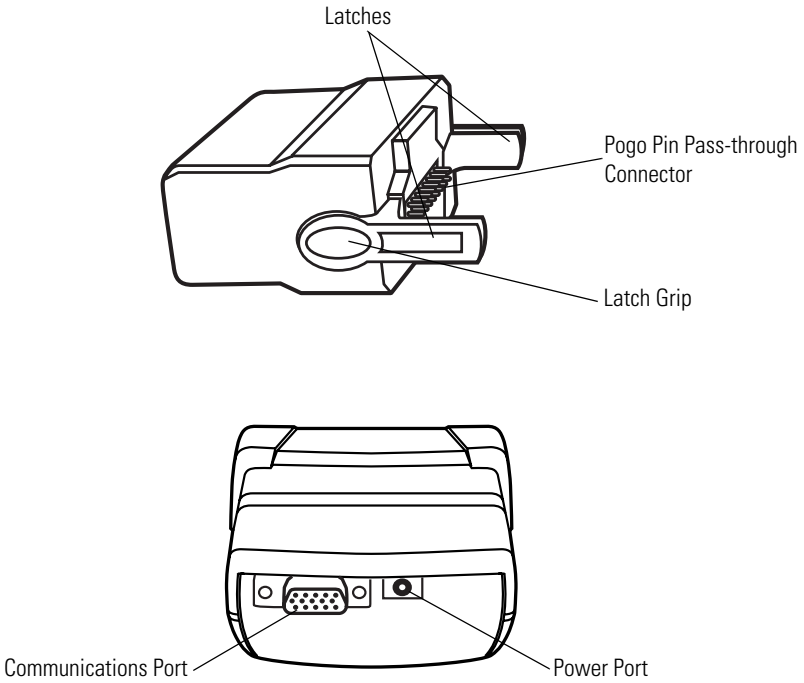


Figure 10-17. Cable Adapter Module

When attached to the mobile computer, the CAM can perform the following functions.

- Provides power for operating the mobile computer, with the appropriate power connection.
- Provides serial connection through the serial pass-through port for communication with a serial device, such as a host computer. For communication setup procedures, see *Serial Communication Setup on page 4-9*.
- Provides USB connection through the USB pass-through port for communication with a USB device, such as a host computer. For communication setup procedures, see *Serial Communication Setup on page 4-9*.
- Charges the mobile computer's battery, when used with the appropriate power supply.

Attaching and Removing

To attach, snap the CAM onto the bottom of the mobile computer.

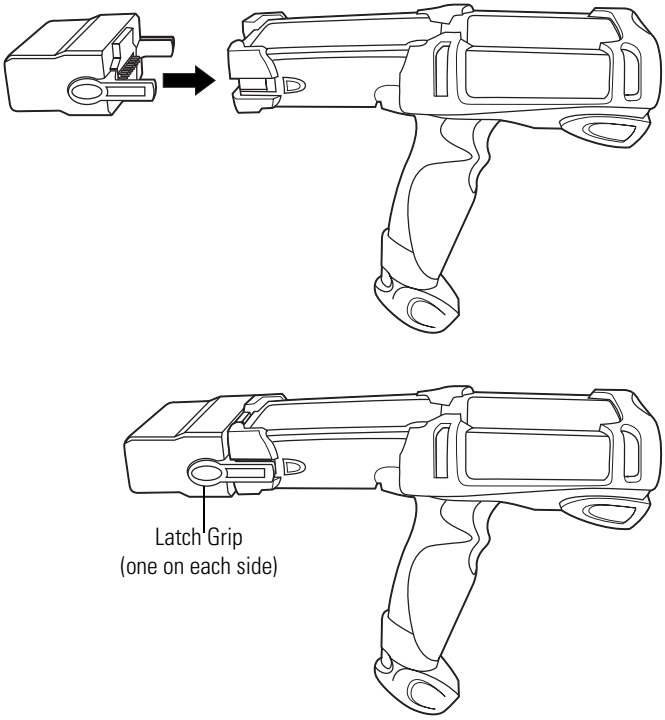


Figure 10-18. Attaching the CAM

To remove, squeeze the latch grips and pull the CAM from the mobile computer.

Note

Remove the CAM from the bottom of the mobile computer before using a cradle for charging and communication.

Setup

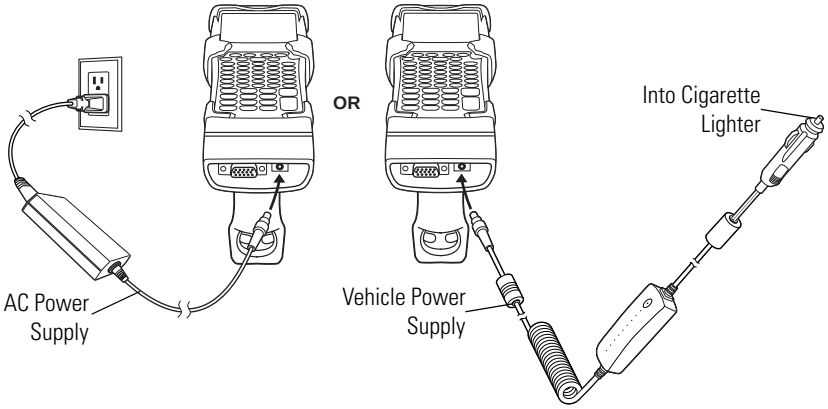


Figure 10-19. CAM Power Connection

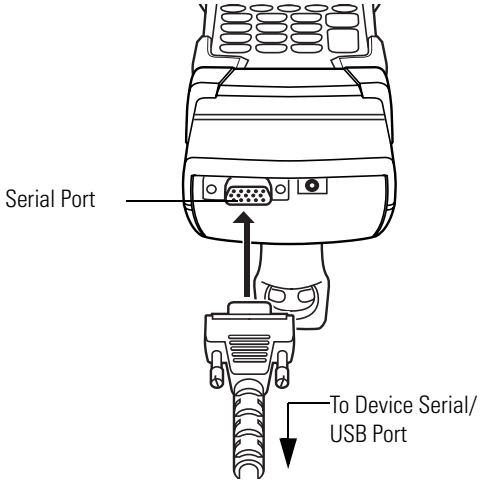


Figure 10-20. CAM Serial Connection

Battery Charging Indicators

To charge the mobile computer's battery through the CAM, connect the power supply to the CAM (see *Figure 10-19 on page 10-28*), then attach the CAM to the mobile computer. The mobile computer begins charging automatically.

Batteries must be charged within the 32° to 104° F (0° to +40° C) ambient temperature range.

The mobile computer's amber charge LED, located in the Indicator LED Bar (see *Figure 1-1 on page 1-3*), shows the status of the battery charging in the mobile computer. See *Table 1-1 on page 1-11* for charging status indications.

The battery usually charges in less than four hours, if the mobile computer is not in use.

Serial/USB Connection

The CAM can connect to and communicate with a serial/USB device, such as a printer or host computer, through its serial port. See *Serial Communication Setup on page 4-9* for the host computer communication setup procedure.

To connect the CAM to a serial/USB device, connect one end of the serial device cable into the serial port on the CAM and the other end into the serial/USB port on the device.

Universal Battery Charger (UBC) Adapter

This section describes how to use the UBC adapter to charge a spare battery.

The UBC can be used with a power supply as a standalone spare battery charger or it can be used with the four station UBC2000 to provide charging to simultaneously charge up to four spare batteries. For additional information about the UBC2000, see the *UBC 2000 Universal Battery Charger Product Guide* (p/n 70-33188-xx).

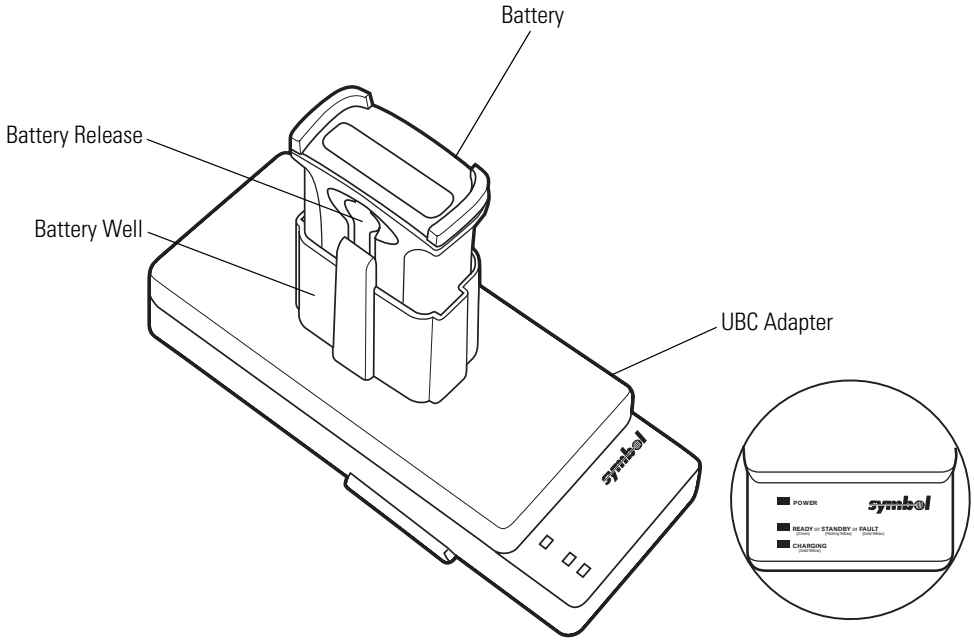


Figure 10-21. UBC Adapter

Inserting and Removing a Battery

Insert the battery into the battery well with the charging contacts facing down (over charging pins) and gently press down on the battery to ensure proper contact.

To remove the battery, press the battery release and lift battery out of the well.

Setup

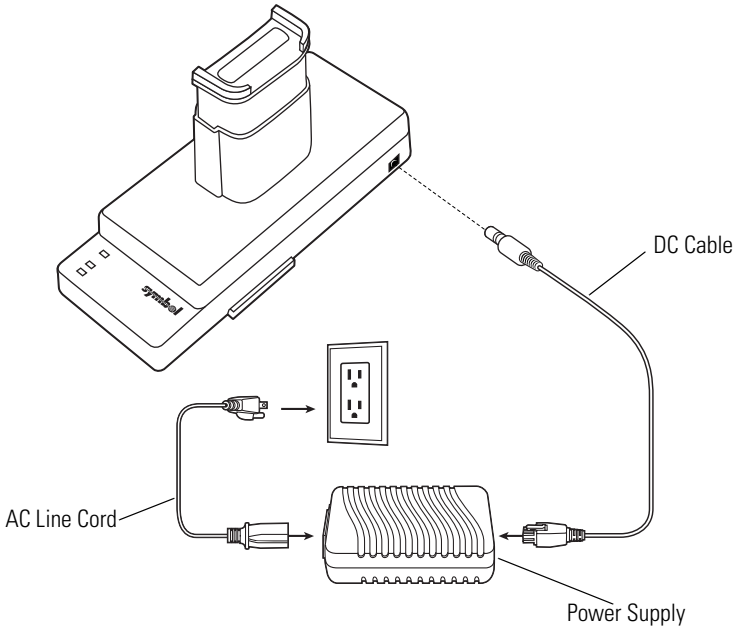


Figure 10-22. UBC Adapter Power Connection

Battery Charging Indicators

To charge a spare battery using the UBC adapter, connect the power supply to the UBC (see *Figure 10-22 on page 10-31*), then insert the spare battery. The spare battery begins charging automatically.

The UBC's charge LEDs (see Figure 10-23)) show the status of the battery charging in the adapter. Table 10-3 shows battery charging status indications.

The battery usually charges in three hours.

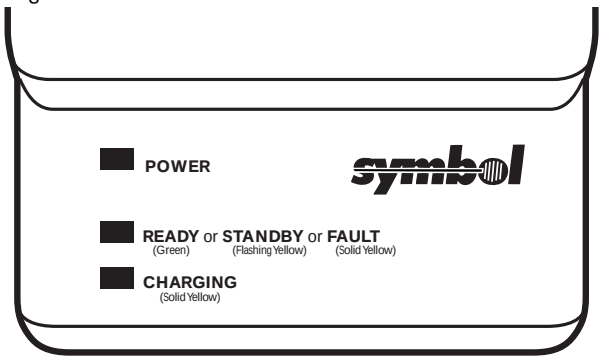


Figure 10-23. UBC Adapter LEDs

Table 10-3. UBC Adapter Charge LED Status Indications

LED	Indication	Description
POWER	Green	Power is connected to the UBC Adapter.
READY or	Green	Charging complete.
STANDBY or	Flashing-Yellow	The battery was deeply discharged and is being trickle charged to bring the voltage up to the operating level. After operating level voltage is achieved the battery charges normally.
FAULT	Yellow	Charging error, check placement of mobile computer/spare battery.
CHARGING	Yellow	Normal charge.

Modem Module

This section describes how to setup and use the MDM9000 Modem Module.

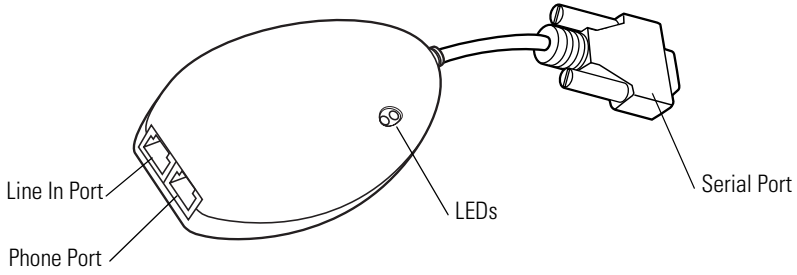


Figure 10-24. Modem Module

The Modem Module enables data communication between the mobile computer and a host computer, remotely through the phone lines, and synchronizes information between the mobile computer and a host computer.

The following items are required for a modem connection:

- Telephone number, IP address and DNS/WINS address information from the dial-in server administrator
- Dial-in account on the host system, including a user ID and password
- RJ11 or RJ12 modem cable
- Functioning telephone jack that supports plug-in modems connected to the local telephone system
- Setup of Country Codes to use the modem with the appropriate country's telephone network.

The following items are required for communication:

- MC9000-G Series or MC906R-G RFID mobile computer
- Cable Adapter Module (CAM), Symbol p/n ADP9000-100 (see *Cable Adapter Module on page 10-26*)
- Serial Adapter Cable (for communication via cradle), Symbol p/n 25-63856-01
- Microsoft ActiveSync
- Setup of host computer and mobile computer.

Setup

Connecting to the Mobile Computer

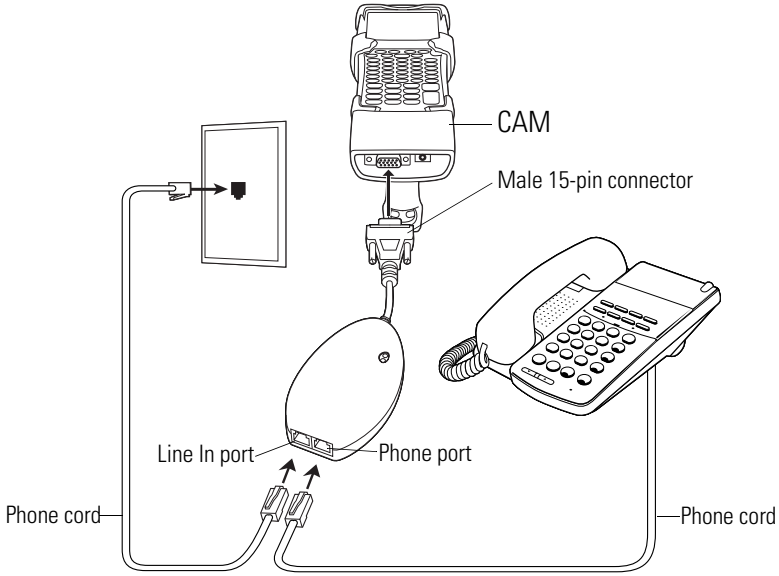


Figure 10-25. Modem Module Connection - Mobile Computer

CAUTION

Do not connect the modem's 15-pin connector into a VGA port of a host computer.

Using the Correct Telephone Line Type

Use a standard analog phone line, as in most households. In an office, use a line connected to a fax machine or modem. In a hotel, request a room with a standard phone line or data port. If necessary, check with the local phone company or administrator to make sure you are using the right type of line before sending data.

Connecting to the Single Slot Serial/USB Cradle

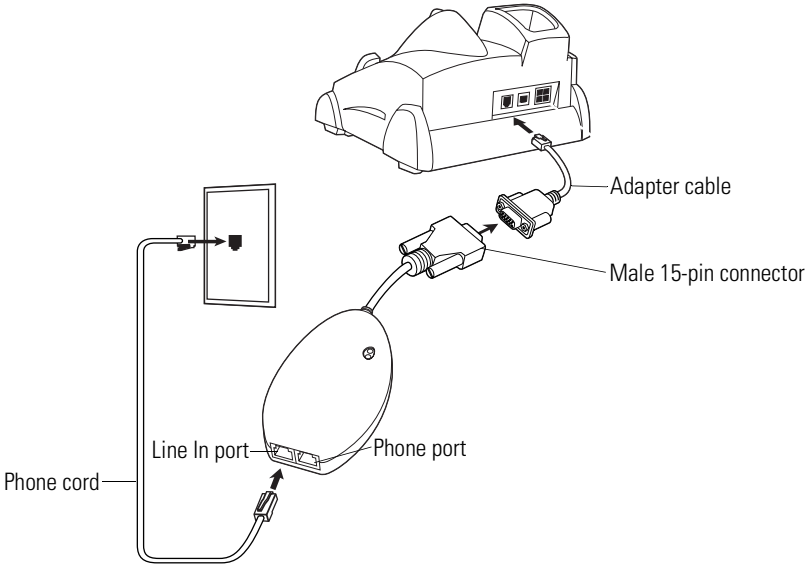


Figure 10-26. Modem Module Connection - Single Slot Serial/USB Cradle

CAUTION

Do not connect the modem's 15-pin connector into a VGA port of a host computer.

Note

If using a phone, connect the cord from the phone to the Phone port on the modem.

Modem LED Indicators

LED	Indication
Off	Modem is not properly connected to the mobile computer; modem is not receiving power.
Green	Modem is connected to the mobile computer and is receiving power.
Solid Amber	Mobile computer is communicating with the host computer.

Configuring the Mobile Computer for the Modem

To edit an existing modem connection using *Manage existing connections*, see *Changing the Initialization String on page 10-41*.

To create a new modem connection on the mobile computer:

1. Connect the modem to the mobile computer as described in *Connecting to the Mobile Computer on page 10-34*.
2. Tap *Start* - *Settings* - *Connections* tab - *Connections* icon.
3. In the *Connections* window, select *Add a new modem connection* to create a connection.

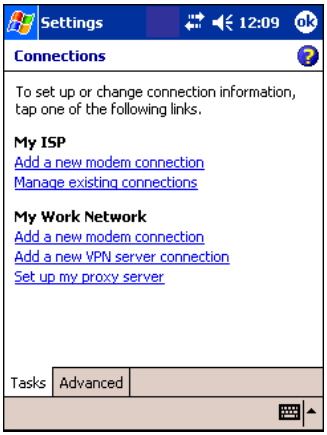


Figure 10-27. Connections Window

4. Enter a name for the connection. In the *Select a modem:* drop-down menu, select *Hayes Compatible on COM1*, then tap **Next**.

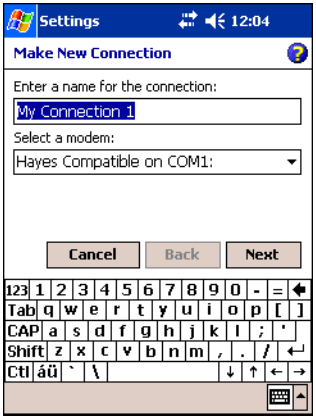


Figure 10-28. New Connection Window

5. Enter the access phone number in the *My Connection* window and tap **Next**.

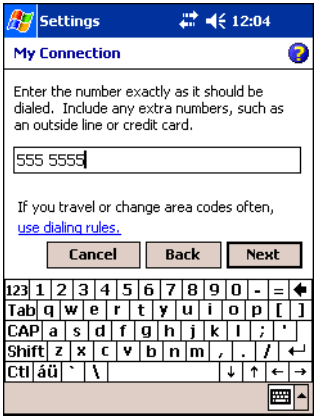


Figure 10-29. My Connection Window - Phone Number

Note

Depending on the location when dialing, additional numbers may need to be dialed (e.g., a 9 prefix is often required if dialing from work; a country code is needed if dialing internationally). To avoid creating new modem connections for each situation, tap *use dialing rules* to define frequently used dialing locations.

6. If necessary, enter the user name, password and domain.

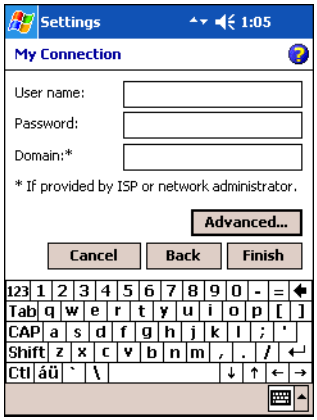


Figure 10-30. My Connection Window - User Information Settings

7. Tap **Advanced...** to edit the *Extra dial-string modem commands:* text box to set country parameters to operate the modem with other country telephone networks.

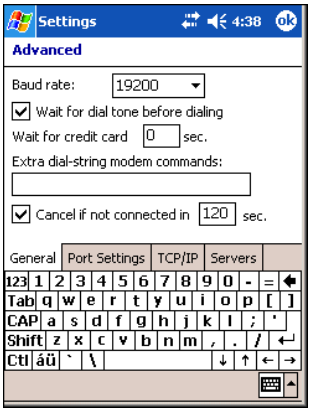


Figure 10-31. Advanced Window - Extra Dial-String Modem Commands

The modem defaults to operation with US telephone networks (country code: B5). To operate the modem with other country telephone networks, a country code must be entered. The modem adjusts its operating parameters to comply with the telephone network in the country specified. See *Modem Country Setup on page 10-40* for the appropriate syntax and a list of country codes.

8. Tap **ok** to exit the *Advanced* window.
9. Tap **Finish**.

Connecting the Modem

To start the connection:

1. Tap *Start* - *Settings* - *Connections* tab - *Connections*.
2. In the *Connections* window, tap *Manage existing connections*.

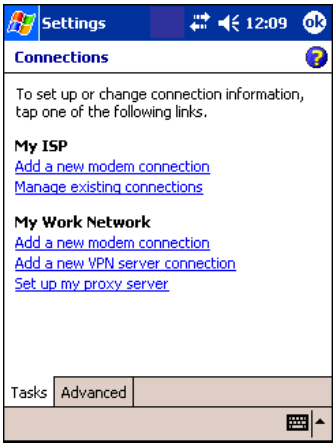


Figure 10-32. My Connections Window

3. Tap and hold the connection name, then select *Connect* from the menu that appears. The modem attempts to connect.

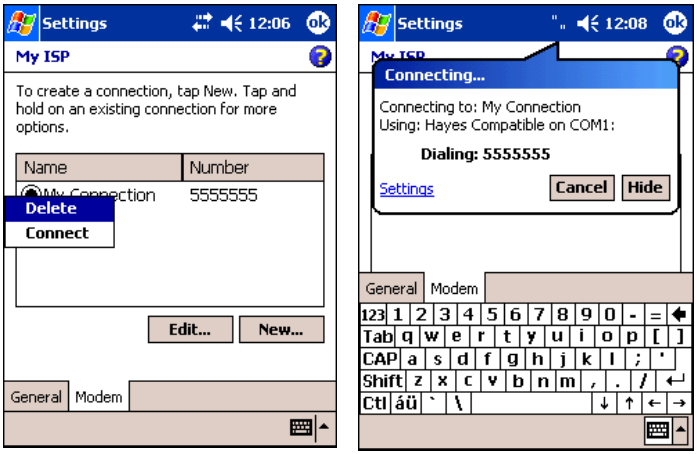


Figure 10-33. Creating a Connection

Modem Country Setup

Edit the *Extra dial-string modem commands:* text box in the mobile computer to set country parameters. The syntax used is: +GCI=<country_code>.

Supported Countries

Table 10-4. Supported Countries

Country	Code	Country	Code	Country	Code
Australia	09	Greece	FD or 46	Norway	FD or 82
Austria	FD or 0A	Iceland	FD	Portugal	FD or 8B
Belgium	FD or 0F	Ireland	FD or 57	Spain	FD or A0
Brazil	16	Italy	FD or 59	Sweden	FD or A5
Canada	20	Liechtenstein	FD	Switzerland	FD or A6
Denmark	FD or 31	Luxembourg	FD	TBR-21 (Europe)	FD
Finland	FD or 3C	Mexico	73	United Kingdom	FD or B4
France	FD or 3D	Netherlands	FD or 7B	United States	B5 (Default)
Germany	FD or 42	New Zealand	7E		
Note: Use FD where possible. If connection problems occur, use the alternate code where provided.					

AT Commands

The AT Command Set allows you to custom-configure the modem.

Note

Only experienced users having difficulty with default settings should use this feature.

Changing the Initialization String

To enter AT commands:

1. Tap *Start* - *Settings* - *Connections* tab - *Connections* icon.
2. If creating a new connection, select *Add a new modem connection* in the *Connections* window. Then follow steps 1 through 6 in *Configuring the Mobile Computer for the Modem on page 10-36* and proceed to Step 6.

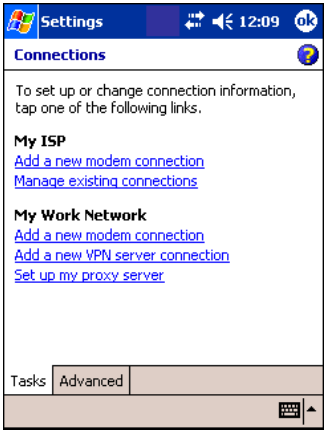


Figure 10-34. Connections Window

3. If entering AT commands for an existing connection, select *Manage existing connections* in the *Connections* window.

4. On the *Modem* tab, select the radio button of the item to edit and tap **Edit...** .

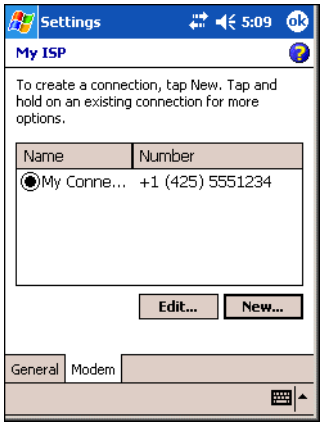


Figure 10-35. New Connection Window

5. Tap **Next** until the *User Information Settings* window appears.
6. Tap **Advanced...** .

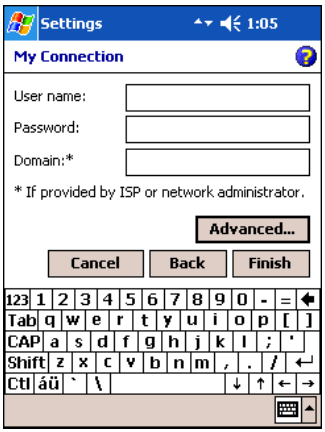


Figure 10-36. My Connection Window - User Information Settings

7. Enter AT commands in the *Extra dial-string modem commands:* text box. See *Basic AT Command Syntax on page 10-43*.

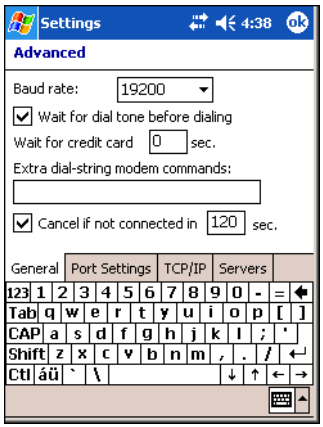


Figure 10-37. Advanced Window - Extra Dial-String Modem Commands

8. Tap **ok** to exit the *Advanced* window.
9. Tap **Finish**.

Basic AT Command Syntax

A command line is made up of three elements:

- **Prefix** - consists of the characters “AT” or “at” or, to repeat the execution of the previous command line, “A/” or “a/”.
- **Body** - made up of individual commands described later. Space characters (IA5 2/0) are ignored and may be used for formatting purposes, unless they are embedded in numeric or string constants. The termination character may not appear in the body. The modem can accept at least 40 characters in the body.
- **Termination character** - may be selected by a user option (parameter S3). The default is CR.

The format of Basic Syntax commands, except for the D and S commands, is as follows:

<command>[<number>]

where:

- <command> is either a single character, or the "&" character followed by a single character per V.250; or the "%" character followed by a single character, the "*" character followed by a single character, or the "^" character followed by a single character.
- <number> is a string of one or more characters from "0" through "9" representing a decimal integer value. Commands expecting a <number> are noted in the description of the command. If <number> is missing from such a command (<command> is immediately followed by another <command> or the termination character), the value "0" is assumed. If a command does not expect a <number> and a number is present, an error occurs. All leading "0"s in <number> are ignored by the modem.

Additional commands may follow a command (and associated parameter, if any) on the same command line with a separation character. The actions of some commands cause the rest of the command line to be ignored.

S-Parameters

Commands that begin with the letter "S" are known as "S-parameters". The number following the "S" indicates the "parameter number" referenced. If the number is not recognized as a valid parameter number, an ERROR result code issues. Immediately following this number, either a "?" or "=" character must appear. "?" is used to read the current value of the indicated S-parameter; "=" sets the S-parameter to a new value.

S<parameter_number>?

S<parameter_number>=[<value>]

If the "=" is used, the new value to be stored in the S-parameter is specified in decimal following the "=". If no value is given (i.e., the end of the command line occurs or the next command follows immediately), the S-parameter specified may be set to 0, or an ERROR result code issues and the stored value remains. The ranges of acceptable values are given in the description of each S-parameter.

If the "?" is used, the modem transmits a single line of information text to the DTE. The text portion of this information text consists of exactly three characters, giving the value of the S-parameter in decimal, with leading zeroes included.

Commands

The tables that follow summarize the AT commands, result codes, and S-Registers for the MDM 3000. **<string>** represents a letter, number, or symbol to be entered. **<value**> represents a number to be entered. Possible values are listed below the command.

Table 10-5. AT Command Table

Command	Description		Country Specific
D	Dial "D<string>"		
	0-9	DTMF digits 0-9	
	*	The 'star' digit (tone dialing only)	
	#	The 'gate' digit (tone dialing only)	
	A-D	DTMF digits A,B,C,D	X
	L	Re-dial last number	
	P	Pulse dialing	X
	T	Tone dialing	
	W	Wait for dial tone. (Modem waits for dial tone before dialing digits following "W".)	
	@	Wait for silence. (Modem waits for at least 5 seconds of silence in the call progress frequency band before continuing with next dial string parameter.)	
	&	Wait for credit card dialing tone before continuing with the dial string.	
	‘	Dial pause. (Modem pauses for a time specified by S8 before dialing the digits following ",")	
	;	Return to command state. (Modem goes off hook and allows entering additional AT commands. Use "H" to go back to on hook.)	
	() - <space>	Ignored. (Might be used to format the dial string.)	
A	**Off-hook and attempt to answer a call**		
H	**Disconnect – Hang UP**		
O	**Return to On-Line Data Mode. O <value>**		
	0	Enters on-line data mode without a retrain.	
	1	Enters on-line data mode with a retrain.	

Table 10-5. AT Command Table (Continued)

Command	Description		Country Specific
L	**Speaker volume (Not used)**		
M	**Speaker control. M <value>**		
	0	Always off.	
	1	On during call establishment. Off when receiving carrier. (default)	
	2	Always on.	
	3	Off when receiving carrier and during dialing. On during answering.	
&G	**Guard tone. &G<value>**		X
	0	Disables guard tone. (default)	
	1	Disables guard tone.	
	2	Select 1800 Hz guard tone.	
&V1	**Displays last connection statistics**		
+MS	**Modulation Selection. +MS=<carrier>**		X
	B103	Bell 103 (300)	
	B212	Bell 212 (1200 Rx/75 or 75Rx/1200 Tx)	
	V21	300	
	V22	1200	
	V22B	2400 or 1200	
	V23C	1200	
	V32	9600 or 4800	
	V32B	14400, 12000, 9600, 7200 or 4800	
	V34	33600, 31200, 28800, 26400, 2400, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800 or 2400	
%E	**Enable/Disable Line Quality Monitor and Auto-Retrain or Fall back/Fall forward. %E<value>**		
	0	Disable line quality monitor and auto re-train.	
	1	Enable line quality monitor and auto re-train.	
	2	Enable line quality monitor and fallback/fall forward. (default).	

Table 10-5. AT Command Table (Continued)

Command	Description		Country Specific
B	**CCITT or Bell. B<value>**		
	0	Select CCITT operation at 300 or 1200 bauds.	
	1	Selects Bell operation at 300 or 1200 bauds.	
&L	**Leased Line Operation. &L<value>**		
	0	Requests dial-up operation. Dial-up operation continues.	

Table 10-6. S-Register Settings

Reg	Function	Range	Default		Units
			De-fault	Saved	
S0	Rings to Auto Answer	0-255	0	*	rings
S1	Ring Counter	0-255	0	*	rings
S2	Escape Character	0-255	43		ASCII
S3	Carriage Return Character	0-127	13		ASCII
S4	Line Feed Character	0-127	10		ASCII
S5	Backspace Character	0-255	8		ASCII
S6	Wait Time before Blind Dialing or Dial Tone	2-255	2	*	S
S7	Wait Time for Carrier, Silence or Dial Tone	1-255	50	*	S
S8	Pause Time for Dial Delay Modifier	0-255	2	*	S
S9	Carrier Detect Response Time	1-255	6	*	0.1 S
S10	Lost Carrier to Hangup Delay	1-255	14	*	0.1 S
S11	DTMF Tone Duration	50-255	95	*	mS
S12	Escape Prompt Delay (EPD)	0-255	50	*	.02 S

* Register value may be stored in on of two user

** Country-dependent

Table 10-6. S-Register Settings (Continued)

Reg	Function	Range	Default		Units
			De-fault	Saved	
S14	General Bit Mapped Options Status	-	138 (8Ah)		
S16	Test Mode Bit Mapped Options Status	-	0		
S19	Reserved	-	0		
S20	Reserved	-	0		
S21	V.24 Bit Mapped Options Status	-	52 (34h)		
S22	Speaker/Results Bit Mapped Options	-	117 (75h)		
S23	General Bit Mapped Options Status	-	62 (3Dh)		
S24	Sleep Inactivity Timer	0-255	0		S
S25	Delay to DTR off	0-255	5		S
S26	RTS-to-CTS Delay	0-255	1		.01 S
S27	General Bit Mapped Options Status	-	73 (49h)		
S28	General Bit Mapped Options Status	-	0		
S29	Flash Dial Modifier Time	0-255	70		10 mS
S30	Disconnect Inactivity Timer	0-255	0		10 S
S31	General Bit Mapped Options Status	-	195 (C0h)		
S36	LAPM Failure Control	-	7	*	
S38	Delay Before Forced Hangup	0-255	20		S
S39	Flow Control Bit Mapped Options Status	-	3		
S40	General Bit Mapped Options Status	-	104 (68h)	*	

* Register value may be stored in on of two user

** Country-dependent

Table 10-6. S-Register Settings (Continued)

Reg	Function	Range	Default		Units
			De-fault	Saved	
S41	General Bit Mapped Options Status	-	195 (C3h)	*	
S46	Data Compression Control	-	138	*	
S48	V.42 Negotiation Control	-	7		
S86	Call Failure Indication	0-26	0		
S91	PSTN Transmit Attenuation Level	0-15	10**		dBm
S92	Fax Transmit Attenuation Level	0-15	10**		dBm
S95	Extended Result Codes Control		0	*	
S210	V.34 Symbol Rate	0-255	13 (0Dh)		

* Register value may be stored in on of two user

** Country-dependent

Wall Mounting Bracket and Shelf Slide

This section describes how to install and set up the MC9000 Wall Mount Bracket and Shelf Slide to mount cradles to a wall.

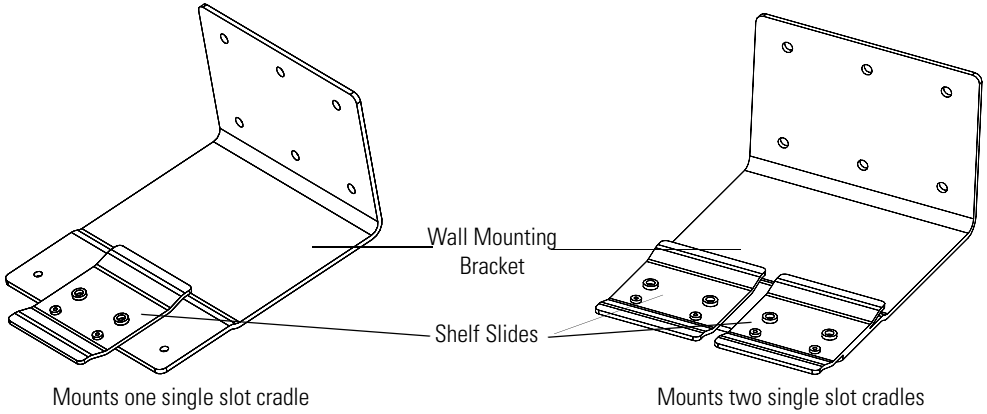


Figure 10-38. Wall Mounting Bracket with Shelf Slide

When installed on a wall, the mounting bracket and shelf slide enable mounting one or two single slot cradles to a wall. Use two brackets to mount a four slot cradle.

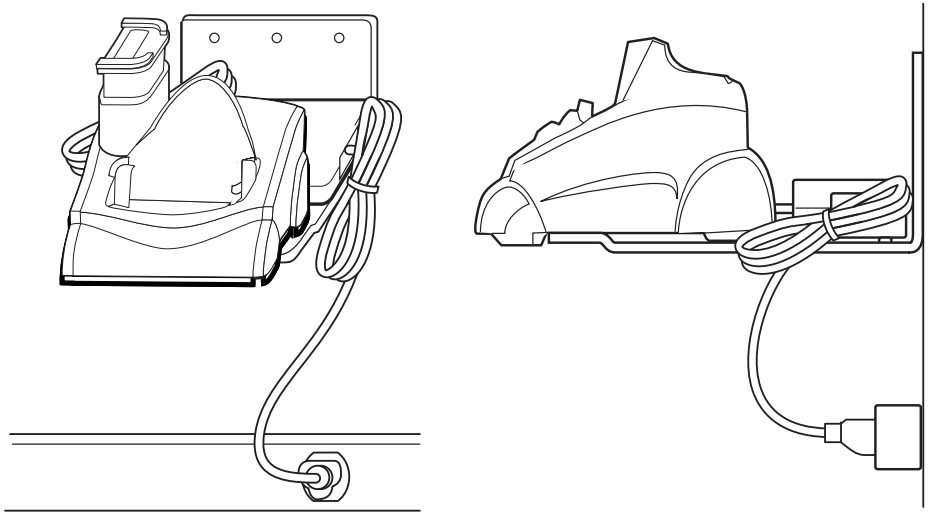


Figure 10-39. Mounted Single Slot Cradle With Power Connection

Installing the Wall Mount Bracket

To install the wall mount bracket for use with one or two single slot cradles or four slot chargers, place the smaller surface of the bracket against the wall or vertical support structure, and secure with four 1/4" screws (use two of the three screw holes in each row).

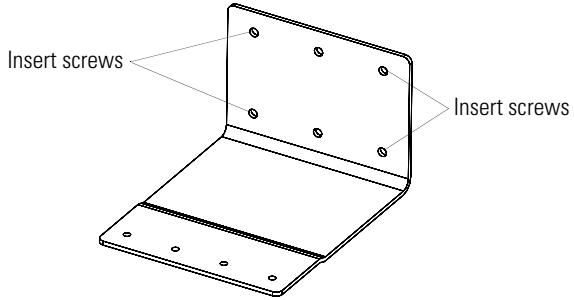


Figure 10-40. Wall Mounting Bracket Mounting Screws

If using the bracket and slide with a four slot cradle, secure a second bracket to the wall next to the first, aligning the horizontal screw holes on the second with those of the first.

Attaching the Shelf Slide to the Wall Mount Bracket

One Single Slot Cradle/Four Slot Battery Charger

To attach the shelf slide to the wall mount bracket for use with one single slot cradle or four slot battery charger:

1. Place the slide on the bracket, aligning the larger pan-head screw holes in the slide with the center two screw holes on the bracket.

2. Secure the slide to the bracket by inserting the two pan-head screws provided from below the bracket, up through the bracket's screw holes and then through the slide's pan-head screw holes.

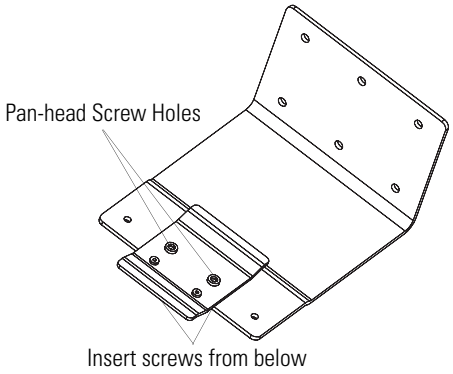


Figure 10-41. Attaching One Shelf Slide

Two Single Slot Cradles/Four Slot Battery Chargers

To attach the shelf slide to the wall mount bracket for use with two single slot cradles or two four slot battery chargers:

1. Place the slide on the bracket, aligning the larger pan-head screw holes in the slide with the left or right two screw holes on the bracket.
2. Secure the slide to the bracket by inserting the two pan-head screws provided from below the bracket, up through the bracket's screw holes and then through the slide's pan-head screw holes.

3. Secure a second slide to the remaining two screw holes on the bracket in the same manner.

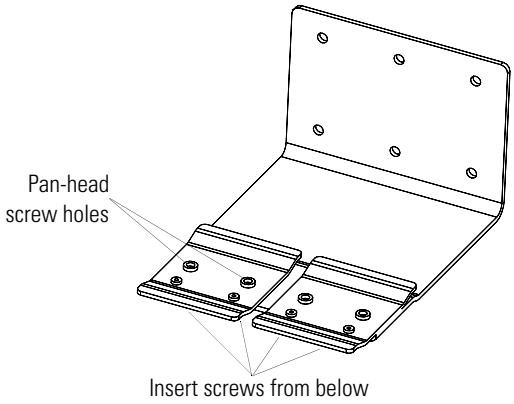


Figure 10-42. Attaching Two Shelf Slides

Four Slot Cradle

To attach the shelf slide to the wall mount bracket for use with a four slot cradle:

1. Place a slide on the left-hand bracket, aligning the larger pan-head screw holes in the slide with the left two screw holes on the bracket.
2. Secure the slide to the bracket by inserting the two pan-head screws provided from below the bracket, up through the bracket's screw holes and then through the slide's pan-head screw holes.
3. Place a slide on the right-hand bracket, aligning the larger pan-head screw holes in the slide with the right two screw holes on the bracket.
4. Secure the second slide to the bracket as described in Step 2.

Installing the Cradle/Charger on the Bracket

Install the cradle or charger onto the bracket, inserting the bracket's slide into the grooves on the bottom of the cradle/charger and sliding the cradle/charger into the desired position.

For one single slot cradle/four slot charger, center it on the bracket.

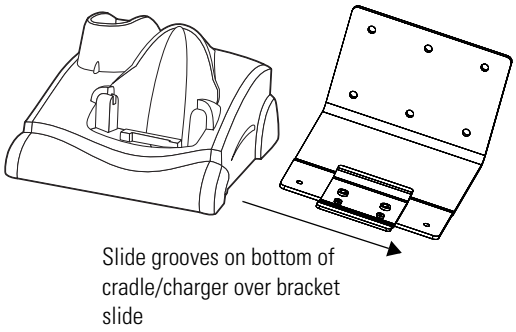


Figure 10-43. Attaching Two Shelf Slides

For two single slot cradle/four slot chargers, slide one onto the left-hand slide, and one onto the right-hand slide.

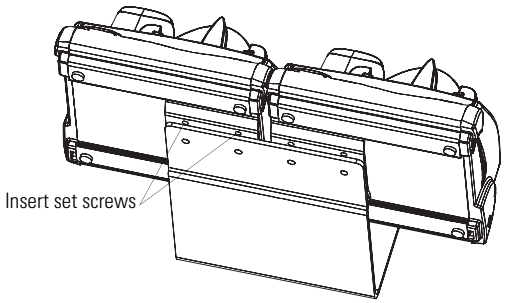


Figure 10-1. Attaching Two Shelf Slides

For a four slot cradle, slide the cradle on to the slides, across both brackets.

Secure each cradle or charger to its slide using the two set screws provided.

11

Software Installation on Development PC

Contents

Introduction

To develop applications to run on the mobile computer, one or more of the following is required:

- Symbol Mobility Developer Kit (SMDK) for Embedded Visual C 4.0 (eVC4)
- Symbol Mobility Developer Kit (SMDK) for .NET
- Device Configuration Package (DCP) for MC9000w.

The SMDK for eVC4 is a development tool used to create native C and C++ applications for all Symbol mobile computers running the Microsoft Windows Mobile 2003 Software for Pocket PCs operating system. It includes documentation, header files (.H), and library files (.LIB) for native code application development that targets Symbol value-add APIs.

The SMDK for .NET provides all of the tools necessary to develop C# and VB.NET managed applications for Symbol mobile computers. These tools include class libraries, sample applications, and associated documentation. SMDK for .NET allows Microsoft .NET Compact Framework developers to programmatically access Symbol value-add features of the mobile devices.

The DCP for MC9000w provides the Product Reference Guide (PRG), flash partitions, Terminal Configuration Manager (TCM) and the associated TCM scripts. With this package hex images that represent flash partitions can be created and downloaded to the mobile computer.

Required System Configurations

The minimum system configuration required to install the SMDK for eVC4, SMDK for .NET and DCP for MC9000w is:

- IBM-compatible host computer with Pentium 450 MHz processor or higher
- Microsoft Windows XP or Microsoft Windows 2000 operating system
- 128 MB RAM
- 100 MB available hard disk space
- CD-ROM drive
- One available serial port
- Mouse
- ActiveSync software, available at the Microsoft web site: http://www.microsoft.com.

SMDK for eVC4

Installation Requirements

In order to install the SMDK for eVC4, the following additional components must first be installed on the development PC:

- Microsoft Windows XP or Windows 2000
- Microsoft Embedded Visual C++ v4.0 with SP2
- Microsoft Windows Mobile 2003 SDK
- Microsoft ActiveSync version 3.7 or higher
- Adobe® Acrobat® Reader® 3.0 or higher.

SMDK for eVC4 Contents and Locations

The SMDK for eVC4 contains the components listed in Table 11-1.

Table 11-1. SMDK for eVC4 Contents and Locations

Components	Directory Location
API Help file and Readme file	\Program Files\Symbol Mobility Developer Kit v1.1 for eVC4\
Sample applications for quick-start development	\Program Files\Symbol Mobility Developer Kit v1.1 for eVC4\Samples\evc\
Header files with API prototypes and structures *	\Program Files\Windows CE Tools\wce420\Pocket PC 2003\Include\armv4
Import Library files*	\Program Files\Windows CE Tools\wce420\Pocket PC 2003\Lib\armv4
Start Menu	\Documents and Settings\All Users\Start Menu\Programs
Readme	
Help	
Samples	
WEB Updates	
* The header files and lib files are time and date stamped so they can be easily identified in the armv4 directories. The "date" is the date on which the software release was assembled and the time is the version of the release. For example, a time of 1:00 signifies version 1.0.	

SMDK for .NET

Installation Requirements

In order to install the SMDK for .NET, the following additional components must first be installed on the development PC:

- Remove any SMDK for .NET (Beta 1 or Beta 2) packages prior to installation.
- Microsoft Visual Studio .NET 2003.

SMDK for .NET Contents and Locations

The SMDK for .NET contains the components listed in Table 11-2.

Table 11-2. SMDK for .NET Contents and Location

Components	Directory Location
Class library assemblies	\Program Files\Microsoft Visual Studio .NET 2003\CompactFrameworkSDK\v1.0.5000\Windows CE
Forms source code	\Program Files\Symbol Mobility Developer Kit for .NET\v1.1\Windows CE\Source
Sample applications	\Program Files\Symbol Mobility Developer Kit for .NET\v1.1\Windows CE\Samples
Help files	\Program Files\Symbol Mobility Developer Kit for .NET\v1.1\Windows CE\Help Files
Updates to native drivers	\Program Files\Symbol Mobility Developer Kit for .NET\v1.1\Windows CE\DriverUpdates
CAB files	\Program Files\Symbol Mobility Developer Kit for .NET\v1.1\Windows CE\MassDeployment

DCP for MC9000w

Installation Requirements

The DCP for MC9000w has no additional installation requirements.

DCP for MC9000w Contents and Locations

The DCP for MC9000w contains the components listed in Table 11-3.

Table 11-3. DCP Contents and Locations

Components	Directory Location
Files that make up the flash partitions	Program Files\Symbol Device Configuration Packages\MC9000w\v1.0\Flash Folders
File used to create device splash screen	\Program Files\Symbol Device Configuration Packages\MC9000w\v1.0\Flash Folders\Splash
Hex image - default location	\Program Files\Symbol Device Configuration Packages\MC9000w\v1.0\Hex Images
Product Reference Guide	\Program Files\Symbol Device Configuration Packages\MC9000w\v1.0
Readme	\Program Files\Symbol Device Configuration Packages\MC9000w\v1.0
Scripts used to customize flash partitions	\Program Files\Symbol Device Configuration Packages\MC9000w\v1.0\TCM Scripts
Terminal Configuration Manager (TCM)	Program Files\Symbol\TCM
Tools (ex Keyboard remap, if any)	\Program Files\Symbol Device Configurations package\MC9000w\v1.0\Tools\kbtool
Start Menu	\Documents and Settings\All Users\Start Menu\Programs
Readme	
PRG	
TCM	
WEB Updates	

The SMDK for eVC4, SMDK for .NET and DCP for MC9000w are available from the Symbol Developer's Zone web site, http://devzone.symbol.com.

Installing Other Development Software

Developing applications for the mobile computer may require installing other development software such as application development environments on the development PC. Follow the installation instructions provided with this software.

12

Configuring the Mobile Computer

Contents

Introduction

Terminal Configuration Manager (TCM) is an application used to customize flash file system partitions for the mobile computer. The most common use is to create an application partition hex file that contains the customer's application. TCM can also be used to load hex files to the flash memory of the mobile computer.

The program resident on the mobile computer that receives the hex file and burns it to the flash memory is called Initial Program Loader (IPL).

The customization of partitions is controlled by TCM scripts. The scripts contain all of the necessary information for building an image. The script is a list of copy commands specifying the files to copy from the development computer to the partition.

TCM works with a pair of directory windows, one displaying the script and the other displaying the source files resident on the development computer. Using standard windows drag and drop operations, files can be added and deleted from the script window.

The DCP for MC9000w includes scripts used by Symbol Technologies to build the standard factory installed *Platform* and *Application* partitions provided on the mobile computer. The standard *Platform* partition contains drivers while the *Application* partition contains demo applications and optional components. The standard TCM scripts can be found in the following folder: *C:\Program Files\Symbol Device Configuration Packages\MC9000w\v1.0\TCM Scripts.*

Before creating a script to build a hex image, identify the files required (system files, drivers, applications, etc.) and locate the files' source directories to make the script building process easier.

The required processes for building a hex image in TCM include:

- Starting TCM
- Defining script properties
- Creating the script for the hex image
- Building the image
- Sending the hex image
- Creating a splash screen
- Flash storage.

Starting Terminal Configuration Manager

Click the Windows start menu TCM icon (*Symbol Device Configuration Packages, MC9000w v1.0*) to start TCM. The *TCM* window appears displaying two child windows: *Script1* and *File Explorer*. The *Script1* window contains a newly created script and the *File Explorer* window contains a file explorer view used for selecting files to be placed in the script.

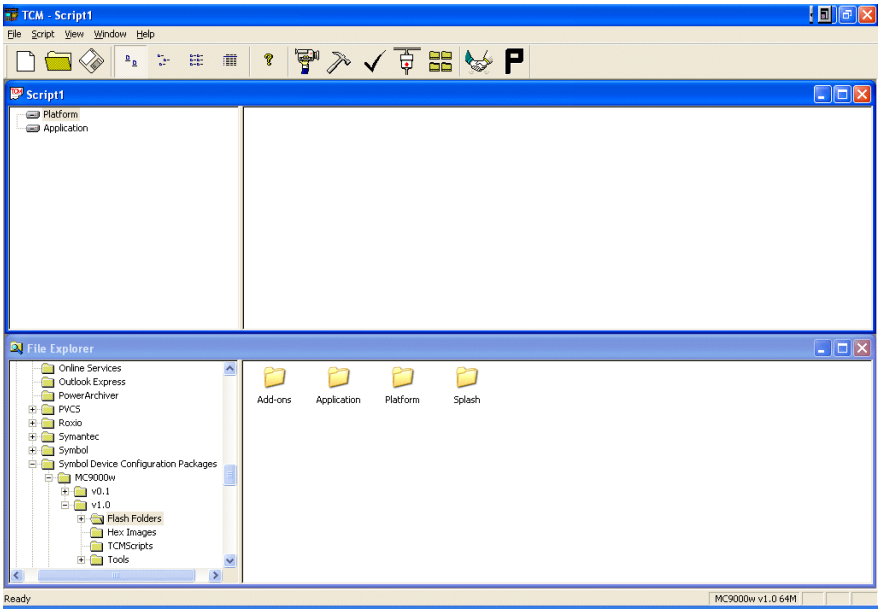


Figure 12-1. TCM Startup Window

The following table lists the components of the TCM window.

Table 12-1. TCM Components

Icon	Component	Function
	Script Window	Displays the files to be used in the creation of the partition(s).
	File Explorer Window	Used to select the files to be added to the script.
	Create button	Create a new script file.
	Open button	Open an existing script file.
	Save button	Save the current script file.
	Large icons button	View the current script items as large icon.
	Small icons button	View the current script items as small icon.

Table 12-1. TCM Components (Continued)

Icon	Component	Function
	List button	View the current script items as a list.
	Details button	View the current script items with more details.
	About button	Display version information for TCM.
	Properties button	View/change the current script properties.
	Build button	Build the current script into a set of hex files.
	Check button	Check the script for errors (files not found).
	Send button	Download the hex image to the mobile computer.

Table 12-1. TCM Components (Continued)

Icon	Component	Function
	Tile button	Arrange the sub-windows in a tiled orientation.
	Build and Send	Build the current script into a set of hex images and send the hex images to the mobile computer.
	Preferences button	View/change the global TCM options.

Defining Script Properties

Before a script is created, the script properties must be defined. This defines the type of mobile computer, flash type, number of disks being created and the memory configuration of each disk partition.

To define the script properties:

1. Select the *Script* window to make it active.
2. Click the **Properties** button. The *Script Properties window - Partition Data* tab appears.

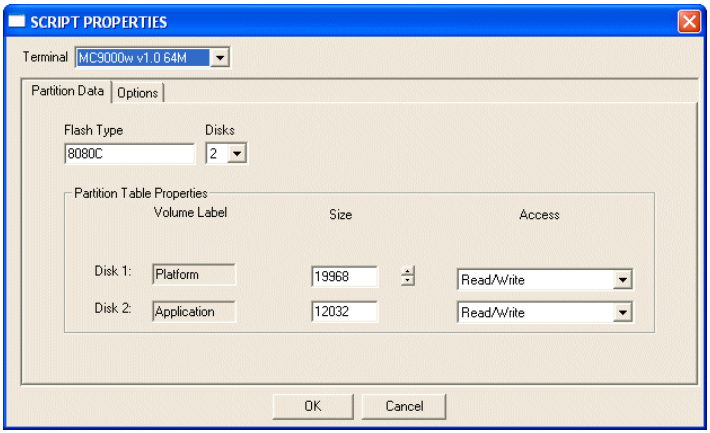


Figure 12-2. Script Properties Window - Partition Data Tab

3. In the *Terminal* drop-down list, the *MC9000w v1.0 64M* entry is already selected.
4. Use the default *Flash Type*.
5. In the *Disks* drop-down list, *s*elect the number of disk partitions to create.
6. Select the (memory) *Size* for each partition. Note that adding space to one disk. partition subtracts it from another.
7. In the *Access* drop-down list for each disk partition, determine and select the Read/Write access option.

8. Click the *Options* tab. The *Script Properties window - Options* tab appears.

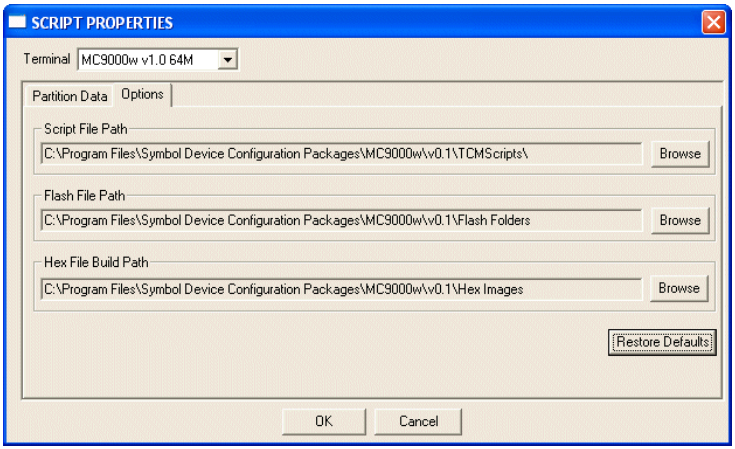


Figure 12-3. Script Properties Window - Options Tab

9. Set the paths for the Script File, Flash File and Hex File Build.
10. Click **OK**.

Creating the Script for the Hex Image

On start-up, *TCM* displays the *TCM* window with the *Script1* window and *File Explorer* window pointing to the following directory:

\Program Files\Symbol Device Configuration Packages\MC9000w\v0.1\TCMScripts\

The *Script1* window directory pane displays two partitions: *Platform* and *Application*. Depending on the type of flash chip, the number of partitions may change. Files can be added to each of the partitions. TCM functionality includes:

- Opening a new or existing script file
- Copying components to the script window
- Saving the script file.

Opening a New or Existing Script

A script file can be created from scratch or based on an existing script file. Click **Create** to create a new script or click **Open** to open an existing script (for example, a script provided in the DCP for MC9000w). If an existing script is opened and changes are made, saving the changes overwrites the original script. To use an original or Symbol supplied standard script as a base and save the changes in a new script, use the *Save As* function to save the script using a different file name.

Updating TCM 1.X Scripts

Script files that were created with older versions of TCM can be upgraded to TCM 2.0 scripts. Click **Open** to open an existing script created with an older version of TCM. The *Conversion* window appears automatically.

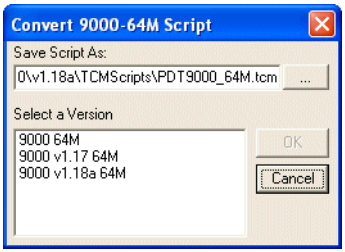


Figure 12-4. Conversion Window - Upgrading to TCM 2.0

Copying Components to the Script

Script contents are managed using standard file operations such as *New Folder*, *Delete* and *Rename*. Items can be added to the script by clicking files and folders in the *File Explorer* window and dragging them to the *Script* window. The *File Explorer* window supports standard windows; multiple files may be selected by clicking while holding the **SHIFT** or **CTRL** keys.

Saving the Script

Modifications to a script file can be saved using the *Save* or the *Save As* function. Saving changes to an existing script writes over the original script. To use a Symbol-supplied standard script as a base and save the changes in a new script, use the *Save As* function.

Building the Image

Once the script is created, the hex image defined by the script can be built.

As part of the build, TCM performs a check on the script which verifies that all files referenced in the script exist. This check is important for previously created scripts to ensure that files referenced in the script are still in the designated locations.

To build scripts:

1. Click **Build** on the TCM toolbar. The *Configure Build* window appears.

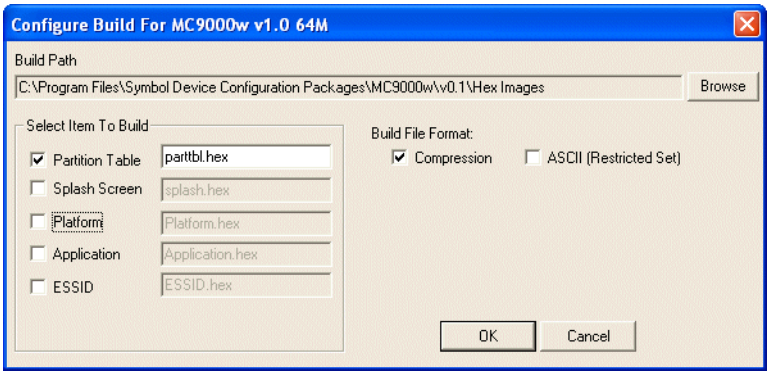


Figure 12-5. Configure Build Window

2. Select the items (partitions) to build using the check box(es) to the left of each named partition.
3. The *Build Path* defines where to store all built partitions.
4. Select (hex image) COMPRESSION to reduce the size and speed up the download.
5. Click **OK** and follow the on-screen instructions.

If one of the partitions being built is the ESSID, a prompt appears requesting the ESSID value. Deselect the HR (High Rate) check box when building ESSID images for a device with an FH radio.

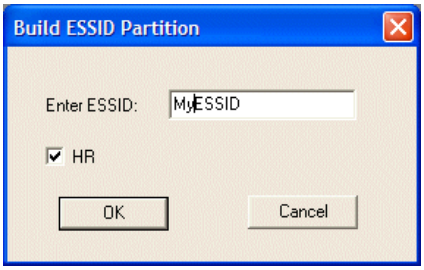


Figure 12-6. Build ESSID Partition Window

If one of the partitions being built is the Splash Screen, a prompt appears requesting both the source Bitmap file and the destination HEX file.

6. A check is performed and if there are no errors, the partition hex files are created.

If the build fails, the hex files are not be created and TCM displays an error message. Two of the most common reasons for a build failure are:

- Files defined in the script can not be found. This error can occur when the files referenced by the script are no longer stored on the development computer or the folders where they are stored were renamed.
- The total amount of flash memory space required by the script exceeds the image size. To correct this, reduce the number of files in the partition or increase the size of the partition. See *Defining Script Properties on page 12-8* for more information about setting the image size appropriately.

Sending the Hex Image

Once the hex file is built, it can be downloaded to the mobile computer.

To load the hex files on to the mobile computer:

1. For downloads using a serial connection, connect the mobile computer to the development computer using the Single Slot Serial/USB cradle or CAM.
2. Press and hold the left scan button or the scan trigger and the Power button simultaneously until the mobile computer resets into IPL.

Note

The mobile computer must be inserted in the cradle or attached to the CAM, both with their appropriate power supplies connected to a power source, for the mobile computer to reset into IPL.

3. When the *Initial Program Loader* menu appears, release scan button/trigger and Power button.

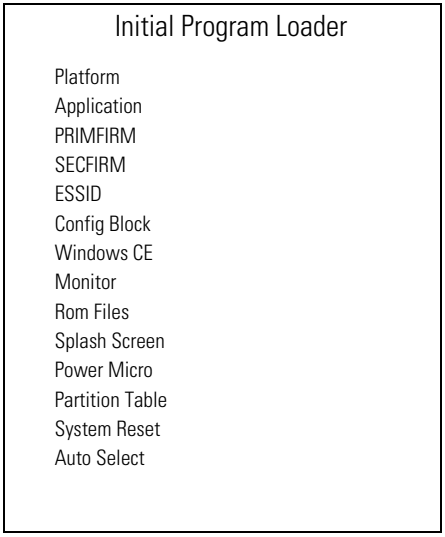


Figure 12-7. Initial Program Loader (IPL) Menu

Note

The Rom Files menu option is for internal use only.

CAUTION

To insure a successful download, d*o not remove power from the mobile computer while in IPL mode.*

4. Choose Auto Select or use the up and down scroll buttons to select the partition to download, then press **Enter**.

Table 12-2. IPL Menu Partitions

Partition Name	Description
Platform	Contains the files in the *Platform* folder.
Application	Contains the files in the *Application* folder.
PRIMFIRM	Contains the primary radio firmware for the Spectrum24 HR radio card. Note: These partitions must be loaded to use wireless downloads through IPL with the HR radio. They are only used by IPL and are not required by the Operating System or the S24 FH radios.
SECFIRM	Contains the secondary radio firmware for the Spectrum24 HR radio card. Note: These partitions must be loaded to use wireless downloads through IPL with the HR radio. They are only used by IPL and are not required by the Operating System or the S24 FH radios.
ESSID	Identifies the ESSID, used for wireless downloads. Note: This partition specifies the ESSID to be used for IPL downloads via all S24 radios. If the partition is not present, then an ESSID of 101 is assumed. This partition is only used by IPL and is not required by the Operating System.
Config Block	Contains information to correctly configure the Operating System for the mobile computer. This information is loaded by the manufacturer. Note: Great care should be taken to ensure that an incorrect config block is not loaded into the mobile computer. Loading an incorrect config block prevents the correct operation of the computer.
Windows CE	Contains the operating system for the mobile computer.
Monitor	Contains the Monitor and IPL programs.
Rom Files	This partition is for internal use only.
Splash Screen	Contains the splash screen that displays while booting the mobile computer. Note: Splash screens are generated from .bmp images and must be less than or equal to 240 pixels wide and 296 pixels deep. For mono displays, the bmp image must be 4 bpp and for color screens the color depth must be 8 bpp. Note: 8 bits per pixel only applies to splash screen images. Once Windows CE is running, the color density is 16 bits per pixel.
Power Micro	The Power Micro is a small computer contained within the mobile computer that controls several system resources. In the unlikely event that the Power Micro Firmware needs updating, selecting this item allows the device to be programmed.

Table 12-2. IPL Menu Partitions (Continued)

Partition Name	Description
Partition Table	Contains the partition information for all other partitions. Note: The partition table should never need changing unless the sizes of the platform and application images are changed within TCM. If this is done, then the new partition table should be loaded first, followed by both platform and application in any order.
System Reset	Selecting this item provides a simple method to exit IPL and to boot the operating system.
Auto Select	Selecting this item allows one or more files to be downloaded without having to manually select the destination. (The content of the files being downloaded automatically directs the file to the correct destination.) For technical reasons, Auto Select cannot be used to download Monitor, Power Micro, or Partition Table. These items must be specifically selected.

If the platform or application partition sizes are changed, you must download a new partition table first.

5. IPL displays the *Select Transport* menu which lists the available methods of downloading the file.

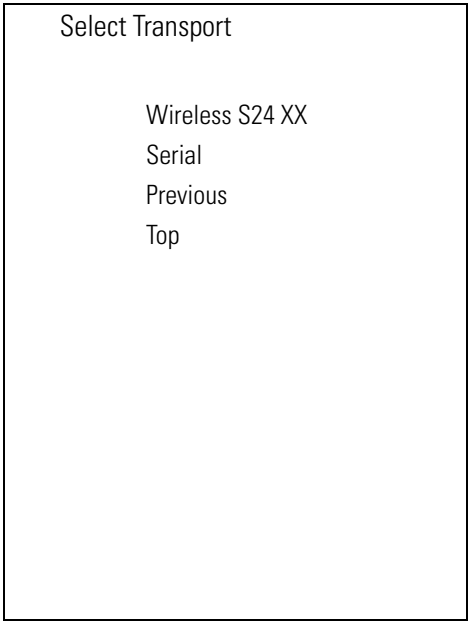


Figure 12-8. Select Transport Menu

Note

If the mobile computer does not have a radio, then the WirelessS24XX selection is not available on the *Transport* menu.

6. Use the up and down scroll buttons to select the method of transport, then press **Enter**.

7. If you selected the *Serial* transport method, the *Baud Rate Menu* appears.

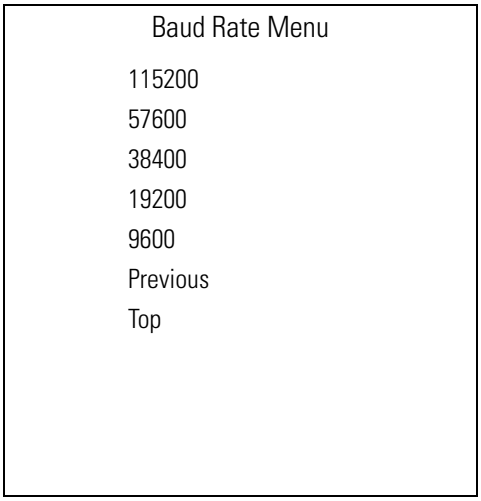


Figure 12-9. Baud Rate Menu

8. Use the up and down scroll buttons to select the appropriate baud rate, then press **Enter**.
9. If you selected the *Wireless S24XX* transport method, the *Address Configuration* menu appears.

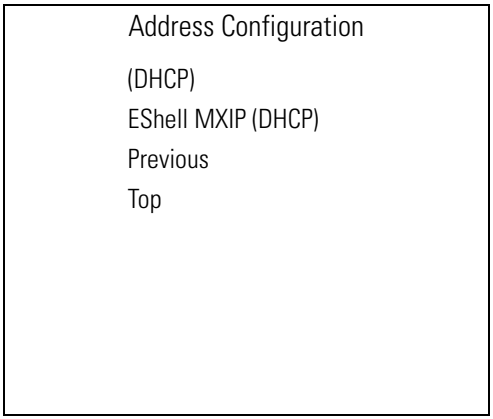


Figure 12-10. Address Configuration Menu

Note

For wireless downloads, the ESSID partition must be loaded with the correct ESSID.

10. Use the up and down scroll buttons to select DHCP, then press **Enter**.
11. The *Download File?* menu appears.

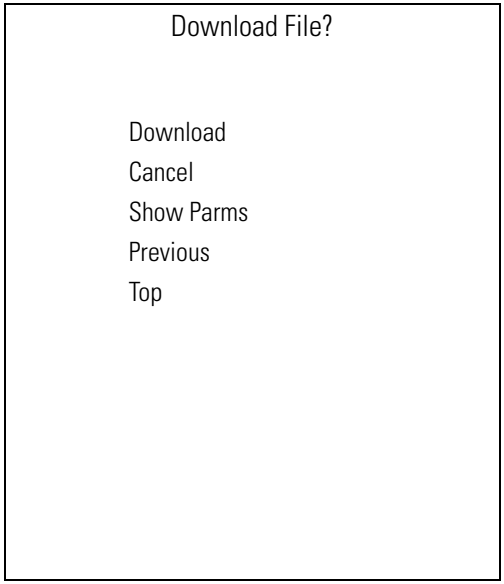


Figure 12-11. Download File? Menu

12. Use the up and down scroll buttons to select *Show Parms* to verify the file to download. Press **Enter** to display the *Parameters* screen.

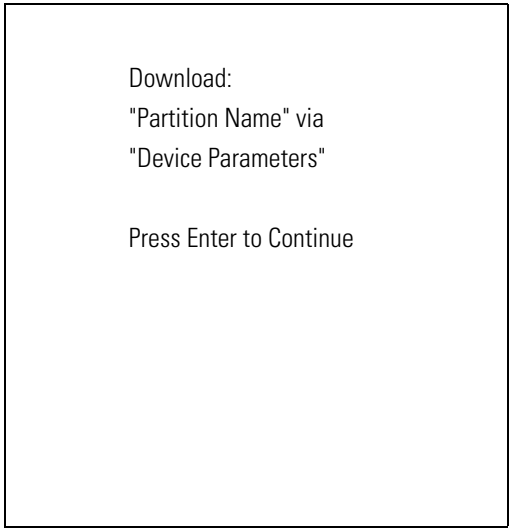


Figure 12-12. Parameters Screen

Partition Name is the name of the partition selected in the *Initial Program Loader* menu.

Device Parameters is the device selected in the *Select Transport* menu with the *baud rate* for serial downloads, or *DHCP address* for wireless downloads.

13. Press **Enter** to return to the *Download File?* menu.

14. Use the up and down scroll buttons to select *Download*. Press **Enter**. The *Downloading* screen appears.

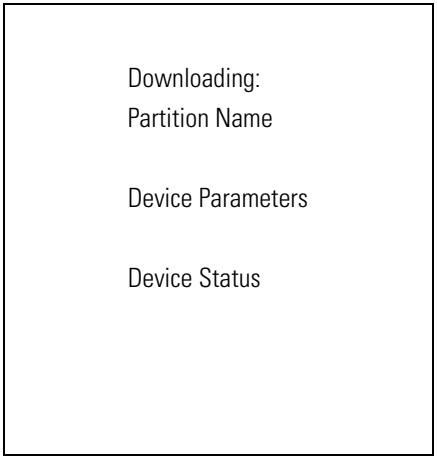


Figure 12-13. Downloading Screen

Before the download starts, if *Serial* was selected in the *Select Transport* menu, *Waiting for Data* appears in the *Device Status* field. If *Wireless S24XX* was selected in the *Select Transport* menu, the IP address appears in the *Device Status* field.

15. On the development computer, click **Load** on the TCM toolbar. The *Load Terminal* window - *Serial* tab appears.

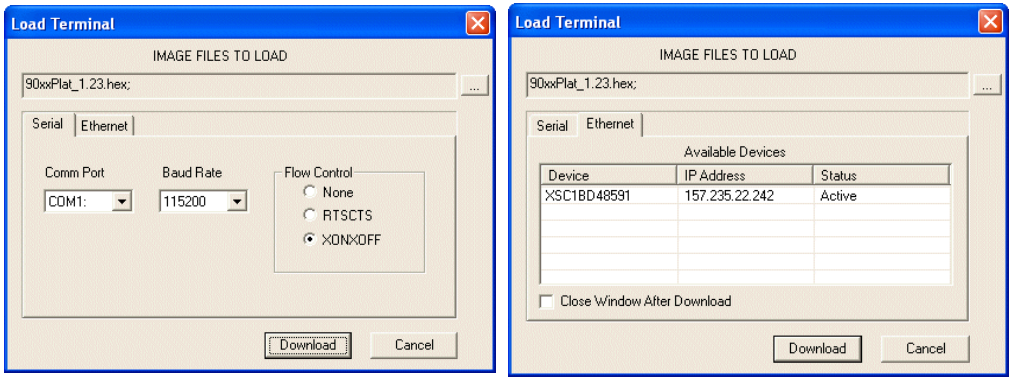


Figure 12-14. Load Terminal Window - Serial and Ethernet Tabs

16. For Serial port connections, click the *Serial* tab and select the *Image Files To Load*, *Comm Port* and *Baud Rate* from their respective drop-down lists.

    For Wireless connections, click the *Ethernet* tab. A list of available devices and their IP addresses appear. Only those devices placed into the Wireless transport mode of IPL appear in this dialog. Select the files to download and the device to receive the files. To load a device, the status must be "Active."

17. Click **Download** to begin the operation.
18. During download, the *Downloading* screen on mobile computer displays the *Device Status* and a progress bar.
19. When complete, *Device Status* displays *Result was Success*, or in the case of an error, the cause of the error.
20. On completion, press **Enter** to return to the IPL menu to select the next partition to download.
21. To exit IPL, select the *System Reset* item from the IPL menu (see *Figure 12-7 on page 12-13*).

TCM Error Messages

TCM validates the cells in the partition table when the Execute button is clicked. Cells highlighted in red contain an error. Partition loading is disabled until all errors are corrected.

Table 12-3. TCM Error Messages

Error	Description/Solution
Failed to build images: flash file system DLL not loaded!	TCM could not load the DLL required to build images for the targeting flash file system. Reinstall TCM or recover the DLL.
Failure finding directory xxx	Building process failed because directory xxx was not found.
Failure creating volume	Building process failed because a certain disk volume could not be created.
Failure adding system file to image	Build process failed because TCM failed to add a certain system file to the disk image.
INVALID PATH	The path for the image file to build is not valid.
Nothing Selected To Build	In the Config Build window, no item is selected to build.
Illegal ESS ID	In the Build ESSID Partition window, no ESS ID was entered or the ESS ID entered was illegal.
Disk Full	TCM failed to create Hex image file at the selected path. Check available disk space.
Target Disk Full	Build process failed because TCM failed to add file to the image of a disk volume. Remove some files or increase the disk size.
Hex file is READ ONLY	The Hex image file to be created exists and is read-only. Delete the existing file or change its attribute.
Error opening the file xxx with write access	TCM could not open file xxx with write access. Check if file is in use.
Failure creating binary file	TCM failed to open/create an intermediate binary file.
Hex File To load is missing or invalid	In Load Terminal window, the file selected to load has invalid status.
Could not locate mobile computer name in TCM.ini file	While loading the Script Properties window, TCM could not find the TCM.ini section corresponding to the mobile computer type specified by the current opening script. Either TCM.ini or the script file is invalid.
Incorrect disk sizes in TCM.ini file	The total disk size specified in the script does not match the total disk size defined in the corresponding TCM.ini section. Check if the script is corrupt or the TCM.ini has changed after the script was created.
INVALID DIRECTORY	In Script Properties window, the selected System File Path is not a valid directory.

Table 12-3. TCM Error Messages (Continued)

Error	Description/Solution
One of the disk sizes is one sector in size	In Script Properties window, one of the disks is too small (one sector in size). This may cause problem while building images, especially when cushion is enabled. Increase the disk size.
INVALID VOLUME NAME	In Script Properties window, one of the volume labels is not valid.
Corrupt TCM.INI file! (Invalid value of VolumeDivisor)	The VolumeDivisor entry is missing or invalid in the TCM.ini. Reinstall TCM or recover TCM.ini.
Invalid version of TCM script file	The TCM script was not created by this version of TCM.
Corrupt or missing TCM.ini file	TCM could not find TCM.ini file.
FAILED CONNECTION TO COM PORT (Could not get status)	While downloading images to mobile computer, TCM failed to connect to the selected COM port. Check if the COM port is free and is properly configured.
FAILED CONNECTION TO TERMINAL (Terminal Not Connected Properly/Terminal Not Ready to Receive)	While downloading images, TCM failed to connect to the mobile computer. Check if the correct flow control protocol is selected and the mobile computer is properly connected and is in a listening state.

IPL Error Detection

While receiving data, IPL performs many checks on the data to ensure that the data is received correctly. If an error is detected, IPL immediately aborts the download, and reports the error on an error screen.

Error screens may vary depending on the action being performed. A sample error screen may look like the screen pictured below:

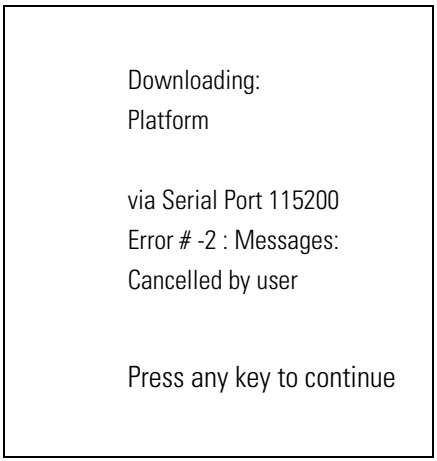


Figure 12-15. IPL Error Screen

This error message screen displays until you press any key. Once the screen is acknowledged, IPL returns to the *Initial Program Loader* main menu to wait for a new selection.

To find the probable cause of the error, use the error number and/or the error text displayed on the screen to look up the error in Table 12-4.

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Table 12-4. IPL Errors

Error Text	Error Number	Probable Cause
Unknown error	-1	A general error occurred. Retry the download. If the failure persists, it is most likely due to a hardware failure; the mobile computer requires servicing.
Cancelled by user	-2	The user canceled the download.

Table 12-4. IPL Errors (Continued)

Error Text	Error Number	Probable Cause
Can't open the source	-7	An error occurred opening the source device (either radio card or Serial port). Check source device connectivity and retry.
Can't open the destination	-8	An error occurred opening the destination device (either flash ROM or Power Micro). Retry the download. If the failure persists, it is most likely due to a hardware failure; the mobile computer requires servicing.
Can't read from the source device	-9	The source device (either radio card or Serial port) could not be read from. Check source device connectivity and retry.
Can't write to the destination device	-10	The destination device (either flash ROM or Power Micro) could not be written to. Retry the download. If the failure persists, it is most likely due to a hardware failure; the mobile computer requires servicing.
Transmission checksum error	-11	An error occurred during transmission from the source device (either radio card or Serial port) and the checksum check failed. Check source device connectivity and retry.
Readback checksum error	-12	A checksum, generated from reading back data that was written to the destination device, was incorrect. An error during transmission or a write error to the destination device could cause this.
There is no more heap space available	-14	There is no more heap space available for the download procedure. Restart IPL and retry the download. If the failure persists, contact service with details of what is being downloaded.
Insufficient data available to complete record	-21	A Symbol HEX file download was attempted but the HEX file is invalid. Ensure the file is in Symbol HEX file format.
Invalid Symbol HEX file	-23	A Symbol HEX file download was attempted but the HEX file is invalid. Ensure the file is in Symbol HEX file format.
Unrecognized or unsupported HEX record	-24	The Symbol HEX file being downloaded contains an invalid or unrecognized HEX record. Ensure the file is in proper Symbol HEX file format.

Table 12-4. IPL Errors (Continued)

Error Text	Error Number	Probable Cause
Invalid data in HEX file	-25	The Symbol HEX file being downloaded contains invalid data. Ensure the file is in proper Symbol HEX file format with valid HEX data.
Exceeded max size	-26	The download file is too large to fit into the space allocated for it. Either make the file smaller or increase the space allocated for it by altering the partition table.
Partition is not valid on this device	-27	The downloaded file specifies a partition entry that does not exist on the device. Only download files that are valid for this device, or change the partition table so that the new file is valid on the device.
Wrong destination code	-28	A specific partition was chosen from the Main Menu (not Auto Select) but the file selected for download was for another partition. Ensure that the partition selected from the Main Menu matches the file selected for download.
File type does not support IPL Auto Select	-29	Monitor, Power Micro and Partition Table cannot be loaded with Auto Select. Select the appropriate area, and try again.
Non-contiguous record found	-30	A Symbol HEX file download was attempted but the HEX file is invalid. Ensure the file is in Symbol HEX file format.
Timed Out - No data	-31	IPL was waiting for data from the source device but timed out before receiving any. Check the source device connectivity and retry.
Fail: Buffer Overrun	-32	The serial port device could not keep up with incoming data. Retry the serial download with a lower baud rate.
Partition Table not Valid	-33	The size of flash memory is different than that described in the partition table. Retry the download with the correct partition table file.
Invalid file format	-34	The file format is invalid. Only Symbol HEX files are supported by IPL.

Creating a Splash Screen

The source bitmap files used to create the default splash screens for the mobile computer are supplied with the DCP for MC9000w. These files can be modified using any of the standard windows image editors, allowing customization for particular customers.

To create a custom splash screen, perform the following steps:

1. For mobile computers with monochrome screens, open the Splashmono.bmp file supplied with the DCP for MC9000w using an image editor.
2. For mobile computers with color screens, open the Splashcolor.bmp file supplied with the DCP for MC9000w using an image editor.
3. Modify the bitmap file and save.
4. Create a splash partition using the steps shown in the *Building the Image on page 12-11*.

Splash Screen Format

If the default files are not used to create the new splash screens, be sure to preserve the image format. The formats are as follows:

Table 12-5. Splash Screen Format

Screen Type	Dimensions	Color Format
Monochrome	240x296	4 bits per pixel
Color	240x296	8 bits per pixel*
* 8 bits per pixel only applies to splash screen images. Once Windows CE is running, the color density is 16 bits per pixel.		

See *Sending the Hex Image on page 12-12* for information about loading the splash screen using TCM and IPL.

Flash Storage

In addition to the RAM-based storage standard on Windows CE mobile computers, the mobile computer is also equipped with a non-volatile Flash-based storage area which can store data (partitions) that can not be corrupted by a cold boot. This Flash area is divided into two categories: Flash File System (FFS) Partitions and Non-FFS Partitions.

FFS Partitions

The mobile computer includes two FFS partitions. These partitions appear to the mobile computer as a hard drive that the OS file system can write files to and read files from. Data is retained even if power is removed.

The two FFS partitions appear as two separate folders in the Windows CE file system and are as follows:

- Platform: The Platform FFS partition contains Symbol-supplied programs and Dynamic Link Libraries (DLLs). This FFS is configured to include DLLs that control system operation. Since these drivers are required for basic mobile computer operation, only experienced users should modify the content of this partition.
- Application: The Application FFS partition is used to store application programs needed to operate the mobile computer.

Working with FFS Partitions

Because the FFS partitions appear as folders under the Windows CE file system, they can be written to and read like any other folder. For example, an application program can write data to a file located in the Application folder just as it would to the Windows folder. However, the file in the Application folder is in non-volatile storage and is not lost on a cold boot (e.g., when power is removed for a long period of time).

Standard tools such as ActiveSync can be used to copy files to and from the FFS partitions. They appear as the "Application" and "Platform" folders to the ActiveSync explorer. This is useful when installing applications on the mobile computer. Applications stored in the Application folder are retained even when the mobile computer is cold booted, just as the Demo 9000 program is retained in memory.

There are two device drivers included in the Windows CE image to assist developers in configuring the mobile computer following a cold boot: RegMerge and CopyFiles.

RegMerge.dll

RegMerge.dll is a built-in driver that allows registry edits to be made to the Windows CE Registry. Regmerge.dll runs very early in the boot process and looks for registry files (.reg files) in certain Flash File System folders during a cold boot. It then merges the registry changes into the system registry located in RAM.

Since the registry is re-created on every cold boot from the default ROM image, the RegMerge driver is necessary to make registry modifications persistent over cold boots.

RegMerge is configured to look in the root of two specific folders for .reg files in the following order:

\Platform

\Application

Regmerge continues to look for .reg files in these folders until all folders are checked. This allows folders later in the list to override folders earlier in the list. This way, it is possible to override Registry changes made by the Platforms partitions folders. Take care when using Regmerge to make Registry changes. The DCP for MC9000w contains examples of .reg files.

Regmerge only merges the .reg files on cold boots. The merge process is skipped during a warm boot.

Typically, do not make modifications to registry values for drivers loaded before RegMerge. However, these values may require modification during software development. Since these early loading drivers read these keys before RegMerge gets a chance to change them, the mobile computer must be cold booted. The warm boot does not re-initialize the registry and the early loading driver reads the new registry values.

Do not use Regmerge to modify built-in driver registry values, or merge the same Registry value to two files in the same folder, as the results are undefined.

CopyFiles

Windows CE expects certain files to be in the Windows folder, residing in volatile storage. Windows CE maintains the System Registry in volatile storage. CopyFiles copies files from one folder to another on a cold boot. Files can be copied from a non-volatile partition (Application or Platform) to the Windows or other volatile partition during a cold boot. During a cold boot CopyFiles looks for files with a .CPY extension in the root of the Platform and Application FFS partitions (Platform first and then Application). These files are text files containing the source and destination for the desired files to be copied separated by ">". The following example from the file application.cpy is contained on the demo application partition included in the DCP for MC9000w. It can also be obtained from the Symbol web site at http://devzone.symbol.com/.

Files are copied to the Windows folder from the Flash File System using copy files (*.cpy) in the following order:

\Platform

\Application

Example:

\Application\ScanSamp2.exe>\Windows\ScanSamp2.exe

This line directs CopyFiles to copy the ScanSamp2.exe application from the \Application folder to the \Windows folder.

Non-FFS Partitions

Non-FFS Partitions include additional software and data pre-loaded on the mobile computer that can be upgraded. Unlike FFS Partitions, these partitions are not visible when the operating system is running. They also contain system information. Non-FFS partitions include the following:

- Windows CE: The complete Windows CE operating system is stored on Flash devices. If necessary, the entire OS image may be downloaded to the mobile computer using files provided by Symbol. The current OS partition on the mobile computer is included as part of the TCM installation package. Any upgrades must be obtained from Symbol. This partition is mandatory for the mobile computer.
- Splash Screen: a bitmap smaller than 16 Kb (and limited to 8 bits per pixel) is displayed as the mobile computer cold boots. To download a customized screen to display, see *Creating a Splash Screen on page 12-27*.

8 bits per pixel only applies to splash screen images. Once Windows CE is running, the color density is 16 bits per pixel.

- IPL: This program interfaces with the host computer and allows downloading via cradle or serial cable any or all of the partitions listed above, as well as updated versions of IPL. Use caution downloading updated IPL versions; incorrect downloading of an IPL causes permanent damage to the mobile computer. IPL is mandatory for the mobile computer.
- Partition Table: Identifies where each partition is loaded in the mobile computer.

Downloading Partitions to the Mobile Computer

TCM is used to specify a hex destination file for each partition and download each file to the mobile computer. This download requires a program loader stored on the mobile computer. The mobile computer comes with a program loading utility, Initial Program Loader (IPL), stored in the mobile computer's write-protected flash.

IPL

IPL allows the user to upgrade the mobile computer with software updates and/or feature enhancements.

Partition Update vs. File Update

There are two types of update supported by the mobile computer: partitions and files. The file system used by the mobile computer is the same as the file system used on a desktop computer. A file is a unit of data that can be accessed using a file name and a location in the file system. When a file is replaced, only the contents of the previous file are erased. The operating system must be running for a file to be updated, so the IPL cannot perform individual file updates as it is a stand-alone program that does not require the operating system to be running.

A typical partition is a group of files, combined into a single "partition" that represents a specific area of storage. Examples of partitions are the flash file systems such as Platform or Application. (Using the desktop computer comparison, these partitions are roughly equivalent to a C: or D: hard disk drive.) In addition to the "hard disk" partitions, some partitions are used for single items such as the operating system, monitor, or splash screen. (Again using a desktop computer comparison, these partitions are roughly the equivalent of the BIOS or special hidden system files.) When a partition is updated, all data that was previously in its storage region is erased - i.e. it is not a merge but rather

a replacement operation. Typically, the operating system is not running when partitions are update, so IPL can perform partition updates.

Partition images for selected partitions can be created by TCM. All partition images suitable for use by IPL are in hex file format for transfer by TCM from the development computer to the mobile computer.

Upgrade Requirements

Upgrade requirements:

- The hex files to be downloaded (on development computer)
- A connection from the host computer and the mobile computer (either serial or wireless)
- TCM (on development computer) to download the files.

Once these requirements are satisfied, the mobile computer can be upgraded by invoking IPL and navigating the menus. See *Sending the Hex Image on page 12-12* for procedures on downloading a hex file to the mobile computer.

13

Maintenance & Troubleshooting

Contents

Introduction

This chapter includes instructions on cleaning and storing the mobile computer, and provides troubleshooting solutions for potential problems during mobile computer operating.

Maintaining the Mobile Computer

For trouble-free service, observe the following tips when using the mobile computer:

- Take care not to scratch the screen of the mobile computer. When working with the mobile computer, use the supplied stylus or plastic-tipped pens intended for use with a touch-sensitive screen. Never use an actual pen or pencil or other sharp object on the surface of the mobile computer screen.
- Although the mobile computer is water and dust resistant, do not expose it to rain or moisture for an extended period of time. In general, treat the mobile computer as you would a pocket calculator or other small electronic instrument.
- The touch-sensitive screen of the mobile computer contains glass. Take care not to drop the mobile computer or subject it to strong impact.
- Protect the mobile computer from temperature extremes. Do not leave it on the dashboard of a car on a hot day, and keep it away from heat sources.
- Do not store or use the mobile computer in any location that is extremely dusty, damp or wet.
- Use a soft lens cloth to clean the mobile computer. If the surface of the mobile computer screen becomes soiled, clean it with a soft cloth moistened with a diluted window-cleaning solution.

Troubleshooting

Mobile Computer

Table 13-1. Troubleshooting the Mobile Computer

Problem	Cause	Solution
MC9000-G Series/MC906R-G RFID		
Mobile computer does not turn on.	Lithium-ion battery not charged.	Charge or replace the lithium-ion battery in the mobile computer.
	Lithium-ion battery not installed properly.	Ensure battery is installed properly. See *Installing and Removing the Main Battery on page 1-7*.
	System crash.	Perform a warm boot. If the mobile computer still does not turn on, perform a cold boot. See *Resetting the Mobile Computer on page 2-62*.
Rechargeable lithium-ion battery did not charge.	Battery failed.	Replace battery. If the mobile computer still does not operate, try a warm boot, then a cold boot. See *Resetting the Mobile Computer on page 2-62*.
	Mobile computer removed from cradle while battery was charging.	Insert mobile computer in cradle and begin charging. The lithium-ion battery requires less than four hours to recharge fully.
Cannot see characters on display.	Mobile computer not powered on.	Press the Power button.
During data communication, no data was transmitted, or transmitted data was incomplete.	Mobile computer removed from cradle or unplugged from host computer during communication.	Replace the mobile computer in the cradle, or reattach the Synchronization cable and re-transmit.
	Incorrect cable configuration.	See the System Administrator.
	Communication software was incorrectly installed or configured.	Perform setup. See *Chapter 4, Communications* for details.
No sound is audible.	Volume setting is low or turned off.	Unit may be a beeper only unit or incorrect Config Block is programmed into device.

Table 13-1. Troubleshooting the Mobile Computer (Continued)

Problem	Cause	Solution
Mobile computer turns itself off.	Mobile computer is inactive.	The mobile computer turns off after a period of inactivity. If the mobile computer is running on battery power, this period can be set from 1 to 5 minutes, in one-minute intervals. If the mobile computer is running on external power, this period can be set to 1, 2, 5, 10, 15 and 30 minutes. Check the *Power* window by selecting *Start - Settings - System tab* and tap the *Power* icon. Select the *Advanced* tab and change the setting if you need a longer delay before the automatic shutoff feature activates.
	Battery is depleted.	Replace the battery.
	Battery is not inserted properly.	Insert the battery properly (see *Installing and Removing the Main Battery on page 1-7*).
Tapping the window buttons or icons does not activate the corresponding feature.	LCD screen not aligned correctly.	Re-calibrate the screen. See *Figure 1-11 on page 1-18*.
	The system is hung.	Warm boot the system. To perform a warm boot (see *Resetting the Mobile Computer on page 2-62*).
A message appears stating that the mobile computer memory is full.	Too many files stored on the mobile computer.	Delete unused memos and records. You can save these records on the host computer.
	Too many applications installed on the mobile computer.	If you have installed additional applications on the mobile computer, remove them to recover memory. Select *Start - Settings - System tab* and tap the *Remove Programs* icon. Select the unused program and tap **Remove.**

Table 13-1. Troubleshooting the Mobile Computer (Continued)

Problem	Cause	Solution
The mobile computer does not accept scan input.	Scanning application is not loaded.	Verify that the unit is loaded with a scanning application. See the System Administrator.
	Unreadable bar code.	Ensure the symbol is not defaced.
	Distance between exit window and bar code is incorrect.	Ensure mobile computer is within proper scanning range.
	Mobile computer is not programmed for the bar code.	Ensure the mobile computer is programmed to accept the type of bar code being scanned.
	Mobile computer is not programmed to generate a beep.	If a beep on a good decode is expected and a beep is not heard, check that the application is set to generate a beep on good decode.
	Battery is low.	If the scanner stops emitting a laser beam when the trigger is pressed, check the battery level. When the battery is low, the scanner shuts off before the mobile computer low battery condition notification. Note: If the scanner is still not reading symbols, contact the distributor or Symbol Technologies.
MC906R-G RFID Only		
The following error message appears when launching an RFID application: Cannot find 'XXXXXXXXXX' (or one of it's components). Make sure the path and filename are correct...	Corrupt or missing DLL, wrong version of DLL.	Ensure the latest RFIDAPI32.DLL file is being used. Ensure the RFIDAPI32.DLL file is located in the \Windows directory. (Place a copy in the \Platform folder as well since the cold boot process always copies the RFIDAPI32.DLL file located in the Platform folder to the \Windows directory.
A "Hardware Error" message appears when attempting to read, or program an RFID tag.	Antenna malfunction or disconnection.	Reboot computer. If problem persists contact the Symbol Support Center.

Table 13-1. Troubleshooting the Mobile Computer (Continued)

Problem	Cause	Solution
The mobile computer cannot read RFID tags.	Tag is damaged.	Try another tag.
	Tag is not programmed.	Program tag.
	Tag type is not supported by reader.	Try an appropriate tag type.
	User is too far from tag.	Move to within 10 feet or closer of tag (based on tag type). Note: For a successful tag read, the allowable read distance from the front of the mobile computer's scan exit window to the tag is .2 ft - 10 ft (.061 m to 3.1 m).
	Wrong tag orientation.	See *Figure 2-36 on page 2-61*.
	Reader is in a "multi-path" interference zone.	"Multi-path" is a radio phenomena caused by radio waves reflecting from other surfaces, such as concrete floors or metal shelving, that causes interference when the reader is at certain distances from the tag. Moving the reader up or down, or moving closer or further from the tag eliminates this interference. In general, reader motion enhances tag reading abilities.
The mobile computer cannot program RFID tags.	Tag is damaged.	Try another tag.
	Tag type is not supported by reader.	Try an appropriate tag type.
	Tag is locked.	Try another tag.
	User is to far from tag.	Move to within two feet of tag (based on tag type). Note: The minimum write distance is 1 foot from the antenna. Moving closer than 1 foot during programming can damage the tag and render it unreadable.

Table 13-1. Troubleshooting the Mobile Computer (Continued)

Problem	Cause	Solution
The mobile computer cannot erase RFID tags.	Tag is damaged.	Try another tag.
	Tag type is not supported by reader.	Try an appropriate tag type.
	Tag is locked.	Try another tag.
	User is too far from tag.	Move to within two feet of tag (based on tag type). Note: The minimum write distance is 1 foot from the antenna. Moving closer than 1 foot during programing can damage tag and render it unreadable.
The mobile computer cannot lock RFID tags.	Tag is damaged.	Try another tag.
	Tag type is not supported by reader.	Try an appropriate tag type.
	Tag is already locked.	Try another tag.
	User is too far from tag.	Move to within two feet of tag (based on tag type). Note: The minimum write distance is 1 foot from the antenna. Moving closer than 1 foot during programing can damage tag and render it unreadable.
The mobile computer cannot kill RFID tags.	Tag is damaged.	Try another tag.
	Tag type is not supported by reader.	Try an appropriate tag type.
	Tag is not locked.	Lock tag first.
	User is too far from tag.	Move to within two feet of tag (based on tag type). Note: The minimum write distance is 1 foot from the antenna. Moving closer than during programing can damage tag and render it unreadable.

Bluetooth Connection

Table 13-2. Troubleshooting Bluetooth Connection

Problem	Cause	Solution
Mobile computer cannot find any Bluetooth devices nearby.	Too far from other Bluetooth devices.	Move closer to the other Bluetooth device(s), within a range of 10 meters.
	The Bluetooth device(s) nearby are not turned on.	Turn on the Bluetooth device(s) you wish to find.
	The Bluetooth device(s) are not in discoverable mode.	Set the Bluetooth device(s) to discoverable mode. If needed, refer to the device's user documentation for help.
Mobile computer keeps powering down to protect memory contents.	The mobile computer's battery is low.	Recharge the battery.
	The Bluetooth radio is powered on for a long time. This mode requires battery power and should be powered off whenever not needed.	Using the SetDeviceState() API (refer to the SMDK Help File for Symbol mobile computers), set the Bluetooth to D4 power state.
When trying to connect a Bluetooth phone and mobile computer, the phone thinks a different mobile computer (that I previously paired with the phone) is used.	The phone remembers the name and address of the mobile computer it last paired with via the Bluetooth radio.	Manually delete the pairing device and name from the phone. Refer to the phone's user documentation for instructions.
Can't make my Ericsson R520 phone discoverable.	You attempted to bond with the phone, and when the phone presented a "pairing query," you entered No. This prevents the phone from being discoverable until it is reset.	Reset the phone by removing its battery.
There is a delay in the Bluetooth stack re-initializing during a resume from suspend.	This is the normal behavior.	No solution required.

Table 13-2. Troubleshooting Bluetooth Connection (Continued)

Problem	Cause	Solution
Piconet (the connection between a Bluetooth master and one or more Bluetooth slaves) drops.	When the mobile computer suspends, and the Bluetooth radio power is turned off, piconet is dropped. One of the devices may be out of range.	An application can register for notification of a mobile computer resume by creating a message queue using the CreateMsgQueue() API and power notifications using the RequestPowerNotifications() API (see the Symbol SMDK Help file). After an application receives a resume notification it should close previously open Bluetooth sessions and reopen them.This reestablishes the piconet lost during the suspend.
My application created a successful RFCOMM session with another Bluetooth device but the RFCOMM session was dropped.	Device went out of range or was shut off.	Check the return value of APIs for errors. Look for a DCD state change event in the Microsoft Bluetooth stack DCD window of the Bluetooth connection.
After completing an RFCOMM session with another Bluetooth device, I was unable to create a virtual COM port to connect to another Bluetooth device.	The Microsoft Bluetooth stack holds a baseband connection for ten seconds after an application closes its session and exits. This was designed to allow for speedy connections to the same device if other profiles were to connect.	Either wait 10 seconds, choose a different COM port number for the virtual COM port, or modify HKLM\software\Microsoft\bluetooth\l2cap\Idle Phys (which defines the number of seconds to hold the connection).

Four Slot Charge Only Cradle

Table 13-3. Troubleshooting the Four Slot Charge Only Cradle

Problem	Cause	Solution
Mobile computer charge indicator LED does not light.	Cradle is not receiving power.	Ensure the power supply is securely connected and receiving power.
	Mobile computer is not seated correctly in the cradle.	Ensure the battery is properly installed in the mobile computer, and re-seat the mobile computer in the cradle.
	The battery is not properly installed in the mobile computer.	
	The battery in the mobile computer is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
Note: The Four Slot Charge Only Cradle has no power indication.		

Four Slot Ethernet Cradle

Table 13-4. Troubleshooting the Four Slot Ethernet Cradle

Symptom	Cause	Solution
Attempt by the mobile computer to ActiveSync failed.	Mobile computer removed from the cradle while the LED was blinking green.	Wait one minute and reinsert the mobile computer in the cradle. This allows the cradle to attempt another synchronization.
	ActiveSync on the host computer has not yet closed the previous ActiveSync session.	Wait one minute and reinsert the mobile computer in the cradle. This allows the cradle to attempt another synchronization.
	Incorrect cable configuration.	Check your DHCP server and determine which IP address was allocated to the cradle, then check connectivity by pinging the cradle.
	Communications software improperly configured.	Perform setup as described in *Chapter 4, Communications*. Check your DHCP server and determine which IP address was allocated to the mobile computer slot, then check connectivity by pinging the cradle.
	Mobile computer ActiveSync disabled or not configured to accept network connection.	On the mobile computer, tap *Start* - *ActiveSync* - *Tools* - *Options* - **Options** button. Then, uncheck the *Enable PC sync using this connection:* check box.
	Host ActiveSync disabled or not configured to accept network connection.	On the host computer, check *File* - *Connection Settings* - *Allow network (Ethernet) Server Connection with this desktop computer.*
During communications, no data was transmitted, or transmitted data was incomplete.	Mobile computer removed from cradle during communications.	Replace mobile computer in cradle and retransmit.
	Mobile computer has no active connection.	An icon will be visible in the status bar if a connection is currently active.
Mobile computer has successfully connected through the cradle, but no data is being transmitted over the connection.	Data is being transferred over the S24 radio link.	Temporarily disable the radio link to force data transmission through the cradle. Tap the wireless LAN icon from the systray on the Today screen. Tap the *Mode/General* tab. Enter an in-valid value in the *ESSID:* text box and tap the OK button. Power cycle the mobile computer. Verify that your radio link has been disabled (the wireless LAN icon has a red box with a ! on it). Once you have completed your data transmission, re-enable your radio link.

Table 13-4. Troubleshooting the Four Slot Ethernet Cradle (Continued)

Symptom	Cause	Solution
All Communication Status LEDs are flashing red.	The unit could not configure itself, or it has lost the lease on its IP address.	Connect the unit to an Ethernet network with a correctly functioning DHCP server.
	Failed automatic cradle configuration via local DHCP service.	Connect a properly configured DHCP server or DHCP relay agent to the subnet, and power cycle the cradle. Check the DHCP server log to verify that the cradle is receiving a response to its DHCP request.
	The Ethernet link may be down.	Ensure the ethernet cable is connected to an active hub.
Communication Status LED does not light up.	Mobile computer has been inserted incorrectly into the cradle.	Remove, wait a minute, and then reinsert the mobile computer, ensuring it fits snugly onto the connector at the bottom of the cradle.
	Cradle is not receiving power.	Ensure the power supply is securely connected and receiving power.
Battery is not recharging.	Mobile computer removed from the cradle too soon.	Replace the mobile computer into the cradle. It can take up to 4 hours to recharge a completely depleted battery pack if mobile computer is suspended or longer if the mobile computer is on. Tap *Start - Settings - System - Power* to view battery status.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Mobile computer is not inserted correctly into the cradle.	Remove the mobile computer and reinsert it correctly. Verify charging is active. Tap *Start - Settings - System - Power* to view battery status.
Warning Message - "! Unable to obtain a server assigned IP address. Try again later or enter an IP address in Network Settings."	This message occurs if a suspend/resume cycle is performed and the mobile computer radio is not associated (e.g. due to being out of range)	Tap OK to close the message. The mobile computer will obtain address information and communicate through the ethernet cradle.

Four Slot Spare Battery Charger

Table 13-5. Troubleshooting The Four Slot Spare Battery Charger

Symptom	Possible Cause	Action
Batteries not charging.	Battery was removed from the charger or charger was unplugged from AC power too soon.	Ensure MSR is receiving power. Ensure mobile computer is attached correctly. Confirm main battery is charging under *Start - Settings - System - Power.* If a mobile computer battery is fully depleted, it can take up to four hours to fully recharge a battery (if the mobile computer is off and longer if the mobile computer is operating).
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Battery contacts not connected to charger.	Verify that the battery is seated in the battery well correctly with the contacts facing down.

Single Slot Serial/USB Cradle

Table 13-6. Troubleshooting the Single Slot Serial/USB Cradle

Symptom	Possible Cause	Action
LEDs do not light when mobile computer or spare battery is inserted.	Cradle is not receiving power.	Ensure the power cable is connected securely to both the cradle and to AC power.
	Mobile computer is not seated firmly in the cradle.	Remove and re-insert the mobile computer into the cradle, ensuring it is firmly seated.
	Spare battery is not seated firmly in the cradle.	Remove and re-insert the spare battery into the charging slot, ensuring it is firmly seated.
Mobile computer battery is not charging.	Mobile computer was removed from cradle or cradle was unplugged from AC power too soon.	Ensure cradle is receiving power. Ensure mobile computer is seated correctly. Confirm main battery is charging under *Start - Settings - System - Power.* If a mobile computer battery is fully depleted, it can take up to four hours to fully recharge a battery (if the mobile computer is off and longer if the mobile computer is operating).
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The mobile computer is not fully seated in the cradle.	Remove and re-insert the mobile computer into the cradle, ensuring it is firmly seated.

Table 13-6. Troubleshooting the Single Slot Serial/USB Cradle (Continued)

Symptom	Possible Cause	Action
Spare battery is not charging.	Battery not fully seated in charging slot.	Remove and re-insert the spare battery into the cradle, ensuring it is firmly seated.
	Battery inserted incorrectly.	Ensure the contacts are facing down and toward the back of the cradle.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
During data communications, no data was transmitted, or transmitted data was incomplete.	Mobile computer removed from cradle during communications.	Replace mobile computer in cradle and retransmit.
	Incorrect cable configuration.	See the System Administrator.
	Communications software is not installed or configured properly.	Perform setup as described in *Serial Communication Setup on page 4-9*.

Cable Adapter Module

Table 13-7. Troubleshooting The Cable Adapter Module

Symptom	Possible Cause	Action
Mobile computer battery is not charging.	Mobile computer was removed from CAM or CAM was unplugged from AC power too soon.	Ensure CAM is receiving power. Ensure mobile computer is attached correctly. Confirm main battery is charging under *Start - Settings - System - Power*. If a mobile computer battery is fully depleted, it can take up to four hours to fully recharge a battery (if the mobile computer is off and longer if the mobile computer is operating).
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The mobile computer is not fully attached to the CAM.	Detach and re-attach the CAM to the mobile computer, ensuring it is firmly connected.
During data communications, no data was transmitted, or transmitted data was incomplete.	Mobile computer detached from CAM during communications.	Re-attach mobile computer to CAM and retransmit.
	Incorrect cable configuration.	See the System Administrator.
	Communications software is not installed or configured properly.	Perform setup as described in *Chapter 4, Communications*.

Magnetic Stripe Reader

Table 13-8. Troubleshooting the Magnetic Stripe Reader

Symptom	Possible Cause	Action
MSR cannot read card.	Mobile computer detached from MSR during card swipe.	Re-attach mobile computer to MSR and reswipe the card.
	Faulty magnetic stripe on card.	See the System Administrator.
	MSR application is not installed or configured properly.	Ensure the MSR application is installed on the mobile computer. Ensure the MSR application is configured correctly.

Table 13-8. Troubleshooting the Magnetic Stripe Reader (Continued)

Symptom	Possible Cause	Action
Mobile computer battery is not charging.	Mobile computer was removed from MSR or MSR was unplugged from AC power too soon.	Ensure MSR is receiving power. Ensure mobile computer is attached correctly. Confirm main battery is charging under *Start - Settings - System - Power*. If a mobile computer battery is fully depleted, it can take up to four hours to fully recharge a battery (if the mobile computer is off and longer if the mobile computer is operating).
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The mobile computer is not fully attached to the MSR.	Detach and re-attach the MSR to the mobile computer, ensuring it is firmly connected.
During data communications, no data was transmitted, or transmitted data was incomplete.	Mobile computer detached from MSR during communications.	Reattach mobile computer to MSR and retransmit.
	Incorrect cable configuration.	See the System Administrator.
	Communications software is not installed or configured properly.	Perform setup as described in *Chapter 4, Communications*.

Modem Module

Table 13-9. Troubleshooting the Modem Module

Symptom	Possible Cause	Action
Mobile computer is not communicating through the modem.	The modem cable is not fully connected.	Connect the modem cable securely to both the modem and the telephone jack.
	Modem is not securely connected to the mobile computer.	Reconnect the modem firmly to the mobile computer.
	Communication software is not installed or configured properly.	Set up the communication software as described in the mobile computer's *Product Reference Guide*.
	Problem in the telephone lines.	Connect a conventional telephone and dial the remote modem to verify the telephone lines are functioning. If the remote modem does not answer the call and emit answering tones, contact the remote System Administrator.
	Mobile computer's battery is low or discharged, which shuts off power to the modem.	Install a charged battery in the MC9000, or use an external DC power adapter to recharge the battery.
ActiveSync fails.	A partnership was not established with the host computer.	Establish a partnership with the host computer (see *Chapter 4, Communications*).
	Host computer is not selected in the *ActiveSync* window on the mobile computer.	Select a host computer in the *ActiveSync* window, and perform setup (see *Chapter 4, Communications*).
	Modem RAS connection not allowed by host computer.	Select RAS connection in the host computer *(File - Connection Settings* window). Refer to the ReadMe files located in the Microsoft ActiveSync folder on the host computer.
	Mobile computer or modem was disconnected from the telephone line while ActiveSync was in progress.	Disconnect the modem cable for 30 seconds to hang up the local telephone connection. Close any open windows on the mobile computer and any modem connections.
	Synchronization occurred, but the session is configured to close immediately after synchronization is complete.	Verify the setting of the *When manually synchronizing disconnect when complete* checkbox by tapping *Start - ActiveSync - Tools - Options - Schedule* tab.

Table 13-9. Troubleshooting the Modem Module (Continued)

Symptom	Possible Cause	Action
Dial-out fails	Location setting is incorrect.	Verify Dialing Locations. Verify Dialing Patterns are correct for the current location. For example, enter 'G' in the *For local calls, dial:* field to dial directly, or '9,G' if the telephone system requires dialing '9' first to access an outside line.
	Incorrect server phone number.	Verify the connection phone number in the *Connecting* window.
	Pulse dialing not supported for country.	Use a connection within a tone-dialing system.
	Dialtone detection not supported.	The service you subscribe to (e.g., a remote answering service) may use a different type of dialtone. Disable dialtone detection on the modem by entering the initialization string "ATX0" in the *Extra dial-string modem commands:* text box of the *Modem Settings* window.
	The following error message appears: Trouble Connecting: There is no answer at the number dialed. Verify the phone...'	The modem may be required to be powered before opening the port for dial-out. Tap *Start - Settings - System - Symbol Settings - Settings - External5VoltPower* and select *ActiveOn*.
	The Connection Manager routes are incorrect.	Warm boot the mobile computer and confirm the connection settings.

A

Block Recognizer

Contents

Introduction

Using the Block Recognizer, you can write characters directly on the mobile computer screen with the stylus. These characters are translated into typed text. Use Block Recognizer to enter text, for example, to write a note or to fill in fields in a dialog box.

Figure A-2 provides examples of how to write characters in lowercase. The Block Recognizer input panel is divided into two writing areas. Letters written in the left area (labeled abc) create lowercase letters. Use the right area (labeled 123) for writing numbers, symbols, special characters, and punctuation.

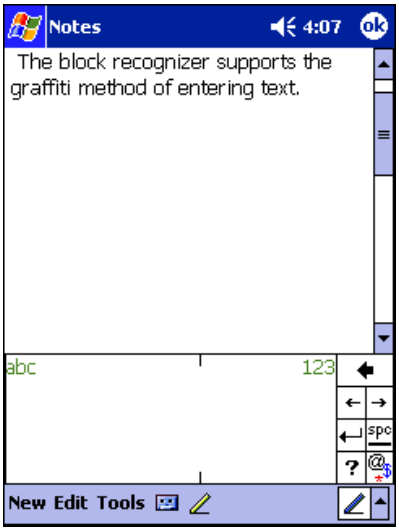


Figure A-1. Using Block Recognizer

The following chart illustrates some of the characters you can write (the dot on each character is the starting point for writing).

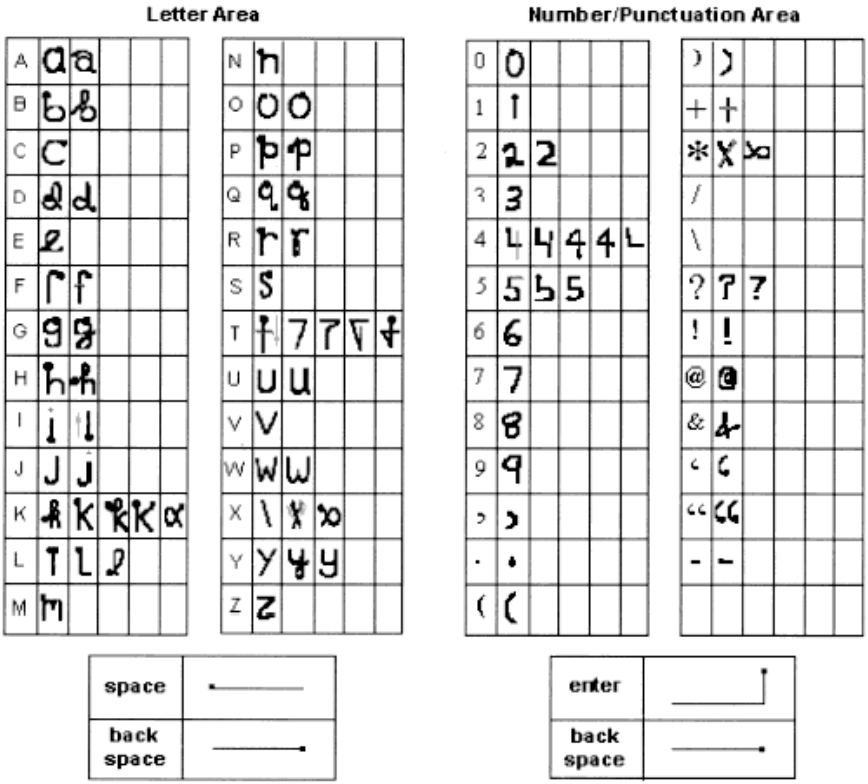


Figure A-2. Character Chart

For specific instructions on using Block Recognizer, with Block Recognizer open, tap the question mark next to the writing area.

10, *Accessories*

B

Demo Program

Contents

Introduction

The 9000 Demo program illustrates how to use some of the mobile computer's many applications.

If the demo program is not already running on the mobile computer, it can be launched from the Application folder (*Start - Programs - File Explorer - Application* folder). The demo program files reside in the *Application* partition on the mobile computer. If this partition was not loaded to the device, it can be obtained from the Symbol Web site and loaded using TCM (see *Chapter12, Configuring the Mobile Computer* for instructions on using TCM).

The sample application programs included in the 9000 Demo are provided for the purpose of demonstration and are to be used as-is. Although each program was thoroughly tested, there always exists the possibility of coding errors. The source code for each sample application is provided in the SMDK for eVC4 to allow a jump start into mobile application development. In the unlikely event a coding error is found in one of the sample applications, having access to the source code allows the customer to fix the error.

The following options are available via the demo program.

- *Test Apps*
  - *SelfTest* - tests the functionality of various features on the mobile computer (e.g., display, scanner, touch panel, etc.).
  - *Notify* - tests the green decode/function/shift/control/comm LEDs, and beeper functionality.
  - *Keyboard* - displays key codes when keys are pressed on the keypad.
  - *Display* - shows examples of the shades (monochrome displays) and colors (color displays) displayed in the touch panel.
  - *Memory* - sample memory usage and allocation.
  - *MSR 9000* - sample magnetic stripe reader application.
  - *MSR Cameo* - sample magnetic stripe reader application.
  - *Printing* - sample printing application.
- *Scan* - sample scanning application for Visual C/C++.
- *Files* - sample file management utility.
- *Sounds* - plays and tests .wav files.
- *Images* - sample image editor.
- *Ctl Panel*- accesses the Control Panel window.

- *PC Link* - sample PC/mobile computer connection notification dialog.
- *About OTL* - provides version number, and other information, for the Demo program.

If the demo program is already on the mobile computer, tap *Start - 9000 Demo*. If the demo program was downloaded into the *Application* directory on the mobile computer, navigate to the directory using *File Explorer* and tap the *Blt* file. The *Series 9000 Demo* window appears.

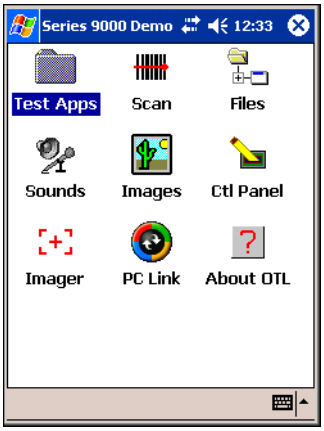


Figure B-1. Series 9000 Demo Window

Tap the *Test Apps* icon. The *Test Applications* window appears.

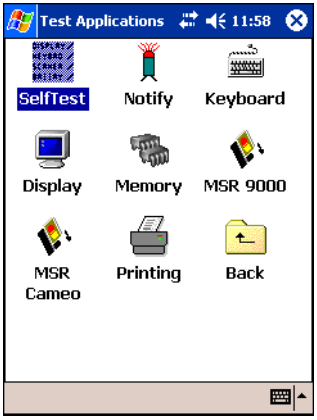


Figure B-2. Series 9000 Demo Window - Test Applications

Test Apps

Test applications include samples programs that test the functionality of various features on the mobile computer.

SelfTest

SelfTest tests the functionality of the features on the mobile computer.

1. To access the Self Test application, tap the *Self Test* icon on the *Test Applications* window. The *Self Test* window appears.

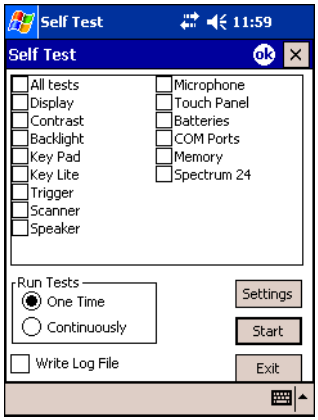


Figure B-3. Self Test Window

2. Select as many check boxes to test as desired.
3. In the *Run Tests* box, select the *One Time* radio button to run one test for each checked item or select the *Continuously* radio button to run tests for each checked item continuously.
4. Tap **Settings**.The *Self-Test Settings* window appears.

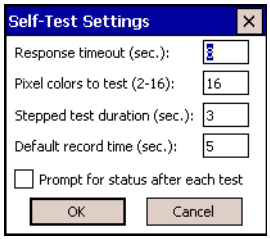


Figure B-4. Self Test Settings Window

5. Enter the desired settings and tap **OK**.
6. Tap **Start** to run the test(s).
7. Tap **Exit** to close the application.

Notify

Notify tests the functionality of the green decode LED, function, shift and control key LEDs (keypad dependent), communication LED (where applicable), and beeper of the mobile computer.

1. To access the Notify application, tap the *Notify* icon on the *Test Applications* window. The *Notify Example* window appears.

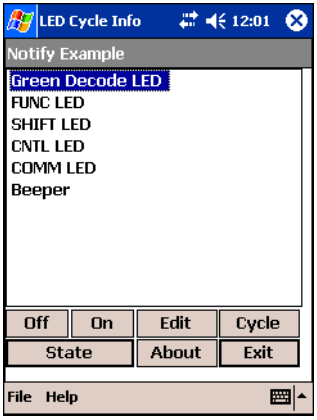


Figure B-5. Notify Window

2. Select one of the items from the list.
3. Tap the **On** button. The selected item is activated.
4. Tap the **Off** button.
5. Tap **Exit** to close the application.

Keyboard

Keyboard displays the values of a key on the keypad.

1. To access the Keyboard application, tap the *Keyboard* icon on the *Test Applications* window. The *KeyCheck Example* window appears.

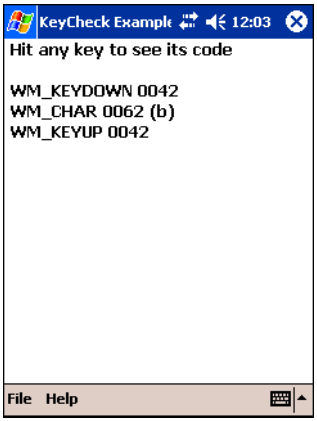


Figure B-6. KeyCheck Example Window

2. Press a key on the mobile computer's keypad.
3. The key's codes display.
4. Tap **X** to close the application.

Display

Display is a test of the shades and colors displayed in the touch panel when the mobile computer is in use.

On mobile computers with a monochrome display, black, white and shades of gray appear. On mobile computers with a color display, colors appear.

1. To access the Display test application, tap the *Display* icon on the *Test Applications* window. The *DisplayTest* window appears.

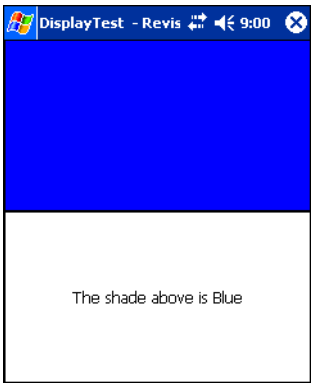


Figure B-7. DisplayTest Window

2. Tap **X** to close the application.

Memory

Memory displays memory usage and allocation on the mobile computer.

1. To access the Memory application, tap the *Memory* icon on the *Test Applications* window. The *MemTest Example* window appears.

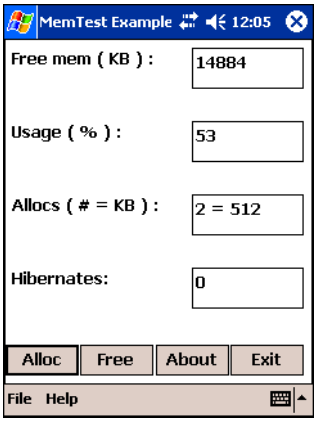


Figure B-8. MemTest Example Window

2. Tap **Alloc** to allocate memory.
3. Tap **Free** to free previously allocated memory.
4. Tap **Exit** to close the application.

MSR 9000

The *MSR 9000* application is designed to work with the snap-on MSR. This sample application illustrates how an application should handle MSR inputs.

1. Attach the MSR 9000 to the mobile computer (see *Attaching and Removing* on page 10-22), with the appropriate power supply.
2. To access the MSR 9000 application, tap the *MSR 9000* icon on the *Test Applications* window. The *MSR 9000 Swipe Card* window appears.

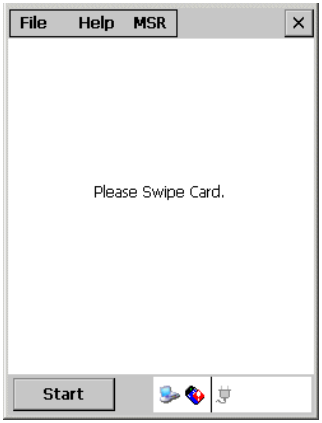


Figure B-9. MSR 9000 Swipe Card Window

3. Swipe a magnetic stripe card. The content on the card displays in the window.

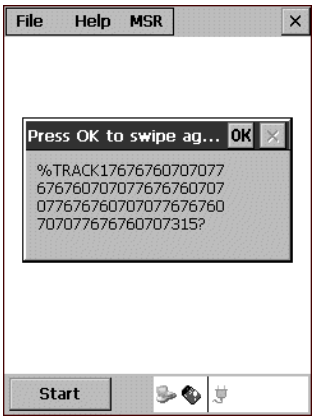


Figure B-10. MSR 9000 Data Window

4. Tap **OK** to swipe another card.
5. Tap **X** to close the application.

MSR Cameo

The *MSR 9000 Cameo* application is designed to work with the snap-on MSR. The application is identical to the MSR 9000, however it uses a different driver to support a different type of MSR. This sample application illustrates how an application should handle MSR inputs.

1. Attach the MSR Cameo to the mobile computer (see *Attaching and Removing* on page 10-22), with the appropriate power supply.
2. To access the MSR Cameo application, tap the *MSR Cameo* icon on the *Test Applications* window. The *MSR Cameo Swipe Card* window appears.

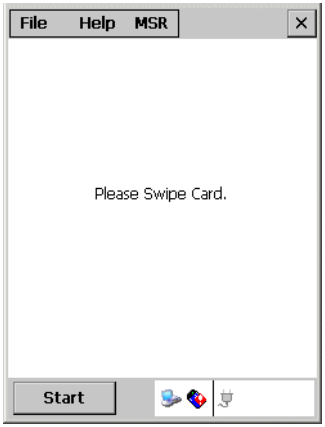


Figure B-11. MSR Cameo Swipe Card Window

3. Swipe a magnetic stripe card. The content on the card displays in the window.

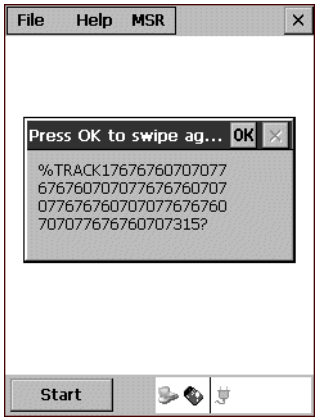


Figure B-12. MSR Cameo Data Window

4. Tap **OK** to swipe another card.
5. Tap **X** to close the application.

Printing

Printing tests the functionality of a printer.

1. To access the Printing application, tap the *Printing* icon on the *Test Applications* window. The *BasicPrint v1.0* window appears.

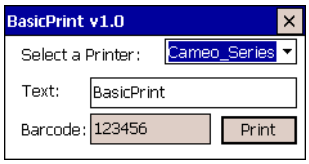


Figure B-13. BasicPrint v1.0 Window

2. Select a printer from the *Select a Printer:* drop-down list.
3. Enter the text to print in the *Text:* box.
4. Enter the bar code to print in the *Barcode:* box.
5. Tap **Print** to print the information entered.
6. Tap **X** to close the application.

Scan

The Visual C/C++ sample scanning application enables the mobile computer's scanner, allows the user to change scan parameters, and displays scanned data. To access the Scan demo, tap the *Scan* icon on the *Series 9000 Demo* window. The *ScanSamp2 Example* window appears.

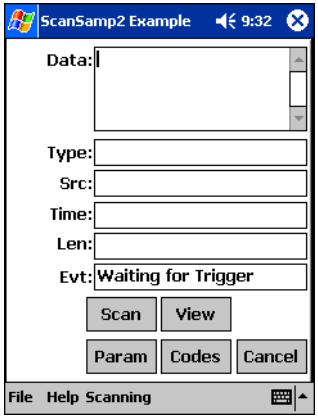


Figure B-14. ScanSamp2 Example Window

Scanning Data Fields

After a bar code is scanned, the following data appears in the screen:

- *Data* displays the data encoded in the scanned bar code.
- *Type* indicates the hex type scanned.
- *SRC* indicates the scanner being used, and the bar code type scanned (e.g., Code 128).
- *Time* displays the time the bar code was scanned.
- *Len* indicates the number of digits in the bar code.
- *Evt.* indicates the status of the application, "Waiting for Trigger" or "Scanning."

Scanning Options

The following options are available in the *Scan* window:

- *Scan* provides an alternative to the trigger buttons on the mobile computer.
- *View* displays the bar code content in a separate window.

- *Params* is used to change scanning parameter options, such as:
  - beep time (length of decode beep)
  - beeper frequency (tone)
  - LED-on time (length of time LED remains on upon decode)
  - Code ID (AIM, Symbol)
  - Wav File (sound of decode beep).
- *Codes* selects the code types the mobile computer is able to decode, and sets the options for each code type.
- *Cancel* closes the *Scan* window.

Files

To access the Files demo, tap the *Files* icon on the *Series 9000 Demo* window for a file browser utility, *InkWiz Example*. It provides similar Windows Explorer-like functionality and allows the user to browse, cut, copy, paste and delete files as well as execute the program.

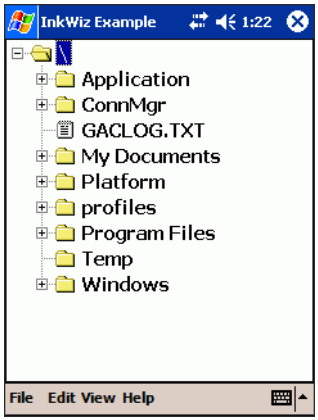


Figure B-15. InkWiz Example Window

Sounds

To access the Sounds demo, tap the *Sounds* icon on the *Series 9000 Demo* window for a sample audio application. The toolbar on the bottom of the window allows the user to open, play, record and save sample .wav files.

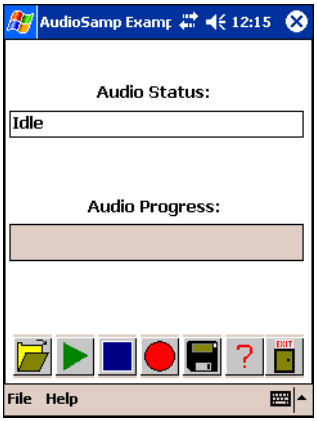


Figure B-16. AudioSamp Example Window

Images

To access the Images demo, tap the *Images* icon on the *Series 9000 Demo* window for a sample image application. The toolbar on the bottom of the window allows the user to edit images.

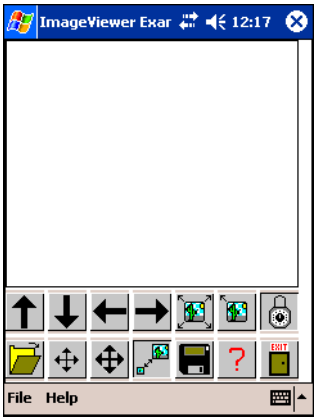


Figure B-17. ImageViewer Example Window

Table B-1. ImageViewer Toolbar

	Tap an arrow and drag stylus on image to accomplish the following: • Up Arrow expands image from bottom to top or pans up (based upon re-scale or pan mode). • Down Arrow expands image from top to bottom or pans down (based upon re-scale or pan mode). • Left Arrow shrinks image from right to left or pans left (based upon re-scale or pan mode). • Right Arrow expands image from left to right or pans right (based upon re-scale or pan mode).
 1 2 3	Tap an icon and use stylus to crop the image as follows: 1. Fits image to screen (maintain original aspect ratio). 2. Locates image to home position (upper left). 3. Re-scales mode enable.
	Tap to lock aspect ratio enable/disable.
	Tap to **Open** a .jpg file.
 1 2	Tap and drag stylus on image as follows: 1. Fine panning mode enable. 2. Coarse panning mode enable.
	Tap to **Save** an image.

Table B-1. ImageViewer Toolbar (Continued)

	Tap to open **About** ImageViewer.
	Tap to **Exit** ImageViewer.

Ctl Panel

To access the Control Panel demo, tap the *Ctl Panel* icon on the *Series 9000 Demo* window to access the *Control Panel* window, where you can specify settings for the mobile computer.

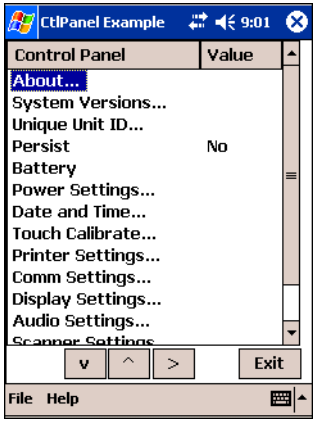


Figure B-18. CtlPanel Window

About

Tap *About* on the *Control Panel* to view the version of the *Control Panel*.

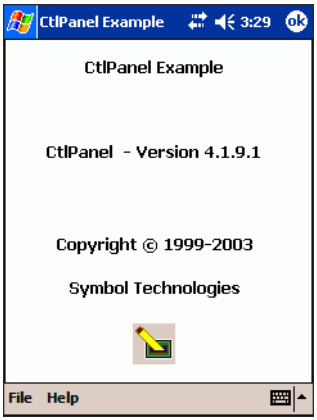


Figure B-19. About Window

System Versions

Tap *System Versions* to view version information for the applications on the mobile computer.

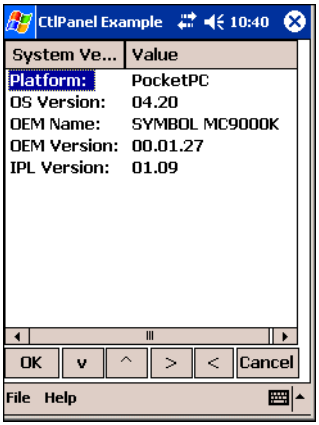


Figure B-20. System Versions Window

On the *System Versions* window:

- *Platform* indicates the operating system running on the mobile computer (Pocket PC).
- *OS Version* specifies the version of the operating system.
- *OEM Name* is the OEM name of the mobile computer.
- *OEM Version* indicates the build version of the operating system.
- *IPL Version* identifies the build version of the system loader.

Unique Unit ID

Tap *Unique Unit ID* on the *Control Panel* to view the mobile computer's unique unit ID (a 16-byte hex number identifier), and the version numbers for RCM (Resource Coordinator Manager) API, Rescoord (Resource Coordinator) DLL, UUID DLL, and Temperature DLL.

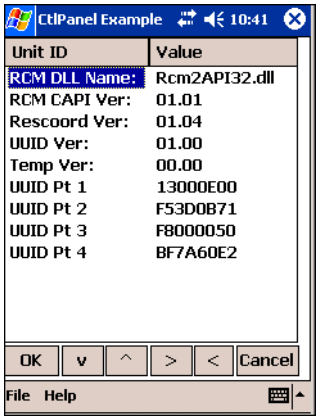


Figure B-21. Unique Unit ID Window

Note

Series 9000 mobile computers do not support the Temperature DLL.

Persist

Persist allows changes made by the *Control Panel* to remain in effect after a cold boot. When enabled, *Persist* creates .reg files which save specific settings that are made and restore the settings to the registry after a cold boot.

Toggle *Persist* to *Yes* to retain these changes made after a cold boot.

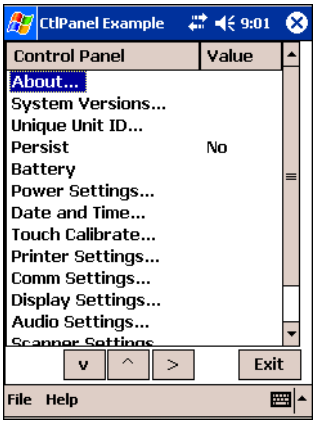


Figure B-22. Persist

Note

Not all options support Permanent Persistence.

Battery

Tap *Battery* on the *Control Panel* to view the mobile computer's battery status.

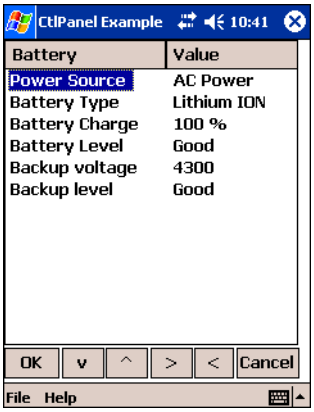


Figure B-23. Battery Window

Power Settings

Select *Power Settings* on the *Control Panel* to specify the settings to use for the mobile computer's devices.

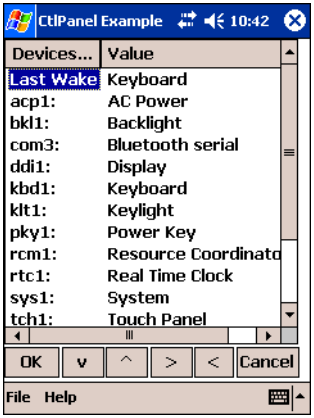


Figure B-24. Power Settings Window

Tap each device listed to select the appropriate settings, where applicable. Scroll through the device values to select the appropriate value.

Note

Backlight settings (bkl1) can be used to determine which Activities wake the backlight (Trigger, Touch, Keyboard, User). If Touch or Keyboard activities are turned off (Value = No), the User activity must also be turned off.

Bluetooth Settings

Select *Bluetooth Settings* on the *Control Panel* to view version information for the mobile computer's Bluetooth radio.

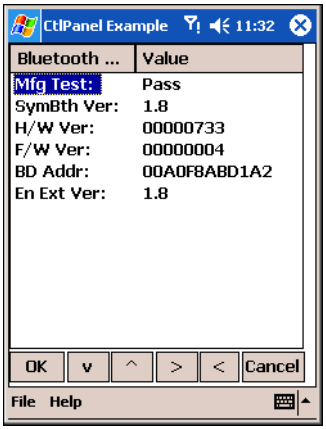


Figure B-25. Bluetooth Window

Date and Time

Tap *Date and Time* on the *Control Panel* to change the date and time. The Date and Time window appears.

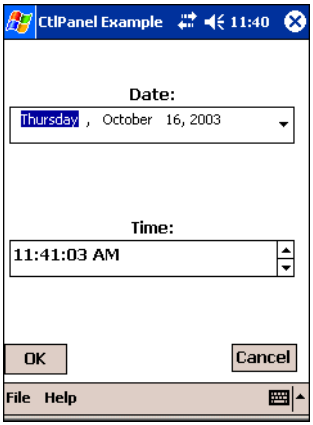


Figure B-26. Date and Time Window

To change the time, tap the *Time:* field and up the up and down arrows to change the value.

To change the date, tap the down arrow in the *Date:* field. A calendar box appears. Select the month and then select the day.

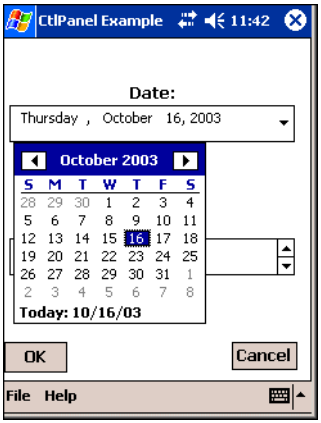


Figure B-27. Date Selection

Touch Calibrate

Select *Touch Calibrate* to re-align the window. Press **ESC** to exit.

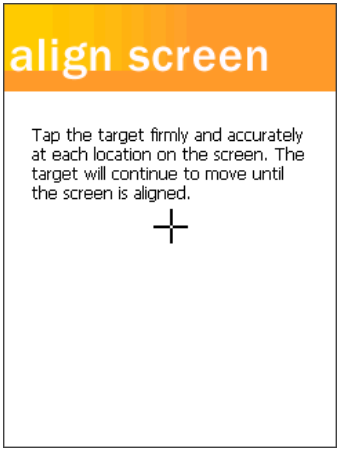


Figure B-28. Align Window

Printer Settings

Select *Printer Settings* on the *Control Panel* to specify the settings to use for printing.

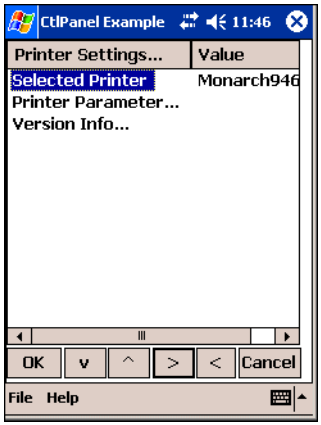


Figure B-29. Printer Settings Window

Tap each item listed to select the appropriate settings, where applicable. Scroll through the device values to select the appropriate value.

Communication Settings

Select *Comm Settings* on the *Control Panel* to specify the settings to use when communicating with other devices.

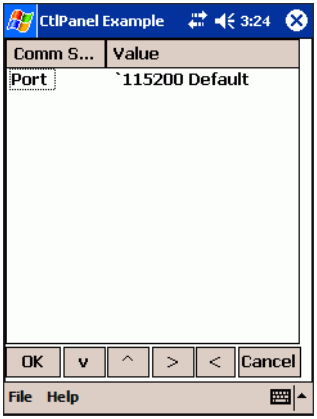


Figure B-30. Communication Settings Window

Tap *Port* to select the appropriate communication settings to be used by ActiveSync. Scroll through the communication settings to select the appropriate value.

Display Settings

Select *Display Settings* on the Control Panel to adjust display backlight features.

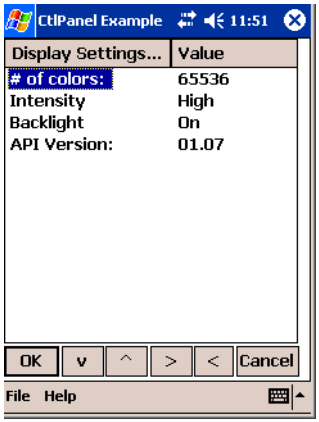


Figure B-31. Display Settings Window

- Tap *Intensity* to toggle the backlight intensity between low, medium, high and super. As you change the value, the display provides a sample of each intensity level.
- Tap *Backlight* to turn the backlight on and off.

Audio Settings

Select *Audio Settings* on the Control Panel to specify the beeper volume and view the version numbers for the Audio and Notify APIs.

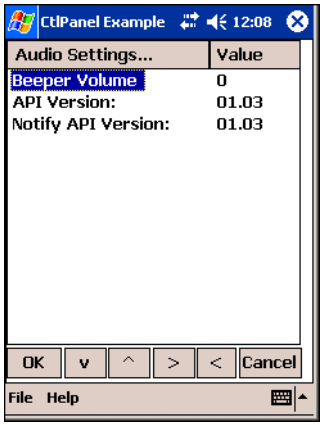


Figure B-32. Audio Settings Window

- Tap *Beeper Volume* to toggle the beeper volume between low (0), medium (1), high (2) and very high (3). As you change the value, the beeper sounds to demonstrate the level.
- *API Version* displays the version number of the Audio API.
- *Notify API Version* displays the version number of the Notify API.

Scanner Settings

Select *Scanner Settings* on the Control Panel to specify scanner-related parameters.

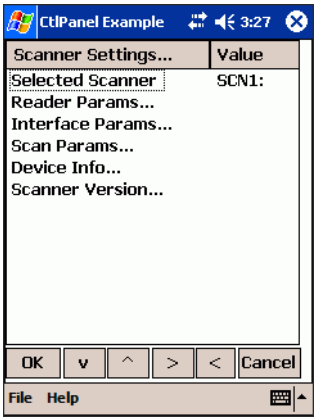


Figure B-33. Scanner Settings Window

- *Selected Scanner* displays the value of the selected scanner.
- Tap *Reader Params* to view and modify the values of various scanner reader parameters. The reader parameter settings are dependent on the type of scanner used, either a laser scanner or an imager.

  Imager Parameters

  - *Reader Type* displays the type of bar code reader used (Imager type scan engine or laser type scan engine).
  - *Aim Type* sets the type of aiming to use. Tap to toggle between *Timed Release* (activation stops even if the trigger is still held after a specified period of time); *Timed Hold* (trigger can be released but it remains active for the specified period of time); and, *Trigger* (on/off controlled by the trigger).
  - *Aim Duration* sets the duration in milliseconds (0-60,000 in increments of 100) for timed aim modes. Tap to select the duration.
  - *Aim Mode* sets the aiming mode to use. Only *None* (no aiming) and *Reticle* (reticle aiming) are supported.
  - *Beam Timer* sets the maximum amount of time that the laser remains on (0-60,000 in increments of 100). A value of 0 means infinite time-out.

- *Pointer Timer* is not supported.
- *Image Capture Timeout* is not supported.
- *Image Compress Timeout* is not supported.
- *Linear Sec* sets the number of times a bar code is re-read to confirm an accurate decode. Tap to toggle between *Short, Redun* (two times redundancy based on redundancy flags and code length); *Short, Codabar* (two times redundancy if short bar code or CODABAR); *All codes *2* (two times redundancy for all bar codes); *Long *2 Short *3* (two times redundancy for long bar codes, three times for short bar codes); and, *All codes *3* (three times redundancy for all bar codes).
- *Focus Mode* sets the focus mode to use. *Fixed* mode is currently the only focus mode supported.
- *Focus Position* sets the fixed focus position to use. Tap to toggle between *Far* (focus position is 9 inches) and Near (focus position is 5 inches).

Laser Scanner Parameters

- *Reader Type* displays the type of bar code reader used (Imager type scan engine or laser type scan engine).
- *Aim Type* sets the type of aiming to use. Tap to toggle between *Timed Release* (activation stops even if the trigger is still held after a specified period of time); *Timed Hold* (trigger can be released but it remains active for the specified period of time); and, *Trigger* (on/off controlled by the trigger).
- *Aim Duration* sets the duration in milliseconds (0-60,000 in increments of 100) for timed aim modes. Tap to select the duration.
- *Aim Mode* sets the aiming mode to use. Only *None* (no aiming), *Slab* (slab aiming) and *Dot* (dot aiming) are supported.
- *Beam Width* sets the laser beam width. Tap to toggle between *Normal* and *Narrow*.
- *Raster Mode* is not supported.
- *Beam Timer* sets the maximum amount of time that the laser remains on (0-60,000 in increments of 100). A value of 0 means infinite time-out.
- *Control LED* is not supported.
- *LED Level* is not supported.
- *Class 1 Sup* is not supported.
- *Redundancy* sets the read direction for the bar code redundancy. Tap to toggle between *None* and *Bidirectional* (reads in both directions).

  - *Linear Sec* sets the number of times a bar code is re-read to confirm an accurate decode. Tap to toggle between *Short, Redun* (two times redundancy based on redundancy flags and code length); *Short, Codabar* (two times redundancy if short bar code or CODABAR); *All codes *2* (two times redundancy for all bar codes); *Long *2 Short *3* (two times redundancy for long bar codes, three times for short bar codes); and, *All codes *3* (three times redundancy for all bar codes).
  - *Pointer Timer* sets the maximum beam timer in milliseconds (0-60,000 in increments of 100ms) for pointer mode. A value of 0 means infinite time-out. Tap to select the beam timer.
  - *Raster Height* is not supported.
- Tap *Interface Params* to view and modify the values of the following interface parameters:
  - Interface Type
  - Power Settle Time
  - Enable Settle Time
  - Low Power Time.
- Tap *Scan Params* to view and modify the values of various scanner parameters.
- Tap *Device Info* to see the values of the following parameters:
  - Beam Width
  - Aim Mode
  - Scan Direction
  - Feedback
  - Supported Fmts
  - Max Image Rect.
- Tap *Scanner Version* to view the version numbers for the API, MDD, PDD, decoder and hardware.

Refer to the SMDK Help File for Symbol Mobile Computers in the SMDK for eVC4 for details on the available parameter options.

Symbol Security

Tap *Symbol Security* on the *Control Panel* to view the security values of the mobile computer's features.

Figure B-34. Symbol Security Window

Imager

Note

ImagerSample applications provided for the device can vary. If the ImagerSample on the device does not match the ImagerSample described in this section, see *Imager* on page C-4 for additional information.

The ImagerSample application (in mobile computers with an integrated imager) provides the user with the ability to capture and display image files. To launch the Imager demo, tap the *Imager* icon on the *Series 9000 Demo* window. The *ImagerSample* window appears.

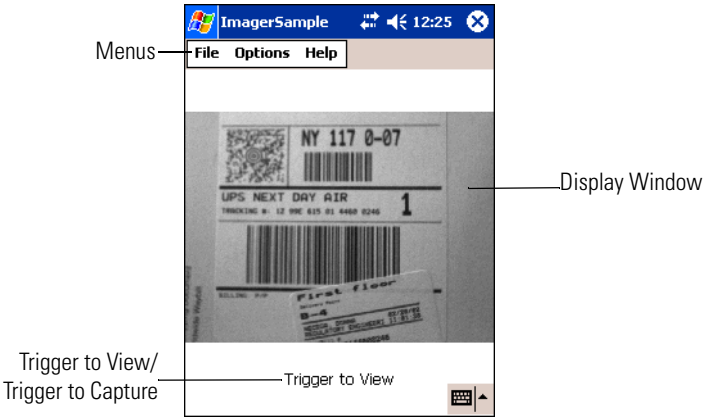


Figure B-35. ImagerSample Window

Table B-2. ImagerSample Window Options

Option	Description
Menus	
File	*Save As*: Allows the captured image to be saved as a .bmp file (see *Save As* on page B-34). *Capture*: Allows the video image in the display window to be captured (see *Capture* on page B-34). *Viewer*: Turns on the video image in the display window to capture an image (see *Viewer* on page B-34). *Exit*: Exits the ImagerSample demo (see *Exit* on page B-35).

Table B-2. ImagerSample Window Options (Continued)

Option	Description
Options	*Aim* (see *Aim* on page B-35). *Lamp* (see *Lamp* on page B-35). *Focus Near* (see *Focus Near* on page B-35).
Help	About (see *About* on page B-36).
Display Window	This area contains the video image, or a recently captured image.
Trigger to View/Trigger to Capture	This message text shows the current mode in the display window: • Trigger to View: Image in display window is in capture mode. Press any scan button to start the Image Acquisition process by enabling image capture. A real-time video image displays. • Trigger to Capture: Image in display window is a real-time video image. Press any scan button to acquire the image displayed.

Menus

Use the menus to set options and save, capture and view images.

File

Use the File menu to save, capture and view an image, or exit the ImagerSample application.

Save As

Save the currently loaded image file in bitmap file format.

To save an acquired image:

1. Tap *ImagerSample - File - Save As*. The *Save Image file* window appears.

Figure B-36. ImagerSample - Save As Window

2. Enter the name of the image to save in the *Name* text box.
3. Select the folder in which you want to save the image from the *Folder* drop-down list.
4. The default type of file to save is .bmp.
5. Select the location in which to save the file from the *Location* drop-down list.
6. Tap **OK** to save the image.

Note

If no folder is selected, the default folder to save acquired images is '\My Documents'.

Capture

When the window displays a real-time video image, tap *File - Capture* to acquire the image displayed.

Viewer

When the window displays a a recently captured image, tap *File - Viewer* to display a real-time video image.

Exit

Tap *File - Exit* to exit the ImagerSample application.

Options

Use the *Options* menu to set the Aim, Lamp and Focus Near selections.

Aim

Tap *Options - Aim* (laser aim) to create a targeting pattern when aiming the exit window.

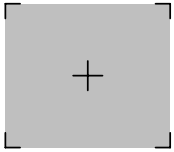


Figure B-37. Aiming Pattern

Lamp

Tap *Options - Lamp* to turn the lamp on during the exposure phase of image acquisition.

Focus Near

Tap *Options - Focus Near* to enable a close focal (focus) length.

Help

The *Help* menu provides software and hardware information and enables defaults to be reset.

About

Tap *Help - About*. The *About* window appears.

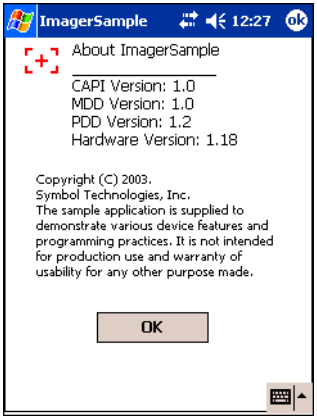


Figure B-38. ImagerSample - About Window

The *About* window provides software and hardware version information for the ImagerSample application on the mobile computer.

PC Link

Select the *PC Link* icon to connect to a host computer with the appropriate power connections.

About

Select the *About* icon on the *Series 9000 Demo* window to view information about the demo program.

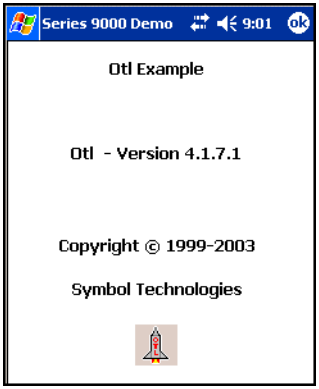


Figure B-39. About OTL Window

C

RFID Demo Program

Contents

Introduction

The 9000 Demo program illustrates how to use some of the mobile computer's many applications. In MC906R-G RFID mobile computers, the 9000 Demo program includes two additional sample applications: an RFID sample application for reading tags using RFID technology; and, an expanded Imager sample application for image capture and scanning 1-D and 2-D bar codes with an integrated imager.

If the demo program is not already running on the mobile computer, it can be launched from the Application folder (*Start - Programs - File Explorer - Application* folder). The demo program files reside in the *Application* partition on the mobile computer. If this partition was not loaded to the device, it can be obtained from the Symbol Web site and loaded using TCM (see *Chapter 12, Configuring the Mobile Computer* for instructions on using TCM).

Note

The sample application programs included in the 9000 Demo are provided for the purpose of demonstration and are to be used as-is. Although each program was thoroughly tested, there always exists the possibility of coding errors. The source code for each sample application is provided in the SMDK for eVC4 to allow a jump start into mobile application development. In the unlikely event a coding error is found in one of the sample applications, having access to the source code allows the customer to fix the error.

If the demo program is already on the mobile computer, tap *Start - 9000 Demo*. If the demo program was downloaded into the *Application* directory on the mobile computer, navigate to the directory using *File Explorer* and tap *9000 Demo*. The *Series 9000 Demo* window displays.

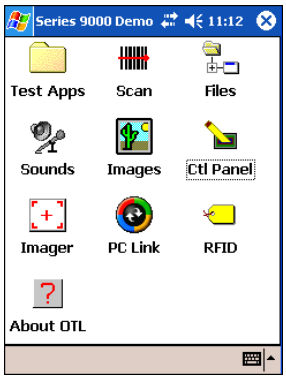


Figure C-1. Series 9000 Demo Window

Note

For information about the other sample applications in the Series 9000 Demo program, see *Appendix B, Demo Program*.

Imager

The Imager sample application in MC906R-G RFID mobile computers with an integrated imager provides the user with the ability to scan 1-D and 2-D bar codes and capture, display, and manipulate image files. In addition, the application allows the user to adjust a wide range of settings that affect image capture. These settings are called "capabilities" (CAPs). Capabilities can be accessed via the *Advanced* menu.

Capabilities are grouped into the following categories, based on function:

- **AcqCap (Acquisition capabilities)**: Settings that affect the acquisition process, such as illumination and auto exposure (see *AcqCap* on page C-14).
- **ImgCap (Image Capture capabilities)**: Settings that affect the image captured, such as image file format and image rotation (see *ImgCap* on page C-16).
- **VFCap (Video Viewfinder capabilities)**: Settings that affect the video viewfinder, such as enable/disable viewfinder and video viewfinder cropping styles (see *VFCap* on page C-19).
- **DevCap (Device capabilities)**: Settings that affect the imager engine, such as light sources and power modes (see *DevCap* on page C-23). Many of these settings cannot be changed.
- **Version (Version capabilities)**: Version numbers of all imager software components (see *Version* on page C-24).
- **Misc (Miscellaneous capabilities)**: Miscellaneous settings, such as file naming, image file save path, etc. (see *Misc* on page C-25).

Launching Imager

To launch the RFID Imager sample application, tap *Start - 9000 Demo - Imager* icon. (If the demo program is not already running on the mobile computer, it can be launched from the Application folder by tapping *Start - Programs - File Explorer - Application* folder.)

When the Imager sample application is launched, the mobile computer's display can vary. When launched for the first time, or after a soft reset, the *Scan* window displays.

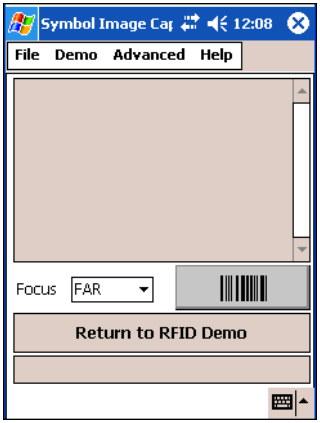


Figure C-2. Symbol Image Capture - Scan Window

File Menu

Tap the *File* menu to open, save or delete a file, or exit the application.

Opening a File

Use the open option to open saved scanned data or a saved image file.

To open a file:

1. Tap *File* - *Open* to display the *Open* window.

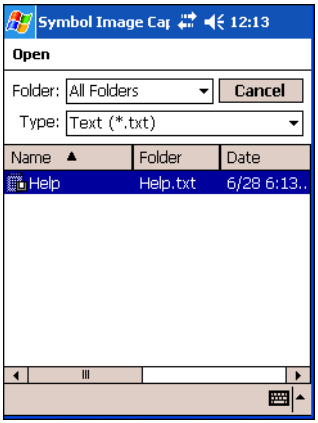


Figure C-3. Symbol Image Capture - Open Window

2. Locate the file to open by selecting a folder on the mobile computer from the *Folder:* drop-down list.
3. Select the types of files to display (e.g., Text, BMP, JPEG, TIFF) from the *Type:* drop-down list.

Note

The default image file type displayed in the *Type:* drop-down list is set in the *File Format* field on the *ImgCap* tab (*Advanced* - *Settings* - *ImgCap* tab). See *ImgCap* on page C-16. Text files can only be opened in the *Scan* window. Images can only be opened in the *Capture* window.

4. Tap the appropriate file name in the list to open the file.

Saving a File

Use the save option to save scanned data or save the currently loaded image file, either as a new file name and/or a new file format. Saving an image file also applies any edit changes applied in edit mode. If the file is not saved, edit changes are lost when the application exits, or another image is opened/captured.

To save an acquired image:

1. Tap *File* - *Save* to display the *Save As* window.

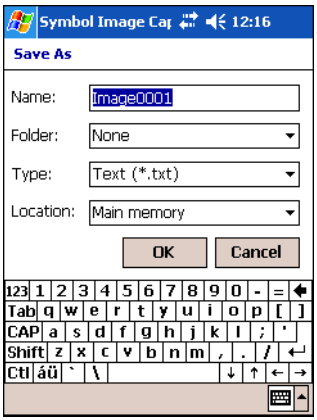


Figure C-4. Symbol Image Capture - Save As Window

2. Enter the name of the image to save in the *Name:* text box.
3. Select the folder in which you want to save the image from the *Folder:* drop-down list.
4. Select the type of file to save (e.g., Text, BMP, JPEG, TIFF) from the *Type:* drop-down list.
5. Select the location in which to save the file from the *Location:* drop-down list.
6. Tap **OK** to save the image.

Note

By default, all acquired images are automatically saved in *\My Documents*. See *Misc* on page C-25 for more information about the default location and naming convention of saved image files.

Deleting a File

Use the delete option to delete a saved image file.

To delete an image file:

1. Tap *Demo* - *Capture* to display the *Capture* window.

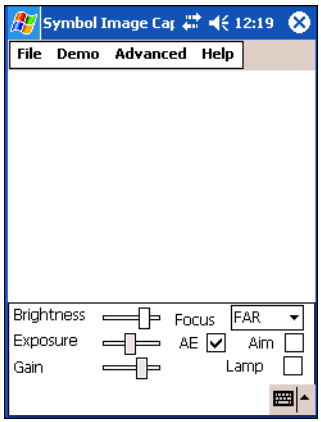


Figure C-5. Symbol Image Capture - Capture Window

2. Tap *File* - *Delete*. The *Open* window displays.

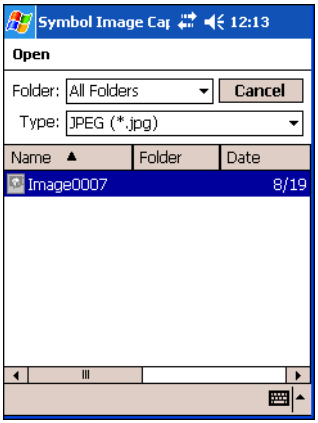


Figure C-6. Symbol Image Capture - Open Window

3. From the *Folder:* drop-down list, select the folder that contains the image to delete.
4. From the *Type:* drop-down list, select the type of file to delete.

5. Select the file to delete from the list. The *File Delete* dialog displays.

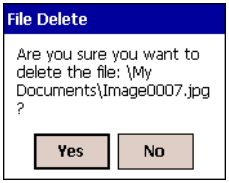


Figure C-7. Symbol Image Capture - File Delete Dialog

6. Tap **Yes** to delete the file.

Exiting Imager

Tap *File - Exit* to exit the Imager sample application.

Demo Menu

Tap the *Demo* menu to select an image capture option: *Simple*, *Scan* or *Capture*.

Simple

The *Simple* image capture option provides a basic image capture method for acquiring images or scanning. Tap *Demo - Simple* to display the *Simple* window.

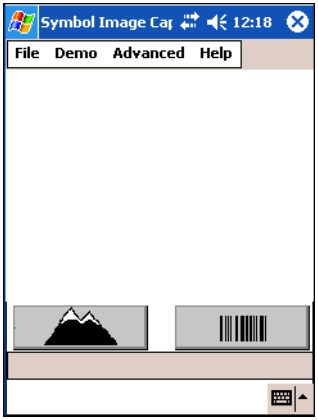


Figure C-8. Symbol Image Capture - Simple Window

To acquire an image:

1. Tap  or press the trigger to enable the imager. The imager is enabled when a video image appears on the mobile computer's display.
2. Aim the exit window at the image to capture.
3. Press and release the trigger. A beep sounds to indicate a successful image capture.

   The captured image appears on the mobile computer's display until the mobile computer is enabled to capture another image or another image is opened from the *File* menu

If the image to capture requires editing, edit the image on the display from the *Advanced* menu prior to acquiring the image. (See *Edit* on page C-29 for information about each mode.).

To scan a bar code:

1. Tap *Demo* - *Simple* to display the *Simple* window (see Figure C-8 on page -9).
2. Tap  to display the *Scan* window (see Figure C-9 on page -11).
3. Aim the exit window at the bar code.
4. Press and release the trigger. A beep sounds to indicate a successful decode. The scanned data appears on the mobile computer's display until another bar code is scanned or another file is opened from the *File* menu.

See *Scanning Bar Codes* on page 2-59 for detailed information about scanning.

Scan

The *Scan* option opens the *Scan* window to scan bar codes without exiting the Imager sample application. See *Data Capture* on page 2-57 for additional scanning instructions. There is no ability to configure the scanner in this mode.

To scan a bar code:

1. Tap *Demo* - *Scan* to display the *Scan* window.

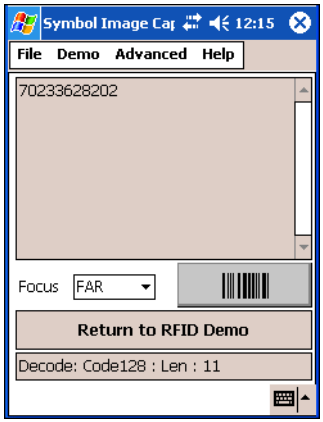


Figure C-9. Symbol Image Capture - Scan Window

2. Select a focal (focus) length from the *Focus* drop-down list. *Near* enables a close focal length; *Far* enables a distant focal length.
3. Aim the exit window at the bar code.
4. Tap  or press and release the trigger. A beep sounds to indicate a successful decode. The scanned data appears on the mobile computer's display until another bar code is scanned or another file is opened from the *File* menu.
5. Tap **Return to RFID Demo** to return to the *Series 9000 Demo* window (see Figure C-1 on page -3).

After a bar code is scanned:

- The bar code data can be saved to a file for editing. Editing the data has no effect other than changing the data displayed in the window.
- The status of the scanned bar code displays in the text box on the bottom of the screen (e.g., Decode: Code 128, etc.).

Capture

The *Capture* option starts the Image Acquisition process when the trigger is pressed by enabling image capture and displaying a video image on the mobile computer's display.

Note

The settings defined on the *Capture* window can also be defined in the *AcqCap* tab (*Advanced* - *Settings* - *AcqCap* tab). See Table C-1 on page C-15 for *AcqCap* field descriptions.

To acquire images of documents and signatures:

1. Tap *Demo* - *Capture* to display the *Capture* window.

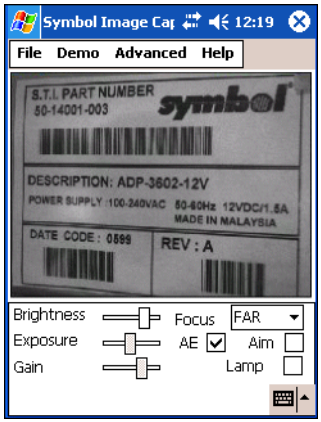


Figure C-10. Symbol Image Capture - Capture Window

2. Ensure the imager is enabled. The imager is enabled when a video image appears on the mobile computer's display. To enable the imager, press the trigger.
3. Adjust/enable the following features as needed:
   - Adjust *Brightness*, *Exposure* and *Gain* by moving the appropriate slide bar with the stylus.
   - Select a focal (focus) length from the *Focus* drop-down list. *Near* enables a close focal length, *Far* enables a distant focal length.
   - Select the *AE* (auto exposure) check box to automatically adjust the exposure settings (light, time, etc.). Selecting this feature is recommended.

When *AE* is enabled, *Brightness* is enabled, *Exposure* is disabled and *Gain* is disabled. When *AE* is disabled, *Brightness* is disabled, *Exposure* is enabled and *Gain* is enabled.

- Select the *Aim* (laser aim) check box to create a targeting pattern.
- Select the *Lamp* (illumination) check box to illuminate the target.

4. If the image to acquire requires additional editing, tap *Advanced* - *Crop* or *Advanced* - *Edit* to edit the image on the display prior to acquiring the image. (See *Crop* on page C-28 and *Edit* on page C-29 for information about editing images.)
5. Aim the exit window at the image to capture and align the document or signature within the corners of the target.
6. Press and release the trigger. A beep sounds to indicate a successful image capture.

   The captured image appears on the mobile computer's display until the mobile computer is enabled to capture another image, or another image is opened from the *File* menu.
7. Tap *File* - *Save* to save any edits made in this mode. Otherwise, image edits are discarded upon exit, or when a new file is opened. (See *Saving Captured Images*.)

Saving Captured Images

The default location to save an acquired image is '\My Documents'. Acquired images are named "ImageXXXX" (where XXXX = a four digit number, incremented sequentially). The default file save path and file name can be changed in the *Misc* tab (*Advanced* - *Settings* - *Misc* tab). Acquired images can also be saved by selecting *Save* from the *File* menu and renamed using the File Explorer.

Advanced Menu

Tap the *Advanced* menu to select image editing modes: *Settings*, *Crop* or *Edit*.

Settings (Capabilities)

Tap *Advanced - Settings* to display the Imager capabilities (*AcqCap*, *ImgCap*, *VFCap*, *DevCap*, *Version*, *Misc*, *Scan 1* and *Scan 2*) tabs. On each of the eight tabs image capture options can be set.

Imager capabilities are used to set device information and status for using the Imager, as well as to control device behavior. Some capabilities are read only and cannot currently be changed. However, on each tab the following options can be set:

- fixed versus variable focal lengths
- support for aiming
- different exposure settings.

For detailed information about Still Image Capture 'C' API functions and capabilities, refer to the SMDK Help file for Symbol mobile computers.

AcqCap

Tap the *AcqCap* tab to define and/or control how the imaging hardware acquires images.

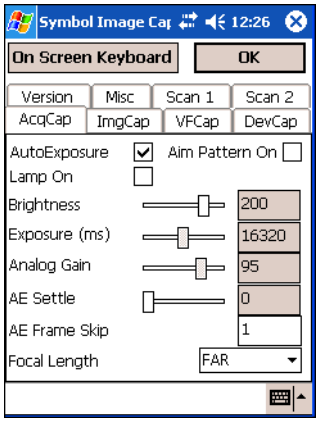


Figure C-11. Symbol Image Capture - AcqCap Tab

Table C-1. AcqCap Fields

Field	Description
AutoExposure	Specifies if auto exposure is enabled or not. Enabling this field affects the exposure time and analog gain. When AutoExposure is enabled, Exposure, Analog Gain, and AE Settle are disabled. The default value is On. Allowed values are Enabled (TRUE) or Disabled (FALSE).
Lamp On	Specifies if the lamp should be used during image acquisition. If enabled, the lamp is turned on during the exposure phase of image acquisition. The default value is Disabled. Allowed values are Enabled (TRUE) or Disabled (FALSE).
Aiming Pattern On	Specifies if the aiming reticule should be enabled. If enabled, the aiming reticule is turned on as image acquisition is started. The aiming reticule automatically turns off during the exposure phase of image acquisition so that it does not appear in the captured image. The default value is Disabled. Allowed values are Enabled (TRUE) or Disabled (FALSE).
Brightness	Specifies the target brightness that the auto exposure algorithm attempts to achieve. This feature is only meaningful when auto exposure is enabled. The default value is 200. Allowed values are 2 - 254.
Exposure (ms)	Specifies the exposure time in microseconds. The field is disabled, and its current value is ignored, if the auto exposure is enabled. The default value is 16320. Allowed values are 64 - 32704, step 64.
Analog Gain	Specifies the amount of analog gain to apply. The field is disabled, and its current value is ignored, if the auto exposure is enabled. The default value is 95. Allowed values are 0 - 127.

Table C-1. AcqCap Fields (Continued)

Field	Description
AE Settle	Defines the degree to which the auto exposure algorithm must settle before an image is returned. This field has no effect if auto exposure is disabled. Setting *AE Settle* too low may cause a fail to return an image under certain lighting conditions. The default value should ensure adequate settling. This feature may be disabled by setting the field value to 0. When this field is disabled, the first acquired image is returned regardless of the state of the auto exposure algorithm. The default value is 2000. Allowed values are any value equal to or greater than 0. If the value is equal to 0, the capability is disabled and the image is returned regardless of how Auto Exposure works.
AE Frame Skip	Specifies the number of frames to skip between auto exposure updates. This feature is only meaningful if auto exposure is enabled. The default value is 1. Allowed values are 0 - 20.
Focal Length (mm)	Specifies the available focal (focus) length in millimeters. The default value is 221mm. Allowed values are 123mm and 221mm.

ImgCap

Tap the *ImgCap* tab to define and/or control how images are formatted.

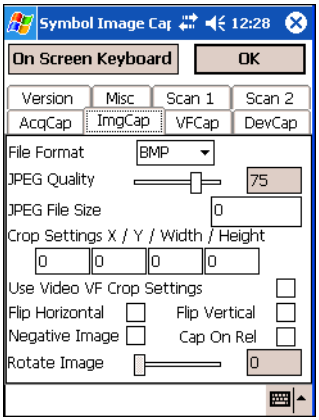


Figure C-12. Symbol Image Capture - ImgCap Tab

Table C-2. ImgCap Fields

Field	Description
File Format	Specifies the file format in which to encapsulate image data. The default value is JPEG. Allowed values are JPEG, BMP, DIB and TIFF.
JPEG Quality	Specifies the desired JPEG image quality as a percentage. No assumption is made about the meaning of the range 1 - 99. It may be derived from the JPEG standard, or it may be optimized for the device. However, 100 implies a loss-less form of compression. Applications are not encouraged to use this value since it results in poor compression, as well as a format that is not currently widely supported in the industry. A value of 0 means no specific quality is requested and the default is used. *JPEG File Size* takes priority over *JPEG Quality*. *JPEG Quality* is ignored if the current value of *JPEG Size* is not 0. The default value is 75. Allowed values are 0 - 100.
JPEG File Size	Specifies the desired size for a JPEG image in Kilo bytes. This capability is ignored if the current value is set to 0. The default value is 0. Allowed values are 0 - 500.

Table C-2. ImgCap Fields (Continued)

Field	Description
Crop Settings	**X Coordinate**: Specifies, in pixels, the X coordinate of the top, left corner of the rectangle that is used to crop the acquired image. The default value is 0. Allowed values are any value equal to or greater than 0. **Y Coordinate**: Specifies, in pixels, the Y coordinate of the top, left corner of the rectangle that is used to crop the acquired image. The default value is 0. Allowed values are any value equal to or greater than 0. **Width**: Specifies, in pixels, the width of the rectangle that is used to crop the acquired image. If the current value is set to 0 this capability is ignored and the device uses a width that encompasses the entire acquired image. The default value is 0. Allowed values are any value equal to or greater than 0. **Height**: Specifies, in pixels, the height of the rectangle that is used to crop the acquired image. If the current value is set to 0 this capability is ignored and the device uses a height that encompasses the entire acquired image. The default value is 0. Allowed values are any value equal to or greater than 0.
Use Video VF Crop Settings	Specifies if the cropping defined for the viewfinder should be used for image retrieval as well. If this field is enabled, all *image capabilities* crop settings are ignored and all *viewfinder capabilities* are used instead. The default value is Disabled. Allowed values are Enabled or Disabled.
Flip Horizontal	Specifies if the acquired image should be flipped on the horizontal axis. The default value is Disabled. Allowed values are Enabled or Disabled.
Flip Vertical	Specifies if the acquired image should be flipped on the vertical axis. The default value is Disabled. Allowed values are Enabled or Disabled.

Table C-2. ImgCap Fields (Continued)

Field	Description
Negative Image	Specifies if the bits in the acquired image should be negated, providing a negative image. The default value is Disabled. Allowed values are Enabled or Disabled.
Cap On Rel	Specifies if Cap On Rel ('Capture On Release') is Enabled or Disabled. When enabled, an image is captured when the trigger is *released*. When disabled, an image is captured when the trigger is *pressed*. The default value is Disabled.
Rotate Image	Specifies the amount, in degrees, that the acquired image should be rotated. Some devices may impose a minimum increment value. This feature is not currently supported.

VFCap

Tap the *VFCap* tab to define and/or control aspects of the viewfinder function.

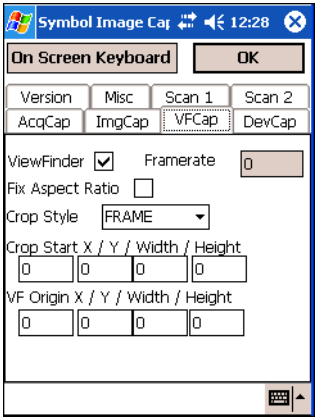


Figure C-13. Symbol Image Capture - VFCap Tab

Table C-3. VFCap Fields

Field	Description
ViewFinder	Enables and disables the viewfinder.
Framerate	Indicates the current frame rate of the viewfinder in frames per second. The allowed value is 0 and cannot be changed.
Fix Aspect Ratio	Specifies if the aspect ratio of the viewfinder image is forced to match that of the acquired image. The aspect ratio of the viewfinder window is defined by *VF Origin* Width and Height. The aspect ratio of the imaging device is defined by the *Native Res* X and Y coordinates (see DEVCap fields). If *Fix Aspect Ratio* is enabled, the acquired image is proportionally scaled so that it fits into the viewfinder window. The viewfinder window is not completely filled with image data if the viewfinder window aspect ratio does not match the device aspect ratio. If *Fix Aspect Ratio* is disabled, the acquired image is scaled, disproportionately if necessary, to completely fill the viewfinder scale rectangle. The default value is Disabled. Allowed values are Enabled or Disabled.
Crop Style	Specifies how the cropped area is displayed. The default value is FILL. Allowed values are FILL, DARKEN or FRAME. • FILL: The viewfinder displays only the cropped region. • DARKEN: The whole image is displayed and everything outside the cropped region is darkened. • FRAME: The whole image is displayed and the cropped region is framed with a rectangle.

Table C-3. VFCap Fields (Continued)

Field	Description
Crop Start	**X Coordinate**: Specifies, in pixels, the X coordinate of the top, left corner of the rectangle that is used to crop the viewfinder image. The default value is 0. Allowed values are any value equal to or greater than 0. **Y Coordinate**: Specifies, in pixels, the Y coordinate of the top, left corner of the rectangle that is used to crop the viewfinder image. The default value is 0. Allowed values are any value equal to or greater than 0. **Width**: Specifies, in pixels, the width of the rectangle that is used to crop the viewfinder image. If the current value is set to 0 this capability is ignored and the device uses a width that encompasses the entire viewfinder image. The default value is 0. Allowed values are any value equal to or greater than 0. **Height**: Specifies, in pixels, the height of the rectangle that is used to crop the viewfinder image. If the current value is set to 0 this capability is ignored and the device uses a height that encompasses the entire viewfinder image. The default value is 0. Allowed values are any value equal to or greater than 0.

Table C-3. VFCap Fields (Continued)

Field	Description
VF Origin	**X Coordinate**: Specifies, in pixels, the X coordinate of the display rectangle. This is the rectangle in the window defined by the *Window Handle* where the viewfinder image is displayed. If the current value is set to a value that is larger then the window, the viewfinder is not visible. The default value is 0. Allowed values are any value equal to or greater than 0. **Y Coordinate**: Specifies, in pixels, the Y coordinate of the display rectangle. This is the rectangle in the window defined by the *Window Handle* where the viewfinder image will be displayed. If the current value is set to a value that is larger then the window, the viewfinder is not visible. The default value is 0. Allowed values are any value equal to or greater than 0. **Width**: Specifies, in pixels, the width of the display rectangle. This is the rectangle in the window defined by the *Window Handle* where the viewfinder image will be displayed. If the current value is set to 0 this capability is ignored and the device uses the full window width. The default value is 0. Allowed values are any value equal to or greater than 0. **Height**: Specifies, in pixels, the height of the display rectangle. This is the rectangle in the window defined by the *Window Handle* where the viewfinder image is displayed. If the current value is set to 0 this capability is ignored and the device uses the full window height. The default value is 0. Allowed values are any value equal to or greater than 0.

DevCap

Tap the *DevCap* tab to define and/or control the actual imaging device. This includes resolution of the imager, its available power modes, etc.

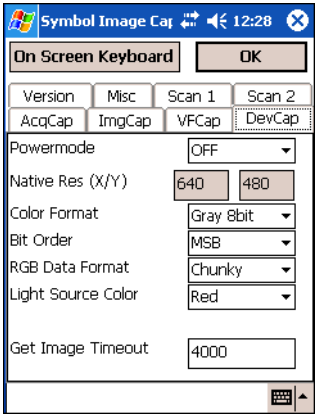


Figure C-14. Symbol Image Capture - DevCap Tab

Table C-4. DevCap Fields

Field	Description
Powermode	Defines the power mode that the imaging device enters when it is locked but not acquiring. The default value is Off. Allowed values are Off, Standby, Halted, Running and Acquiring.
Native Res (X/Y)	The native optical resolution along the X-axis and Y-axis of the imaging device. The default value of the X-axis is 640. The default value of the Y-axis is 480. These capabilities cannot be changed.
Color Format	The color format of the pixel data the imaging device is capable of acquiring. The default value is Gray 8bit (Mono 8-bit) and cannot be changed.

Table C-4. DevCap Fields (Continued)

Field	Description
Bit Order	Specifies how the bytes in an image are filled by the source. MSB indicates that the leftmost bit in the byte (usually bit 7) is the byte's most significant bit. The default value is MSB and cannot be changed.
RGB Data Format	Specifies the available color data formats. There are two options, *Planar* and *Chunky*. In Planar mode, the RGB data is transferred one plane at a time; first the entire red plane, then the entire green plane, and finally the entire blue plane. In Chunky mode, the RGB data for each pixel is transferred in an interface fashion, one pixel at a time (R-G-B, R-G-B, etc.). The default value is Chunky and cannot be changed.
Light Source Color	Describes the general color characteristic of the integrated light source. The default value is Red and cannot be changed.
Get Image Timeout	Defines the maximum length of time, in milliseconds, for the hardware to capture an image based on capture settings (i.e., exposure). The default value is 4000. Any value is allowed.

Version

Tap the *Version* tab to display read-only hardware and software versions on the mobile computer.

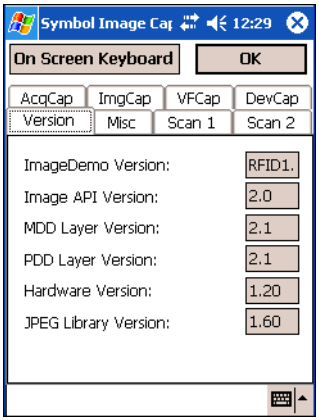


Figure C-15. Symbol Image Capture - Version Tab

Table C-5. VerCap Fields

Field	Description
Image Demo Version	Provides the version number of the Image sample application.
Image API Version	Provides the version number of the Image Capture API.
MDD Layer Version	Provides the version number of the still image capture driver MDD layer.
PDD Layer Version	Provides the version number of the still image capture driver PDD.
Hardware Version	Provides the version number of the imaging hardware.
JPEG Library Version	This is the version of the ImgOperations.DLL currently being used by the Image Capture driver. This DLL provides JPEG, TIFF< BMP format conversion for imaging applications.

Misc

Tap the *Misc* tab to define and/or control where and how the image is saved.

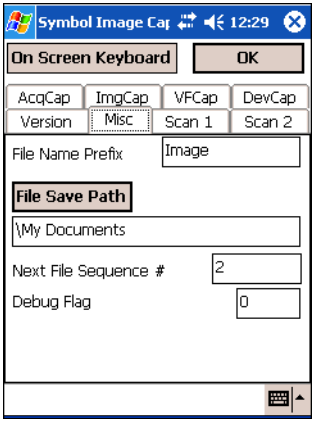


Figure C-16. Symbol Image Capture - Misc Tab

Table C-6. Misc Fields

Field	Description
File Name Prefix	Images are automatically saved on the device when they are acquired. The default name assigned to each acquired image contains a prefix and suffix. The default *File Name Prefix* is the 5-character word *Image*.
File Save Path	The *File Save Path* is the location to save images when images are acquired. The default location to save images on the device in '\My Documents'.
Next File Sequence #	Images are automatically saved on the device when they are acquired. The default name assigned to each image contains a prefix and suffix. The *Next File Sequence Number* is a 4-digit suffix, incremented sequentially, that is added to the File Name Prefix (*Image*).
Debug Flag	Used for debugging purposes. Debugging features will be enabled by setting this flag to an appropriate value. The current default value is 0. This feature is not currently supported.

Scan 1

Tap the *Scan 1* tab to define the bar code types to support for scanning. Bar codes in bold type with a check are supported on the mobile computer. Select or deselect a check box as needed.

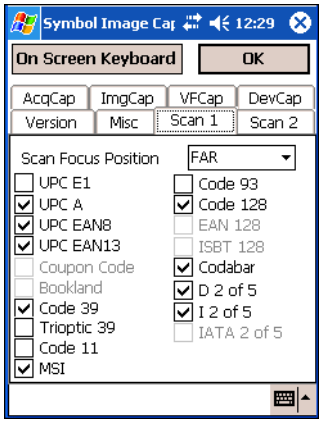


Figure C-17. Symbol Image Capture - Scan 1Tab

Scan 2

Tap the *Scan 2* tab to define the bar code types to support for scanning. Bar codes in bold type with a check are supported on the mobile computer. Select or deselect a check box as needed.

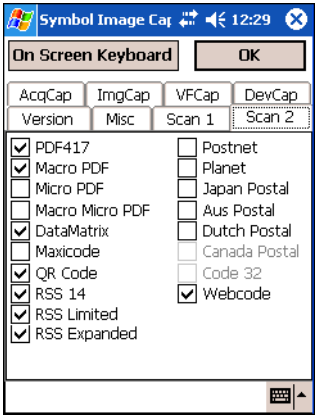


Figure C-18. Symbol Image Capture - Scan 2 Tab

Crop

The *Crop* option allows images to be cropped on the mobile computer's display, through the viewfinder, prior to capturing an image. Ensure the *ViewFinder* option is enabled in the *VFCap* tab (*Advanced - Settings - VFCap* tab*)* to allow the image to appear on the mobile computer's display.

Note

The settings defined in the *Crop* window can also be defined in the *ImgCap* tab (*Advanced - Settings - ImgCap* tab). See Table C-2 on page C-17 for ImgCap field descriptions.

To crop an image:

1. Tap *Advanced - Crop* to display the *Crop* window.

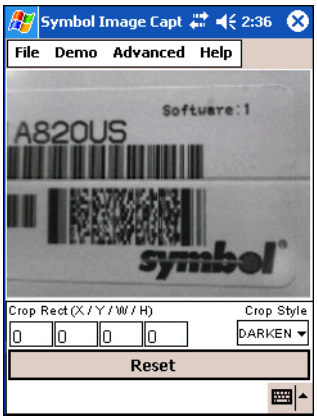


Figure C-19. Symbol Image Capture - Crop Window

2. Press the trigger to enable the imager. The imager is enabled when a video image appears on the mobile computer's display.
3. Aim the exit window at the image to capture.
4. While the exit window is aimed at the image to capture, use the stylus on the mobile computer's display to drag a rectangle to crop the image. The image can also be cropped by entering numeric values in the boxes under *Crop Rect (X / Y / W / H)*.
5. While the exit window is aimed at the image to capture, select a crop style from the *Crop Style* drop-down list.
6. Press and release the trigger. A beep sounds to indicate a successful image capture.

The captured image appears on the mobile computer's display until the mobile computer is enabled to capture another image or another image is opened from the *File* menu. Tap **Reset** to return settings to their default values.

Note

Tap *File* - *Save* to save any edits made in this mode. Otherwise, image edits are discarded upon exit, or when a new file is opened.

Edit

The *Edit* option allows images to be edited on the mobile computer's display, through the viewfinder, prior to capturing an image. Ensure the *ViewFinder* option is enabled in the *VFCap* tab (*Advanced* - *Settings* - *VFCap* tab*)* to allow the image to appear on the mobile computer's display.

To edit an image:

1. Tap *Advanced* - *Edit* to display the *Edit* window:

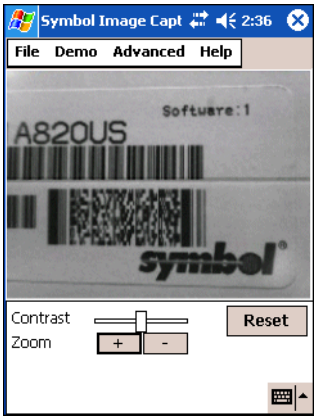


Figure C-20. Symbol Image Capture - Edit Window

2. Press the trigger to enable the imager. The imager is enabled when a video image appears on the mobile computer's display.
3. Aim the exit window at the image to capture.
4. While the exit window is aimed at the image to capture, adjust the *Contrast* by moving the slide bar with the stylus to lighten and darken the image to capture.

5. While the exit window is aimed at the image to capture, tap **+** and **-** to zoom in and out on the image to capture.
6. Press and release the trigger. A beep sounds to indicate a successful image capture.

The captured image appears on the mobile computer's display until the mobile computer is enabled to capture another image or another image is opened from the *File* menu. Tap **Reset** to return settings to their default values.

Note

Tap *File - Save* to save any edits made in this mode. Otherwise, image edits are discarded upon exit, or when a new file is opened.

Help Menu

Tap the *Help* menu to view hardware and software information, and to set defaults.

About

Tap *Help - About* to view software and hardware version information for the Imager sample application on the mobile computer.

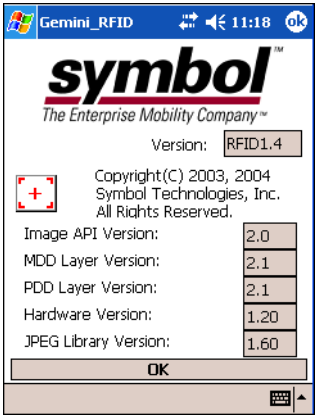


Figure C-21. Symbol Image Capture - About Window

Set Defaults

Tap *Help - Set Defaults* to reset any settings back to their default values.

To set defaults:

1. Tap Help - Set Defaults.

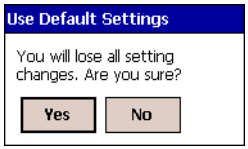


Figure C-22. Symbol Image Capture - Set Defaults Message

2. Tap **Yes** to return all of the mobile computer's Imager settings to their default values. See the capabilities description tables, beginning on page C-15, for the default values assigned to capabilities fields.

Note

All user changes are lost when defaults are reset.

RFID

The RFID sample application in MC906R-G RFID mobile computers with RFID technology, provides the ability to perform a set of typical operations on RFID tags. Tags can be programmed, erased, locked and killed. In addition, data can be collected by decoding in-range EPC Class 1 RFID tags that beam back to the mobile computer the information they contain.

While the trigger is pressed, the mobile computer interrogates all of the RFID tags within the radio frequency (RF) field of view. The mobile computer captures data from each new tag found and displays a tag icon in the main *Tags* window. When the trigger is released, the mobile computer stops interrogating tags.

The sample application supports the launching of an application that is capable of scanning bar codes or capturing images.

Launching RFID

To launch the RFID sample application, tap *Start - 9000 Demo - RFID* icon. (If the demo program is not already running on the mobile computer, it can be launched from the Application folder by tapping *Start - Programs - File Explorer - Application* folder.)

When the RFID sample application is launched, the main *Tags* window displays.

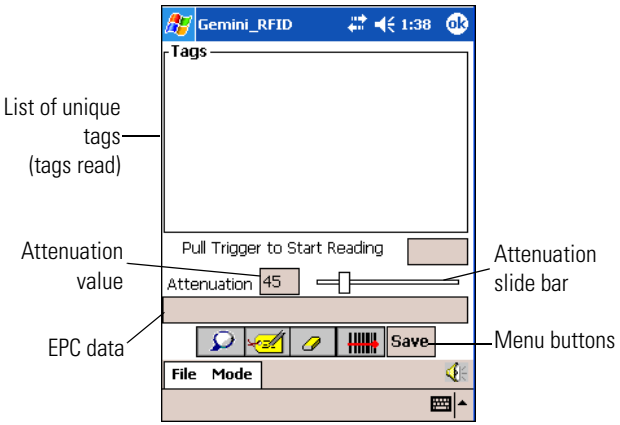
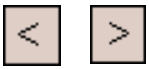
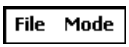


Figure C-23. RFID - Main Tags Window

Table C-7. Main Tags Window Icons / Menus

Icon	Description
	Launches the *Locate Tag* window (see *Locate Tag* on page C-39).
	Launches the *Program Tag* window (see *Program Tag* on page C-40).
	Clears the tag list (see *Clearing the Display* on page C-35).
	Launches the bar code / Image Capture application (see *Scan Bar Code* on page C-41).
	Saves the complete list of tags (see *Saving Tag Data* on page C-35).
	*Previous* and *Next* buttons appear on the menu when read tags exceed the amount of tags that can fit in the tag list display. Tap < to display the previous page. Tap > to display the next page.
	*File* and *Mode* menus (see *File Menu* on page C-36 and *Mode Menu* on page C-38).
	Tap to disable/enable the sound when a tag is read.
	The *RFID Module Power On* icon (displayed next to the *Speaker* icon) indicates that the RFID radio module is powered on and attempting to read tags.

Reading Tags

When the mobile computer's the trigger is pressed, the mobile computer interrogates all of the tags within the radio frequency (RF) field of view. For each new tag found, the mobile computer beeps once and displays a tag icon in the main RFID *Tag* window. If the same tag is found again, the mobile computer does not beep.

When the trigger is released, the mobile computer stops interrogating tags. The total number of unique tags found displays in the *Tag* window.

To read tags:

1. Tap *Start* - *9000 Demo* - *RFID* icon.
2. Ensure that the mobile computer is within the RF field of view.
3. Set the RFID signal power. Use the *Attenuation* slide bar (see Figure C-23 on page C-32) to set a value in a range between 0 (full power) and 255 (low power).
4. Press the mobile computer's trigger.
5. For each new tag found, a beep sounds one time, the Indicator LED flashes green, and a tag icon displays in the *Tag* window.
6. Release the trigger.

Selecting Tags

The *Tag* window can display up to 20 tags. If more than 20 tags are found, the application allows the user to page forward and backward through the list of icons representing the tags found.

To select a tag to view the tag's data:

1. Tap *Start* - *9000 Demo* - *RFID* icon.
2. Read a tag (see *Reading Tags*).
3. Select a tag icon in the *Tags* window.

4. The data contained in the tag, along with a count of how many times the selected tag was read, displays in the *Tags* window.

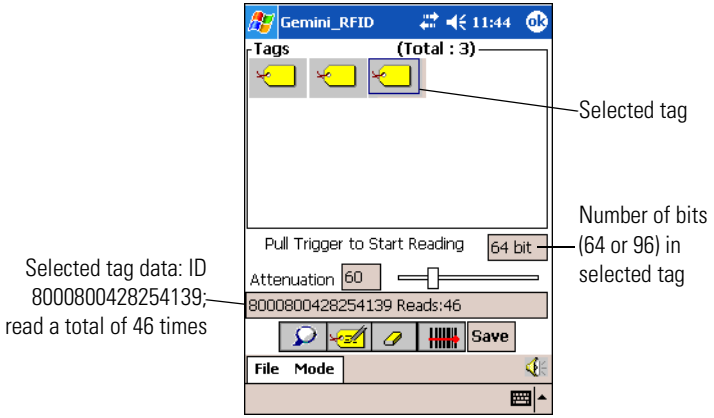


Figure C-24. RFID - Main Tags Window / Selected Tag

Clearing the Display

To clear the tag list in the mobile computer's display, tap  .

Saving Tag Data

A list of read tags can be saved on the mobile computer. The application saves the tag list to the "*\My Documents*" folder and names the file RFIDTaglist.csv.

The file is a .csv format (comma separated text file). This file format can be read by MS Excel, or other applications that support .csv. The sample file contains the following information.

Time Stamp,Tag ID,Tag Type,Read Count:

2004-09-17T15:34:53-05:00,H22EEDDAEBFCCEDEE,C1,10
2004-09-17T15:34:53-05:00,H8000800545234227,C1,10

2004-09-17T15:34:57-05:00,H8000800428254124,C1,15

The Time Stamp format is:

Year-month-dateTHour:Minute:seconds-TimezoneHourDifferential(GMT):TimezoneMinutesDifferntial

The Tag ID format is:

HTagData (H indicates the data is in hex)

The Tag Type format is:

CX, where X is the tag class. Currently the unit supports class 1 tags

The file can not be displayed on the mobile computer (with the factory supplied software). The file is intended to be downloaded to a host and displayed using an application that can read comma delimited fields, such as an Excel spreadsheet.

The file contains a one line header and one line for each unique tag found. The header line contains a comma separated list of field text descriptions. The tag lines contain the Tag ID starting with 'H' for hex, and a number indicating how many times the tag was read.

To save tag data:

1. Tap *Start - 9000 Demo - RFID* icon.
2. Read a tag(s). See *Reading Tags* on page C-34.
3. Tap **Save**.
4. Tap **OK** to save using the default name and directory, or enter a custom name /directory and then tap **OK**.

File Menu

Tap the *File* menu to view version information about RFID, log information, reboot or exit the application.

About

Tap *File* - *About* to view the application version number, the RFID DLL version number, the RFID reader module firmware version number, date code, and serial and port information.

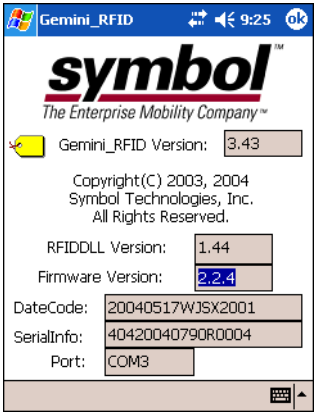


Figure C-25. RFID - About Window

Log

Tap *File* - *Log* to display the *Log* menu.

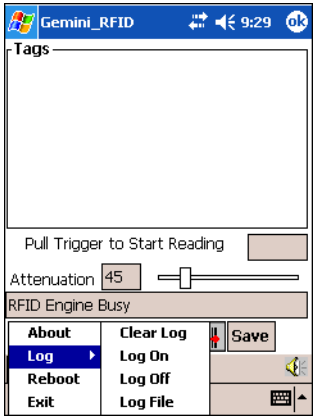


Figure C-26. RFID - Log Menu

From the *Log* menu, tap:

- *Clear Log* to clear logged data.
- *Log On* to turn on the log feature. When this feature is turned on, the display splits into two sections: upper and lower. The lower section displays all communication to the RFID radio module, including tag data.
- *Log Off* to turn off the log feature. *Log Off* is the default.
- *Log File* to create and save a log file. The log file is saved in the root directory on the mobile computer to a file named RXTXLog.txt. This file can be used to track errors reading RFID tags.

Reboot

Tap *File* - *Reboot* to issue a (warm) reboot command to the RFID radio module.

Reboot only if the mobile computer fails to respond.

Exit

Tap *File* - *Exit* to exit the RFID sample application.

Mode Menu

Tap the *Mode* menu to use the Inventory method to read tags, locate a tag, program a tag, or scan a bar code. *Mode* menu options offer all of the operations available by tapping an icon on the main *Tags* window menu bar.

Inventory

Tap *Mode* - *Inventory* to start reading tags using the *Inventory* method. Using this method, the application performs as if the trigger is pulled. Tag read attempts continue until the *Inventory* menu option is tapped again.

Locate Tag

This option is used to find a specific tag.

1. Tap  in the main *Tags* window or tap *Mode - Locate Tag*.

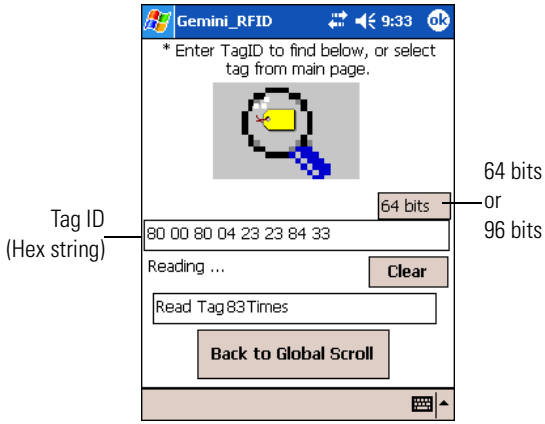


Figure C-27. RFID - Locate Tag Window

2. Enter a valid *Tag ID* in the text box below the magnifying glass:
   - an 8-byte hex string for 64 bits
   - a 12-byte hex string for 96 bits.

Note

To pre-fill the text box with a valid Tag ID, select a tag in the main *Tags* window and tap  .

3. Pull the trigger to locate the tag. The mobile computer beeps when the tag is found. The faster the beep, the closer the mobile computer is to the located tag.

   Figure C-27 shows Tag ID 80 00 80 04 23 23 84 33 was read 83 times since the trigger was pulled.

4. Tap **Back to Global Scroll** to return to the main *Tags* window.

Program Tag

This option can be used to program RFID tags.

1. Tap  in the main *Tags* window or tap *Mode - Program Tag*.

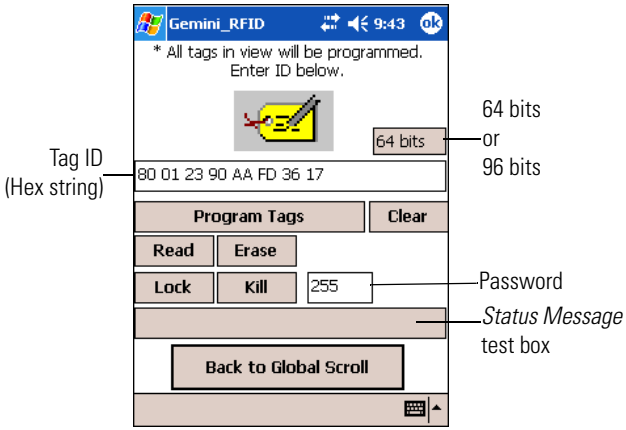


Figure C-28. RFID - Program Tag Window

2. In the text box below the tag icon, enter an 8-byte (64 bits) or 12-byte (96 bits) hex string to be programmed into the tag. This string can contain any number from 0-9, and a letter from A-F. Each byte must consist of 2 characters. Each byte should be separated by a space character.

   For example, if the tag should contain 80012390AAFD3617, type 80 01 23 90 AA FD 36 17 as shown in Figure C-28.

3. A password is required to lock a tag, and kill a tag. In the *Password* box, enter a number from 0 - 255.

Remember the password. Once a tag is locked, it cannot be killed without a password.

4. Tap **Program Tags**. It might take more than one attempt to program the tag.
5. When a tag is successfully programmed, a status message displays in the *Status Message* text box.
6. Tap **Read** to read a newly programmed tag.

Note

For a successful tag read, the allowable read distance from the front of the mobile computer's scan exit window to the tag is 0.2 ft - 10 ft (0.061 m to 3.1 m).

7. Tap **Erase** to erase an unlocked tag.
8. Tap **Lock** to lock a tag so that it cannot be changed. A password is required to lock a tag. (See *Program Tag* on page C-40.)
9. Tap **Kill** to make a tag unreadable. A password is required to kill a tag. (See *Program Tag* on page C-40.)
10. Tap **Back to Global Scroll** to return to the main *Tags* window.

WARNING

To successfully write data to a tag, the tag must be no less than 1 ft (.31 m) from the antenna and no greater than 2 ft (.61 m) from the antenna.

Scan Bar Code

This option launches the Imager sample application to scan bar codes and capture images.

1. Tap  in the main *Tags* window or tap *Mode* - *Scan Barcode*.

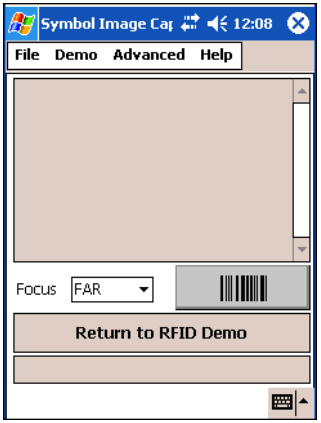


Figure C-29. Symbol Image Capture - Scan Window

2. See *Imager* on page C-4 for information about scanning and image capture.
3. Tap **Return To RFID Demo** to return to the main RFID *Tags* window.

D

Specifications

Contents

Technical Specifications

The following tables summarize the mobile computer's intended operating environment and general technical hardware specifications.

Table D-1. Environmental Parameters

Operating Temperature	**MC9000-G Series/MC906R-G RFID** (color and monochrome units) -4° F to 122° F (-20° C to +50° C) Note: Batteries must be charged within the 32° to 104° F (0° to +40° C) ambient temperature range.
Storage Temperature (color and monochrome units)	-40° F to 158° F (-40° C to +70° C)
Humidity	5% to 95% non-condensing
Electrostatic Discharge (ESD)	+/-15 kVDC (air); +/- 8 kVDC (contact)
Drop to Concrete	**MC9000-G Series/MC906R-G RFID** (color and monochrome units) 6' (1.8 meters) at - 4° F to 122° F (-20° C to 50° C)
Sealing	IP64 (electronic enclosure)

Table D-2. Technical Hardware Specifications

Dimensions	**MC9000-G Series** 9.2 in. L x 3.6 in. W x 7.6 in. H (233.7 mm L x 91.4 mm W x 193 mm H)
	MC906R-G RFID 10.75 in. L x 7.7 in. H Maximum width (antenna area): 4.7 in. Minimum width (keyboard area): 2.5 in. (273.05 mm L x 195.58 mm H) (antenna area: 119.38 mm W) (keyboard area: 63.5 mm W)

Table D-2. Technical Hardware Specifications (Continued)

Weight (including battery)	**MC9000-G Series** 27 oz (765.5 g) **MC906R-G RFID** 35.4 oz (1,003.6 g)
Display	Transflective color TFT-LCD, 65K colors, 240 (W) x 320 (L) (QVGA size) Monochrome TFT-LCD, 16 shades, 240 (W) x 320 (L) (QVGA size)
Touch Panel	Polycarbonate, analog resistive touch
Main Battery	Rechargeable Lithium-Ion 2200 mAh minimum (7.2V)
Backup Battery	Ni-MH battery (rechargeable), 20mAh (3.6V) 3 cells
CPU	Intel® XScale™ PXA255 processor at 400 MHz
Operating Platform	Microsoft® Windows® Mobile 2003 Software for Pocket PCs
Memory	**MC9000-G Series** 64MB RAM/ 64MB ROM 128MB RAM/ 64MB ROM **MC906R-G RFID** 64MB RAM/ 64MB ROM
Interface	RS-232: max. 115.2 kbps, min. 1200 bps USB v1.1 (Client)
Keypad Options	53-key standard Optional Keypads: • 28-key • 43-key • 3270 Emulator • 5250 Emulator • VT Emulator.
MC906R-G RFID Antenna/Tag:	
Antenna polarity	Horizontal direction (parallel to the laser beam).
Antenna gain	6 dbi
Antenna input power	1 Watt max
Antenna output power	4 Watts max
Frequency	902 - 928 MHz

Table D-2. Technical Hardware Specifications (Continued)

Tag Type	EPC Class 1
Tag read range	Max = 10 feet (from front of scan exit window) Min = .2 feet
Tag write range	Max = 2 feet (from front of scan exit window) Min = 1 foot
Tag read rate	15 tags/second
Scanning:	
1-D Decode Capability	**1-D Laser Scan Engine:** Code 39 Code 128 Code 93 Codabar Code 11 Discrete 2 of 5 Interleaved 2 of 5 EAN-8 EAN-13 MSI UPCA UPCE UPC/EAN supplementals Coupon Code Trioptic 39 Webcode

Table D-2. Technical Hardware Specifications (Continued)

Imaging Decode Capability	**1-D/2-D Imager Engine:** Code 39 Code 128 Code 93 Codabar Code 11 Interleaved 2 of 5 Discrete 2 of 5 MSI EAN-8 EAN-13 UPCA UPCE UPC/EAN supplementals Coupon Code Trioptic 39 Webcode TLC39 Composite AB Composite C Micro PDF-417 PDF-417 Macro PDF-417 (Macro) Micro PDF-417 QR Code RSS Expanded RSS Limited RSS-14 Data Matrix Maxi Code US Postnet* US Planet UK 4-state Australian 4-state Canadian 4-state Japanese 4-state Dutch Kix *To be supported at a later date. Go to http://software.symbol.com/ for a list of the latest supported symbologies.

Table D-2. Technical Hardware Specifications (Continued)

MC9000-G Series may include the following additional embedded radio capabilities:	
802.11b (WLAN) *	
WLAN connectivity	IEEE 802.11b: Direct-sequence topology Max data rate: 11 Mbps
Antenna	Internal, dual-element; supports spatial-diversity
Bluetooth (WPAN) **	
WPAN Connectivity	IEEE 802.15: Bluetooth Class 2 Encryption support Max data rate: 1 Mbps
Antenna	Internal
***** 802.11b (WLAN) - standard internal antenna in MC906R-G RFID mobile computers. ****** Bluetooth (WPAN) - not supported in MC906R-G RFID mobile computers.	

Modem Module

Table D-3. Environmental Parameters and Technical Hardware Specifications

Asynchronous character format	Up to 10 bits, including data, start, stop, and parity bits
Asynchronous data rates	Transmission rate fallback through 300 bps
Chipset	Conexant SCM
Compatible public switched network jacks	RJ11
Dialing capability	Tone and rotary pulse
Line requirements	Public switched telephone network (PSTN) including international connections
Operating environment	Altitude: up to 20,000 ft. Humidity: 10% to 90% non-condensing
Operating temperature	Operating: 32^{o} to 122^{o}F / 0^{o} to 50^{o}C Storage: -4^{o} to 149^{o}F / -20^{o} to 65^{o}C
Operating modes	Asynchronous, full duplex, automatic and manual call originate
Performance	Line speed up to 33,600 bps HHC to modem speed (DTE speed) up to 57,600 bps V.42bis data compression V.42 LAPM error correction
Current consumption	100 mA active <10 mA sleep
Pulse dialing rate (except where prohibited under TBR-21 rules)	10 pulses per second Pulse dialing duty cycle: 39/61% (US) make-to-break ratio
Ringer equivalence	0.1 dBm
Standards & protocols	Bell 103, Bell 212A, Hayes AT command set, and ITU Vs. 17, 21, 22 A & B, 22bis, 23, 25bis, 27 ter, 29, 32, 32bis, 42bis
Tone detected	Dial, busy, ring back, modem answer tones. Blind dialing based on time-out periods available for incompatible tones.
AC Adapter	9V, 2 amp regulated AC/DC adapter allows unlimited modem use. Do NOT substitute an AC adapter; using an incorrect AC power supply causes electrical damage to the mobile computer and voids warranty.

Mobile Computer Pin-Outs

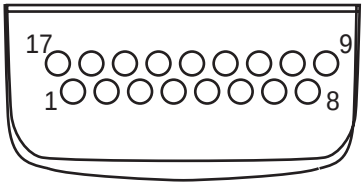


Figure D-1. Pin Locations

Table D-4. MC9000-G Pin-Outs

PIN Number	Signal Name	Function
1	USB_GND	USB
2	USB_D_PLUS	USB
3	TXD	RS232C
4	RXD	RS232C
5	DCD	RS232C
6	RTS	RS232C
7	DSR	RS232C
8	GND	Ground, 2.5A max.
9	RI	RS232C
10	CRADLE_DET	Grounded by cradle when in cradle
11	DTR	RS232C
12	Not connected	Not connected
13	POWER_IN	12V, 2.5A max
14	CTS	RS232C
15	USB_5V_DET	USB
16	USB_D_MINUS	USB
17	EXT_PWR_OUT	3.3V @500mA

Accessory CAM and MSR Pin-Outs

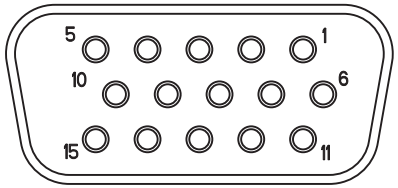


Figure D-2. CAM and MSR Serial Connector

Table D-5. CAM and MSR Serial Connector Pin-outs

Pin	Signal
1	USB_5V_DET
2	USB_D_MINUS
3	USB_D_PLUS
4	GND
5	GND
6	PWR_EXT_OUT
7	CRADLE_DET*
8	DSR
9	DCD
10	TXD
11	CTS
12	DTR
13	RI
14	RTS
15	RXD

Keypad Maps

Contents

Introduction

This appendix contains the keypad maps for the keypad configurations. Each key is listed in the table with its value, depending on the state of the keypad.

Keypads

The mobile computer has five interchangeable modular keypads:

- 28-key
- 43-key
- 53-key
- 3270 Emulator
- 5250 Emulator
- VT Emulator.

The modular keypads can be changed in the field as necessary to support specialized applications.

28-Key Keypad Configuration

The 28-key configuration contains a **Power** button, application keys, scroll keys and a function key. See Table E-1 for key functions and Table E-2 for the keypad mappings. The mapping functions include:

- 28-key functions
- 28-key character map.

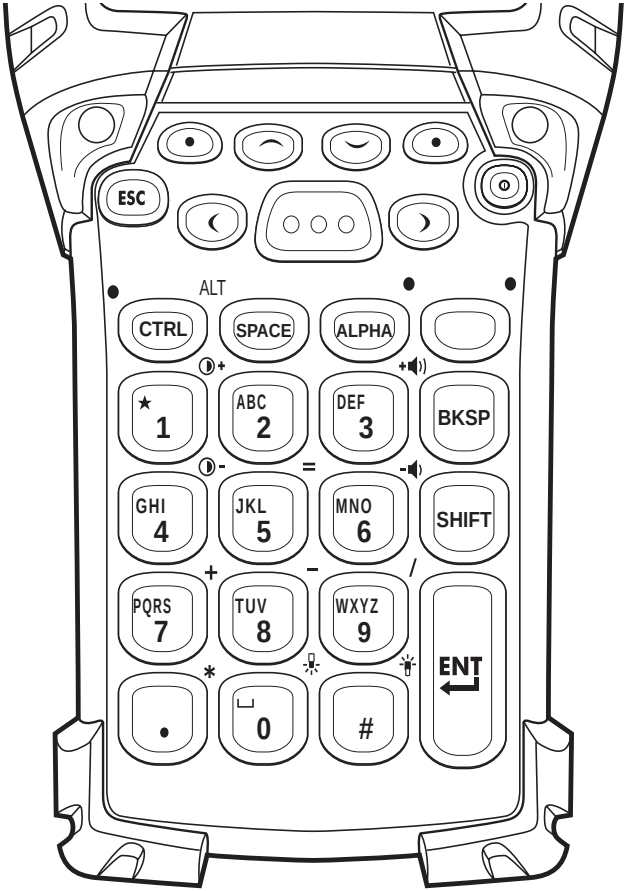


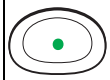
Figure E-1. 28-Key Keypad

Table E-1. 28-Key Functions

Local Function	Key Sequence
Display Backlight On/Off	<Func><#>
Keypad Backlight On/Off	<Func><0>
Contrast + (monochrome) Brightness + (color)	<Func><1>
Contrast - (monochrome) Brightness - (color)	<Func><4>
Volume +	<Func><3>
Volume -	<Func><6>

For registry information about **Enter**/**Return** and **Green**/**Red** dot keys, and API information about **F6**/**F7** keys, see the keypad's description table in *Chapter2, Operating*.

Table E-2. 28-Key Mapping

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
 **Green Dot Key**													VK_F14 (0x7d, 125d)	

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
													VK_F15 (0x7d, 126d)	
Red Dot Key														

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	1												49	49
		*											106	42
											*			
												*		

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	2												50	50
		a											65	97
			b										66	98
				c									67	99
						A							160+65	65
							B						160+66	66
								C					160+67	67

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	3												51	51
		d											68	100
			e										69	101
				f									70	102
						D							160+68	68
							E						160+69	69
								F					160+70	70
											+ *			
												+ *		

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	4												52	52
		g											71	103
			h										72	104
				i									73	105
						G							160+71	71
							H						160+72	72
								I					160+73	73
											 *			
												 *		

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	5												53	53
		j											74	106
			k										75	107
				l									76	108
						J							160+74	74
							K						160+75	75
								L					160+76	76
										5			53	53
											=		187	61
												+	160+187	43

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	6												54	54
		m											77	109
			n										78	110
				o									79	111
						M							160+77	77
							N						160+78	78
								O					160+79	79
														
														

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	7												55	55
		p											80	112
			q										81	113
				r									82	114
					s								83	115
						P							160+80	80
							Q						160+81	81
								R					160+82	82
									S				160+83	83
											+		107	43
												+	160+107	43

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	8												56	56
		t											84	116
			u										85	117
				v									86	118
						T							160+84	84
							U						160+85	85
								V					160+86	86
											-		189	45
												-	160+189	45

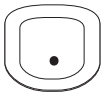
* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	9												57	57
		w											87	119
			x										88	120
				y									89	121
					z								90	122
						W							160+87	87
							X						160+88	88
								Y					160+89	89
									Z				160+90	90
											/		191	47
												/	160+191	47

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	.												190	46
											*		106	42
												*	160+106	42

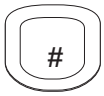
* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	0												48	48
		Space											32	32
											*			
												*		

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	#												160+51	35
											 *			
												 *		

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	Space												32	32
* See Table 2-7 on page 2-29 for special function key values.														

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	BKSP												8	8

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	Up												38	

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	Down												40	

* See Table 2-7 on page 2-29 for special function key values.

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	Right												39	
* See Table 2-7 on page 2-29 for special function key values.														

Table E-2. 28-Key Mapping (Continued)

Key	Default State	Alpha State (1 Tap)	Alpha State (2 Taps)	Alpha State (3 Taps)	Alpha State (4 Taps)	Shift Alpha State (1 Tap)	Shift Alpha State (2 Taps)	Shift Alpha State (3 Taps)	Shift Alpha State (4 Taps)	Ctrl State	Funct State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	Left												37	

* See Table 2-7 on page 2-29 for special function key values.

43-Key Keypad Configuration

The 43-key configuration contains a Power button, application keys, scroll keys and a function key. See Table E-3 for key functions and Table E-4 for the keypad mappings. The mapping functions include:

- 43-key functions
- 43-key character map.

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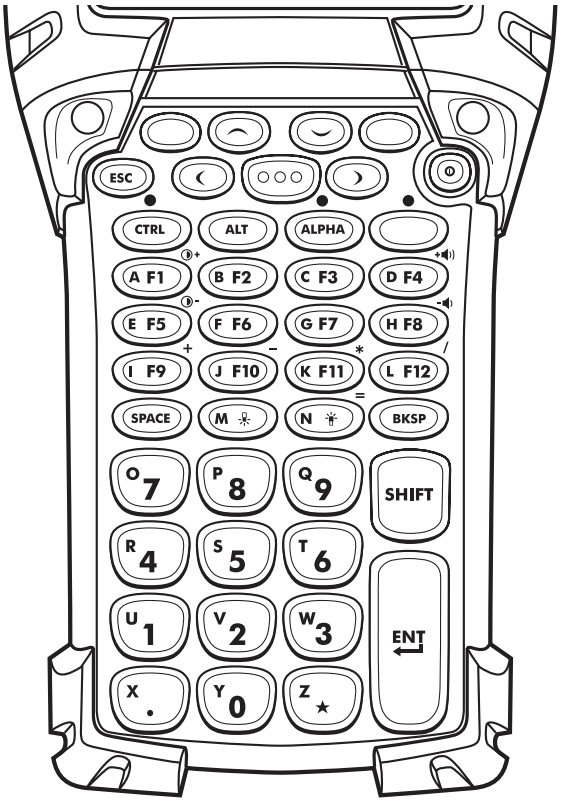

Figure E-2. 43-Key Keypad

Table E-3. 43-Key Keypad Functions

Local Function	Key Sequence
Display Backlight On/Off	
Keypad Backlight On/Off	
Contrast + (monochrome) Brightness + (color)	<Func><F1>
Contrast - (monochrome) Brightness - (color)	<Func><F5>
Volume +	<Func><F4>
Volume -	<Func><F8>

For registry information about **Enter**/**Return** and **Green**/**Red** dot keys, and API information about **F6**/**F7** keys, see the keypad's description table in *Chapter2, Operating*.

Table E-4. 43-Key Keypad Mapping

Key	Default (Numlock) State	Alpha State	Shift-Alpha State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
 **Green Dot Key**						VK_F14 (0x7d, 125d)	
 **Red Dot Key**						VK_F15 (0x7d, 126d)	
	1					49	49
		u				85	117
			U			160+85	85
				u		85	117
					U	160+85	85
	2					50	50
		v				86	118
			V			160+86	86
				v		86	118
					V	160+86	86

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-4. 43-Key Keypad Mapping (Continued)

Key	Default (Numlock) State	Alpha State	Shift-Alpha State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	3					51	51
		w				87	119
			W			160+87	87
				w		87	119
					W	160+87	87
	4					49	49
		r				82	114
			R			160+82	82
				r		82	114
					R	160+82	82
	5					53	53
		s				83	115
			S			160+83	83
				s		83	115
					S	160+83	83
	6					54	54
		t				84	116
			T			160+84	84
				t		84	116
					T	160+84	84

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-4. 43-Key Keypad Mapping (Continued)

Key	Default (Numlock) State	Alpha State	Shift-Alpha State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	7					55	55
		o				79	111
			O			160+79	79
				o		79	111
					O	160+79	79
	8					56	56
		p				80	112
			P			160+80	80
				p		80	112
					P	160+80	80
	9					57	57
		q				81	113
			Q			160+81	81
				q		81	113
					Q	160+81	81
	0					49	49
		y				89	121
			Y			160+89	89
				y		89	121
					Y	160+89	89

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-4. 43-Key Keypad Mapping (Continued)

Key	Default (Numlock) State	Alpha State	Shift-Alpha State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	F1						
		a				65	97
			A			160+65	97
				 *			
					 *		
	F2						
		b				66	98
			B			160+66	66
				b		66	98
					B	160+66	66
	F3						
		c				67	99
			C			160+67	67
				c		67	99
					C	160+67	67

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-4. 43-Key Keypad Mapping (Continued)

Key	Default (Numlock) State	Alpha State	Shift-Alpha State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	F4						
		d				68	100
			D			160+68	68
				 *			
					 *		
	F5						
		e				69	101
			E			160+69	69
				 *			
					 *		
	F6						
		f				70	102
			F			160+70	70
				**		Cannot be remapped. Dedicated to controlling volume level.**	
					F	160+70	70

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-4. 43-Key Keypad Mapping (Continued)

Key	Default (Numlock) State	Alpha State	Shift-Alpha State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	F7						
		g				71	103
			G			160+71	71
				**		Cannot be remapped. Dedicated to controlling volume level.**	
					G	160+71	71
	F8						
		h				72	104
			H			160+72	72
				h		72	104
					H	160+72	72
	F9						
		i				73	105
			I			160+73	73
				+		107	43
					+	160+107	43
	F10						
		j				74	106
			J			160+74	74
				-		109	45
					-	160+109	45

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-4. 43-Key Keypad Mapping (Continued)

Key	Default (Numlock) State	Alpha State	Shift-Alpha State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	F11						
		k				75	107
			K			160+75	75
				*		106	42
					*	160+106	42
	F12						
		l				76	108
			L			160+76	76
				/		191	47
					?	160+191	63
	* 						
		m				77	109
			M			160+77	77
				m		77	109
					M	160+77	77
	* 						
		n				78	110
			N			160+78	78
				n		78	110
					N	160+78	78

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-4. 43-Key Keypad Mapping (Continued)

Key	Default (Numlock) State	Alpha State	Shift-Alpha State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	Space					32	32
		Space				32	32
			Space			160+32	32
	BKSP					8	8
		BKSP				8	8
			BKSP			160+8	8
				=		0xbb,187d	61d
					+	160+187	43d
	UP					38	-
	DOWN					40	

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-4. 43-Key Keypad Mapping (Continued)

Key	Default (Numlock) State	Alpha State	Shift-Alpha State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	Right					39	
	Left					37	
	.					190	46
		x				88	120
			X			160+88	88
				x		88	120
					X	160+88	88
	*					106	42
		z				90	122
			Z			160+90	90
				z		90	122
					Z	160+90	90

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

53-Key Keypad Configuration

The 53-key configuration contains a Power button, application keys, scroll keys and function keys. See Table E-5 for key functions and Table E-6 for the keypad mappings. The mapping functions include:

- 53-key functions
- 53-key character map.

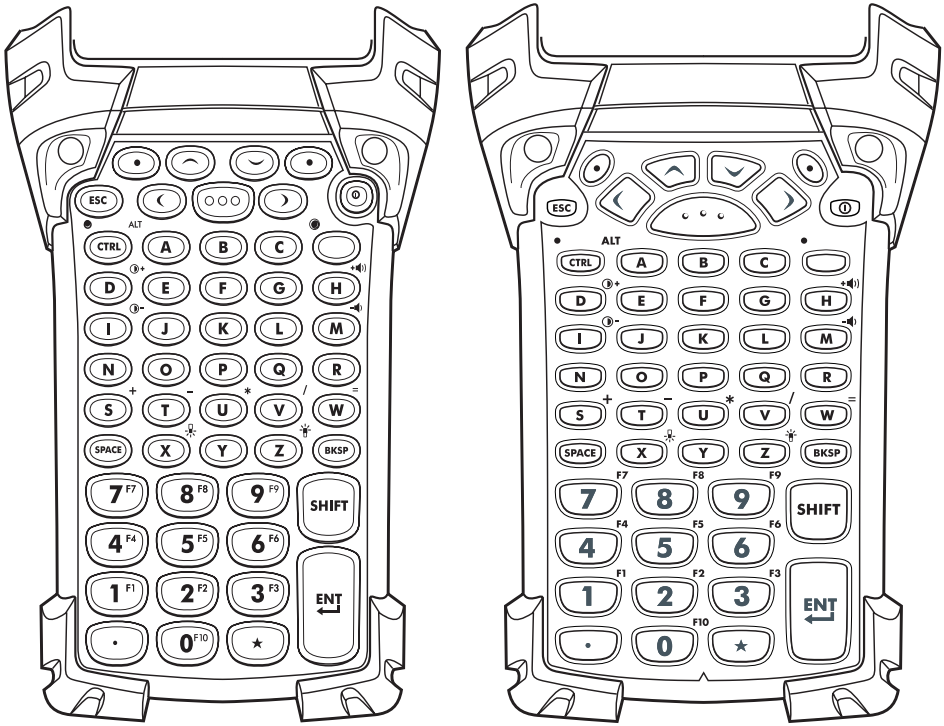

Figure E-3. 53-Key Keypad

Table E-5. 53-Key Keypad Functions

Local Function	Key Sequence
Display Backlight On/Off	<Func><Z>

Table E-5. 53-Key Keypad Functions

Local Function	Key Sequence
Keypad Backlight On/Off	<Func><X>
Contrast + (monochrome) Brightness + (color)	<Func><D>
Contrast - (monochrome) Brightness - (color)	<Func><I>
Volume +	<Func><H>
Volume -	<Func><M>

Note

For registry information about **Enter**/**Return** and **Green**/**Red** dot keys, and API information about **F6**/**F7** keys, see the keypad's description table in *Chapter2, Operating*.

Table E-6. 53-Key Keypad Mapping

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
 **Green Dot Key**					VK_F14 (0x7d, 125d)	
 **Red Dot Key**					VK_F15 (0x7d, 126d)	

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-6. 53-Key Keypad Mapping (Continued)

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	1				49	49
		!			160+49	33
			F1		112	
				F1	1160+12	
	2				50	50
		@			160+50	64
			F2		113	
				F2	160+113	
	3				51	51
		#			160+51	35
			F3		114	
				F3	160+114	
	4				52	52
		$			160+52	103
			F4		115	
				F4	160+115	
	5				53	53
		%			160+53	106
			F5		116	
				F5	160+116	

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-6. 53-Key Keypad Mapping (Continued)

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	6				54	54
		^			160+54	94
			**		Cannot be remapped.Dedicated to controlling volume level.**	
				F6	160+117	
	7				55	55
		&			160+55	112
			**		Cannot be remapped.Dedicated to controlling volume level.**	
				F7	160+118	
	8				56	56
		*			160+56	42
			F8		119	
				F8	160+119	
	9				57	57
		(			160+57	41
			F9		120	
				F9	160+120	
	0				48	48
		)			160+48	40
			F10		121	
				F10	160+121	

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-6. 53-Key Keypad Mapping (Continued)

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	UP				38	
	DOWN				40	
	Right				39	
	Left				37	
	ENTER				13	13

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-6. 53-Key Keypad Mapping (Continued)

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
A	a				65	97
		A			160+65	65
			,		188	44
				<	160+188	60
B	b				66	98
		B			66	66
			.		190	46
				>	160+190	60
C	c				67	99
		C			160+67	67
			‘		222	39
				“	160+222	34
D	b				68	100
		D			160+68	68
			+ *			
				+ *		
E	e				69	101
		E			160+69	69
			[		219	91
				{	160+219	123

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-6. 53-Key Keypad Mapping (Continued)

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
F	f				70	102
		F			160+70	70
			]		221	93
				}	160+221	125
G	g				71	103
		G			160+71	71
			\		220	92
				|	160+220	124
H	h				72	104
		H			160+72	72
			+◀)) *			
				+◀)) *		
I	i				73	105
		I			160+73	73
			◑- *			
				◑- *		

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-6. 53-Key Keypad Mapping (Continued)

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
J	j				74	106
		J			160+74	74
			‘		192	96
				~	160+192	126
K	k				75	107
		K			160+75	75
			k		75	107
				K	160+75	75
L	l				76	108
		L			160+76	76
			/		191	47
				?	160+191	63
M	m				77	109
		M			160+77	77
			*			
				*		
N	n				78	110
		N			160+78	78
			-		189	45
				_	160+189	95

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-6. 53-Key Keypad Mapping (Continued)

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
O	o				79	111
		O			160+79	79
			o		79	111
				O	160+79	79
P	p				80	112
		P			160+80	80
			p		80	112
				P	160+80	80
Q	q				81	113
		Q			160+81	81
			q		81	113
				Q	160+81	81
R	r				82	114
		R			160+82	82
			;		186	59
				:	160+186	58
S	s				83	115
		S			160+83	83
			+		187	43
				+	160+187	43
T	t				84	116
		T			160+84	84
			-		109	45
				-	160+109	45

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-6. 53-Key Keypad Mapping (Continued)

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
U	u				85	117
		U			85	85
			*		106	42
				*	160+106	42
V	v				86	118
		V			160+86	86
			/		191	47
				?	160+191	63
W	w				87	119
		W			160+87	87
			=		187	43
				+	160+187	43
X	x				88	120
		X			160+88	88
			*			
				*		
Y	y				89	121
		Y			160+89	89
			y		89	121
				Y	160+89	89

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

Table E-6. 53-Key Keypad Mapping (Continued)

Key	Default State	Shift State	Func State	Shift-Func State	VK Code (Decimal)	ASCII Value (Decimal)
	z				90	122
		Z			90	90
			 *			
				 *		

* See Table 2-7 on page 2-29 for special function key values.

** See Table 2-2 on page 2-10 for more information about F6/F7 keys.

3270 Emulator Configuration

The 3270 emulator configuration contains a Power button, application keys, scroll keys and a function key. The 3270 emulator configuration uses the 53-key mapping when not in the emulator mode (see Table E-6 for descriptions for the 53-key mappings.) The emulator mapping functions include:

- 3270 key functions
- 3270 emulator keys
- 3270 character map.

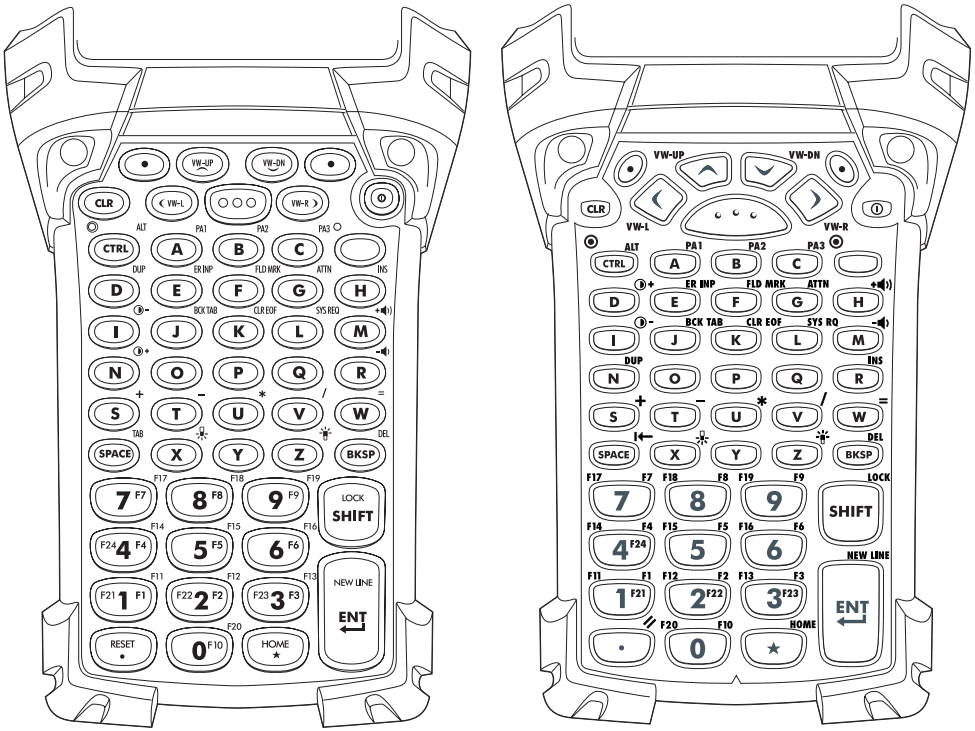

Figure E-4. 3270 Emulator Keypad

Note

For registry information about **Enter**/**Return** and **Green**/**Red** dot keys, and API information about **F6**/**F7** keys, see the keypad's description table in *Chapter2, Operating*.

Table E-7. 3270 Key Functions

Local Function	Key Sequence
Program Information	<Func><Ctrl><P>
Diagnostics	<Func><Ctrl><D>
Keyclicks On/Off	<Func><Ctrl><K>
Quiet Mode On/Off	<Func><Ctrl><Q>
Mobile Computer Configuration	<Func><Ctrl><C>
Host Profiles	<Func><Ctrl><R>
Message Recall	<Func><Ctrl><M>
Free Cursor Mode	<Func><Ctrl><F>
Close Session	<Func><Ctrl><T>
Previous Session	<Upper Left Button>
Next Session	<Upper Right Button>
Caps Lock	<Func><Shift>
View Mode On/Off	<Func><Ctrl><Z>
Scroll Left	<Ctrl><Left>
Scroll Right	<Ctrl><Right>
Scroll Up	<Ctrl><Up>
Scroll Down	<Ctrl><Down>
Display Backlight On/Off	<Func><Z>
Keypad Backlight On/Off	<Func><X>
Contrast + (monochrome) Brightness + (color)	<Func><D>
Contrast - (monochrome) Brightness - (color)	<Func><I>
Volume +	<Func><H>
Volume -	<Func><M>

Table E-8. 3270 Emulator Keys

3270 Key	Key Sequence
Attention	<Ctrl><G>
Backspace	<BKSP>
Back Tab	<Ctrl><J>
Clear	<Esc>
Clear EOF	<Ctrl><K>
Delete	<Func><BKSP>
Dup	<Ctrl><D>
Enter	<Enter>
Erase Input	<Ctrl><E>
Field Mark	<Ctrl><F>
Home	<Func><*>
Insert	<Ctrl><H>
New Line	<Ctrl><N>
Reset	<Ctrl><O>
System Request	<Ctrl><L>
Tab	<Func><Space>
Left Arrow	<Left Arrow>
Right Arrow	<Right Arrow>
Up Arrow	<Up Arrow>
Down Arrow	<Down Arrow>
PA1	<Ctrl><A>
PA2	<Ctrl><B>
PA3	<Ctrl><C>
F1	<Func><1>
F2	<Func><2>
F3	<Func><3>

Table E-8. 3270 Emulator Keys (Continued)

3270 Key	Key Sequence
F4	<Func><4>
F5	<Func><5>
F6	<Func><6>
F7	<Func><7>
F8	<Func><8>
F9	<Func><9>
F10	<Func><0>
F11	<Shift><1>
F12	<Shift><2>
F13	<Shift><3>
F14	<Shift><4>
F15	<Shift><5>
F16	<Shift><6>
F17	<Shift><7>
F18	<Shift><8>
F19	<Shift><9>
F20	<Shift><0>
F21	<Ctrl><1>
F22	<Ctrl><2>
F23	<Ctrl><3>
F24	<Ctrl><4>

Table E-9. 3270 Character Map

Char	Key Sequence
Space	<space>
!	<Ctrl><5>
"	<Shift><Func><C>
#	<Ctrl><6>
$	<Ctrl><7>
%	<Ctrl><8>
&	<Ctrl><9>
'	<Func><C>
(	<Ctrl><0>
)	<Func><Ctrl><A>
*	<*>
+	<Func><S>
,	<Func><A>
-	<Func><T>
.	<.>
/	<Func><V>
0	<0>
1	<1>
2	<2>
3	<3>
4	<4>
5	<5>
6	<6>
7	<7>
8	<8>
9	<9>

Table E-9. 3270 Character Map (Continued)

Char	Key Sequence
:	<Shift><Func><R>
;	<Func><R>
<	<Shift><Func><A>
=	<Func><W>
>	<Shift><Func><B>
?	<Func><Ctrl><G>
@	<Func><Ctrl><B>
A	<Shift><A>
B	<Shift><B>
C	<Shift><C>
D	<Shift><D>
E	<Shift><E>
F	<Shift><F>
G	<Shift><G>
H	<Shift><H>
I	<Shift><I>
J	<Shift><J>
K	<Shift><K>
L	<Shift><L>
M	<Shift><M>
N	<Shift><N>
O	<Shift><O>
P	<Shift><P>
Q	<Shift><Q>
R	<Shift><R>
S	<Shift><S>
T	<Shift><T>

Table E-9. 3270 Character Map (Continued)

Char	Key Sequence
U	<Shift><U>
V	<Shift><V>
W	<Shift><W>
X	<Shift><X>
Y	<Shift><Y>
Z	<Shift><Z>
[	<Func><E>
\	<Func><G>
]	<Func><F>
^	<Func><Ctrl><E>
_	<Shift><Func><N>
`	<Func><J>
a	<A>
b	<B>
c	<C>
d	<D>
e	<E>
f	<F>
g	<G>
h	<H>
i	<I>
j	<J>
k	<K>
l	<L>
m	<M>
n	<N>
o	<O>

Table E-9. 3270 Character Map (Continued)

Char	Key Sequence
p	<P>
q	<Q>
r	<R>
s	<S>
t	<T>
u	<U>
v	<V>
w	<W>
x	<X>
y	<Y>
z	<Z>
{	<Shift><Func><E>
|	<Shift><Func><G>
}	<Shift><Func><F>
~	<Shift><Func><J>

5250 Emulator Configuration

The 5250 emulator configuration contains a Power button, application keys, scroll keys and a function key. The 5250 emulator configuration uses the 53-key mapping when not in the emulator mode (see Table E-6 for descriptions for the 53-key mappings). The emulator mapping functions include:

- 5250 key functions
- 5250 emulator keys
- 5250 character map.

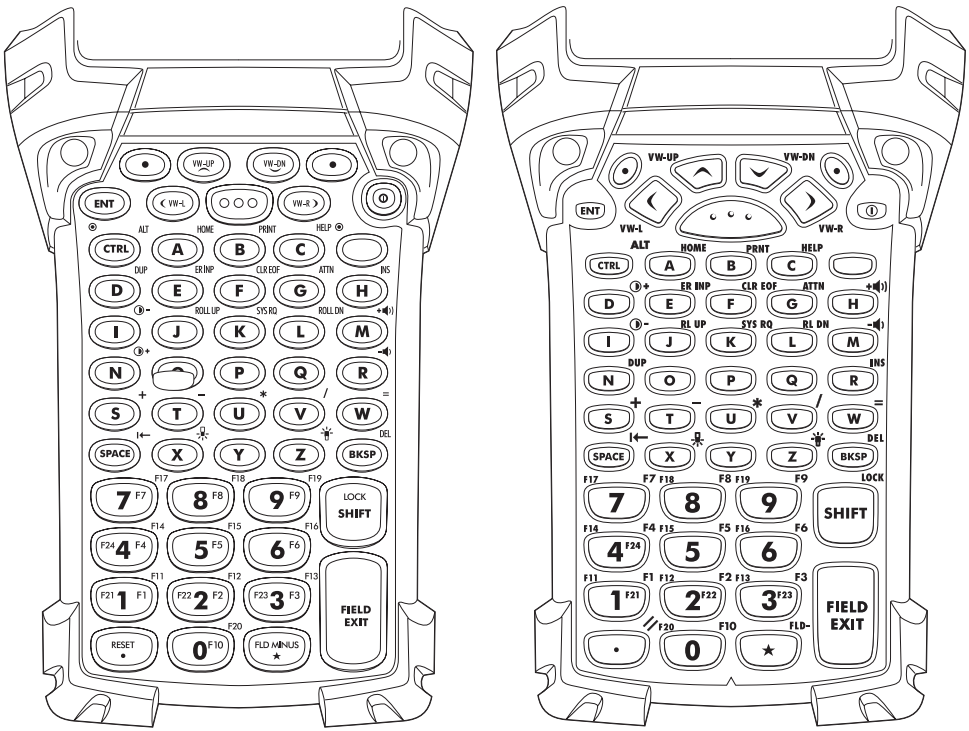

Figure E-5. 5250 Emulator Keypad

Note

For registry information about **Enter**/**Return** and **Green**/**Red** dot keys, and API information about **F6**/**F7** keys, see the keypad's description table in *Chapter2, Operating*.

Table E-10. 5250 Key Functions

Local Function	Key Sequence
Program Information	<Func><Ctrl><P>
Diagnostics	<Func><Ctrl><D>
Keyclicks On/Off	<Func><Ctrl><K>
Quiet Mode On/Off	<Func><Ctrl><Q>
Mobile Computer Configuration	<Func><Ctrl><C>
Host Profiles	<Func><Ctrl><R>
Message Recall	<Func><Ctrl><M>
Free Cursor Mode	<Func><Ctrl><F>
Close Session	<Func><Ctrl><T>
Previous Session	<Upper Left Button>
Next Session	<Upper Right Button>
Caps Lock	<Func><Shift>
View Mode On/Off	<Func><Ctrl><Z>
Scroll Left	<Ctrl><Left>
Scroll Right	<Ctrl><Right>
Scroll Up	<Ctrl><Up>
Scroll Down	<Ctrl><Down>
Display Backlight On/Off	<Func><Z>
Keypad Backlight On/Off	<Func><X>
Contrast + (monochrome) Brightness + (color)	<Func><D>
Contrast - (monochrome) Brightness - (color)	<Func><I>
Volume +	<Func><H>
Volume -	<Func><M>

Table E-11. 5250 Emulator Keys

5250 Key	Key Sequence
Attention	<Ctrl><G>
Backspace	<BKSP>
Back Tab	<Func><Space>
Clear	<Func><Ctrl><Shift><1>
Delete	<Func><BKSP>
Dup	<Ctrl><D>
Enter	<Ent>
Erase Input	<Ctrl><E>
Field Exit	<Field Exit>
Field Minus	<Func><*>
Help	<Ctrl><C>
Home	<Ctrl><A>
Insert	<Ctrl><H>
Print	<Ctrl><B>
Reset	<Func><.>
Roll Up	<Ctrl><J>
Roll Down	<Ctrl><L>
System Request	<Ctrl><K>
Tab	<Ctrl><I>
Left Arrow	<Left Arrow>
Right Arrow	<Right Arrow>
Up Arrow	<Up Arrow>
Down Arrow	<Down Arrow>
F1	<Func><1>
F2	<Func><2>
F3	<Func><3>

Table E-11. 5250 Emulator Keys (Continued)

5250 Key	Key Sequence
F4	<Func><4>
F5	<Func><5>
F6	<Func><6>
F7	<Func><7>
F8	<Func><8>
F9	<Func><9>
F10	<Func><0>
F11	<Shift><1>
F12	<Shift><2>
F13	<Shift><3>
F14	<Shift><4>
F15	<Shift><5>
F16	<Shift><6>
F17	<Shift><7>
F18	<Shift><8>
F19	<Shift><9>
F20	<Shift><0>
F21	<Ctrl><1>
F22	<Ctrl><2>
F23	<Ctrl><3>
F24	<Ctrl><4>

Table E-12. 5250 Character Map

Char	Key Sequence
Space	<space>
!	<Ctrl><5>
"	<Shift><Func><C>
#	<Ctrl><6>
$	<Ctrl><7>
%	<Ctrl><8>
&	<Ctrl><9>
'	<Func><C>
(	<Ctrl><0>
)	<Func><Ctrl><A>
*	<*>
+	<Func><S>
,	<Func><A>
-	<Func><T>
.	<.>
/	<Func><V>
0	<0>
1	<1>
2	<2>
3	<3>
4	<4>
5	<5>
6	<6>
7	<7>
8	<8>
9	<9>

Table E-12. 5250 Character Map (Continued)

Char	Key Sequence
:	<Shift><Func><R>
;	<Func><R>
<	<Shift><Func><A>
=	<Func><W>
>	<Shift><Func><B>
?	<Func><Ctrl><G>
@	<Func><Ctrl><B>
A	<Shift><A>
B	<Shift><B>
C	<Shift><C>
D	<Shift><D>
E	<Shift><E>
F	<Shift><F>
G	<Shift><G>
H	<Shift><H>
I	<Shift><I>
J	<Shift><J>
K	<Shift><K>
L	<Shift><L>
M	<Shift><M>
N	<Shift><N>
O	<Shift><O>
P	<Shift><P>
Q	<Shift><Q>
R	<Shift><R>
S	<Shift><S>
T	<Shift><T>

Table E-12. 5250 Character Map (Continued)

Char	Key Sequence
U	<Shift><U>
V	<Shift><V>
W	<Shift><W>
X	<Shift><X>
Y	<Shift><Y>
Z	<Shift><Z>
[	<Func><E>
\	<Func><G>
]	<Func><F>
^	<Func><Ctrl><E>
_	<Shift><Func><N>
`	<Func><J>
a	<A>
b	<B>
c	<C>
d	<D>
e	<E>
f	<F>
g	<G>
h	<H>
i	<I>
j	<J>
k	<K>
l	<L>
m	<M>
n	<N>
o	<O>

Table E-12. 5250 Character Map (Continued)

Char	Key Sequence
p	<P>
q	<Q>
r	<R>
s	<S>
t	<T>
u	<U>
v	<V>
w	<W>
x	<X>
y	<Y>
z	<Z>
{	<Shift><Func><E>
|	<Shift><Func><G>
}	<Shift><Func><F>
~	<Shift><Func><J>

VT Emulator Configuration

The VT emulator configuration contains a Power button, application keys, scroll keys and a function key. The VT emulator configuration uses the 53-key mapping when not in the emulator mode (see Table E-6 for descriptions for the 53-key mappings). The emulator mapping functions include:

- VT key functions
- VT-100 emulator keys
- VT-220 emulator keys
- VT/HP character map.

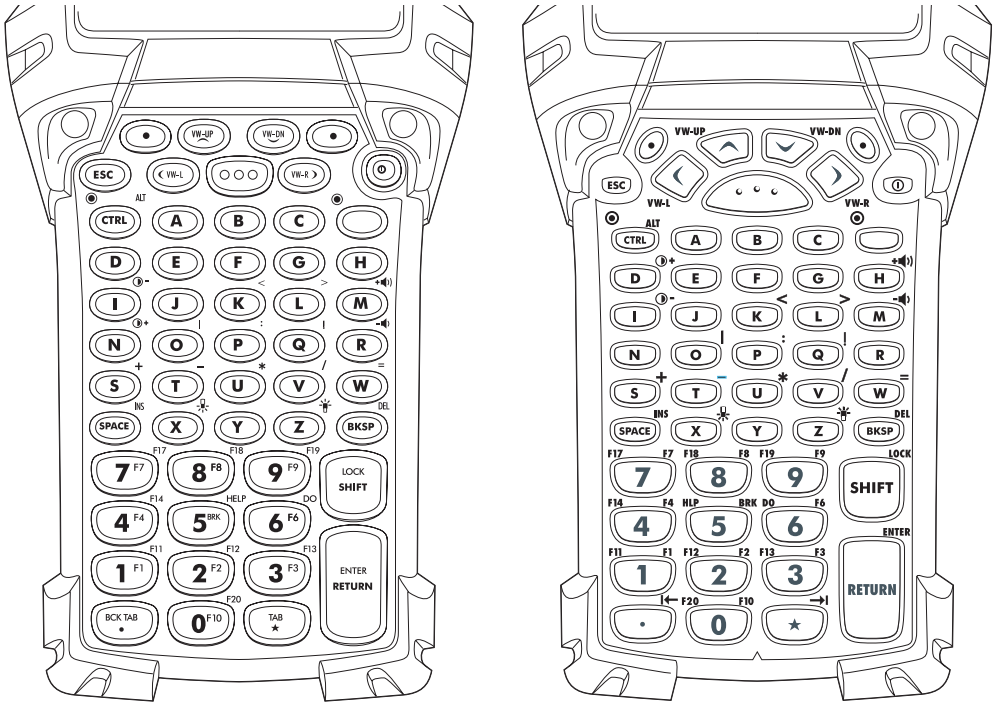

Figure E-6. VT Emulator Keypad

Note

For registry information about **Enter**/**Return** and **Green**/**Red** dot keys, and API information about **F6**/**F7** keys, see the keypad's description table in *Chapter2, Operating*.

Table E-13. VT Key Functions

VT Function	Key Sequence
Program Information	<Func><Ctrl><P>
Diagnostics	<Func><Ctrl><D>
Keyclicks On/Off	<Func><Ctrl><K>
Quiet Mode	<Func><Ctrl><Q>
Mobile Computer Configuration	<Func><Ctrl><C>
Host Profiles	<Func><Ctrl><R>
Close Session	<Func><Ctrl><T>
Previous Session	<Func><Ctrl><Shift><1>
Next Session	<Func><Ctrl><Shift><3>
Caps Lock	<Func><Shift>
View Mode On/Off	<Func><Ctrl><Z>
Scroll Left	<Ctrl><Left>
Scroll Right	<Ctrl><Right>
Scroll Up	<Ctrl><Up>
Scroll Down	<Ctrl><Down>
Display Backlight On/Off	<Func><Z>
Keypad Backlight On/Off	<Func><X>
Contrast + (monochrome) Brightness + (color)	<Func><D>
Contrast - (monochrome) Brightness - (color)	<Func><I>
Volume +	<Func><H>
Volume -	<Func><M>

Table E-14. VT-100 Emulator Keys

VT-100 Key	Key Sequence
Return	<Return>
Backspace	<BKSP>
Tab	<Func><*>
Up Arrow	<Up Arrow>
Left Arrow	<Left Arrow>
ESC	<Esc>
BS	<BKSP>
LF	<Ctrl><J>
Hard Mobile Computer Reset	<Func><Ctrl><H>
Enter	<Return>
Backspace(Delete)	<BKSP>
Backtab	<Func><.>
Down Arrow	<Down Arrow>
Right Arrow	<Right Arrow>
PF1	<Func><1>
PF2	<Func><2>
PF3	<Func><3>
PF4	<Func><4>

Table E-15. VT-220 Emulator Keys

VT-220 Key	Key Sequence
Return	<Return>
Backspace	<BKSP>
Tab	<Func><*>
Up Arrow	<Up Arrow>
Left Arrow	<Left Arrow>
Hard Mobile Computer Reset	<Func><Ctrl><H>
Find	<Func><Ctrl><Left>
Insert Here	<Func><Space>
Prev Screen	<Func><Ctrl><Shift><4>
PF1	<Func><1>
PF2	<Func><2>
PF3	<Func><3>
PF4	<Func><4>
BREAK1	<Func><5>
F6	<Func><6>
F7	<Func><7>
F8	<Func><8>
F9	<Func><9>
F10	<Func><0>
F11	<Shift><1>
F12	<Shift><2>
F13	<Shift><3>
F14	<Shift><4>
F15/Help	<Shift><5>
F16/Do	<Shift><6>
F17	<Shift><7>

Table E-15. VT-220 Emulator Keys (Continued)

VT-220 Key	Key Sequence
F18	<Shift><8>
F19	<Shift><9>
F20	<Shift><0>
Enter	<Return>
Backspace(Delete)	<Ctrl><BKSP>
Backtab	<Func><.>
Down Arrow	<Down Arrow>
Right Arrow	<Right Arrow>
Soft Mobile Computer Reset	<Func><Ctrl><S>
Select	<Func><Ctrl><Shift><5>
Remove	<Func><Ctrl><Shift><7>
Next Screen	<Func><Ctrl><Shift><6>

Table E-16. VT/HP Character Map

Char	Key Sequence
^@	
^A	<Ctrl><A>
^B	<Ctrl><B>
^C	<Ctrl><C>
^D	<Ctrl><D>
^E	<Ctrl><E>
^F	<Ctrl><F>
^G	<Ctrl><G>
^H	<Ctrl><H>
^I	<Ctrl><I>

Table E-16. VT/HP Character Map (Continued)

Char	Key Sequence
^J	<Ctrl><J>
^K	<Ctrl><K>
^L	<Ctrl><L>
^M	<Ctrl><M>
^N	<Ctrl><N>
^O	<Ctrl><O>
^P	<Ctrl><P>
^Q	<Ctrl><Q>
^R	<Ctrl><R>
^S	<Ctrl><S>
^T	<Ctrl><T>
^U	<Ctrl><U>
^V	<Ctrl><V>
^W	<Ctrl><W>
^X	<Ctrl><X>
^Y	<Ctrl><Y>
^Z	<Ctrl><Z>
ESC	<ESC>
^\	<Ctrl><1>
^]	<Ctrl><2>
^^	<Ctrl><3>
^_	<Ctrl><4>
Space	<space>
!	<Func><Q>
"	<Shift><Func><C>
#	<Ctrl><6>
$	<Ctrl><7>

Table E-16. VT/HP Character Map (Continued)

Char	Key Sequence
%	<Ctrl><8>
&	<Ctrl><9>
'	<Func><C>
(	<Ctrl><0>
)	<Func><Ctrl><A>
*	<*>
+	<Func><S>
,	<Func><A>
-	<Func><T>
.	<.>
/	<Func><V>
0	<0>
1	<1>
2	<2>
3	<3>
4	<4>
5	<5>
6	<6>
7	<7>
8	<8>
9	<9>
:	<Func><P>
;	<Func><R>
<	<Func><K>
=	<Func><W>
>	<Func><L>
?	<Func><Ctrl><G>

Table E-16. VT/HP Character Map (Continued)

Char	Key Sequence
@	<Func><Ctrl><B>
A	<Shift><A>
B	<Shift><B>
C	<Shift><C>
D	<Shift><D>
E	<Shift><E>
F	<Shift><F>
G	<Shift><G>
H	<Shift><H>
I	<Shift><I>
J	<Shift><J>
K	<Shift><K>
L	<Shift><L>
M	<Shift><M>
N	<Shift><N>
O	<Shift><O>
P	<Shift><P>
Q	<Shift><Q>
R	<Shift><R>
S	<Shift><S>
T	<Shift><T>
U	<Shift><U>
V	<Shift><V>
W	<Shift><W>
X	<Shift><X>
Y	<Shift><Y>
Z	<Shift><Z>

Table E-16. VT/HP Character Map (Continued)

Char	Key Sequence
[	<Func><E>
\	<Func><G>
]	<Func><F>
^	<Func><Ctrl><E>
_	<Shift><Func><N>
`	<Func><J>
a	<A>
b	<B>
c	<C>
d	<D>
e	<E>
f	<F>
g	<G>
h	<H>
I	<I>
j	<J>
k	<K>
l	<L>
m	<M>
n	<N>
o	<O>
p	<P>
q	<Q>
r	<R>
s	<S>
t	<T>
u	<U>

Table E-16. VT/HP Character Map (Continued)

Char	Key Sequence
v	<V>
w	<W>
x	<X>
y	<Y>
z	<Z>
{	<Shift><Func><E>
|	<Func><O>
}	<Shift><Func><F>
~	<Shift><Func><J>

Glossary

802.11/802.11b	A radio protocol that may be used by the Symbol Spectrum24 radio card. Symbol radio cards that use the 802.11 protocol also have an ESS_ID.
ACK/NAK	ACK/NAK is the default software handshaking.

Access Point

Access Point (AP) refers to Symbol's Spectrum24 Ethernet Access Point. It is a piece of communications equipment that manages communications between the host computer system and one or more wireless mobile computers. An AP connects to a wired Ethernet LAN and acts as a bridge between the Ethernet wired network and IEEE 802.11 interoperable radio-equipped mobile units, such as a mobile computer. The AP allows a mobile user to roam freely through a facility while maintaining a seamless connection to the wired network.

AirBEAM® Manager

AirBEAM® Manager is a comprehensive wireless network management system that provides essential functions that are required to configure, monitor, upgrade and troubleshoot the Spectrum24® wireless network and its components (including networked mobile computers). Some features include event notification, access point configuration, diagnostics, statistical reports, auto-discovery, wireless proxy agents and monitoring of access points and mobile units.

AirBEAM® Smart Client

AirBEAM® Smart Client is part of Symbol's AirBEAM® suite, which also includes AirBEAM® Safe and AirBEAM® Manager. The AirBEAM® Smart Client system uses the network accessible host server to store software files that are to be downloaded to the mobile computers. The AirBEAM® Smart Client provides the mobile computers with the "smarts" to request software from the host. It allows them to request, download and install software, as well as to upload files and status data. The AirBEAM® Smart Client uses the industry standard FTP or TFTP file transfer protocols to check the host system for updates, and if necessary, to transfer updated software. Most often, AirBEAM® Smart Client is used with wireless networks, but any TCP/IP connection can be used. For more information, refer to the AirBEAM® Smart Windows® CE Client Product Reference Guide (p/n 72-63060-xx).

AP

See **Access Point**.

API

An interface by means of which one software component communicates with or controls another. Usually used to refer to services provided by one software component to another, usually via software interrupts or function calls

Aperture	The opening in an optical system defined by a lens or baffle that establishes the field of view.
Application Programming Interface	See **API**.
ANSI Terminal	A display terminal that follows commands in the ANSI standard terminal language. For example, it uses escape sequences to control the cursor, clear the screen and set colors. Communications programs support the ANSI terminal mode and often default to this terminal emulation for dial-up connections to online services.
ASCII	American Standard Code for Information Interchange. A 7 bit-plus-parity code representing 128 letters, numerals, punctuation marks and control characters. It is a standard data transmission code in the U.S.
Autodiscrimination	The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content is decoded.
Bar	The dark element in a printed bar code symbol.
Bar Code	A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a bar code symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format. See **Symbology**.
Bar Code Density	The number of characters represented per unit of measurement (e.g., characters per inch).
Bar Height	The dimension of a bar measured perpendicular to the bar width.
Bar Width	Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.
Baud Rate	A measure of the data flow or number of signaling events occurring per second. When one bit is the standard "event," this is a measure of bits per second (bps). For example, a baud rate of 50 means transmission of 50 bits of data per second.

BIOS	Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.
Bit	Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.
Bits per Second (bps)	Bits transmitted or received.
Bit	Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.
bps	See **Bits Per Second**.
Byte	On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory is used to store one ASCII character.
BOOTP	A protocol for remote booting of diskless devices. Assigns an IP address to a machine and may specify a boot file. The client sends a bootp request as a broadcast to the bootp server port (67) and the bootp server responds using the bootp client port (68). The bootp server must have a table of all devices, associated MAC addresses and IP addresses.
boot or boot-up	The process a computer goes through when it starts. During boot-up, the computer can run self-diagnostic tests and configure hardware and software.
CDMA	Code Division Multiple Access is a cellular technology originally know as IS-95.
CDRH	Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.
CDRH Class 1	This is the lowest power CDRH laser classification. This class is considered intrinsically safe, even if all laser output were directed into the eye's pupil. There are no special operating procedures for this class.

CDRH Class 2	No additional software mechanisms are needed to conform to this limit. Laser operation in this class poses no danger for unintentional direct human exposure.
Cellular Digital Packet Data	See **CDPD**.
Character	A pattern of bars and spaces which either directly represents data or indicates a control function, such as a number, letter, punctuation mark, or communications control contained in a message.
Character Set	Those characters available for encoding in a particular bar code symbology.
Check Digit	A digit used to verify a correct symbol decode. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbologies. Using check digits decreases the chance of substitution errors when a symbol is decoded.
Codabar	A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (- $: / , +).
Code 128	A high density symbology which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.
Code 3 of 9 (Code 39)	A versatile and widely used alphanumeric bar code symbology with a set of 43 character types, including all uppercase letters, numerals from 0 to 9 and 7 special characters (- . / + % $ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.
Code 93	An industrial symbology compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.
Code Length	Number of data characters in a bar code between the start and stop characters, not including those characters.
Cold Boot	A cold boot restarts the mobile computer and erases all user stored records and entries.
COM port	Communication port; ports are identified by number, e.g., COM1, COM2.

Continuous Code	A bar code or symbol in which all spaces within the symbol are parts of characters. There are no intercharacter gaps in a continuous code. The absence of gaps allows for greater information density.
Cradle	A cradle is used for charging the mobile computer battery and for communicating with a host computer, and provides a storage place for the mobile computer when not in use.
Data Communications Equipment (DCE)	A device (such as a modem) which is designed to attach directly to a DTE (Data Terminal Equipment) device.
DCE	See **Data Communications Equipment**.
DCP	See **Device COnfiguration Package**.
Dead Zone	An area within a scanner's field of view, in which specular reflection may prevent a successful decode.
Decode	To recognize a bar code symbology (e.g., UPC/EAN) and then analyze the content of the specific bar code scanned.
Decode Algorithm	A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.
Decryption	Decryption is the decoding and unscrambling of received encrypted data. Also see, **Encryption** and **Key**.
Depth of Field	The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.
Device Configuration Package	The Symbol Device Configuration Package provides the Product Reference Guide (PRG), flash partitions, Terminal Configuration Manager (TCM) and the associated TCM scripts. With this package hex images that represent flash partitions can be created and downloaded to the mobile computer.
DHCP	(Dynamic Host Configuration Protocol) Software that automatically assigns IP addresses to client stations logging onto a TCP/IP network. Similar to BOOTP, but also permits the leasing of an IP address. It eliminates having to manually assign permanent IP addresses. DHCP software typically runs in servers and is also found in network devices such as routers that allow multiple users access to the Internet.

DHCP Server	A server in the network or a service within a server that assigns IP addresses.
Discrete Code	A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.
Discrete 2 of 5	A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.
DNS Server	The Control Panel allows you to set the IP address for a DNS Server, if used. This allows users to use server names, rather than IP addresses. It is set on the Network tab of the Control Panel.
Domain Name	The Control Panel allows you to set a Domain Name for the DNS Server, if used (*e.g.*, symbol.com). It is set on the Network tab of the Control Panel.
DOS	Disk Operating System. This is basic software that allows you to load and use software applications on your computer. Also see **NetID**.
DRAM	Dynamic random access memory.
DTE	See **Data Terminal Equipment**.
EAN	European Article Number. This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.
Electronic Product Code	See **EPC**.
Element	Generic term for a bar or space.
Encoded Area	Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.
ENQ (RS-232)	ENQ software handshaking is also supported for the data sent to the host.
Encryption	Encryption is the scrambling and coding of data, typically using mathematical formulas called algorithms, before information is transmitted over any communications link or network. A key is the specific code used by the algorithm to encrypt or decrypt the data. Also see, **Decryption** and **Key**.

EPC

The Electronic Product Code is an electronically coded tag that is intended as an improvement on the UPC bar code system. The EPC is a 64- or 96-bit tag which contains a number called the Global Trade Identification Number (GTIN). Unlike a UPC number, which only provides information specific to a group of products, the GTIN gives each product its own specific identifying number, giving greater accuracy in tracking. The EPC was the creation of the MIT AutoID Center, a consortium of over 120 global corporations and university labs. The EPC system is currently managed by EPCGlobal Inc., a subsidiary of the Electronic Article Numbering International group and the Uniform Code Council (UCC), creators of the UPC bar code. The EPC is used in the RFID system.

ESD

Electro-Static Discharge

ESS_ID

Extended Service Set Identifier, defines the coverage area. Prior to the release of the 802.11 specification the ESS_ID was called the Net_ID or Network Identifier. For mobile computers using Spectrum24 radios with the 802.11 protocol, an ESS_ID allows facilities to limit which Access Points a mobile computer can communicate with. It is set on the Network tab of the Control Panel. The mobile computer can only communicate with Spectrum24 Access Points that have matching ESS_IDs.

Ethernet

Ethernet communication port. Allows a wired interface to a radio network.

Flash Disk

An additional megabyte of non-volatile memory for storing application and configuration files.

Flash Memory

Flash memory is nonvolatile, semi-permanent storage that can be electronically erased in the circuit and reprogrammed. Series 9000 mobile computers use Flash memory to store the operating system (ROM-DOS), the mobile computer emulators, and the Citrix ICA Client for DOS.

File Transfer Protocol (FTP)

A TCP/IP application protocol governing file transfer via network or telephone lines. See **TCP/IP.**

Frequency Hopping

The use of a random sequence of frequency channels to achieve spread spectrum compliance. Stations that use frequency hopping change their communications frequency at regular intervals. A hopping sequence determines the pattern at which frequencies are changed. Messages take place within a hop. See **Hopping Sequence** and **Spread Spectrum**.

FTP

See **File Transfer Protocol**.

Flash Memory

Flash memory is responsible for storing the system firmware and is non-volatile. If the system power is interrupted the data is not lost.

Gateway Address

An IP address for a network gateway or router. A mobile computer may be part of a subnet as specified by its IP address and Netmask. It can send packets directly to any node on the same subnet. If the destination node is on a different subnet, then the mobile computer sends the packet to the gateway first. The gateway determines how to route the packet to the destination subnet. This field is an option used by networks that require gateways.

Hard Reset

See **Cold Boot**.

Hopping Sequence

A set of random frequencies designed to minimize interference with other sets of random frequencies. A hopping sequence determines the pattern with which a station that uses frequency hopping changes its communications frequency. See **Frequency Hopping**.

Hz

Hertz; A unit of frequency equal to one cycle per second.

Host Computer

A computer that serves other mobile computers in a network, providing such services as computation, database access, supervisory programs and network control.

IDE

Intelligent drive electronics. Refers to the solid-state hard drive type.

IEC

International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.

IEC (825) Class 1
This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 second window and an automatic laser shutdown if the scanner's oscillating mirror fails.

IEEE Address
See **MAC Address**.

Interleaved 2 of 5
A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

IOCTL
Input/Output Control.

IP
Internet Protocol.

imaging scanning
Mobile computers with an integrated imager use digital camera technology to take a digital picture of a bar code, store the resulting image in memory and execute state-of-the-art software decoding algorithms to extract the data from the image.

Intercharacter Gap
The space between two adjacent bar code characters in a discrete code.

Interleaved Bar Code
A bar code in which characters are paired together, using bars to represent the first character and the intervening spaces to represent the second.

Interleaved 2 of 5
A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

Internet Protocol Address
See **IP**.

I/O Ports
interface The connection between two devices, defined by common physical characteristics, signal characteristics, and signal meanings. Types of interfaces include RS-232 and PCMCIA.

Input/Output Ports I/O ports are primarily dedicated to passing information into or out of the mobile computer's memory. Series 9000 mobile computers include Serial and USB ports.

IP (Internet Protocol) The IP part of the TCP/IP communications protocol. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or subnetwork. IP accepts "packets" from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a "datagram" to the layer 2 data link protocol. It may also break the packet into fragments to support the maximum transmission unit (MTU) of the network.

IP Address (Internet Protocol address) The address of a computer attached to an IP network. Every client and server station must have a unique IP address. A 32-bit address used by a computer on a IP network. Client workstations have either a permanent address or one that is dynamically assigned to them each session. IP addresses are written as four sets of numbers separated by periods; for example, 204.171.64.2.

IPX/SPX Internet Package Exchange/Sequential Packet Exchange. A communications protocol for Novell. IPX is Novell's Layer 3 protocol, similar to XNS and IP, and used in NetWare networks. SPX is Novell's version of the Xerox SPP protocol.

Kerberos Kerberos is a network authentication protocol. It is designed to provide strong authentication for client/server applications by using secret-key cryptography. A free implementation of this protocol is available from the Massachusetts Institute of Technology. Kerberos is available in many commercial products as well.

Key A key is the specific code used by the algorithm to encrypt or decrypt the data. Also see, **Encryption** and **Decrypting**.

LAN Local area network. A radio network that supports data communication within a local area, such as within a warehouse of building.

laser scanner A type of bar code reader that uses a beam of laser light.

LASER Light Amplification by Stimulated Emission of Radiation.The laser is an intense light source. Light from a laser is all the same frequency, unlike the output of an incandescent bulb. Laser light is typically coherent and has a high energy density.

Laser Diode	A gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.
LCD	See **Liquid Crystal Display**.
LED Indicator	A semiconductor diode (LED - Light Emitting Diode) used as an indicator, often in digital displays. The semiconductor uses applied voltage to produce light of a certain frequency determined by the semiconductor's particular chemical composition.
Liquid Crystal Display (LCD)	A display that uses liquid crystal sealed between two glass plates. The crystals are excited by precise electrical charges, causing them to reflect light outside according to their bias. They use little electricity and react relatively quickly. They require external light to reflect their information to the user.
Light Emitting Diode	See **LED**.
MAC Address (also called IEEE Address)	Spectrum24® devices, like other Ethernet devices, have unique, hardware-encoded MAC (also called IEEE addresses). MAC addresses determine the device sending or receiving data. The MAC address is a 48-bit number written as six hexadecimal bytes separated by colons.
MC	Mobile Computer.
MIL	1 mil = 1 thousandth of an inch.
Misread (Misdecode)	A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.
Mobile Computer	In this text, *mobile computer* refers to the Symbol Series 9000 wireless portable computer. It can be set up to run as a stand-alone device, or it can be set up to communicate with a network, using wireless radio technology.
NCU	Network Control Unit.
NetBeui	A non-routable LAN protocol that is an extension to NetBIOS. Used for IBM's OS/2-based LAN Manager and Microsoft's LAN Manager and Windows for Workgroups.

NetID	For mobile computers using Spectrum24 radios with the Spring protocol, a NetID allows facilities to limit which Access Points a mobile computer can communicate with. It is set on the Network tab of the Control Panel. The mobile computer can only communicate with Spectrum24 Access Points that have matching NetIDs. Also see **ESS_ID**.
Nominal	The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.
Nominal Size	Standard size for a bar code symbol. Most UPC/EAN codes are used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).
Null Modem Cable	An RS-232 cable used to connect two personal computers together in close proximity for file transfer. It attaches to the serial ports of both machines and simulates what would occur naturally if modems and the phone system were used. It crosses the sending wire with the receiving wire.
NVM	Non-Volatile Memory.
ODI	See **Open Data-Link Interface**.
Open Data-Link Interface (ODI)	Novell's driver specification for an interface between network hardware and higher-level protocols. It supports multiple protocols on a single NIC (Network Interface Controller). It is capable of understanding and translating any network information or request sent by any other ODI-compatible protocol into something a NetWare client can understand and process.
Open System Authentication	Open System authentication is a null authentication algorithm.
PAN	Personal area network. Using Bluetooth wireless technology, PANs enable devices to communicate wirelessly. Generally, a wireless PAN consists of a dynamic group of less than 255 devices that communicate within about a 33-foot range. Only devices within this limited area typically participate in the network.
Parameter	A variable that can have different values assigned to it.

PC Card

A plug-in expansion card for laptop computers and other devices, also called a PCMCIA card. PC Cards are 85.6mm long x 54 mm wide, and have a 68 pin connector. There are several different kinds:

Type I; 3.3 mm high; use - RAM or Flash RAM

Type II; 5 mm high; use - modems, LAN adaptors

Type III; 10.5 high; use - Hard Disks

PCMCIA

Personal Computer Memory Card Interface Association. See **PC Card**.

Percent Decode

The average probability that a single scan of a bar code would result in a successful decode. In a well-designed bar code scanning system, that probability should approach near 100%.

PING

(Packet Internet Groper) An Internet utility used to determine whether a particular IP address is online. It is used to test and debug a network by sending out a packet and waiting for a response.

Print Contrast Signal (PCS)

Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. PCS = (RL - RD) / RL, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.

Programming Mode

The state in which a scanner is configured for parameter values. See **Scanning Mode**.

Quiet Zone

A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.

QWERTY

A standard keyboard commonly used on North American and some European PC keyboards. "QWERTY" refers to the arrangement of keys on the left side of the third row of keys.

Radio Frequency Identification

See **RFID**.

RAM

Random Access Memory. Data in RAM can be accessed in random order, and quickly written and read.

Rapid Deployment

The Rapid Deployment (RD) Client facilitates software downloads to a mobile device from a Mobility Services Platform (MSP) Console's FTP server.

Reflectance	Amount of light returned from an illuminated surface.
Resolution	The narrowest element dimension which is distinguished by a particular reading device or printed with a particular device or method.
RF	Radio Frequency.
RFID	Radio Frequency Identification is a system for tagging and identifying mobile objects such as store merchandise, postal packages and sometimes living organisms (like pets). Using a special device called an RFID reader, RFID allows objects to be labeled and tracked as they move from place to place.
RFID Reader	Device used to read RFID tags.
ROM	Read-Only Memory. Data stored in ROM cannot be changed or removed.
ROM-DOS	The name of the licensed Disk Operating System loaded into the mobile computer's flash file system.
Router	A device that connects networks and supports the required protocols for packet filtering. Routers are typically used to extend the range of cabling and to organize the topology of a network into subnets. See **Subnet**.
RS-232	An Electronic Industries Association (EIA) standard that defines the connector, connector pins, and signals used to transfer data serially from one device to another.
Scan Area	Area intended to contain a symbol.
Scanner	An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are: 1. Light source (laser or photoelectric cell) - illuminates a bar code. 2. Photodetector - registers the difference in reflected light (more light reflected from spaces). 3. Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.
Scanning Mode	The scanner is energized, programmed and ready to read a bar code.
Scanning Sequence	A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.

SDK	Software Development Kit
Self-Checking Code	A symbology that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.
Shared Key	Shared Key authentication is an algorithm where both the AP and the MU share an authentication key.
SHIP	Symbol Host Interface Program.
SMDK	Symbol Mobility Developer Kit.
Soft Reset	See **Warm Boot**.
Space	The lighter element of a bar code formed by the background between bars.
Spectrum24	Symbol's frequency-hopping, spread spectrum cellular network.
Spectrum One	Symbol's implementation of the Spread Spectrum wireless network, utilizing direct sequencing.
Specular Reflection	The mirror-like direct reflection of light from a surface, which can cause difficulty decoding a bar code.
Spread Spectrum	A technique for uniformly distributing the information content of a radio signal over a frequency range larger than normally required for robust transmission of data. Spreading the signal without adding additional information adds significant redundancy, which allows the data to be recovered in the presence of strong interfering signals such as noise and jamming signals. The primary advantage of spread spectrum technology is its ability to provide robust communications in the presence of interfering signals.
Spring Radio Protocol	A radio protocol that may be used by the Symbol Spectrum24 radio card. Symbol Radio cards that use the Spring protocol also have an Net ID.
Start/Stop Character	A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.
STEP	Symbol Terminal Enabler Program.
Subnet	A subset of nodes on a network that are serviced by the same router. See **Router**.

Subnet Mask — A 32-bit number used to separate the network and host sections of an IP address. A custom subnet mask subdivides an IP network into smaller subsections. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets. Default is often 255.255.255.0.

Substrate — A foundation material on which a substance or image is placed.

SVTP — Symbol Virtual Terminal Program.

Symbol — A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters and check characters.

Symbol Aspect Ratio — The ratio of symbol height to symbol width.

Symbol Height — The distance between the outside edges of the quiet zones of the first row and the last row.

Symbol Length — Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.

Symbology — The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, Code 39, PDF417, etc.).

TCP/IP — (Transmission Control Protocol/Internet Protocol) A communications protocol used to internetwork dissimilar systems. This standard is the protocol of the Internet and has become the global standard for communications. TCP provides transport functions, which ensures that the total amount of bytes sent is received correctly at the other end. UDP is an alternate transport that does not guarantee delivery. It is widely used for real-time voice and video transmissions where erroneous packets are not retransmitted. IP provides the routing mechanism. TCP/IP is a routable protocol, which means that all messages contain not only the address of the destination station, but the address of a destination network. This allows TCP/IP messages to be sent to multiple networks within an organization or around the world, hence its use in the worldwide Internet. Every client and server in a TCP/IP network requires an IP address, which is either permanently assigned or dynamically assigned at startup.

Telnet	A mobile computer emulation protocol commonly used on the Internet and TCP/IP-based networks. It allows a user at a mobile computer or desk-top computer to log onto a remote device and run a program.
Terminal	See **Mobile Computer**.
Terminate and Stay Resident (TSR)	A program under DOS that ends its foreground execution to remain resident in memory to service hardware/software interrupts, providing background operation. It remains in memory and may provide services on behalf of other DOS programs.
Terminal Emulation	A "terminal emulation" emulates a character-based mainframe session on a remote non-mainframe mobile computer, including all display features, commands and function keys. The MC9000-G Series and MC906R-G RFID supports Terminal Emulations in 3270, 5250 and VT220.
TFTP	(Trivial File Transfer Protocol) A version of the TCP/IP FTP (File Transfer Protocol) protocol that has no directory or password capability. It is the protocol used for upgrading firmware, downloading software and remote booting of diskless devices.
Tolerance	Allowable deviation from the nominal bar or space width.
Transmission Control Protocol/Internet Protocol	See **TCP/IP.**
Trivial File Transfer Protocol	See **TFTP.**
TSR	See **Terminate and Stay Resident**.
UPC	Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbology for retail food packages in the United States.
UDP	User Datagram Protocol. A protocol within the IP protocol suite that is used in place of TCP when a reliable delivery is not required. For example, UDP is used for real-time audio and video traffic where lost packets are simply ignored, because there is no time to retransmit. If UDP is used and a reliable delivery is required, packet sequence checking and error notification must be written into the applications.
Visible Laser Diode (VLD)	A solid state device which produces visible laser light.

WAN	Wide-Area Network. A radio network that supports data communication beyond a local area. That is, information can be sent across a city, state, or even nationwide.
Warm Boot	A warm boot restarts the mobile computer by closing all running programs. All data that is not saved to flash memory is lost.
WEP	Wired Equivalent Privacy, is specified by IEEE for encryption and decryption of RF (wireless) communications.
WEP Encryption	(Wired Equivalent Privacy encryption) The conversion of data into a secret code for transmission over a public network. The original text, or plaintext, is converted into a coded equivalent called ciphertext via an encryption algorithm. The ciphertext is decoded (decrypted) at the receiving end and turned back into plaintext. The encryption algorithm uses a key, which is a binary number that is typically from 40 to 128 bits in length. The greater the number of bits in the key (cipher strength), the more possible key combinations and the longer it would take to break the code. The data is encrypted, or "locked," by combining the bits in the key mathematically with the data bits. At the receiving end, the key is used to "unlock" the code and restore the original data.
Wireless Local Area Network (WLAN)	See **LAN**.
Wireless Wide Area Network (WWAN)	See **WAN**.
WNMP	(Wireless Network Management Protocol) This is Symbol's proprietary MAC layer protocol used for inter access point communication and other MAC layer communication.
WNMS (was renamed to AirBEAM® Manager)	See **AirBEAM® Manager**.

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