MC31XX Series Mobile Computer
User Guide
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**Patents**

This product is covered by one or more of the patents listed on the website: [www.motorola.com/enterprisemobility/patents](http://www.motorola.com/enterprisemobility/patents)
# Revision History

Changes to the original manual are listed below:

<table>
<thead>
<tr>
<th>Change</th>
<th>Date</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>-01 Rev A</td>
<td>October 2009</td>
<td>Initial release.</td>
</tr>
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Glossary

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Introduction

This guide provides information about using the MC31XX mobile computers and accessories.

NOTE Screens and windows pictured in this guide are samples and may differ from actual screens.

Documentation Set

The documentation set for the MC31XX is divided into guides that provide information for specific user needs.

- **MC31XX Series Quick Start Guide** - describes how to use the MC31XXS and MC31XXR mobile computers.
- **MC3190G Quick Start Guide** - describes how to use the MC3190G mobile computer.
- **MC31XX Series Mobile Computer User Guide** - describes how to use the MC31XX mobile computer.
- **MC31XX Series Mobile Computer Integrator Guide** - describes how to set up the MC31XX mobile computer and the accessories.
- **Microsoft Applications for Windows Mobile 6.1 and CE 6.0 User Guide** - describes how to use Microsoft developed applications.
- **Application Guide for Motorola Enterprise Mobility Devices** - describes how to use Motorola Enterprise Mobility developed applications.
- **EMDK Help File** - provides API information for writing applications.
# Configurations

This guide covers the following configurations:

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<td>1D laser scanner in rotating turret</td>
<td>Windows CE 6.0 Professional</td>
<td>28, 38 or 48 key</td>
</tr>
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<td>WPAN: Bluetooth</td>
<td>Color</td>
<td>128 MB RAM/256 MB Flash</td>
<td>1D laser scanner, 2D imager</td>
<td>Windows CE 6.0 Professional or Windows Mobile 6.1 Classic</td>
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</tr>
<tr>
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<td>1D laser scanner or 2D imager</td>
<td>Windows CE 6.0 Professional or Windows Mobile 6.1 Classic</td>
<td>28, 38 or 48 key</td>
</tr>
<tr>
<td>MC3190R</td>
<td>WLAN: 802.11a/b/g WPAN: Bluetooth</td>
<td>Color</td>
<td>128 MB RAM/512 MB Flash</td>
<td>1D laser scanner in rotating turret</td>
<td>Windows CE 6.0 Professional or Windows Mobile 6.1 Classic</td>
<td>28, 38 or 48 key</td>
</tr>
<tr>
<td>MC3190S</td>
<td>WLAN: 802.11a/b/g WPAN: Bluetooth</td>
<td>Color</td>
<td>128 MB RAM/512 MB Flash</td>
<td>1D laser scanner, 2D imager or DPM imager</td>
<td>Windows CE 6.0 Professional or Windows Mobile 6.1 Classic</td>
<td>28, 38 or 48 key</td>
</tr>
</tbody>
</table>

## Software Versions

This guide covers various software configurations and references are made to operating system or software versions for:

- Adaptation Kit Update (AKU) version
- OEM version
- BTEExplorer version
- Fusion version.

### AKU Version for Windows Mobile 6.1 Devices

To determine the Adaptation Kit Update (AKU) version on a Windows Mobile 6.1 device:

Tap **Start** > **Settings** > **System** tab > **About** icon > **Version** tab.
The second line lists the operating system version and the build number. The last part of the build number represents the AKU number. For example, Build 20963.1.5.2 indicates that the device is running AKU version 1.5.2.

**OEM Version on Windows Mobile 6.1 Devices**

To determine the OEM software version on a Windows Mobile 6.1 device:

Tap **Start > Settings > System tab > System Information icon > System tab.**

**OEM Version on Windows CE 6.0 Devices**

To determine the OEM software version on a Windows CE 6.0 device:

Tap **Start > Settings > Control Panel > System Info icon > System tab.**

**BTExplorer Software**

To determine the BTExplorer software version on a Windows Mobile 6.1 or Windows CE 6.0 device:

Tap **BTExplorer icon > Show BTExplorer> File > About.**
Fusion Software

To determine the Fusion software version on a Windows Mobile 6.1 or Windows CE 6.0 device:

Tap Wireless Strength icon > Wireless Status > Versions.

Chapter Descriptions

Topics covered in this guide are as follows:

- **Chapter 1, Getting Started**, describes the mobile computer’s physical characteristics, how to install and charge the batteries, remove and replace the handstrap and how to start the mobile computer for the first time.
- **Chapter 2, Operating the MC31XX**, provides basic instructions for using the mobile computer and navigating the mobile computer software.
- **Chapter 3, Using Bluetooth**, explains how to perform Bluetooth functionality on the mobile computer.
- **Chapter 4, Accessories**, describes the accessories available for the mobile computer and how to use the accessories to charge the mobile computer.
- **Chapter 5, Maintenance and Troubleshooting**, includes instructions on cleaning and storing the mobile computer, and provides troubleshooting solutions for potential problems during mobile computer operation.
- **Appendix A, Technical Specifications**, includes a table listing the technical specifications for the mobile computer.
- **Appendix B, Keypads**, contains keypad descriptions and special character generation tables.
Notational Conventions

The following conventions are used in this document:

- The term “mobile computer” refers to the Motorola MC31XX.
- *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 items provide more information about the MC31XX mobile computers.

- **MC31XX Series Quick Start Guide**, p/n 72-124259-xx
- **MC3190G Quick Start Guide**, p/n 72-124276-xx
- **MC31XX Regulatory Guide**, p/n 72-124293-xx
- **MC31XX Series Mobile Computer Integrator Guide**, p/n 72E-68900-xx
- **Application Guide for Motorola Enterprise Mobility Devices**, p/n 72E-68901-xx
- **Microsoft® Applications for Mobile 6.1 and CE 6.0 User Guide**, p/n 72E-108299-xx
- **Enterprise Mobility Developer Kit (EMDK) Help File**, p/n 72E-38880-03
- **Enterprise Mobility Developer Kit for C (EMDK for C)**, available at: http://www.motorola.com/enterprisemobility/support

For the latest version of this guide and all guides, go to: http://www.motorola.com/enterprisemobility/manuals.

Service Information

If you have a problem with your equipment, contact Motorola Enterprise Mobility support for your region. Contact information is available at: http://www.motorola.com/enterprisemobility/contactsupport.

When contacting Enterprise Mobility support, please have the following information available:

- Serial number of the unit
- Model number or product name
- Software type and version number

Motorola responds to calls by email, telephone or fax within the time limits set forth in support agreements.

If your problem cannot be solved by Motorola Enterprise Mobility Support, you may need to return your equipment for servicing and will be given specific directions. Motorola 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 you purchased your Enterprise Mobility business product from a Motorola business partner, contact that business partner for support.
Chapter 1 Getting Started

Introduction

This chapter describes the mobile computer physical characteristics, how to install and charge the batteries, how to remove and replace the handstrap and how to start the mobile computer for the first time.

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 the equipment listed below is included:

- Mobile computer
- Battery
- Regulatory Guide
- Quick Start Guide.

Inspect the equipment for damage. If any equipment is missing or damaged, contact the Motorola Enterprise Mobility Support immediately. See Service Information on page xvi for contact information.

Features

There are three versions of the MC31XX mobile computers, the MC31XXS with 1D laser and 2D Imager, the MC31XXR with Rotating Scan Turret and the MC3190G with 1D laser and 2D Imager. For more information on the Rotating Scan Turret, see Figure 1-3 on page 1-3.
Figure 1-1  *MC31XXS and MC31XXR Mobile Computers (Front View)*
The MC31XXR mobile computer features a Rotating Scan Turret with three position stops. This feature offers greater scanning flexibility.

**CAUTION** Do not try to rotate turret past side position stops. Damage to device can occur.

**Figure 1-3 Rotating Scan Turret**
Figure 1-4  MC3190G Mobile Computer (Front View)
Mobile Computer Startup

To start using the mobile computer:

- Install the SD card.
- Install the main battery.
- Charge the main battery and the backup battery.
- Start the mobile computer.

Install SD Card

The Secure Device (SD) card provides secondary non-volatile storage (the flash memory is slower than RAM). The SD card holder is located under the battery.

**CAUTION** Follow proper Electro-Static Discharge (ESD) precautions to avoid damaging the SD card. Proper ESD precautions include, but are not limited to, working on an ESD mat and ensuring that the operator is properly grounded.

Do not use the SD card slot for any other accessories.
To insert the SD card:

1. Lift the SD card retaining door.
2. Position the SD card, with the contacts down, into the SD card slot. The SD card corner notch fits into the slot only one way.
3. Close SD card retaining door.

NOTE Select SD cards with environmental and/or the write cycle performance specifications that meet or exceed the application requirements.

To install the main battery:

1. Remove the battery door.
2. Insert the battery into the slot, bottom first and press the battery gently into the slot. The battery clip locks the battery into place.
3. With the latches in the open position, replace the battery door, top first and press to close.

4. Rotate the latches (to the lock position) to lock the door in place.
Battery Charging

**CAUTION** Ensure that you follow the guidelines for battery safety described in *Battery Safety Guidelines on page 5-2.*

Use the mobile computer cradles, cables and spare battery chargers to charge the mobile computer main battery.

The main battery can be charged before insertion into the mobile computer or after it is installed. There are two main batteries for the MC31XX, the Standard Battery (1X) and the Extended Life Battery (2X). The standard capacity battery ships from the factory in all MC31X0-R configurations. The Extended Life Battery ships from the factory in all MC31X0-S and MC31X0-G configurations. To install an Extended Life Battery in the MC31X0-R configurations, purchase an Extended Life Battery and a Brick Extended Life Battery door. 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 while it is installed in the mobile computer.

Before using the mobile computer for the first time, fully charge the main battery until the amber Charge LED Indicator remains lit (see *Table 1-1 on page 1-9* for charge status indications). The Standard Battery fully charges in less than five hours and the Extended Life Battery fully charges in less than eight hours.

The mobile computer is equipped with a memory backup battery which automatically charges from the main battery whether or not the mobile computer is operating or is in suspend mode. The memory backup battery retains data in memory for at least 30 minutes when the mobile computer’s main battery is removed or fully discharged. When the mobile computer is used for the first time or after the memory backup battery has fully discharged, the memory backup battery requires approximately 15 hours to fully charge. Do not remove the main battery from the mobile computer for 15 hours to ensure that the memory backup battery fully charges. If the main battery is removed from the mobile computer or the main battery is fully discharged, the memory backup battery completely discharges in several hours.

When the main battery reaches a very low battery state, the combination of main battery and backup battery retains data in memory for at least 72 hours.

**NOTE** 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.

Batteries must be charged within the 0° to +40° C (32° to 104° F) ambient temperature range.

The following accessories can be used to charge batteries:

- **Cradles (and a power supply):**
  - Single Slot Serial/USB Cradle
  - Four Slot Cradles.
- **Cables (and a power supply):**
  - USB Client Charge Cable
  - Serial (RS232) Charge Cable.
- **Spare Battery Chargers (and a power supply):**
  - Single Slot Serial/USB Cradle
  - Four Slot Spare Battery Charger
  - Universal Battery Charger (UBC) Adapter.

To charge the mobile computer using the cradles:
1. Insert the mobile computer into a cradle. See Chapter 4, Accessories for accessory setup.

2. The mobile computer starts to charge automatically. The amber Charge LED Indicator indicates the charge status. See Table 1-1 on page 1-9 for charging indications.

To charge the mobile computer using the cables:

1. Connect the MC31XX Communication/Charge Cable to the appropriate power source and connect to the mobile computer. See Chapter 4, Accessories for accessory setup.

2. The mobile computer starts to charge automatically. The amber Charge LED Indicator indicates the charge status. See Table 1-1 for charging indications.

Table 1-1  Mobile Computer LED Charge Indicators

<table>
<thead>
<tr>
<th>LED</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Mobile computer not placed correctly in the cradle; charge cable not connected correctly; charger is not powered.</td>
</tr>
<tr>
<td>Fast Blinking Amber</td>
<td>Error in charging; check placement of the mobile computer.</td>
</tr>
<tr>
<td>Slow Blinking Amber</td>
<td>Mobile computer is charging.</td>
</tr>
<tr>
<td>Solid Amber</td>
<td>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.</td>
</tr>
</tbody>
</table>

Spare Battery Charging

There are three accessories that can be used to charge a spare battery:

- Single Slot Serial/USB Cradle
- Four Slot Spare Battery Charger
- UBC Adapter.

To charge a spare battery:

1. Connect the charging accessory to the appropriate power source. See Chapter 4, Accessories for setup instructions.

2. Insert the spare battery into the spare battery charging slot and gently press down on the battery to ensure proper contact.

The battery starts to charge automatically. The amber charge LED Indicator lights to indicate the charge status. See Chapter 4, Accessories for charging indications. The Standard Battery usually fully charges in less than five hours and the Extended Life Battery usually fully charges in less than eight hours.

Stylus

Use the stylus for selecting items and entering information on the screen. The stylus functions as a pen and a mouse. Tap the touch screen once with the stylus to select options and open menu items.
To remove the stylus, slide the stylus out of the stylus holder. To store the stylus, push the stylus back into the stylus holder in the handstrap (MC31XXR/S) or stylus silo (MC3190G).

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**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 2-22*.

When the mobile computer is powered on for the first time, it initializes. The **Splash** screen appears for a short period of time, followed by the **Calibration** screen.

![Figure 1-10 Splash Screen](image)

On Windows CE 6.0 configurations, after the calibration procedure is performed the factory settings launch the **Sample Applications** window displays. Application specific shells may provide application specific windows instead of the **Sample Applications** window. These screens also appear when a cold boot is performed.

If the mobile computer does not power on, see *Resetting the Mobile Computer on page 2-22*.

**Calibration Screen**

Use the **Calibration** screen to align the touch screen:

1. Remove the stylus from the stylus holder.
2. Carefully press and briefly hold the stylus tip on the center of the **Calibration** screen target. Repeat the procedure as the target moves and stops at different locations on the screen. This enters the new calibration settings.

![Figure 1-11 Calibration Screen](image)

3. Once all of the new calibration settings are input, tap the screen or press the **ENTER** button to save the new calibration settings. Press **ESC** to discard the new calibration settings.
Waking the Mobile Computer

The wakeup condition settings are used to define what actions wake up the mobile computer. The settings are configurable so they are subject to change/update. For more information see, Waking the Mobile Computer on page 2-23.

Main Battery Removal

To remove the main battery from an MC31XXS/R:

1. If the MC31XXS/R is in suspend mode, press the Power button to wake the device.
2. Press the power button to place the MC31XXS/R in suspend mode.
3. Wait for the red Scan LED to turn on and then turn off.
4. Rotate the latches to the open position.

**CAUTION** Do not lift up on the latches when removing the door. Lift up on the handstrap only.

5. Lift the door off, bottom first.
6. With finger, press the battery clip in (at the top of the battery) and lift the battery out top first.

   **WARNING!** Do not use a tool to remove the battery.

   ![Battery Clip]

   **Figure 1-14** *Remove Battery*

To remove the main battery from an MC3190G:

1. If the MC3190G is in suspend mode, press the Power button to wake the device.
2. Press the Power button to place the MC3190G in suspend mode.
3. Wait for the red Scan LED to turn on and then turn off.
4. Rotate the latches to the open position.

   ![Open Latches]

   **Figure 1-15** *Open Latches*

   **CAUTION** Do not lift up on the latches when removing the door. Lift up on the handstrap only.

5. Lift the door off, bottom first.
6. With two fingers, press the battery toward the bottom of the mobile computer and lift the battery out top first.

**WARNING!** Do not use a tool to remove the battery.

---

**Handstrap Removal and Replacement (MC31XXS/R)**

To remove the handstrap:

1. Use a #00 Phillips screwdriver to remove the screws.
2. Lift the mounting clip.
3. Slide the mounting clip out of the strap loop.
4. Open the handstrap flap and pull the handstrap through the battery door mounting slot.
To replace the handstrap:

1. Feed the mounting clip through the strap loop.
2. Secure the mounting clip to the housing using the two screws.
3. Feed the handstrap through the slot on the battery door.
4. Attach the hook material to the loop material and press together.

---

**Handstrap Removal and Replacement (MC3190G)**

To remove the handstrap:

1. Slip the button through the loop.

2. Remove loop section from handle.
3. Separate the loop and hook tape and pull the handstrap through the slot in the battery door.
To install a new handstrap:

1. Insert one end of the loop section into the mounting slot in the handle.
2. Thread the other end of the loop section through the loop and pull to tighten the loop.
3. Slip the button into the loop section.
4. Thread the end of the handstrap into the slot in the battery door.
5. Press the hook material against the loop material.
Turning Off the Radios

On Device with Windows CE 6.0

**WLAN Radio**

To turn off the WLAN radio tap the *Fusion Signal Strength* icon on the task tray and select *Disable Radio*. A red X appears across the icon indicating that the radio is disabled (off).

*Figure 1-24  Fusion Signal Strength Icon*

To turn the radio back on, tap the *Fusion Signal Strength* icon on the task tray and select *Enable Radio*. The red X disappears from the icon indicating that the radio is enabled (on).

**Bluetooth Radio with StoneStreet One Stack Enabled**

To turn off the Bluetooth radio, tap the *Bluetooth* icon in the task tray and select *Disable Bluetooth*.

*Figure 1-25  Bluetooth Icon*

To turn on the Bluetooth radio, tap the *Bluetooth* icon in the task tray and select *Enable Bluetooth*.

On Devices with Windows Mobile 6.1

Windows Mobile 6.1 devices include *Wireless Manager*, which provides a simple method of enabling, disabling, and configuring all the device’s wireless capabilities in one place.

To open *Wireless Manager*, tap the *Connectivity* icon.

*Figure 1-26  Opening Wireless Manager*

Select *Wireless Manager*. 
To enable or disable a wireless connection, tap its blue bar.

To enable or disable all wireless connections, tap and hold the **All** bar.

To configure settings for a connection, tap **Menu**.
Chapter 2 Operating the MC31XX

Introduction

This chapter provides basic instructions for using the mobile computer and navigating the mobile computer software.

Power Button

Press the red **Power** button to toggle the mobile computer between suspend and resume. When the screen is off the mobile computer is in suspend mode and when the screen is on the mobile computer is on.

Windows CE Sample Applications Window

The MC31XX with Windows CE contains a set of sample applications that can be installed. By default an installation icon is on the Desktop. Double-tap the icon to install the sample applications. When installed, the **Sample Applications** window appears on the screen whenever the MC31XX re-boots. Refer to the MC31XX Series Mobile Computer Integrator Guide for installation and configuration.

The **Sample Applications** window links to sample applications. The sample applications are intended to be used by application developers as application development examples. These applications were not developed to support end users. Refer to the Application Guide for Motorola Enterprise Mobility Devices for the sample applications.

![Sample Applications Window](image.png)

*Figure 2-1 Sample Applications Window*
Windows CE Desktop

The desktop displays the applications available with the Windows CE configurations. For information on using the Microsoft® applications refer to the Microsoft® Applications for Mobile and CE 6.0 User Guide, p/n 72E-78456-xx.

![Windows CE Desktop](image)

Figure 2-2   Windows CE Desktop

Windows CE Status Icons

The taskbar (at the bottom of the screen) displays the Start button, active programs, battery status and communication status. The taskbar icons are described in Table 2-1. The taskbar icons display the function status, indicate what programs are active and indicate the battery charge status. The Taskbar buttons are used to access menus, select/deselect functions or to change display windows.

- Status Icons: The status icons indicate the function key status. If the FUNC, SHIFT, CTRL, ALT or ALPHA functions are active the appropriate status icon is displayed.

- Active Programs Icons: The active applications icons are displayed on the taskbar. If more than one program is active, icons can be used to toggle between the open programs (applications). Tap on a taskbar application to maximize the application.

- AC Power/Battery Status Icons: The AC Power/Battery Status icons are shown in the taskbar to indicate the present power supply status of the mobile computer. The main battery status icons provide the battery status in 10% increments from 10% to 100%. The backup battery low icon indicates that the backup battery charge is low. See Battery Charging on page 1-8 for backup battery charging instructions.
### Table 2-1  Taskbar Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Battery-Charging-Icon" /></td>
<td>Indicates that the battery is charging.</td>
</tr>
<tr>
<td><img src="image2" alt="Battery-Full-Charging-Icon" /></td>
<td>Indicates that the battery is fully charged (100% charged). The battery status icons provide the battery status in 10% increments from 10% to 100%.</td>
</tr>
<tr>
<td><img src="image3" alt="Battery-Communication-Icon" /></td>
<td>Indicates that communication with the smart battery has not been established. After a mobile computer reset, this icon may be displayed for up to 30 seconds. See, Battery Unknown Icon on page 2-4 for additional information.</td>
</tr>
<tr>
<td><img src="image4" alt="Backup-Battery-Low-Icon" /></td>
<td>Indicates that the backup battery is low.</td>
</tr>
<tr>
<td><img src="image5" alt="Battery-Full-Charging-External-Power-Icon" /></td>
<td>Indicates that the battery is fully charged and the mobile computer is running on external power.</td>
</tr>
<tr>
<td><img src="image6" alt="IP-Status-Icon" /></td>
<td>Indicates IP status. Only displays when the mobile computer is in emulation mode.</td>
</tr>
<tr>
<td><img src="image7" alt="ActiveSync-Icon" /></td>
<td>Indicates that the ActiveSync application is running.</td>
</tr>
<tr>
<td><img src="image8" alt="Wireless-LAN-Connected-Icon" /></td>
<td>Indicates that the wireless application radio is connected to a wireless LAN network with excellent signal strength.</td>
</tr>
<tr>
<td><img src="image9" alt="Wireless-LAN-Disconnected-Icon" /></td>
<td>Indicates that the wireless application radio is not connected to a wireless LAN network.</td>
</tr>
<tr>
<td><img src="image10" alt="Bluetooth-Enabled-Icon" /></td>
<td>The Bluetooth Enabled icon appears in the task tray and indicates that the Bluetooth radio is on (Displays only if the StoneStreet One Bluetooth stack is enabled).</td>
</tr>
<tr>
<td><img src="image11" alt="Bluetooth-Disabled-Icon" /></td>
<td>The Bluetooth Disabled icon appears in the task tray and indicates that the Bluetooth radio is off (Displays only if the StoneStreet One Bluetooth stack is enabled).</td>
</tr>
<tr>
<td><img src="image12" alt="Bluetooth-Communication-Icon" /></td>
<td>The Bluetooth Communication icon appears in the task tray and indicates that the mobile computer is communicating with another Bluetooth device (Displays only if the StoneStreet One Bluetooth stack is enabled).</td>
</tr>
<tr>
<td><img src="image13" alt="IST-Control-Panel-Icon" /></td>
<td>Opens the IST control panel.</td>
</tr>
<tr>
<td><img src="image14" alt="SHIFT-Icon" /></td>
<td>Indicates that the SHIFT button function is selected.</td>
</tr>
</tbody>
</table>
Battery Unknown Icon

The Battery Unknown icon displays when communication with the smart battery has not been established. As part of normal operation this icon may be displayed for 30 seconds following a mobile computer reset.

If the icon displays beyond this 30 second period:

1. Remove and re-seat the battery.
2. If after re-seating the battery, the icon remains, warm boot the mobile computer.
3. If after warm booting the mobile computer, the icon remains, then cold boot the mobile computer.
4. If after cold booting the mobile computer, the icon remains, install a new (tested and working) battery.
5. If the icon remains, return the mobile computer for servicing.

Start Button

Tap the Start button to launch the Start menu.

- **Programs**: Use to access available programs.
- **Favorites**: Displays files in Favorites directory.
- **Documents**: Displays files in Documents directory.
- **Settings**: Accesses the Control Panel, the Network and Dial-up Connections and the Taskbar and Start menu.
- **Help**: Accesses the Windows CE Help.
- **Run**: Runs a program or application.
- **Suspend**: Places the mobile computer in the suspend state.

Programs Menu

From the Start menu, tap Programs to open the Programs menu. The programs installed on the MC31XX with Windows CE display in the Programs menu. Refer to the Application Guide for Motorola Enterprise Mobility Devices, p/n 72-68901-xx and the Microsoft® Applications for Mobile 6.1 and CE 6.0 User Guide, p/n 72E-108299-xx for application information.
Keyboard Input Panel Button

Use the Keyboard Input Panel as an alternate input device. For more information, see Entering Information Using the Keyboard Input Panel on page 2-14.

Desktop Display Button

Use the Desktop Display button to minimize all open programs and display the desktop.

- My Computer: Double-tap the icon to open My Computer.
- Recycle Bin: Deleted files remain in the recycle bin until the recycle bin is emptied. Once emptied the files cannot be retrieved.
- Remote Desktop Connection: Tap the Remote Desktop Connection icon to access the Remote Desktop Connection window.

Task Manager and Properties

Use the Task Manager to control an application’s use and use the Properties functions to set display and clock options.

Task Manager

1. Select FUNC - CTRL, (to activate the ALT state) and tap on the taskbar to display the Task Manager, Properties Selection menu.
2. Tap Task Manager to display the Task Manager window.

![Task Manager Window](image)

Figure 2-4  Task Manager Window

3. Tap a task in the Active Tasks list and tap Switch To to make that task the primary task, or tap End Task to end the selected task.
4. Tap X to exit the Task Manager window.

Properties

1. Tap Start > Control Panel > Taskbar and Start Menu ... . The Task Manager, Properties window displays, see Figure 2-6 on page 2-6.
2. Tap Properties to display the Taskbar and Start Menu, General tab.
3. This menu provides taskbar options:
   - Check the Always on Top checkbox to keep the taskbar on top of all other windows.
• Check the **AutoHide** checkbox to make the taskbar disappear, touch the bottom of the display to make the taskbar return.

• Check the **Show Clock** checkbox to display the clock on the taskbar.

4. Tap **OK** to save the settings and exit the window.

![Figure 2-5  Taskbar and Start Menu, General Tab](image)

**Advanced Tab**

1. Tap the **Advanced** tab to enter the **Taskbar and Start Menu, Advanced** tab.

2. Tap the **Clear** button to delete all of the documents listed in the **Start > Documents** entry, see **Start Button on page 2-4**. Typically this list is empty, but if there were documents in the list the **Clear** button would delete them.

3. Tap the **Expand Control Panel** checkbox to display the entire contents of the MS control panel in list form, rather than icons.

![Figure 2-6  Taskbar and Start Menu, Advanced Tab](image)

4. Tap **OK** to save the settings and exit the window.

---

**Windows Mobile 6.1 Today Screen**

The Today screen displays important information, such as upcoming appointments and status indicators. Tap a section on the screen to open the associated program. Alternatively, tap **Start > Today** to display the Today screen.
To customize the **Today** screen, 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.

## Windows Mobile 6.1 Status Icons

### Status Bar

Status icons are shown in the **Status Bar** to indicate present status of the mobile computer. Tapping each status icon displays the corresponding dialog box and enables you to change or adjust its settings. You may see the status icons listed in **Table 2-2** on the **Status Bar** located at the top of the screen.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="audio.png" alt="Audio Icon" /></td>
<td>Audio Speaker</td>
<td>Speaker is on.</td>
</tr>
<tr>
<td><img src="mute.png" alt="Audio Mute Icon" /></td>
<td>Audio Speaker</td>
<td>Speaker is off.</td>
</tr>
<tr>
<td><img src="battery.png" alt="Battery Icon" /></td>
<td>Battery Backup</td>
<td>Backup battery is very low.</td>
</tr>
<tr>
<td><img src="battery.png" alt="Battery Icon" /></td>
<td>Battery Main</td>
<td>Main battery is charging.*</td>
</tr>
<tr>
<td><img src="battery.png" alt="Battery Icon" /></td>
<td>Battery Main</td>
<td>Main battery level.*</td>
</tr>
<tr>
<td><img src="battery.png" alt="Battery Icon" /></td>
<td>Battery Main</td>
<td>Main battery is very low.*</td>
</tr>
<tr>
<td><img src="connection.png" alt="Connection Icon" /></td>
<td>Connectivity</td>
<td>Connection is active.</td>
</tr>
<tr>
<td><img src="sync_error.png" alt="Sync Error Icon" /></td>
<td>Connectivity</td>
<td>ActiveSync error</td>
</tr>
<tr>
<td><img src="sync_error.png" alt="Sync Error Icon" /></td>
<td>Connectivity</td>
<td>Synchronization is occurring.</td>
</tr>
</tbody>
</table>

* Only appears in the **Time and Next Appointment** dialog box.
Table 2-2  Status Icons (Continued)

<table>
<thead>
<tr>
<th>Icon</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>✉️</td>
<td>Instant Message</td>
<td>Notification that one or more instant messages were received.</td>
</tr>
<tr>
<td>💌</td>
<td>E-Mail</td>
<td>Notification that one or more e-mail messages were received.</td>
</tr>
<tr>
<td>🕒</td>
<td>Time and Next Appointment</td>
<td>Displays current time in analog or digital format.</td>
</tr>
<tr>
<td>📣</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Only appears in the Time and Next Appointment dialog box.

Command Bar

You may see the icons listed in Table 2-3 on the Command Bar located at the bottom of the screen.

Table 2-3  Command Bar Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>📒</td>
<td>Wireless connection status icon. Indicates WLAN signal strength and opens the Wireless Applications menu.</td>
</tr>
<tr>
<td>📒</td>
<td>The Bluetooth Enabled icon appears in the task tray and indicates that the Bluetooth radio is on (Displays only if the StoneStreet One Bluetooth stack is enabled).</td>
</tr>
<tr>
<td>📒</td>
<td>The Bluetooth Disabled icon appears in the task tray and indicates that the Bluetooth radio is off (Displays only if the StoneStreet One Bluetooth stack is enabled).</td>
</tr>
<tr>
<td>📒</td>
<td>The Bluetooth Communication icon appears in the task tray and indicates that the mobile computer is communicating with another Bluetooth device (Displays only if the StoneStreet One Bluetooth stack is enabled).</td>
</tr>
<tr>
<td>☀️</td>
<td>Opens the IST control panel.</td>
</tr>
<tr>
<td>📒</td>
<td>The ActiveSync icon appears in the task tray and indicates an active serial connection between the mobile computer and the development computer.</td>
</tr>
</tbody>
</table>
Speaker Icon

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

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

![Volume Dialog Box](image)

**Figure 2-9  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.

   ![Volume Dialog Box](image)

   **Figure 2-9  Volume Dialog Box**

   - **NOTE** Use can also adjust the system volume using the **Sounds & Notifications** window or by using the keypad.

Battery Icons

The **Main Battery** icon appears in the **Title Bar** when the Today screen is visible. The icon indicates the battery power level.

![Battery Icon on the Title Bar](image)

**Figure 2-10  Battery Icon on the Title Bar**

You can also view the battery status using the **Power** window.

When the main battery power falls below a predetermined level a **Main Battery** dialog box appears indicating the status of the main battery. When the backup battery power falls below a predetermined level a **Backup Battery** icon and dialog box appears indicating the status of the backup battery.
Connectivity Icon

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

![Connecting Icon](image)

**Time Icon**

✓ **NOTE** The **Time** icon only appears in the **Title Bar** when an application displays. It does not appear it the **Title Bar** when the **Today** screen displays.

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.

![Time Icon Format Menu](image)

To display current date, time and appointments:

1. Tap the **Time** icon to display the **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.

**E-Mail Icon**

The **E-Mail** icon notifies you when you have received incoming e-mails.

**Multiple Notification Icon**

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

**Locking the Mobile Computer (Windows Mobile 6.1 Only)**

You can lock the MC311XX by disabling key presses and screen tap or by requiring a password.
Keypad Locking

Locking the MC31XX turns off keyboard and touch screen functionality. This is helpful when the MC31XX is turned on and you want to prevent accidental key presses.

To lock the device, tap the **Device unlocked** icon. The icon changes to locked.

![Device Unlocked Icon](image1) ![Device Locked Icon](image2)

**Figure 2-17  Device Locked/Unlocked Icons**

To unlock the device and free it for use, tap **Unlock**.

![Unlock Device Window](image3)

**Figure 2-18  Unlock Device Window**

Tap **Unlock** on the **Unlock** window.

Password Locking

Use the **Password** window to set a password to disable unauthorized access to the MC31XX.

> **NOTE** 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.

1. Tap **Start** > **Settings** > **Personal** tab > **Lock** icon > **Password** tab.

![Password Window - Password Tab](image4)

**Figure 2-19  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. From the **Password type** drop-down list, select either **Simple PIN** or **Strong alphanumeric**.

5. For a simple password, enter a four-digit password in the **Password** field.
   
   For a stronger password:
   
   a. Enter a seven character password in the **Password** field. A strong password must contain at least seven characters and contain at least three of the following: uppercase and lowercase letters, numerals, and punctuation.
   
   b. Re-enter the password in the **Confirm** field.

6. Tap **ok**.

7. To set a hint to remember the password, tap the **Hint** tab.

   ![Password Window - Hint Tab](image)

   **Figure 2-20** Password Window - Hint Tab

8. In the text box, enter a hint for a password reminder.

9. Tap **ok**.

When the MC31XX is not used for a period of time and the user tries to access the device, the **Password** window appears.

![Enter Password Windows](image)

**Figure 2-21** Enter Password Windows

Enter the password to un-lock the device.

Tap **Unlock**.
Entering Information

To enter information:

- Use the keypad.
- Use the keyboard input panel (soft keyboard) to enter text.
- Scan bar code data into data fields.
- Use Microsoft® ActiveSync® to synchronize or copy information from the host computer to the mobile computer. For more information on ActiveSync, refer to the MC31XX Series Mobile Computer Integrator Guide.

Entering Information Using Keypad

The 28, 38 and 48-key alphanumeric keypads produce the 26-character alphabet (A - Z), numbers (0 - 9), function keys and assorted characters. The keypads default characters/functions are printed black or white, the ALPHA character/functions are printed orange and the FUNC character/functions are printed blue. See Appendix B, Keypads for keypad configurations, keypad special functions and special character generation.

Entering Information Using the Keyboard Input Panel

Use the keyboard input panel (soft keyboard) to enter information in any program. To launch the keyboard input panel, tap the button on the taskbar. Tap a key to enter the value. Tap the keyboard input panel button to display or to hide the keyboard input panel.

Entering Data via the Bar Code Scanner

The sample bar code scanner application scans data into data fields in the same way data is entered via the keypad.
Interactive Sensor Technology

This section describes the functionality of the Interactive Sensor Technology (IST) feature on the MC31XX.

The IST supports the following features.

- **Power Management** – manage power by configuring IST to control switching on/off the backlight, control suspend mode of the MC31XX by monitoring motion and orientation.
- **Display Orientation** – switch the screen orientation to either landscape or portrait depending on the MC31XX orientation.
- **Free Fall Detection** – monitors free fall duration and records the time and type of the drop event.

**Power Management**

The MC31XX orientation and motion sensitive data can be used as an indicator of MC31XX usage and can be used to manage the battery power of the mobile computer. For example, IST can be configured to control the backlight on and off functionality or go into suspend according to a user gesture by placing screen facing down. It can also be used to keep the MC31XX active while it is in movement to prevent it from quickly going into suspend mode while in use.

**Display Orientation**

The screen can be rotated between portrait and landscape modes automatically, depending on the physical orientation of the MC31XX. For example, if the MC31XX is rotated 90° counterclockwise, IST rotates the display counterclockwise 90° so that the screen display appears correct.

This functionality is achieved by monitoring screen angle and rotating the display to counter any changes. IST only rotates the screen in multiples of 90°.

Figure 2-23  *Display Orientation*
Free Fall Detection

IST continuously monitors gravitational force on the MC31XX according to its current position. When the MC31XX free falls, IST detects the absence of gravitational force and records the event data if it detects a free fall more than 450 ms, which may indicate nearly a one meter drop. This data can be used as an indicator of potential abuse or misuse.

IST features a log for recording the free fall events. This log records the date, time and the time period of the free fall.

Figure 2-24  Free Fall Detection
Connecting a Wired headset

To connect a wired headset to the MC31XX:
Using a Bluetooth Headset

You can use a Bluetooth headset for audio communication when an audio enabled application is used. See Chapter 3, Using Bluetooth for information on connecting a Bluetooth device to the mobile computer. Ensure that the mobile computer’s volume is set appropriately before putting the headset on. When a Bluetooth headset is connected the speaker is muted.

✓  **NOTE**  If the mobile computer goes into suspend mode the Bluetooth connection is disabled and the mobile computer automatically switches to speakerphone mode.

Data Capture

The mobile computer has an integrated laser scanner or imager that collects data by scanning bar codes.

Laser Scanning

To scan bar codes with the mobile computer:

1. Ensure that the mobile computer is loaded with a scanning application.
2. If the mobile computer is equipped with a rotating head, adjust the head prior to scanning.
3. Aim the scan window at the bar code.
4. Press the scan button or trigger. Ensure the red scan beam covers the entire bar code. The Scan LED Indicators illuminate red to indicate that the laser is on. The Scan LED Indicators illuminate green and a beep sounds to indicate a successful decode.

![Figure 2-25 Laser Aiming](image)

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.

Scan LED Indicators

The red/green Scan LED Indicators (located in the Indicator LED Bar and in the rotating turret) indicates the scan status. For the location of the Scan LED Indicators see, Figure 1-1 on page 1-2.
Scanning Considerations

Scanning consists of: aim, scan and decode. Scanning performance can be optimized by considering the range and the scanning angle:

- **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**
  The scan angle is important for optimizing decode performance. 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 do not 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.

  **NOTE** Contact the Motorola Enterprise Mobility Support Center if chronic scanning difficulties develop. Decoding of properly printed bar codes should be quick and effortless.

### Imaging

MC31XX with an integrated imager have the following features:

- Omnidirectional (360°) reading of a variety of bar code symbologies, including the most popular linear, postal, PDF417, and 2D 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.
Operational Modes

MC31XX with an integrated imager support three modes of operation, listed below. Activate each mode pressing the Scan button.

- **Decode Mode:** In this mode, the MC31XX attempts to locate and decode enabled bar codes within its field of view. The imager remains in this mode as long as you hold the scan button, or until it decodes a bar code.

- **Pick List Mode:** This mode allows you to selectively decode a bar code when more than one bar code is in the MC31XX’s field of view. To accomplish this, move the aiming crosshair center dot over the required bar code to decode only that bar code. This feature is ideal for pick lists containing multiple bar codes and manufacturing or transport labels containing more than one bar code type (either 1D or 2D).

- **Image Capture Mode:** Use this mode to capture an image within the MC31XX’s field of view. This is useful for capturing signatures or images of items like damaged boxes.

Imager Scanning

1. Ensure that a scan-enabled application is loaded on the MC31XX.
2. Aim the exit window at the bar code.
3. Press the scan button.

   The red laser aiming pattern turns on to assist in aiming. Ensure the cross-hair is on top of the bar code.

   The Scan LED lights red to indicate that scanning is in process, then lights green and a beep sounds, by default, to indicate the bar code was decoded successfully. Note that when the MC31XX is in Pick List Mode, the imager does not decode the bar code until the crosshair center dot touches the bar code.

---

**Note**

To enable Pick List Mode, download the Control Panel applet from the Support Central web site at [http://www.motorola.com/enterprisemobility/support](http://www.motorola.com/enterprisemobility/support). Pick List can also be set in an application using a API command.

---

**Figure 2-26**  
Imager Aiming Pattern
4. Release the scan button.

**NOTE** Imager decoding usually occurs instantaneously. The MC31XX repeats the steps required to take a digital picture (image) of a poor or difficult bar code as long as the scan button remains pressed.
Resetting the Mobile Computer

Windows CE 6.0 Devices

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. All data that is not saved is lost.

A cold boot also restarts the mobile computer, but erases all stored records and entries from RAM. In addition it returns formats, preferences and other settings to the factory default settings.

Perform a warm boot first. If the mobile computer still does not respond, perform a cold boot.

Performing a Warm Boot

To perform a warm boot:

1. Press the Power button for five seconds.
2. As the mobile computer initializes MC31XX Sample Applications window appears.

CAUTION Files that remain open during a warm boot may not be retained.

Performing a Cold Boot

A cold boot restarts the mobile computer and erases all user stored records and entries from RAM. Never perform a cold boot unless a warm boot does not solve the problem.

CAUTION Cold boot resets the mobile computer, to the default settings. All added applications and all stored data are removed. Do not cold boot without support desk approval.

To perform a cold boot:

1. Simultaneously press and then release the 1, 9 and Power keys. Do not hold down any other keys or buttons. As the mobile computer initializes, the splash window, Figure 1-10 on page 1-10, appears for about a minute.
2. Calibrate the touch screen. See Calibration Screen on page 1-10 to calibrate the mobile computer screen.

Windows Mobile 6.1 Devices

There are two reset functions, warm boot and cold boot.

- A warm boot restarts the mobile computer and closes all running programs.
- A cold boot also restarts the mobile computer and closes all running programs but also resets the Real-Time-Clock (RTC).

Data saved in flash memory or a memory card is not lost. 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

To perform a warm boot:

1. Press the Power button for five seconds.
2. As the mobile computer initializes Today screen appears.

**Performing a Cold Boot**

A cold boot restarts the mobile computer. The operating system and all applications are restarted. File storage is preserved and some drivers are initialized. *Only perform a cold boot if a warm boot does not solve the problem.*

1. To perform a cold boot, simultaneously press and then release the **1**, **9** and **Power** keys. Do not hold down any other keys or buttons.

2. As the mobile computer initializes, the splash window, *Figure 1-10 on page 1-10*, appears.

---

**Waking the Mobile Computer**

The wakeup conditions define what actions wake up the mobile computer after it has gone into suspend mode. The mobile computer can go into suspend mode by either pressing the Power button or automatically by Control Panel time-out settings. These settings are configurable and the factory default settings are shown in *Table 2-5*.

**Table 2-5  Wakeup Default Settings**

<table>
<thead>
<tr>
<th>Condition for Wakeup</th>
<th>Power Button</th>
<th>Automatic Time-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC power is applied.</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mobile computer is inserted into a cradle.</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mobile computer is removed from a cradle.</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mobile computer is connected to a serial device.</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mobile computer is connected to a USB device.</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mobile computer is disconnected from a USB device.</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>A key is pressed.</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>The scan triggered is pressed.</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>The screen is touched.</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>On Motion</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>USB Host</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Wireless LAN activity is detected.</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

To access the Wakeup settings:

On Window CE 6.0 devices, tap **Start > Settings > Control Panel > Power icon > Wakeup tab.**
On Windows Mobile 6.1 devices, tap **Start** > **Settings** > **System** tab > **Power** icon > **Wakeup** tab.

---

**Figure 2-28**  *Windows CE 6.0 Wakeup Tab*

**Figure 2-29**  *Windows Mobile 6.1 Wakeup Tab*
Chapter 3 Using Bluetooth

Introduction

Bluetooth-equipped devices can communicate without wires, using frequency-hopping spread spectrum (FHSS) radio frequency (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) communication and low power consumption.

MC31XXs 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. To use the MC31XX as a modem, create a dial-up modem connection between a computer and MC31XX.

The MC31XX with Bluetooth technology uses either the StoneStreet Bluetooth stack or the Microsoft Bluetooth stack. To write an application that uses the StoneStreet One Bluetooth stack APIs, refer to the Enterprise Mobility Developer Kit (EMDK) Help.

Adaptive Frequency Hopping

Adaptive Frequency Hopping (AFH) is a method of avoiding fixed frequency interferers, and 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 consists of 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 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 Motorola mobile computers to operate in any infrastructure.

The Bluetooth radio in this MC31XX 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 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.
Security

The current Bluetooth specification defines security at the link level. Application-level security is not specified. This allows application developers to define security mechanisms tailored to their specific need. Link-level security occurs between devices, not users, while application-level security can be implemented on a per-user basis. The Bluetooth specification defines security algorithms and procedures needed to authenticate devices, and if needed, encrypt the data flowing on the link between the devices. Device authentication is a mandatory feature of Bluetooth while link encryption is optional.

Pairing of Bluetooth devices is accomplished by creating an initialization key that is used to authenticate the devices and create a link key for them. Entering a common PIN number in the devices being paired generates the initialization key. The PIN number is never sent over the air. By default, the Bluetooth stack responds with no key when a key is requested (it is up to user to respond to the key request event). Authentication of Bluetooth devices is based-upon a challenge-response transaction. Bluetooth allows for a PIN number or passkey that is used to create other 128-bit keys used for security and encryption. The encryption key is derived from the link key used to authenticate the pairing devices. Also worthy of note is the limited range and fast frequency hopping of the Bluetooth radios that makes long-distance eavesdropping difficult.

Recommendations are:

- Perform pairing in a secure environment
- Keep PIN codes private and don't store the PIN codes in the mobile computer
- Implement application-level security.

The Microsoft stack supports Smart-pairing. For detailed information, refer to the Microsoft MSDN.

Bluetooth Configuration

By default, the MC31XX is configured to using the Microsoft stack. Refer to the *MC31XX Series Mobile COmputer Integrator Guide*, for information on switching between the Microsoft Bluetooth stack and the StoneStreet One Bluetooth stack.

If the MC31XX is configured to use the StoneStreet One Bluetooth stack, the Bluetooth icon appears at the bottom right corner of the Today screen on Windows Mobile devices and in the Status bar for WinCE devices. If the Microsoft Bluetooth stack is configured, the Bluetooth icon does not appear.

![Bluetooth Icon](image)

Table 3-1 list the services supported by the StoneStreet One Bluetooth stack and the Microsoft Bluetooth stack.
Table 3-1  Bluetooth Services

<table>
<thead>
<tr>
<th>Microsoft Bluetooth Stack</th>
<th>StoneStreet One Bluetooth Stack</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Windows Mobile</td>
<td>Windows Mobile</td>
</tr>
<tr>
<td>Serial Port Service</td>
<td>Serial Port Service</td>
</tr>
<tr>
<td>Dial-Up Networking Client Service</td>
<td>Dial-Up Networking Client Service</td>
</tr>
<tr>
<td>OBEX Object Push Service</td>
<td>OBEX Object Push Client and Host Services</td>
</tr>
<tr>
<td>HID Client Service</td>
<td>HID Client Services</td>
</tr>
<tr>
<td>A2DP/AVRCP Service</td>
<td>LAN Client Services</td>
</tr>
<tr>
<td></td>
<td>Headset Audio Gateway Client Services</td>
</tr>
<tr>
<td></td>
<td>Personal Area Networking Services</td>
</tr>
<tr>
<td></td>
<td>File Transfer Client and Host Services</td>
</tr>
<tr>
<td></td>
<td>A2DP/AVRCP Services</td>
</tr>
</tbody>
</table>

Table 3-2 list the COM ports available for the StoneStreet One Bluetooth stack and the Microsoft Bluetooth stack.

<table>
<thead>
<tr>
<th>Microsoft Bluetooth Stack</th>
<th>StoneStreet One Bluetooth Stack</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM5</td>
<td>COM5</td>
</tr>
<tr>
<td>COM9</td>
<td>COM9</td>
</tr>
<tr>
<td>COM11</td>
<td>COM21</td>
</tr>
<tr>
<td>COM22</td>
<td>COM23</td>
</tr>
</tbody>
</table>

Bluetooth Power States

Cold Boot

*With StoneStreet One Bluetooth Stack*

Performing a cold boot on the MC31XX turns off Bluetooth 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.
**With Microsoft Bluetooth Stack**

Performing a cold boot retain the state of the Bluetooth radio prior to the cold boot.

**Warm Boot**

**With StoneStreet One Bluetooth Stack**

Performing a warm boot turns off Bluetooth.

**With Microsoft Bluetooth Stack**

Performing a warm boot retain the state of the Bluetooth radio prior to the warm boot.

**Suspend**

When there is an active Bluetooth connection, the Bluetooth radio goes into low power mode maintaining the active connection. When there is no active connection, the Bluetooth radio turns off.

**With StoneStreet One Bluetooth Stack**

✓ **NOTE** If there is an active Bluetooth connection between the MC31XX and another Bluetooth device, the MC31XX will not timeout. However, if the user presses the Power button on the MC31XX, the MC31XX will suspend and upon receiving data from a remote Bluetooth device, the MC31XX will wake from suspend mode. For example, Bluetooth scanner sending data to the MC31XX.

**With Microsoft Bluetooth Stack**

✓ **NOTE** If there is an active Bluetooth connection between the MC31XX and another Bluetooth device and there is no data activity, the MC931XX will timeout. However, if the user presses the Power button on the MC31XX, the MC31XX will suspend (except when on a call) and upon receiving data from a remote Bluetooth device, the MC31XX will wake from suspend mode. For example, headset redial or Bluetooth scanner sending data to the MC31XX.

**Resume**

When the MC31XX resumes, Bluetooth turns on if it was on prior to suspend.
Using Microsoft Bluetooth Stack with Windows Mobile 6.1

The following sections provide information on using the Microsoft Bluetooth stack with the Windows Mobile 6.1 operating system.

Turning the Bluetooth Radio Mode On and Off

Turn off the Bluetooth radio to save power or if entering an area with radio restrictions (e.g., an airplane). When the radio is off, other Bluetooth devices cannot see or connect to the MC31XX. Turn on the Bluetooth radio to exchange information with other Bluetooth devices (within range). Communicate only with Bluetooth radios in close proximity.

NOTE To achieve the best battery life turn off radios not in use.

Enabling Bluetooth

To enable Bluetooth:

1. Tap Wireless Manager and then tap the Bluetooth bar or Tap Start > Setting > Connections > Bluetooth icon > Mode tab.

2. Check the Turn On Bluetooth checkbox.

3. Tap ok.

Disabling Bluetooth

To disable Bluetooth:

1. Tap Wireless Manager and then tap the Bluetooth bar or Tap Start > Setting > Connections > Bluetooth icon > Mode tab.

2. Un-check the Turn On Bluetooth checkbox.

3. Tap ok.
Discovering Bluetooth Device(s)

The MC31XX can receive information from discovered devices without bonding. However, once bonded, the MC31XX and a bonded device exchange information automatically when you turn the Bluetooth radio on. See Bonding with Discovered Device(s) on page 3-30 for more information.

To find Bluetooth devices in the area:

1. Ensure that Bluetooth is enabled on both devices.
2. Ensure that the Bluetooth device to discover is in discoverable and connectable modes.
3. Ensure that the two devices are within 30 feet (10 meters) of one another.
4. Tap Start > Settings > Connections tab > Bluetooth icon > Devices tab.

![Figure 3-3 Bluetooth - Devices Tab](image)

5. Tap Add new device. The MC31XX begins searching for discoverable Bluetooth devices in the area.

![Figure 3-4 Searching for Bluetooth Devices](image)

6. Select a device from the list.
7. Tap Next. The Enter Passcode window appears.

**NOTE** If Smart-pairing is configured and the device is requesting one of the pre-defined PINs, the Enter Passcode window does not appear.
8. Enter the Passcode on the other device. The device is added to the Bluetooth list.

9. If you created a passcode, you will be prompted by the other device to enter the same passcode. Enter the created passcode to establish a paired connection. (If you entered a passcode from the device, you shouldn’t have to do anything on the other device.)

10. When the connection is complete, a list of matching and supported services on the device appears.

11. Select the services you want to use and tap Finish. The services on the new devices have to be selected or else the pairing won’t include those services, even though the devices are paired. If services are not selected, you will be continually prompted for the passcode from the device.

12. The device appears in the list on the main window.

   After the passcodes have been accepted on both sides, you have a trusted (“paired”) connection.

Available Services

✓ NOTE Some devices might not require a PIN. This depends upon the device’s authentication.

The MC31XX with Microsoft Bluetooth stack and Windows Mobile 6.1 offers the following services:

- OBEX Object Push via Beam
- Serial Port
- Personal Area Networking
- HID
- Dial-up Networking
- A2DP/AVRCP.

See the following sections for information on these services.

**Object Push Services via Beam**

> **NOTE** You can only send files to a remote device using the Beam function.

Use the OBEX Push Service to send files and contacts to another Bluetooth device. To transfer files between the MC31XX and another Bluetooth enabled device:

1. Ensure that Bluetooth is enabled and discoverable on both devices.
2. Ensure that the two devices are within 30 feet (10 meters) of one another.
3. Tap **Start** > **Programs** > **File Explorer**.
4. Navigate to the file to transfer.
5. Tap and hold on the filename until the pop-up menu appears.

![File Explorer Window](image)

**Figure 3-7 File Explorer Window**

6. Select **Beam File**. The MC31XX searches for Bluetooth devices in the area.
7. Tap **Tap to send** next to the Bluetooth device to send the file to. The MC31XX communicates with the device and send the file. When completed, **Tap to send** changes to **Done**.

![Beam File Window](image)

**Figure 3-8 Beam File Window**

To transfer a contact between the MC31XX and another Bluetooth enabled device:
1. Ensure that Bluetooth is enabled and discoverable on both devices.

2. Ensure that the two devices are within 30 feet (10 meters) of one another.

3. Tap Start > Contacts

4. Navigate to the contact to transfer.

5. Tap and hold on the contact until the pop-up menu appears.

![Contact Window](image)

**Figure 3-9 Contact Window**

6. Select Send Contact > Beam. The MC31XX searches for Bluetooth devices in the area.

7. Tap Tap to send next to the Bluetooth device to send the file to. The MC31XX communicates with the device and send the contact. When completed, Tap to send changes to Done.

**Serial Port Services**

Use the wireless Bluetooth serial port connection as you would a physical serial cable connection. Configure the application that will use the connection to the correct serial port.

To establish a serial port connection:

1. Ensure that Bluetooth is enabled and discoverable on both devices.

2. Ensure that the two devices are within 30 feet (10 meters) of one another.

3. Tap Start > Settings > Connections tab > Bluetooth icon > Devices tab.

4. Tap Add new device. The MC31XX begins searching for discoverable Bluetooth devices in the area.

5. Select a device from the list.

6. Tap Next. The Enter Passcode window appears.

   **NOTE** If Smart-pairing is configured and the device is requesting one of the pre-defined PINs, the Enter Passcode window does not appear.

7. Enter the Passcode and the tap Next. The device is added to the Bluetooth list.

8. In the device list, tap the serial device. The Partnership Settings window displays.

9. Select the Serial Port checkbox.

10. Tap Save.

11. Tap COM Ports tab.

12. Tap New Outgoing Port. The add device window appears.
13. Select the serial device in the list and then tap **Next**.

14. Select a COM port from the drop-down list.

15. Tap **Finish**.

   ✓ **NOTE** No connection is made at this point. An application must open the selected COM port to trigger Microsoft Bluetooth stack to open the connection.

**ActiveSync Using Serial Port Services**

Use the wireless Bluetooth serial port connection for ActiveSync just as you would a physical serial cable connection. You must configure the application that will use the connection to the correct serial port.

To set up a Bluetooth ActiveSync connection:

Before setting up a Bluetooth ActiveSync connection, configure the Bluetooth function of your device.

   ✓ **NOTE** For additional security, disable network bridging on the computer (specifically, bridging to a Remote NDIS adapter) before connecting to the computer to pass though to the Internet or a network. For more information on network bridging, see **Windows Help** on your computer.

The instructions below are for computers that support the Windows XP SP2 or later version operating system.

1. Ensure that Bluetooth is enabled and discoverable on both devices.

2. Ensure that the two devices are within 30 feet (10 meters) of one another.

3. On the computer, click **Start > Settings > Control Panel**.

4. Double-click **Bluetooth Devices**.

5. On the **Options** tab, select the **Turn discovery on** and **Allow Bluetooth devices to connect to this computer** checkboxes.

   ![Bluetooth Devices](image)

   **Figure 3-10 Computer Bluetooth Devices Window**
6. On the COM Ports tab, click Add.
7. Select the Incoming (device initiates the connection) option, then click OK.
   Note the number of the COM port that was added.
8. Click OK.
9. Click Start > All Programs > Microsoft ActiveSync.
10. Click File > Connection Settings.

![ActiveSync Connection Settings](image)

Figure 3-11 ActiveSync Connection Settings

11. On the Allow connections to one of the following drop-down list, select the COM port with the number you noted earlier.
12. On the MC31XX, tap Start > Programs > ActiveSync.
13. Tap Menu > Connect via Bluetooth.

   Synchronization is automatically initiated. The ActiveSync icon appears on the lower right corner of the Today screen.

   If an Authentication is required, the Enter Passcode screen appears, type an alphanumeric passkey (PIN code), then tap Next; enter the same passkey on the other device.

   The passkey is recommended for enhanced security. Your passkey must be between 1 to 16 alphanumeric characters.

   If you do not want to use a passkey, tap Next.
14. To disconnect the ActiveSync connection, tap the ActiveSync icon on the Today screen.
15. Tap Disconnect.
Using Microsoft Bluetooth Stack with Windows CE 6.0

The following sections provide information on using the Microsoft Bluetooth stack with Windows CE 6.0 operating system.

Power Modes

The Bluetooth radio switches between normal and low power modes automatically. When data transfer is required, the radio goes into normal mode. After five seconds of inactivity, the radio goes into low power mode.

Discovering Bluetooth Device(s)

The MC31XX can receive information from discovered devices without bonding. However, once bonded, the MC31XX and a bonded device exchange information automatically when you turn the Bluetooth radio on. See Bonding with Discovered Device(s) on page 3-30 for more information.

To find Bluetooth devices in the area:

1. Ensure that Bluetooth is enabled on both devices.
2. Ensure that the Bluetooth device to discover is in discoverable and connectable modes.
3. Ensure that the two devices are within 30 feet (10 meters) of one another.
5. Tap Scan Device button. The MC31XX begins searching for discoverable Bluetooth devices in the area. Discovered devices appear in the Untrusted list.
6. Select a device from the Untrusted list.
7. Tap --> button. A dialog box appears.
8. Tap Yes.

9. The Bluetooth Enter PIN window appears.

---

**Figure 3-14  Enter PIN**

10. Enter the PIN on the other device. The device is added to the Trusted list.

    You are prompted to enter a PIN. If the device has a specific PIN, enter it in the PIN field and tap Next. If the device does not have a specific passcode, enter one in the Passcode field and tap Next. The Bluetooth radio tries to connect with the device.

11. If you created a passcode, you will be prompted by the other device to enter the same passcode. Enter the created passcode to establish a paired connection. (If you entered a passcode from the device, you shouldn’t have to do anything on the other device.)

12. When the connection is complete, a list of matching and supported services on the device appears.

13. Select the services you want to use and tap Finish. The services on the new devices have to be selected or else the pairing won’t include those services, even though the devices are paired. If services are not selected, you will be continually reprompted for the passcode from the device.

14. The device appears in the list on the main window.

    After the passcodes have been accepted on both sides, you have a trusted (“paired”) connection.

    ![✓](https://via.placeholder.com/15) **NOTE** Some devices might not require a PIN. This depends upon the device’s authentication.

---

**Available Services**

![✓](https://via.placeholder.com/15) **NOTE** In order to connect to the Bluetooth device, the application must create the connection to the remote device. Please refer to the MSDN Help for detailed information.

The MC31XX with Microsoft Bluetooth stack and Windows CE 6.0 offers the Serial Port service.
Using Bluetooth StoneStreet One Bluetooth Stack

The following sections provide information on using the Stone Street One Bluetooth stack.

Turning the Bluetooth Radio Mode On and Off

Turn off the Bluetooth radio to save power or if entering an area with radio restrictions (e.g., an airplane). When the radio is off, other Bluetooth devices cannot see or connect to the MC31XX. Turn on the Bluetooth radio to exchange information with other Bluetooth devices (within range). Communicate only with Bluetooth radios in close proximity.

NOTE To achieve the best battery life turn off radios not in use.

Disabling Bluetooth

To disable Bluetooth, tap Bluetooth icon > Disable Bluetooth. The Bluetooth icon changes to indicate that Bluetooth is disabled.

![Figure 3-15 Disable Bluetooth](image)

Enabling Bluetooth

To enable Bluetooth, tap Bluetooth icon > Enable Bluetooth. The Bluetooth icon changes to indicate that Bluetooth is enabled.

![Figure 3-16 Enable Bluetooth](image)

Modes

The BTExplorer application has two modes for managing Bluetooth connections: Wizard Mode and Explorer Mode. The Wizard Mode is for novice Bluetooth users and the Explorer Mode is for experienced Bluetooth users. To switch between modes, select View > Wizard Mode or View > Explorer Mode.

Wizard Mode

Wizard Mode provides a simple process for discovering and connecting to Bluetooth devices.
Using Bluetooth 3 - 15

NOTE Switching between Wizard Mode and Explorer Mode closes all active connections.

Wizard Mode shows the devices and services in a simple Favorites view created by following the step-by-step wizard.

Explorer Mode

The Explorer Mode window is easy to navigate and provides greater control to users familiar with Bluetooth. The menu bar provides quick access to the options and tools used to connect to devices. To access Explorer Mode, tap View > Explorer Mode.

![Explorer Mode Window](image)

Figure 3-17 Explorer Mode Window

You can also use the “tap and hold” technique to view available options. Scroll bars and view options are similar to those on the Windows desktop. The tree structure lists the following sub-items:

- Local Device - This device
- Remote Device - Other Bluetooth devices
  - Trusted Devices - Bonded (paired) Bluetooth devices
  - Untrusted Devices - Discovered devices that are not bonded
- Favorites - Selected services that are set as Favorite for quick access.

NOTE Switching between Wizard Mode and Explorer Mode closes all active connections.

Discovering Bluetooth Device(s)

The MC31XX can receive information from discovered devices without bonding. However, once bonded, the MC31XX and a bonded device exchange information automatically when you turn the Bluetooth radio on. See Bonding with Discovered Device(s) on page 3-30 for more information.

To find Bluetooth devices in the area:

1. Ensure that Bluetooth is enabled on both devices.
2. Ensure that the Bluetooth device to discover is in discoverable and connectable modes.
3. Ensure that the require profile is enabled on the MC31XX. See Profiles Tab on page 3-42 for more information.
4. Ensure that the two devices are within 30 feet (10 meters) of one another.
5. Tap the Bluetooth icon and select Show BTExplorer. The BTExplorer window appears.

![New Connection Wizard](image)

**Figure 3-18 BTExplorer Window**

7. Select Explore Services on Remote Device or another from the drop-down list and tap Next.

The following actions are available in the drop-down list (actions may vary depending upon configurations):

- Explore Services on Remote Device
- Pair with a Remote Device
- Active Sync via Bluetooth
- Browse Files on Remote Device
- Connect to Headset
- Connect to Internet using Access Point
- Connect to Internet using Phone/Modem
- Connect to Personal Area Network
- Connect to Printer
- Send or Exchange Objects
- Associate Serial Port
- Connect to High-Quality Audio (not available on Windows CE 6.0 devices).

**NOTE** If a device discovery action has not been previously performed, a device discovery is automatically initiated. If a device discovery has previously been performed, the device discovery process is skipped, and the previously found list of devices displays. To start a new device discovery, tap and hold in the window and select Discover Devices from the pop-up menu.

8. BTExplorer searches for Bluetooth devices in the area.
The discovered devices display in the **Select Remote Device** window.

9. Select a device from the list and tap **Next**. The MC31XX searches for services on the selected Bluetooth device.

10. Select a service from the list and press **Next**. The **Connection Favorite Options** window appears.

**NOTE** If the MC31XX discovers a service but the service is not supported, the service icon is grayed-out.
11. In the **Favorite Name** text box, enter a name for this service that will appear in the **Favorite** window.

12. Tap **Next**. The **Connection Summary** window appears.

13. Tap **Connect** to add the service to the **Favorite** window and connect to the service.

Figure 3-23  **Favorites Window**

### Available Services

![Figure 3-23  Favorites Window](image)

- **NOTE** Some devices might not require a PIN. This depends upon the device’s authentication.

The MC31XX offers the following services:

- File Transfer
- Dial-Up Networking
- OBEX Object Push
- Headset Audio Gateway
- Serial Port
- Personal Area Networking
- A2DP/AVRCP.

See the following sections for information on these services.
File Transfer Services

**NOTE** Shared folders are a security risk.

To transfer files between the MC31XX and another Bluetooth enabled device:

1. Ensure that OBEX File Transfer profile is enabled on the MC31XX. See Profiles Tab on page 3-42 for more information.

   **NOTE** If favorite connections have already been created, the Favorites screen displays. If no favorite connections have been created, the New Connection Wizard screen displays.

2. Use the Connection Wizard to search for a Bluetooth device.
3. Select the device and tap Next. The Select Remote Service window appears.
4. Tap Next. The Connection Favorite Options window appears.
5. Tap Next. The Connection Summary window appears.
6. Tap Connect. The remote device’s accessible folders appear.

![Figure 3-24 File Transfer Window](image)

7. Double-tap the file to copy. The Save Remote File window appears.

![Figure 3-25 Save Remote File Window](image)

8. Tap and hold on the file. A pop-up menu appears.
9. Select the action to perform:
   - **New** - create a new file or folder on the remote device
   - **Delete** - delete the selected file on the remote device.
- **Get File** - copy the file from the remote device to the MC31XX.
- **Put File** - copy a file from the MC31XX to the remote device.

**Creating a New File or Folder**

To create a new folder or file on the remote device:

1. Tap and hold on the screen and select **New > Folder** or **New > File**. The Create New Folder or Create New File window appears.
2. Enter the name for the new folder or file.
3. Tap **OK** to create the new folder or file on the remote device.

**Deleting a File**

To delete a file from the remote device:

1. Tap and hold on the file to delete and select **Delete**.
2. In the Delete Remote Device File dialog box tap **Yes**.

**Getting a File**

To copy a file from a remote device:

1. Double-tap or tap and hold on the file and select **Get**. The Save Remote File window appears.
2. Navigate to the directory to save the file.
3. Tap **Save**. The file is transferred from the remote device to the MC31XX.

**Copying a File**

To copy a file to a remote device:

1. Tap **Action > Put**. The Send Local File window appears.
2. Navigate to the directory to save the file and select a file.
3. Tap **Open**. The file copies from the MC31XX to the remote device.

**Connecting to the Internet Using an Access Point**

This section explains how to access a Bluetooth-enabled LAN access point (AP) for a network connection. Use Internet Explorer to connect to a server.

1. Ensure the MC31XX is discoverable and connectable. See *Device Info Tab on page 3-33*.
2. Ensure that the **Personal Area Networking** profile is enabled on the MC31XX. See *Profiles Tab on page 3-42* for more information.
3. Use the **Connection Wizard** to search for a Bluetooth AP.

   **NOTE** If favorite connections have already been created, the **Favorites** screen displays. If no favorite connections have been created, the **New Connection Wizard** screen displays.

4. Select the **Personal Area Network** or **Network Access** service and select **Connect** from the pop-up menu. The MC31XX connects with the access point.
5. Tap Start > Internet Explorer. The Internet Explorer window appears.

6. In the address field, enter an internet address and tap the Enter button. The web page loads.

✓ **NOTE** Network Access profile is not supported.

### Dial-Up Networking Services

Dial-up networking allows the user to connect the MC31XX to a Bluetooth Phone and use the Bluetooth Phone as a modem to connect to an office network or ISP.

Before setting up dial-up networking, obtain dial-up information and other necessary settings (username, password and domain name, if required) for the office network or ISP.

To create a new Bluetooth connection:

1. Ensure the Bluetooth Phone is discoverable and connectable.

2. Ensure that the **Dial-Up Networking** profile is enabled on the MC31XX. See *Profiles Tab on page 3-42* for more information.

3. Tap Menu > New Connection.

4. Select **Explore Services on Remote Device** or another from the drop-down list and tap Next.

5. **BTExplorer** searches for Bluetooth devices in the area.

   The discovered devices display in the **Select Remote Device** window.

6. Select the Bluetooth Phone from the list and tap Next. The MC31XX searches for services on the Bluetooth Phone.

   ![Figure 3-26 Select Remote Service Window](image)

7. Select **Dial-up Networking Gateway** service from the list and tap Next. The **Connection Favorite Options** window appears.
8. In the **Favorite Name** text box, enter a name for this service that will appear in the **Favorite** window.

9. Tap **Next**. The **Connection Summary** window appears.

10. Tap **Connect**. The **Select Dial-up Networking Entry** window appears.

11. Select the entry and tap **OK**. The MC31XX begins to communicate with the Bluetooth phone. If required, the phone requests permission to communicate with the MC31XX.

12. Confirm the connection on the phone. The **Network Log On** window appears.

13. In the **User name** text box, enter the user name for this connection.

14. In the **Password** text box, enter the password for this connection.

15. In the **Domain** text box, enter the domain name for this connection, if required.

16. Tap **Finish** or **Connect**.

17. The phone begins dialing and connects to the network.
18. To end a session, tap the **Connection** icon and then tap **Disconnect** in the dialog box.

**Add a Dial-up Entry**

To add a dial-up entry:

1. In the **Select Dial-up Networking Entry** window, tap and hold and then select **Add Entry** from the pop-up menu.

![Select Dial-up Networking Entry Window](image)

**Figure 3-30  Select Dial-up Networking Entry Window**

2. The **Add Phone Book Entry** window appears.

![Add Phone Book Entry Window](image)

**Figure 3-31  Add Phone Book Entry Window**

3. In the **Name for the connection** text box, enter a name for this connection.
4. In the **Country Code** text box, enter the country code for the country that you are calling.
5. In the **Area Code** text box, enter the area code.
6. In the **Phone Number** text box, enter the phone number.
7. Tap **OK**.

**Object Exchange Push Services**

Object Exchange (OBEX) is a set of protocols that allows sharing objects such as Contacts or pictures using Bluetooth.

To exchange contact information with another Bluetooth enabled device:

1. Ensure the MC31XX is discoverable and connectable. See **Device Info Tab on page 3-33**.
2. Ensure that the **OBEX Object Push** profile is enabled on the MC31XX. See **Profiles Tab on page 3-42** for more information.
3. Use the **Connection Wizard** to search for a Bluetooth device.

4. Select the device and tap **Next**.

5. Select the **OBEX Object Push** service and select **Next**. The **Connection Favorite Options** window appears.

6. Tap **Next**. The **Connection Summary** window appears.

7. Tap **Connect**. The **OBEX Object Push** window appears.

8. In the **Action** drop-down list, select one of the following options: **Send Contact Information**, **Swap Contact Information**, **Fetch Contact Information**, or **Send a Picture**.

**Sending a Contact**

To send a contact to another device:

**NOTE** Prior to sending and receiving contacts, a default contact must be set up before attempting to send a contact.

1. Tap and hold on **OBEX Object Push** and select **Connect**. The **OBEX Object Push** window appears.

   **Figure 3-32**  **OBEX Object Push Window**

2. In the **Action**: drop-down list, select **Send Contact Information**.

3. Tap . The **Select Contact Entry** window appears.

   **Figure 3-33**  **Select Contact Entry Window**

4. Select a contact to send to the other device.
5. Tap OK.

6. Tap OK to send the contact to the other device and display a confirmation dialog box on the other device to accept the contact. A Send Contact dialog appears.

7. Tap Ok.

**Swapping Contacts**

To swap contacts with another device:

✓ **NOTE** Prior to swapping contacts, a default contact must be set up before attempting to send a contact.

Ensure that the MC31XX is connectable.

1. Tap and hold on **OBEX Object Push** and select **Connect**. The **OBEX Object Push** window appears.

![Figure 3-34 OBEX Object Push Window](image)

2. In the **Action**: drop-down list, select **Swap Contact Information**.

3. Tap . The **Select Contact Entry** window appears.

![Figure 3-35 Select Contact Entry Window](image)

4. Select a contact to send to the other device.

5. Tap OK.

6. Tap OK to swap contacts with the other device and display a confirmation dialog box on the other device to accept the contact.

7. Tap Ok.
**Fetching a Contact**

To fetch a contact from another device:

1. Tap and hold on **OBEX Object Push** and select **Connect**. The **OBEX Object Push** window appears.

   ![OBEX Object Push Window](image)

   **Figure 3-36 OBEX Object Push Window**

   ✓ **NOTE** Prior to sending and receiving contacts, a default contact must be set up before attempting to send a contact. Ensure that the MC31XX is connectable.

2. In the **Action:** drop-down list, select **Fetch Contact information**.

3. Tap **OK**. The contact on the other device is copied.

**Sending a Picture**

To send a picture to another device:

1. Tap and hold on **OBEX Object Push** and select **Connect**. The **OBEX Object Push** window appears.

   ![OBEX Object Push Window](image)

   **Figure 3-37 OBEX Object Push Window**

2. In the **Action:** drop-down list, select **Send A Picture**.

3. Tap . The **Send Local Picture** window appears.
4. Navigate to the picture to send to the other device.

5. Tap Open.

6. Tap OK to send the picture to the other device and display a confirmation dialog box on the other device to accept the picture. A Send Picture dialog appears.

7. Tap Ok.

**Headset Services**

To connect to a Bluetooth headset:

1. Ensure the MC31XX is connectable (required when automatic re-connect is initiated). See *Device Info Tab on page 3-33*.

2. Ensure that the Headset profile is enabled on the MC31XX. See *Profiles Tab on page 3-42* for more information.

3. Use the Connection Wizard to search for a Bluetooth headset.

4. Select the device and tap Next.

5. Select the Headset service name and select Connect. The MC31XX connects to the headset. Refer to the headset user manual for instructions on communicating with a Bluetooth device.

**NOTE** Newer Bluetooth headsets are device dependant and remember the last device they connected to. If problems occur while connecting to the headset, place the headset in discovery mode. Refer to the headset user manual for more information.

6. Press the communication button on the headset. This routes both system and voice call audio to the headset.

7. When a call is received on the MC31XX, tap the Accept button to answer the call.

8. Press the communication button on the headset to route the audio back to the MC31XX.

**Serial Port Services**

Use the wireless Bluetooth serial port connection as you would a physical serial cable connection. Configure the application that will use the connection to the correct serial port.
To establish a serial port connection:

1. MC31XX Use the Connection Wizard to search for a Bluetooth serial device.
2. Select the device and tap Next. The Connection Favorite Options window appears.
3. In the Local COM Port: drop-down list select a COM port.
4. Tap Finish.

ActiveSync Using Serial Port Services

✓ NOTE By default, COM ports COM5, COM9, COM11, COM21, COM22 and COM23 are Bluetooth virtual ports. If an application opens one of these ports, the Bluetooth driver activates and guides you through a Bluetooth connection.

Use the wireless Bluetooth serial port connection for ActiveSync just as you would a physical serial cable connection. You must configure the application that will use the connection to the correct serial port.

![Figure 3-39 ActiveSync Connection Settings Window on PC](image)

To establish an ActiveSync connection:

1. Ensure that the Sync profile is enabled on the MC31XX. See Profiles Tab on page 3-42 for more information.
2. Use the Connection Wizard to search for a Bluetooth device, such as a PC. In the drop-down list select ActiveSync via Bluetooth.
3. Select the device and tap Next. The Connection Favorite Options window appears.

![Figure 3-40 Remote Service Connection Window](image)
5. In the **Service Type** drop-down list, select **Active Sync**.

6. Tap **OK**. The MC31XX connects the PC and an ActiveSync session begins.

7. Tap **Finish**. The Connection Favorite Options window appears.

8. To end the session, tap the ActiveSync icon in the **Favorite** window and select **Disconnect** from the pop-up window.

**Personal Area Network Services**

   **NOTE** This profile supports Ad-hoc and PAN User. Network Access Profile is not supported.

Connect two or more Bluetooth devices to share files, collaborate, or play multi-player games. To establish a Personal Area Network connection:

1. Ensure that the **Personal Area Networking** profile is enabled on the MC31XX. See Profiles Tab on page 3-42 for more information.

2. Use the **Connection Wizard** to search for a Bluetooth device.

3. Select the device and tap **Next**. The **Connection Favorite Options** window appears.

4. Tap **Next**. The **Connection Summary** window appears.

5. Tap **Connect**. The MC31XX connects to the Bluetooth device.

**A2DP/AVRCP Services**

A2DP/AVRCP is used to connect to a high-quality stereo headset:

1. Ensure the MC31XX is connectable (required when automatic re-connect is initiated). See Device Info Tab on page 3-33.

2. Ensure that the remote Bluetooth device is in discoverable mode. See the devices user manual for instructions.

3. Ensure that the **A2DP/AVRCP** profile is enabled on the MC31XX. See Profiles Tab on page 3-42 for more information.

4. Tap **Menu > Settings > Services** tab.

5. Tap **Add** button.

6. Select **Advanced Audio Distribution Services**.

7. Tap **OK**. The **Edit Local Services** window appears.

8. Tap **OK** twice.

9. Tap **Menu > New Connection**.

10. Select **Connect to High-Quality Audio** from the drop-down list.

11. Tap **Next**.

12. Select the device and tap **Next**.

13. Enter the PIN Code for the remote device and then tap **OK**. The **Connection Favorite Options** window appears.
14. Tap Next.
15. Tap Connect. The MC31XX connects to the high-quality audio headset.

For stereo headsets that can use hands-free services, connect to the hands-free service after connecting to the A2DP service:

1. Tap Menu > New Connection.
2. Select Connect to Headset from the drop-down list.
3. Tap Next.
4. Select the stereo headset and tap Next.
5. Select the Hands-Free unit service and then tap Next.
6. Tap Next.
7. Tap Connect.

**Connect to a HID Device**
The MC31XX can connect to an Human Interface Device (HID) device such as a Bluetooth keyboard:

1. Ensure the MC31XX is connectable (required when automatic re-connect is initiated). See Device Info Tab on page 3-33.
2. Ensure that the remote Bluetooth device is in discoverable mode. See the device user manual for instructions.
3. Ensure that the HID Client profile is enabled on the MC31XX. See Profiles Tab on page 3-42 for more information.
4. Tap Menu > New Connection.
5. Select Explore Services on Remote Device from the drop-down list.
6. Tap Next.
7. Select the device and tap Next.
8. Select the service and tap Next.
9. The Connection Favorite Options window appears.
10. Tap Next.
11. Tap Connect. The MC31XX connects to the HID device.

**Bonding with Discovered Device(s)**
A bond is a relationship created between the MC31XX 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. After creating a bond and turning on the Bluetooth radios, the devices recognize the bond and can exchange information without re-entering a PIN.

To bond with a discovered Bluetooth device:

> NOTE If favorite connections have already been created, the Favorites screen displays. If no favorite connections have been created, the New Connection Wizard screen displays.
1. Tap the Bluetooth icon and select Show BTExplorer. The BTExplorer window appears.


3. In the drop-down list, select Pair with Remote Device.

4. Tap Next. The Select Remote Device window appears.

   **NOTE** Devices discovered previously are listed to save time. To start a new device discovery, tap and hold on the list area and select Discover Devices from the pop-up menu.

5. Select a device from the list and tap Next. The PIN Code Request window appears.

6. In the PIN Code field, enter the PIN code.

7. Tap OK. The Pairing Status window displays.
8. Tap Finish. The devices are successfully paired. The device name moves to the Trusted Devices window.

Deleting a Bonded Device

To delete a device no longer needed:

1. Tap the Bluetooth icon and select Show BTExplorer. The BTExplorer window appears.
2. Tap Menu > Trusted Devices. The Trusted Devices window appears.
3. Tap and hold on the device select Delete Link Key in the pop-up menu.
4. A confirmation dialog appears. Tap Yes.

Accepting a Bond

When a remote device wants to bond with the MC31XX, enter a PIN when requested to grant permission.

1. Ensure that the MC31XX is set to discoverable and connectable. See Bluetooth Settings on page 3-33. When prompted to bond with the remote device the PIN Code Request window appears.

2. In the PIN Code: text box, enter the same PIN entered on the device requesting the bond. The PIN must be between 1 and 16 characters.
3. In the Device Name: text box, edit the name of the device requesting the bond, if desired.
4. Tap OK to create the bond. The MC31XX can now exchange information with the other device.

**Bluetooth Settings**

Use the BTExplorer Settings window to configure the operation of the BTExplorer application. Tap Menu > Settings. The BTExplorer Settings window appears.

**Device Info Tab**

Use the Device Info tab to configure the MC31XX’s Bluetooth connection modes.

![BTExplorer Settings - Device Info Tab](image)

**Table 3-3 Device Info Tab Data**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Name</td>
<td>Displays the name of the MC31XX.</td>
</tr>
<tr>
<td>Discoverable Mode</td>
<td>Select whether or not the MC31XX is discoverable by other Bluetooth devices.</td>
</tr>
<tr>
<td>Connectable Mode</td>
<td>Select whether or not the MC31XX is connectable by other Bluetooth devices.</td>
</tr>
</tbody>
</table>

**Services Tab**

![BTExplorer Settings - Services Tab](image)

**NOTE** Ensure that the MC31XX is discoverable and connectable when remote devices use MC31XX services.

Use the Services tab to add or delete Bluetooth services.

To add a service:
1. Tap **Add**. The **Add Local Service** window displays.

![Add Local Service Window](image)

**Figure 3-47 Add Local Service Window**

2. In the list, select a service to add.

3. Tap **OK**. The **Edit Local Service** window displays for the selected service.

4. Select the appropriate information and then tap **OK**. See the following sections for information on the available services.

### Dial-Up Networking Service

Dial-up Networking allows other Bluetooth devices to access a dial-up modem.

![BTEplorer Settings - Dial-up Networking Information](image)

**Figure 3-48 BTEplorer Settings - Dial-up Networking Information**

**Table 3-4 Dial-up Networking Information Data**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Name</td>
<td>Displays the name of the service.</td>
</tr>
<tr>
<td>Service Security</td>
<td>Select the type of security from the drop-down list. Options are <strong>None</strong>, <strong>Authenticate</strong>, or <strong>Authenticate/Encrypt</strong>.</td>
</tr>
</tbody>
</table>
File Transfer Service

File transfer allows other Bluetooth devices to browse files.

Table 3-4  Dial-up Networking Information Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local COM Port</td>
<td>Select the COM port.</td>
</tr>
<tr>
<td>Local Baud Rate</td>
<td>Select the communication baud rate.</td>
</tr>
<tr>
<td>Local Port Options</td>
<td>Select the port option.</td>
</tr>
</tbody>
</table>

Table 3-5  File Transfer Information Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Name</td>
<td>Displays the name of the service.</td>
</tr>
<tr>
<td>Service Security</td>
<td>Select the type of security from the drop-down list. Options are None, Authenticate, or Authenticate/Encrypt.</td>
</tr>
<tr>
<td>Root Directory</td>
<td>Select the directory that other Bluetooth devices can access.</td>
</tr>
<tr>
<td>File Permissions</td>
<td>Select the file permissions for the selected directory. Check the appropriate box to grant read access, write access, and delete access.</td>
</tr>
</tbody>
</table>
**Headset Audio Gateway Service**

Headset Service Audio Gateway allows connection to headset devices.

**Table 3-6  Headset Audio Gateway Data**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Name</td>
<td>Lists the name of the audio service.</td>
</tr>
</tbody>
</table>

**OBEX Object Push Service**

OBEX Object Push allows other Bluetooth devices to push contacts, business cards, pictures, appointments, and tasks to the MC31XX.

**Table 3-7  OBEX Exchange Information Data**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Name</td>
<td>Displays the name of the service.</td>
</tr>
</tbody>
</table>
Personal Area Networking Service

Personal Area Networking hosts a Personal Area Network which allows communication with other Bluetooth devices.

Table 3-7  OBEX Exchange Information Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Security</td>
<td>Select the type of security from the drop-down list. Options are None, Authenticate, or Authenticate/Encrypt.</td>
</tr>
<tr>
<td>Do not allow clients to push objects</td>
<td>Disables clients from pushing objects to the MC31XX.</td>
</tr>
<tr>
<td>Inbox Directory</td>
<td>Select a directory where another Bluetooth device can store files.</td>
</tr>
</tbody>
</table>

Figure 3-52  BTExplorer Settings - Personal Area Networking

Table 3-8  Personal Area Networking Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Name</td>
<td>Displays the name of the service.</td>
</tr>
<tr>
<td>Service Security</td>
<td>Select the type of security from the drop-down list. Options are None, Authenticate, or Authenticate/Encrypt.</td>
</tr>
</tbody>
</table>

Serial Port Service

Serial port allows other Bluetooth devices to access COM ports.
Figure 3-53  BTExplorer Settings - Serial Port Services

Table 3-9  Serial Port Services Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Name</td>
<td>Displays the name of the service.</td>
</tr>
<tr>
<td>Service Security</td>
<td>Select the type of security from the drop-down list. Options are None, Authenticate, or Authenticate/Encrypt.</td>
</tr>
<tr>
<td>Local COM Port</td>
<td>Select the COM port.</td>
</tr>
<tr>
<td>Local Baud Rate</td>
<td>Select the communication baud rate.</td>
</tr>
<tr>
<td>Local Port Options</td>
<td>Select the port option.</td>
</tr>
</tbody>
</table>

Advanced Audio Distribution Service

Advanced Audio Distribution hosts connects from Bluetooth devices supporting high-quality stereo audio.

Figure 3-54  BTExplorer Settings - Advanced Audio Distribution

Table 3-10  Advanced Audio Distribution Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Name</td>
<td>Lists the name of the audio service.</td>
</tr>
</tbody>
</table>
Audio Video Remote Control Service

Audio Video Remote Control hosts connections from Bluetooth devices supporting audio remote-control functionality.

Figure 3-55  BTExplorer Settings - Audio Video Remote Control

Table 3-11  Audio Video Remote Control Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Name</td>
<td>Lists the name of the audio service.</td>
</tr>
</tbody>
</table>

Security Tab

Security settings allows you to set global security policies for Bluetooth. Note that these settings are only active on local Services that are set to Authenticate or Authenticate/Encryption. You can set authentication on local Services under the Services tab.

To adjust the security settings for an individual service, select the Services tab first, then select the individual service, then Properties.

Figure 3-56  BTExplorer Settings - Security Tab

NOTE  To use PIN Code, select Authenticate or Authenticate/Encrypt from the Service Security drop-down list on each local service.
Use the **Discovery** tab to set and modify discovered devices.

**Table 3-12  Security Tab Data**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use PIN Code (Incoming Connection)</td>
<td>Select for automatic use of the PIN code entered in the <strong>PIN Code</strong> text box. It is recommended not to use this automatic PIN code feature. See <strong>Security on page 3-2</strong> for more information.</td>
</tr>
<tr>
<td>PIN Code</td>
<td>Enter the PIN code.</td>
</tr>
<tr>
<td>Encrypt Link On All Outgoing Connections</td>
<td>Select to enable or disable encryption on all outgoing connections to other Bluetooth devices.</td>
</tr>
</tbody>
</table>

**Discovery Tab**

Use the **Discovery** tab to set and modify discovered devices.

**Table 3-13  Discovery Tab Data**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inquiry Length</td>
<td>Sets the amount of time the MC31XX takes to discover Bluetooth devices in the area.</td>
</tr>
<tr>
<td>Name Discovery Mode</td>
<td>Select either <strong>Automatic</strong> or <strong>Manual</strong> to automatically attempt to discover a Bluetooth device's name after finding the device.</td>
</tr>
<tr>
<td>Discovered Devices - Delete Devices</td>
<td>Deletes all discovered devices and link keys from memory.</td>
</tr>
<tr>
<td>Discovered Devices - Delete Linked Keys</td>
<td>Removes all pairing from remote Bluetooth devices, and makes them all un-trusted.</td>
</tr>
</tbody>
</table>

**Virtual COM Port Tab**

Virtual COM Port defines which COM ports BTExplorer attempts to use for virtual COM ports. Check the appropriate checkbox to use the port as a virtual COM port. When finished, choose **Apply** to enforce changes, or **Revert** to restore the original settings.
Figure 3-58  BTExplorer Settings - Virtual COM Port Tab

Table 3-14  Virtual COM Port Tab Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM5:Bluetooth</td>
<td>Enable or disable COM Port 5.</td>
</tr>
<tr>
<td>COM9:Bluetooth</td>
<td>Enable or disable COM Port 9.</td>
</tr>
<tr>
<td>COM11:Bluetooth</td>
<td>Enable or disable COM Port 11.</td>
</tr>
<tr>
<td>COM21:Bluetooth</td>
<td>Enable or disable COM Port 21.</td>
</tr>
<tr>
<td>COM22:Bluetooth</td>
<td>Enable or disable COM Port 22.</td>
</tr>
<tr>
<td>COM23:Bluetooth</td>
<td>Enable or disable COM Port 23.</td>
</tr>
</tbody>
</table>

**HID Tab**

Use the **HID** tab to select The Human Interface Device Profile programming interface defines the protocols and procedures to be used to implement HID capabilities.

Provides support for devices such as mice, joysticks, keyboards.
Use the **Profile** tab to load or remove Bluetooth services profiles. If a profile is not used, it can be removed to save memory.

1. Tap a check box next to the profile to load (activate).
   - The Serial Port profile is always active and cannot be removed.
2. Tap **Select All** to select all profiles or tap **Deselect All** to deselect all profiles.
3. Tap **Apply** to activate the profiles and then **Close** to exit the application.
System Parameters Tab

Table 3-16 System Parameters Tab Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Page Timeout</td>
<td>Sets the amount of time the MC31XX searches for a device before moving on the next device.</td>
</tr>
<tr>
<td>Link Supervision Timeout</td>
<td>Sets the amount of time that the MC31XX will wait for a device to come back into range after it has gone out of range. If the device does not come back into range by the set time, the MC31XX drops the connection.</td>
</tr>
</tbody>
</table>

Miscellaneous Tab

Table 3-17 Miscellaneous tab Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highlight Connections</td>
<td>Select the connection type to highlight when connected. In the Wizard Mode, the only options are Favorites or None. In the Explorer Mode the options are None, Tree View Only, List View Only, or Tree and List View.</td>
</tr>
<tr>
<td>Apply Text Style</td>
<td>Select the text style to apply to the connection text.</td>
</tr>
<tr>
<td>Apply Text Color</td>
<td>Select the text color to apply to the connection text.</td>
</tr>
</tbody>
</table>
Chapter 4 Accessories

Introduction

The MC31XX accessories provide a variety of product support capabilities. Accessories include cradles, cables and spare battery chargers. Table 4-1 lists the MC31XX accessories.

Table 4-1  MC31XX Accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cradles</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Slot Serial/USB Cradle</td>
<td>CRD300-1001RR</td>
<td>Charges the mobile computer main battery and a spare battery, and synchronizes the mobile computer with a host computer through either a serial or USB connection.</td>
</tr>
<tr>
<td>Four Slot Ethernet Cradle</td>
<td>CRD3000-4001ER</td>
<td>Charges up to four mobile computers and provides Ethernet communications.</td>
</tr>
<tr>
<td>Four Slot Charge Only Cradle</td>
<td>CHS3000-4001CR</td>
<td>Charges up to four mobile computers.</td>
</tr>
<tr>
<td>Mounting Bracket</td>
<td>8710-050006-01R</td>
<td>Used to mount four slot cradles onto a wall.</td>
</tr>
<tr>
<td><strong>Chargers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four Slot Spare Battery Charger</td>
<td>SAC7X00-4000CR</td>
<td>Charges up to four mobile computer spare batteries.</td>
</tr>
<tr>
<td>Universal Battery Charger (UBC)</td>
<td>UBC2000-I500DR</td>
<td>Charges up to four batteries.</td>
</tr>
<tr>
<td>MC31XX Universal Battery Charger Adapter (UBC)</td>
<td>21-32665-45AR</td>
<td>Adapts the UBC for use with MC31XX batteries.</td>
</tr>
<tr>
<td>UBC Mounting Bracket</td>
<td>KT-32665-01R</td>
<td>Used to mount UBC onto a wall.</td>
</tr>
<tr>
<td>Charge Only Cable</td>
<td>25-70103-03R</td>
<td>Plugs into a vehicle cigarette lighter to charge the mobile computer.</td>
</tr>
<tr>
<td>Auto-charge Cable</td>
<td>25-67873-03R</td>
<td>Provides power to the mobile computer.</td>
</tr>
</tbody>
</table>
Table 4-1  MC31XX Accessories (Continued)

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply for Single Slot</td>
<td>KT-14000-148R</td>
<td>Provides power to the Single Slot Serial/USB Cradle and Four Slot Battery</td>
</tr>
<tr>
<td>Serial/USB Cradle</td>
<td></td>
<td>Charger.</td>
</tr>
<tr>
<td>Power Supply for Four Slot</td>
<td>50-14000-241R</td>
<td>Provides power to the Four Slot Charge Only and Ethernet Cradles.</td>
</tr>
<tr>
<td>Cradles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Supply for Charging</td>
<td>50-14000-249R</td>
<td>Provides power to the charge only, serial cable and USB cable.</td>
</tr>
<tr>
<td>Cables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US AC Line Cord</td>
<td>23844-00-00R</td>
<td>Provides power to the 3-wire power supplies.</td>
</tr>
<tr>
<td>Cables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USB Client Charge Cable</td>
<td>25-67868-03R</td>
<td>Provides USB client communication capabilities and charges the mobile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>computer.</td>
</tr>
<tr>
<td>USB Host Charge Cable</td>
<td>25-67869-03R</td>
<td>Provides USB host communication capabilities and charges the mobile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>computer.</td>
</tr>
<tr>
<td>RS232 Charge Cable</td>
<td>25-67866-03R</td>
<td>Provides RS232 communication capabilities and charges the mobile computer.</td>
</tr>
<tr>
<td>O’Neil Printer Cable</td>
<td>25-91512-01R</td>
<td>Provides printer specific communication capabilities.</td>
</tr>
<tr>
<td>Zebra Printer Cable</td>
<td>25-91513-01R</td>
<td>Provides printer specific communication capabilities.</td>
</tr>
<tr>
<td>Zebra Road Warrior Printer</td>
<td>25-91514-01R</td>
<td>Provides printer specific communication capabilities.</td>
</tr>
<tr>
<td>Cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Slot Cradle RS232 Cable</td>
<td>25-63852-01R</td>
<td>Provides serial host communication through the Single Slot Serial/USB cradle.</td>
</tr>
<tr>
<td>Single Slot Cradle USB Cable</td>
<td>25-68596-01R</td>
<td>Provides USB communication through the Single Slot Serial/USB cradle.</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnetic Stripe Reader</td>
<td>MSR3000-100R</td>
<td>Reads magnetic stripe cards.</td>
</tr>
<tr>
<td>Modem Dongle</td>
<td>MDM9000-100R</td>
<td>Provides modem connectivity through mobile computer or Single Slot Serial/USB</td>
</tr>
<tr>
<td>Adapter Cable</td>
<td>25-63856-01R</td>
<td>cradle.</td>
</tr>
<tr>
<td>Cradle Modem Kit</td>
<td>KT-MC3000SERMODEMR</td>
<td>Provides modem connectivity to the Single Slot Serial/USB cradle.</td>
</tr>
<tr>
<td>Kit</td>
<td></td>
<td>Kit includes Modem Dongle and Modem Adapter Cable.</td>
</tr>
<tr>
<td>Modem Kit</td>
<td>KT-70924-01R</td>
<td>Provides modem connectivity to the mobile computer.</td>
</tr>
<tr>
<td>Kit</td>
<td></td>
<td>Kit includes Modem Dongle and Modem Cable.</td>
</tr>
<tr>
<td>Modem Cable</td>
<td>25-70924-01R</td>
<td>Connects the Modem Dongle to the mobile computer.</td>
</tr>
<tr>
<td>Accessory</td>
<td>Part Number</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Headset Adapter Cable: MC3100 2.5 mm jack with unique locking screw to bare wires</td>
<td>25-124389-01R</td>
<td>Connects a headset with unique Quick Disconnect Connector to the mobile computer. Bare wires can be soldered to user defined unique Quick Disconnect Connector.</td>
</tr>
<tr>
<td>Headset Adapter cable: MC3100 2.5mm jack with unique locking screw to Headsets like VXI and RCH50</td>
<td>25-124411-01R</td>
<td>Connects a VXI and RCH50 headset to the mobile computer.</td>
</tr>
<tr>
<td>MC31XXR Audio Jack Cover</td>
<td>11-128366-02R</td>
<td>Replacement audio jack cover for the MC31XXR (5-pack).</td>
</tr>
<tr>
<td>MC31XXS Audio Jack Cover</td>
<td>11-128366-01R</td>
<td>Replacement audio jack cover for the MC31XXS (5-pack)</td>
</tr>
<tr>
<td>MC3190G Audio Jack Cover</td>
<td>11-128366-03R</td>
<td>Replacement audio jack cover for the MC3190G (5-pack)</td>
</tr>
<tr>
<td>2740 mAh Battery</td>
<td>BTRY-MC3XKAB0E</td>
<td>Replacement standard capacity (1X) battery.</td>
</tr>
<tr>
<td>4800 mAh Battery</td>
<td>BTRY-MC31KAB02</td>
<td>Replacement extended capacity (2X) battery.</td>
</tr>
<tr>
<td>UBC Power Supply Kit</td>
<td>KT-32665-02R</td>
<td>Provides power to the Universal Battery Charger.</td>
</tr>
<tr>
<td>DC Line Cord</td>
<td>50-16002-042R</td>
<td>Provides power from the power supply to the Four Slot Ethernet cradle or Four Slot Charge Only cradle.</td>
</tr>
<tr>
<td>MC31XXR/S Stylus</td>
<td>11-42794-03R</td>
<td>Replacement stylus (3-pack).</td>
</tr>
<tr>
<td>MC31XXR/S Stylus</td>
<td>11-42794-50R</td>
<td>Replacement stylus (50-pack).</td>
</tr>
<tr>
<td>MC31XXR/S Tether</td>
<td>11-42722-03R</td>
<td>Replacement tether (3-pack).</td>
</tr>
<tr>
<td>MC31XXR/S Tether</td>
<td>11-42722-50R</td>
<td>Replacement tether (50-pack).</td>
</tr>
<tr>
<td>MC31XXR/S Stylus and Tether Kit</td>
<td>11-43912-03R</td>
<td>Replacement stylus and tether kit (3-pack).</td>
</tr>
<tr>
<td>MC31XXR/S Stylus and Tether Kit</td>
<td>11-43912-50R</td>
<td>Replacement stylus and tether kit (50-pack).</td>
</tr>
<tr>
<td>MC31090G Stylus</td>
<td>KT-68144-10R</td>
<td>Replacement stylus for MC31090G (3-pack).</td>
</tr>
<tr>
<td>MC3190G Stylus and Tether</td>
<td>KT-81680-03R</td>
<td>Replacement stylus and tether for MC3190G (3-pack).</td>
</tr>
<tr>
<td>MC3190G Stylus and Tether</td>
<td>KT-81680-50R</td>
<td>Replacement stylus and tether for MC3190G (50-pack).</td>
</tr>
<tr>
<td>MC3190G Handstrap</td>
<td>SG-MC3123242-01R</td>
<td>Replacement handstrap for MC3190G.</td>
</tr>
<tr>
<td>MC3190G Handstrap Button</td>
<td>KT-97258-01R</td>
<td>Replacement button for MC3190G handstrap (250-pack).</td>
</tr>
<tr>
<td>MC31XXR/S Handstrap</td>
<td>SG-MC3123243-01R</td>
<td>Replacement handstrap for MC31XXR and MC31XXS.</td>
</tr>
<tr>
<td>Accessory</td>
<td>Part Number</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>MC31XX 1X Battery Door</td>
<td>KT-128372-01R</td>
<td>Replacement 1X battery door for MC31XXR and MC31XXS.</td>
</tr>
<tr>
<td>MC31XX 2X Battery Door</td>
<td>KT-128373-01R</td>
<td>Replacement 2X battery door for MC31XXR and MC31XXS.</td>
</tr>
<tr>
<td>MC3190G 2X Battery Door</td>
<td>KT-128374-01R</td>
<td>Replacement 2X battery door for MC3190G.</td>
</tr>
<tr>
<td>Plastic Holster</td>
<td>8710-050005-01R</td>
<td>Provides a clip on holder for the MC31XXR and MC31XX S.</td>
</tr>
<tr>
<td>Fabric Holster</td>
<td>SG-MC3021212-01R</td>
<td>Provides a soft, clip on holder and a shoulder strap for the mobile computer.</td>
</tr>
<tr>
<td>Belt</td>
<td>11-08062-02R</td>
<td>Belt for fabric holster.</td>
</tr>
<tr>
<td>MC3190G Rubber Boot</td>
<td>11-72959-04R</td>
<td>Provides additional protection for both the laser and imager configurations.</td>
</tr>
<tr>
<td>MC31XXS Rubber Boot</td>
<td>11-70899-04R</td>
<td>Provides additional protection for both the laser and imager configurations.</td>
</tr>
<tr>
<td>MC31XXR Rubber Boot</td>
<td>BOOTSCANTURRETR</td>
<td>Provides additional protection for the MC31XXR.</td>
</tr>
<tr>
<td>Screen protector</td>
<td>KT-82057-03R</td>
<td>Replacement screen protectors (3-pack).</td>
</tr>
</tbody>
</table>
Single Slot Serial/USB Cradle

![CAUTION] Ensure that you follow the guidelines for battery safety described in Battery Safety Guidelines on page 5-2.

The Single Slot Serial/USB cradle:

- Provides 5.4VDC power for operating the mobile computer, charging the battery and charging a spare battery.
- Provides a serial port and a USB port 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 synchronize the mobile computer with corporate databases.
- Provides serial connection through the serial pass-through port for communication with a serial device, such as a host computer. For communication setup procedures, refer to the MC31XX Mobile Computer Integrator Guide.
- Provides USB connection through the USB pass-through port for communication with a USB device, such as a host computer. For communication setup procedures, refer to the MC31XX Mobile Computer Integrator Guide.

Battery Charging

The Single Slot Serial/USB cradle can charge the mobile computer main battery and a spare battery simultaneously.

To charge the mobile computer:

1. Slide the mobile computer into the mobile computer slot. The mobile computer amber Charge LED Indicator, indicates the mobile computer battery charging status. The Standard Battery charges in less than five hours and the Extended Life Battery charges in less than eight hours. See Table 4-2 for charging status indications.
2. When charging is complete, remove the mobile computer from the mobile computer slot.

To charge the spare battery:

1. Insert the spare battery into the spare battery charging slot, bottom first, and pivot the top of the battery down onto the contact pins.
2. Gently press down on the battery to ensure proper contact.
3. The Spare Battery Charging LED (see Figure 4-1 on page 4-6) indicates the spare battery charging status. The Standard Battery charges in less than five hours and the Extended Life Battery charges in less than eight hours. See Table 4-2 for charging status indications.
4. When charging is complete, press the battery clip and lift the battery out of the slot.

**WARNING!** Do not use a tool to remove the battery.

**LED Charge Indications**

The Single Slot Serial/USB cradle uses the mobile computer amber Charge LED Indicator to indicate the battery charging status and the Spare Battery Charging LED to indicate spare battery charging status. See Table 4-2 for charging status indications.
Table 4-2  *LED Charging Status Indicators*

<table>
<thead>
<tr>
<th>LED</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mobile Computer Charging</strong> (LED on mobile computer)</td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>Mobile computer not placed correctly in the cradle; cable not connected correctly; charger is not powered.</td>
</tr>
<tr>
<td>Fast Blinking Amber</td>
<td>Error in charging; check placement of mobile computer.</td>
</tr>
<tr>
<td>Slow Blinking Amber</td>
<td>Mobile computer is charging.</td>
</tr>
<tr>
<td>Solid Amber</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Spare Battery Charging</strong> (LED on cradle)</td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>No spare battery in slot; spare battery not placed correctly; cradle is not powered.</td>
</tr>
<tr>
<td>Fast Blinking Amber</td>
<td>Error in charging; check placement of spare battery.</td>
</tr>
<tr>
<td>Slow Blinking Amber</td>
<td>Spare battery is charging.</td>
</tr>
<tr>
<td>Solid Amber</td>
<td>Charging complete.</td>
</tr>
</tbody>
</table>
Four Slot Cradles

CAUTION  Ensure that you follow the guidelines for battery safety described in Battery Safety Guidelines on page 5-2.

There are two four slot cradles, Four Slot Charge Only cradle and Four Slot Ethernet cradle. The Four Slot Ethernet cradle provides Ethernet communications. Both four slot cradles:

- Provide 5.4 VDC power for operating the mobile computer and charging the battery.
- Simultaneously charges up to four mobile computers.

Battery Charging

The four slot cradle can charge up to four mobile computers simultaneously. To charge the mobile computer:

1. Slide the mobile computer into the mobile computer slot.

2. The mobile computer amber Charge LED Indicator, indicates the mobile computer battery charging status. The Standard Battery usually charges in less than five hours and the Extended Life Battery usually charges in less than eight hours. See Table 4-2 for charging status indications.

3. When charging is complete, remove the mobile computer from the cradle.

LED Charge Indications

The Four Slot cradles use the mobile computer amber Charge LED Indicator to indicate the battery charging status. See Table 4-2 on page 4-7 for charging status indications.
**Power LED**

The green Power LED (only on the Four Slot Charge Only cradle) lights to indicate that the Four Slot Charge Only cradle is connected to a power source.

**Speed LED**

The green Speed LED (only on the Four Slot Ethernet cradle) lights to indicate that the transfer rate is 100 Mbps. When it is not lit it indicates that the transfer rate is 10 Mbps.

**Link LED**

The yellow Link LED (only on the Four Slot Ethernet cradle) blinks to indicate activity, or stays lit to indicate that a link is established. When it is not lit, it indicates that there is no link.
Four Slot Spare Battery Charger

**CAUTION** Ensure that you follow the guidelines for battery safety described in *Battery Safety Guidelines on page 5-2.*

The Four Slot Spare Battery Charger simultaneously charges up to four spare batteries.

**Spare Battery Charging**

To charge up to four MC31XX spare batteries:

1. Insert the spare battery into the spare battery charging slot, bottom first.
2. Pivot the top of the battery down onto the contact pins.
3. Gently press down on the battery to ensure proper contact. The Standard Battery usually charges in less than five hours and the Extended Life Battery usually charges in less than eight hours. See *Table 4-2 on page 4-7* for charging status indications.
4. When charging is complete, press the battery clip and lift battery out of the slot.

**WARNING!** Do not use a tool to remove the battery.
LED Charge Indications

The Spare Battery Charging LEDs indicate the spare battery charging status. The Spare Battery Charging LEDs are arranged in the same pattern as the spare battery charging slots so that the charging status of each battery can be identified. See Table 4-2 on page 4-7 for charging status indications.

Cables

The cables are available with a variety of connection capabilities.

MC31XX Communication/Charge cables:

- Provide the mobile computer with operating and charging power when used with the Symbol approved power supply.
- Synchronize information between the mobile computer and a host computer. With customized or third party software, it can also synchronize the mobile computer with corporate databases.
- Provide serial connection through the serial pass-through port for communication with a serial device, such as a host computer. For communication setup procedures, refer to the MC31XX Series Mobile Computer Integrator Guide.
- Provide USB connection through the USB pass-through port for communication with a USB device, such as a host computer. For communication setup procedures, refer to the MC31XX Series Mobile Computer Integrator Guide.

The following MC31XX Communication/Charge cables are available:

- Serial (RS232) Charge cable (9-pin D female with power input receptacle)
- USB Client Charge cable (standard-A connector and a barrel receptacle for power).

Dedicated Printer cables, provide communication with a dedicated printer.

The following printer cables are available directly from the printer manufacturer:

- O’Neil printer cable
- Zebra printer cable
- Monarch printer cable.
Battery Charging and Operating Power

**CAUTION** Ensure that you follow the guidelines for battery safety described in *Battery Safety Guidelines on page 5-2*.

The MC31XX Communication/Charge cables can charge the mobile computer battery and supply operating power.

To charge the mobile computer battery:

1. Connect the MC31XX Communication/Charge cable power input connector to the Symbol approved power source.

2. Slide the bottom of the mobile computer into the MC31XX connector end of the MC31XX Communication/Charge cable and gently press in until the snaps latch into the mobile computer.

3. The mobile computer amber Charge LED Indicator indicates the mobile computer battery charging status. The Standard Battery usually charges in less than five hours and the Extended Life Battery usually charges in less than eight hours. See, *Table 4-2 on page 4-7* for charging status indications.

4. When charging is complete, remove the cable by gently pulling the mobile computer and the cable apart until the snaps release the mobile computer.

**LED Charge Indications**

The MC31XX Communication/Charge cables use the amber Charge LED Indicator to indicate the MC31XX battery charging status. See, *Table 4-2 on page 4-7* for charging status indications.
Universal Battery Charger (UBC) Adapter

**CAUTION** Ensure that you follow the guidelines for battery safety described in *Battery Safety Guidelines on page 5-2*.

The UBC Adapter can be used with a power supply as a standalone spare battery charger or it can be used with the four station UBC2000 to simultaneously charge up to four spare batteries. For additional information on the UBC 2000, refer to the *UBC 2000 Quick Reference Guide p/n 70-33188-xx*.

### Spare Battery Charging

To charge spare batteries:

1. Insert the spare battery into the spare battery charging slot, bottom first.
2. Pivot the top of the battery down onto the contact pins.

![UBC Adapter Battery Insertion](image)

3. Gently press down on the battery to ensure proper contact. The Standard Battery usually charges in less than five hours and the Extended Life Battery usually charges in less than eight hours. See, *Table 4-3 on page 4-14* for charging status indications.

4. When charging is complete, press the battery clip and lift the battery out of the slot.

**WARNING!** Do not use a tool to remove the battery.

### UBC Adapter LED Charge Indications

The UBC Adapter charging LEDs indicate the battery charging status. The Standard Battery usually charges in less than five hours and the Extended Life Battery usually charges in less than eight hours.
Figure 4-6  UBC Adapter LEDs

Table 4-3  UBC Adapter Charge LED Status Indications

<table>
<thead>
<tr>
<th>LED</th>
<th>Indication</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td>Green</td>
<td>Power is connected to the UBC Adapter.</td>
</tr>
<tr>
<td>READY or STANDBY or FAULT</td>
<td>Green</td>
<td>Charging complete.</td>
</tr>
<tr>
<td>STANDBY or</td>
<td>Flashing-Yellow</td>
<td>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.</td>
</tr>
<tr>
<td>FAULT</td>
<td>Yellow</td>
<td>Charging error, check placement of mobile computer/spare battery.</td>
</tr>
<tr>
<td>CHARGING</td>
<td>Yellow</td>
<td>Normal charge.</td>
</tr>
</tbody>
</table>
Plastic Holster

The Plastic Holster provides a holder for the mobile computer. It consists of a mobile computer holder and a detachable belt clip. Press the release button to remove the detachable belt clip.

Figure 4-7  Plastic Holster

Pinch the clip release and attach the Plastic Holster to a belt or waist band.

Figure 4-8  Attaching the Plastic Holster

The Plastic Holster holds the mobile computer on a belt or waist band.

To insert the mobile computer, slide the mobile computer into the Plastic Holster with the screen facing the user.

To remove the mobile computer, press and lift to remove the mobile computer.
Figure 4-9  Insert and Remove the Mobile Computer
Fabric Holster

The Fabric Holster provides a soft holder for the mobile computer. It consists of a fabric mobile computer holder, a detachable shoulder strap and a detachable belt clip. Press the release button to remove the detachable belt clip. See Figure 4-10 to remove the detachable clip see Figure 4-11 on page 4-17 to attach the Fabric Holster to a belt and see Figure 4-12 on page 4-18 to attach the Fabric Holster to a shoulder strap.

![Fabric Holster Detachable Belt Clip](image)

**Figure 4-10**  *Fabric Holster Detachable Belt Clip*

**Belt Clip**

Pinch the clip release and attach the Fabric Holster to a belt or waist band.

![Clips](image)

**Figure 4-11**  *Attaching the Fabric Holster To a Belt*
Shoulder Strap

Remove the detachable belt clip (see *Figure 4-10 on page 4-17*) and attach the shoulder strap.

![Shoulder Strap Diagram](image)

*Figure 4-12  Attach the Fabric Holster To the Shoulder Strap*

The Fabric Holster holds the mobile computer on a belt or waist band.

1. To insert the mobile computer, slide the mobile computer into the Fabric Holster with the screen facing the user.
2. Pull restraining strap over mobile computer and secure in the clip.
3. To remove the mobile computer, pull down on restraining strap to release from clip and lift retaining strap clear.
4. Lift mobile computer out of Fabric Holster.

*Figure 4-13  Insert and Remove the Mobile Computer*
Chapter 5 Maintenance and Troubleshooting

Introduction

This chapter includes instructions on cleaning and storing the mobile computer, and provides troubleshooting solutions for potential problems during mobile computer operation.

Maintaining the Mobile Computer

For trouble-free service, observe the following tips when using the mobile computer:

For trouble-free service, observe the following tips when using the MC31XX:

- Do not scratch the screen of the MC31XX. When working with the MC31XX, 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 MC31XX screen.
  
  Motorola recommends using a screen protector, p/n KT-122010-01R.

- The touch-sensitive screen of the MC31XX is glass. Do not to drop the MC31XX or subject it to strong impact.

- Protect the MC31XX 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 MC31XX in any location that is dusty, damp, or wet.

- Use a soft lens cloth to clean the MC31XX. If the surface of the MC31XX screen becomes soiled, clean it with a soft cloth moistened with a diluted window-cleaning solution.

- Periodically replace the rechargeable battery to ensure maximum battery life and product performance. Battery life depends on individual usage patterns.
• A screen protector is applied to the MC31XX. Motorola recommends using this to minimize wear and tear.
  Screen protectors enhance the usability and durability of touch screen displays. Benefits include:
  • Protection from scratches and gouges
  • Durable writing and touch surface with tactile feel
  • Abrasion and chemical resistance
  • Glare reduction
  • Keeping the device’s screen looking new
  • Quick and easy installation.

Battery Safety Guidelines

**WARNING!** Failure to follow these guidelines may result in fire, explosion, or other hazard.

• The area in which the units are charged should be clear of debris and combustible materials or chemicals. Particular care should be taken where the device is charged in a non commercial environment.
• Follow battery usage, storage, and charging guidelines found in the user's guide.
• Improper battery use may result in a fire, explosion, or other hazard.
• Do not use a tool to remove the battery from the mobile computer or battery charging accessory.
• To charge the mobile device battery, the battery and charger temperatures must be between +32 °F and +104 °F (0 °C and +40 °C)
• Do not use incompatible batteries and chargers. Use of an incompatible battery or charger may present a risk of fire, explosion, leakage, or other hazard. If you have any questions about the compatibility of a battery or a charger, contact Motorola Enterprise Mobility support.
• For devices that utilize a USB port as a charging source, the device shall only be connected to products that bear the USB-IF logo or have completed the USB-IF compliance program.
• To enable authentication of an approved battery, as required by IEEE1725 clause 10.2.1, all batteries will carry a Motorola hologram. Do not fit any battery without checking it has the Motorola authentication hologram.
• Do not disassemble or open, crush, bend or deform, puncture, or shred.
• Severe impact from dropping any battery-operated device on a hard surface could cause the battery to overheat.
• Do not short circuit a battery or allow metallic or conductive objects to contact the battery terminals.
• Do not modify or remanufacture, attempt to insert foreign objects into the battery, immerse or expose to water or other liquids, or expose to fire, explosion, or other hazard.
• Do not leave or store the equipment in or near areas that might get very hot, such as in a parked vehicle or near a radiator or other heat source. Do not place battery into a microwave oven or dryer.
• Battery usage by children should be supervised.
• Please follow local regulations to properly dispose of used re-chargeable batteries.
• Do not dispose of batteries in fire.
In the event of a battery leak, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with large amounts of water and seek medical advice.

If you suspect damage to your equipment or battery, contact Motorola Enterprise Mobility support to arrange for inspection.

---

### Cleaning

**CAUTION** Always wear eye protection.

Read warning label on compressed air and alcohol product before using.

If you have to use any other solution for medical reasons please contact Motorola for more information.

**WARNING!** Avoid exposing this product to contact with hot oil or other flammable liquids. If such exposure occurs, unplug the device and clean the product immediately in accordance with these guidelines.

### Materials Required

- Alcohol wipes
- Lens tissue
- Cotton tipped applicators
- Isopropyl alcohol
- Can of compressed air with a tube

### Cleaning the MC31XX

**Housing**

Using the alcohol wipes, wipe the housing including keys and in-between keys.

**Display**

The display can be wiped down with the alcohol wipes, but care should be taken not to allow any pooling of liquid around the edges of the display. Immediately dry the display with a soft, non-abrasive cloth to prevent streaking.

**Scanner Exit Window**

Wipe the scanner exit window periodically with a lens tissue or other material suitable for cleaning optical material such as eyeglasses.

**Connector**

1. Remove the main battery from mobile computer. See *Replacing the Battery on page 1-8*.
2. Dip the cotton portion of the cotton tipped applicator in isopropyl alcohol.
3. Rub the cotton portion of the cotton tipped applicator back-and-forth across the connector on the bottom of the MC31XX. Do not leave any cotton residue on the connector.
4. Repeat at least three times.

5. Use the cotton tipped applicator dipped in alcohol to remove any grease and dirt near the connector area.

6. Use a dry cotton tipped applicator and repeat steps 4 through 6.

7. Spray compressed air on the connector area by pointing the tube/nozzle about ½ inch away from the surface. CAUTION: Do not point nozzle at yourself and others, ensure the nozzle or tube is away from your face.

8. Inspect the area for any grease or dirt, repeat if required.

Cleaning Cradle Connectors

To clean the connectors on a cradle:

1. Remove the DC power cable from the cradle.

2. Dip the cotton portion of the cotton tipped applicator in isopropyl alcohol.

3. Rub the cotton portion of the cotton tipped applicator along the pins of the connector. Slowly move the applicator back-and-forth from one side of the connector to the other. Do not let any cotton residue on the connector.

4. All sides of the connector should also be rubbed with the cotton tipped applicator.

5. Spray compressed air in the connector area by pointing the tube/nozzle about ½ inch away from the surface. CAUTION: do not point nozzle at yourself and others, ensure the nozzle or tube is pointed away from your face.

6. Ensure that there is no lint left by the cotton tipped applicator, remove lint if found.

7. If grease and other dirt can be found on other areas of the cradle, use lint free cloth and alcohol to remove.

8. Allow at least 10 to 30 minutes (depending on ambient temperature and humidity) for the alcohol to air dry before applying power to cradle.

   If the temperature is low and humidity is high, longer drying time is required. Warm temperature and dry humidity requires less drying time.

Cleaning Frequency

The cleaning frequency is up to the customer’s discretion due to the varied environments in which the mobile devices are used. They may be cleaned as frequently as required. However when used in dirty environments it may be advisable to periodically clean the scanner exit window to ensure optimum scanning performance.
## Troubleshooting

### Mobile Computer

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile computer does not turn on.</td>
<td>Main battery not charged.</td>
<td>Charge or replace the main battery.</td>
</tr>
<tr>
<td></td>
<td>Main battery not installed properly.</td>
<td>Ensure the battery is installed properly. See Install Main Battery on page 1-6.</td>
</tr>
<tr>
<td></td>
<td>System crash.</td>
<td>Perform a warm boot. If the mobile computer still does not turn on, perform a cold boot. For more information see, Resetting the Mobile Computer on page 2-22.</td>
</tr>
<tr>
<td>Battery did not charge.</td>
<td>Battery failed.</td>
<td>Replace battery. If the mobile computer still does not operate, try a warm boot, then a cold boot. For more information see, Resetting the Mobile Computer on page 2-22.</td>
</tr>
<tr>
<td></td>
<td>Mobile computer removed from cradle while battery was charging.</td>
<td>Insert mobile computer in cradle and begin charging. The Standard Battery requires up to five hours to recharge fully and the Extended Life Battery requires up to eight hours to recharge fully.</td>
</tr>
<tr>
<td></td>
<td>Extreme battery temperature.</td>
<td>Battery does not charge if ambient temperature is below 32°F (0°C) or above 104°F (40°C).</td>
</tr>
<tr>
<td>Cannot see characters on screen.</td>
<td>Mobile computer not powered on.</td>
<td>Press the Power button.</td>
</tr>
<tr>
<td>During data communication, no data was transmitted, or transmitted data was incomplete.</td>
<td>Mobile computer removed from cradle or unplugged from host computer during communication.</td>
<td>Replace the mobile computer in the cradle, or reattach the cable and re-transmit.</td>
</tr>
<tr>
<td></td>
<td>Incorrect cable configuration.</td>
<td>See the system administrator or refer to the MC31XX Series Mobile Computer Integrator Guide.</td>
</tr>
<tr>
<td></td>
<td>Communication software was incorrectly installed or configured.</td>
<td>See the system administrator or refer to the MC31XX Series Mobile Computer Integrator Guide.</td>
</tr>
<tr>
<td>Mobile computer does not emit sound.</td>
<td>Volume setting is low or turned off.</td>
<td>Click on the speaker icon to increase the volume.</td>
</tr>
</tbody>
</table>
### Table 5-1  Troubleshooting the Mobile Computer (Continued)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile computer turns itself off.</td>
<td>Mobile computer is inactive.</td>
<td>The mobile computer turns off after a period of inactivity. This period can be set from one to five minutes, in one-minute intervals.</td>
</tr>
<tr>
<td></td>
<td>Battery is depleted.</td>
<td>Recharge or replace the battery.</td>
</tr>
<tr>
<td></td>
<td>Battery is not inserted properly.</td>
<td>Insert the battery properly. For more information see, <strong>Install Main Battery on page 1-6</strong>.</td>
</tr>
<tr>
<td>Tapping the window buttons or icons does not activate the corresponding feature.</td>
<td>Touch screen not calibrated correctly.</td>
<td>Re-calibrate the screen. From the mobile computer, Demo window double-tap the Ctl Panel icon and double-tap on Touch Calibrate. Follow the screen prompts.</td>
</tr>
<tr>
<td>The system crashed.</td>
<td></td>
<td>Warm boot the system. To perform a warm boot, see <strong>Resetting the Mobile Computer on page 2-22</strong>.</td>
</tr>
<tr>
<td>A message appears stating that the mobile computer memory is full.</td>
<td>Too many files stored on the mobile computer.</td>
<td>Delete unused memos and records. If necessary, save these records on the host computer.</td>
</tr>
<tr>
<td></td>
<td>Too many applications installed on the mobile computer.</td>
<td>Remove unused installed applications from the mobile computer to recover memory.</td>
</tr>
<tr>
<td>The mobile computer does not accept scan input.</td>
<td>Scanning application is not loaded.</td>
<td>Verify that the mobile computer is loaded with a scanning application. See the system administrator.</td>
</tr>
<tr>
<td></td>
<td>Unreadable bar code.</td>
<td>Ensure the symbol is not defaced.</td>
</tr>
<tr>
<td></td>
<td>Distance between scan window and bar code is incorrect.</td>
<td>Ensure the mobile computer is within proper scanning range.</td>
</tr>
<tr>
<td></td>
<td>Mobile computer is not programmed for the bar code type.</td>
<td>Ensure the mobile computer is programmed to accept the type of bar code scanned.</td>
</tr>
<tr>
<td></td>
<td>Mobile computer is not programmed to generate a beep.</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Battery is low.</td>
<td>Check the battery level. When the battery is low, the mobile computer automatically goes into suspend mode.</td>
</tr>
</tbody>
</table>
### Single Slot Serial/USB Cradle

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile computer amber Charge LED Indicator does not light when mobile computer inserted.</td>
<td>Cradle is not receiving power.</td>
<td>Ensure the power cable is connected securely to both the cradle and to AC power.</td>
</tr>
<tr>
<td></td>
<td>Mobile computer is not correctly seated.</td>
<td>Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.</td>
</tr>
<tr>
<td>Spare Battery Charging LED does not light when spare battery is inserted.</td>
<td>Spare battery is not correctly seated.</td>
<td>Remove and re-insert the spare battery into the charging slot, ensuring it is correctly seated.</td>
</tr>
<tr>
<td>Mobile computer battery is not charging.</td>
<td>Mobile computer was removed from cradle or cradle was unplugged from AC power too soon.</td>
<td>Ensure cradle is receiving power. Ensure the mobile computer is seated correctly. If the mobile computer battery is fully depleted, it can take up to five hours to fully recharge a Standard Battery and it can take up to eight hours to fully recharge an Extended Life Battery.</td>
</tr>
<tr>
<td></td>
<td>Battery is faulty.</td>
<td>Verify that other batteries charge properly. If so, replace the faulty battery.</td>
</tr>
<tr>
<td></td>
<td>The mobile computer is not fully seated in the cradle.</td>
<td>Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.</td>
</tr>
<tr>
<td>Spare battery is not charging.</td>
<td>Battery not fully seated in charging slot.</td>
<td>Remove and re-insert the spare battery into the cradle, ensuring it is correctly seated.</td>
</tr>
<tr>
<td></td>
<td>Battery inserted incorrectly.</td>
<td>Ensure the contacts are facing down and toward the back of the cradle.</td>
</tr>
<tr>
<td></td>
<td>Battery is faulty.</td>
<td>Verify that other batteries charge properly. If so, replace the faulty battery.</td>
</tr>
<tr>
<td>During data communication, no data was transmitted, or transmitted data was incomplete.</td>
<td>Mobile computer removed from cradle during communication.</td>
<td>Replace mobile computer in cradle and retransmit.</td>
</tr>
<tr>
<td></td>
<td>Incorrect cable configuration.</td>
<td>See the system administrator or refer to the <em>MC31XX Series Mobile Computer Integrator Guide</em>.</td>
</tr>
<tr>
<td></td>
<td>Communication software is not installed or configured properly.</td>
<td>See the system administrator or refer to the <em>MC31XX Series Mobile Computer Integrator Guide</em>.</td>
</tr>
</tbody>
</table>
## Four Slot Charge Only Cradle

Table 5-3  *Troubleshooting the Four Slot Charge Only Cradle*

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile computer amber Charge LED Indicator does not light when mobile computer inserted.</td>
<td>Cradle is not receiving power.</td>
<td>Ensure the power cable is connected securely to both the cradle and to AC power.</td>
</tr>
<tr>
<td></td>
<td>Mobile computer is not correctly seated.</td>
<td>Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.</td>
</tr>
<tr>
<td>Mobile computer battery is not charging.</td>
<td>Mobile computer was removed from cradle or cradle was unplugged from AC power too soon.</td>
<td>Ensure cradle is receiving power. Ensure the mobile computer is seated correctly. If the mobile computer battery is fully depleted, it can take up to five hours to fully recharge a Standard Battery and it can take up to eight hours to fully recharge an Extended Life Battery.</td>
</tr>
<tr>
<td></td>
<td>Battery is faulty.</td>
<td>Verify that other batteries charge properly. If so, replace the faulty battery.</td>
</tr>
<tr>
<td></td>
<td>The mobile computer is not fully seated in the cradle.</td>
<td>Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.</td>
</tr>
</tbody>
</table>

## Four Slot Ethernet Cradle

Table 5-4  *Troubleshooting the Four Slot Ethernet Cradle*

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile computer amber Charge LED Indicator does not light when mobile computer inserted.</td>
<td>Cradle is not receiving power.</td>
<td>Ensure the power cable is connected securely to both the cradle and to AC power.</td>
</tr>
<tr>
<td></td>
<td>Mobile computer is not correctly seated.</td>
<td>Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.</td>
</tr>
<tr>
<td>Mobile computer battery is not charging.</td>
<td>Mobile computer was removed from cradle or cradle was unplugged from AC power too soon.</td>
<td>Ensure cradle is receiving power. Ensure the mobile computer is seated correctly. If the mobile computer battery is fully depleted, it can take up to five hours to fully recharge a Standard Battery and it can take up to eight hours to fully recharge an Extended Life Battery.</td>
</tr>
<tr>
<td></td>
<td>Battery is faulty.</td>
<td>Verify that other batteries charge properly. If so, replace the faulty battery.</td>
</tr>
<tr>
<td></td>
<td>The mobile computer is not fully seated in the cradle.</td>
<td>Remove and re-insert the mobile computer into the cradle, ensuring it is correctly seated.</td>
</tr>
</tbody>
</table>
During data communication, no data was transmitted, or transmitted data was incomplete.

- Mobile computer removed from cradle during communication.
  - Replace mobile computer in cradle and retransmit.
- Incorrect cable configuration.
  - See the system administrator or refer to the MC31XX Series Mobile Computer Integrator Guide.
- Ethernet connection error. Link LED is not lit (see Link LED on page 4-9).
  - See the system administrator. Probable Ethernet connection error.

### Four Slot Spare Battery Charger

#### Table 5-5  Troubleshooting the Four Slot Spare Battery Charger

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare Battery Charging LED does not light when spare battery is inserted.</td>
<td>Spare battery is not correctly seated.</td>
<td>Remove and re-insert the spare battery into the charging slot, ensuring it is correctly seated.</td>
</tr>
<tr>
<td>Spare battery is not charging.</td>
<td>Charger is not receiving power.</td>
<td>Ensure the power cable is connected securely to both the charger and to AC power.</td>
</tr>
<tr>
<td></td>
<td>Spare battery is not correctly seated.</td>
<td>Remove and re-insert the battery into the charger, ensuring it is correctly seated.</td>
</tr>
<tr>
<td></td>
<td>Spare battery was removed from charger or charger was unplugged from AC power too soon.</td>
<td>Ensure charger is receiving power. Ensure the spare battery is seated correctly. If a battery is fully depleted, it can take up to five hours to fully recharge a Standard Battery and it can take up to eight hours to fully recharge an Extended Life Battery.</td>
</tr>
<tr>
<td></td>
<td>Spare battery is faulty.</td>
<td>Verify that other batteries charge properly. If so, replace the faulty battery.</td>
</tr>
</tbody>
</table>
### UBC Adapter

**Table 5-6  Troubleshooting the UBC Adapter**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery Charging LED does not light when spare battery is inserted.</td>
<td>Spare battery is not correctly seated.</td>
<td>Remove and re-insert the spare battery into the charging slot, ensuring it is correctly seated.</td>
</tr>
<tr>
<td>Battery not charging.</td>
<td>Charger is not receiving power.</td>
<td>Ensure the power cable is connected securely to both the charger and to AC power.</td>
</tr>
<tr>
<td></td>
<td>Spare battery is not correctly seated.</td>
<td>Remove and re-insert the spare battery into the charger, ensuring it is correctly seated.</td>
</tr>
<tr>
<td></td>
<td>Spare battery was removed from charger or charger was unplugged from AC power too soon.</td>
<td>Ensure charger is receiving power. Ensure the spare battery is seated correctly. If a battery is fully depleted, it can take up to five hours to fully recharge a Standard Battery and it can take up to eight hours to fully recharge an Extended Life Battery.</td>
</tr>
<tr>
<td></td>
<td>Spare battery is faulty.</td>
<td>Verify that other batteries charge properly. If so, replace the faulty battery.</td>
</tr>
</tbody>
</table>

### Cables

**Table 5-7  Troubleshooting the Cables**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile computer amber Charge LED Indicator does not light when mobile computer attached.</td>
<td>Cable is not receiving power.</td>
<td>Ensure the power cable is connected securely to both the cable and to AC power.</td>
</tr>
<tr>
<td>Mobile computer battery is not charging.</td>
<td>Mobile computer was detached from cable or cable was unplugged from AC power too soon.</td>
<td>Ensure cable is receiving power. Ensure the mobile computer is seated correctly. If the mobile computer battery is fully depleted, it can take up to five hours to fully recharge a Standard Battery and it can take up to eight hours to fully recharge an Extended Life Battery.</td>
</tr>
<tr>
<td></td>
<td>Battery is faulty.</td>
<td>Verify that other batteries charge properly. If so, replace the faulty battery.</td>
</tr>
<tr>
<td></td>
<td>The mobile computer is not fully seated in the cable.</td>
<td>Remove and re-attach the mobile computer to the cable, ensuring it is correctly seated.</td>
</tr>
</tbody>
</table>
Table 5-7  Troubleshooting the Cables (Continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>During data communication, no data was transmitted, or transmitted data was incomplete.</td>
<td>Cable removed from mobile computer during communication.</td>
<td>Reattach cable to mobile computer and retransmit.</td>
</tr>
<tr>
<td></td>
<td>Incorrect cable configuration.</td>
<td>See the system administrator or refer to the MC31XX Series Mobile Computer Integrator Guide.</td>
</tr>
<tr>
<td></td>
<td>Communication software is not installed or configured properly.</td>
<td>See the system administrator or refer to the MC31XX Series Mobile Computer Integrator Guide.</td>
</tr>
</tbody>
</table>
Table A-1 summarizes the mobile computer technical specifications and intended operating environments. Table A-2 summarizes the accessory technical specifications and the intended operating environments.

### Mobile Computer and Accessory Technical Specifications

Table A-1  *MC31XX Technical Specifications*

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
</tr>
<tr>
<td>MC31XXS:</td>
<td>7.49 in L x 3.25 in W x 1.77 in D</td>
</tr>
<tr>
<td></td>
<td>(190.4 mm L x 82.6 mm W x 45.2 mm D)</td>
</tr>
<tr>
<td></td>
<td>At grip: 2.40 in. W x 1.44 in. D/61.2 mm x 36.8 mm</td>
</tr>
<tr>
<td>MC31XXR:</td>
<td>8.55 in L x 3.25 in W x 1.57 in D</td>
</tr>
<tr>
<td></td>
<td>(217.12 mm L x 82.6 mm W x 39.9 mm D)</td>
</tr>
<tr>
<td></td>
<td>At grip: 2.40 in. W x 1.14 in. D/61.2 mm x 29 mm</td>
</tr>
<tr>
<td>MC3190G:</td>
<td>7.5 in L x 3.2 in W x 6.5 in D</td>
</tr>
<tr>
<td></td>
<td>(193 mm L x 80.8 mm W x 166 mm H)</td>
</tr>
<tr>
<td>Weight (including battery, stylus,</td>
<td>MC31XXR (with standard battery)* - 13.52 oz (384 g)</td>
</tr>
<tr>
<td>and handstrap)</td>
<td>MC31XXS (with extended battery)* - 14.95 oz (424 g)</td>
</tr>
<tr>
<td></td>
<td>MC3190G (with extended battery)* - 18.34 oz (520 g)</td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td>3.0 inch Color (TFT) (320 x 320) display with backlight</td>
</tr>
<tr>
<td><strong>Touch Panel</strong></td>
<td>Analog resistive touch</td>
</tr>
<tr>
<td><strong>Backlight</strong></td>
<td>LED backlight</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Battery              | Standard: Rechargeable Lithium-Ion 2740 mAh minimum (3.7V)  
                             Extended Life: Rechargeable Lithium-Ion 4800 mAh minimum (3.7V)                                                                                                                     |
| Expansion Slot       | User accessible SD/MMC slot up to 8 GB; approved for memory expansion only                                                                                                                                  |
| Network Connections  | High-speed USB client, full-speed USB host, Bluetooth and WiFi. USB host mode available with appropriate cables only.                                                                                     |
| Notification         | Programmable LEDs; Audio notifications                                                                                                                                                                      |
| Keypad Options       | 28-key Numeric  
                             38-key Shifted Alpha (calculator-style integrated numeric keypad)  
                             48-key Alpha-Numeric (calculator-style integrated numeric keypad)                                                                                                                                        |
| Audio                | Speaker, receiver, microphone, software support for full duplex capability, Bluetooth stereo.                                                                                                               |

### Performance Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Marvell PXA320 processor at 624 MHz</td>
</tr>
</tbody>
</table>
| Operating System     | Microsoft® Windows CE .NET 6.0 Professional  
                             Microsoft® Windows Mobile 6.1 Classic                                                                                                                                                                    |
| Memory               | 128 MB RAM/256MB Flash or  
                             128 MB RAM/512 MB Flash                                                                                                                                                                                    |
| Output Power         | USB: 5 VDC @ 400 mA max.                                                                                                                                                                                  |

### User Environment

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-20°C to 50°C (-4°F to 122°F)</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°C to 70°C (-40°C to 158°F) without battery</td>
</tr>
<tr>
<td>Charging Temperature</td>
<td>0°C to 40°C (32°F to 104°F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 - 95% non-condensing</td>
</tr>
<tr>
<td>Drop Specification</td>
<td>Multiple 4 ft./1.2 m drop to concrete across the operating temperature range Meets and exceeds MIL-STD 810G drop specifications.</td>
</tr>
<tr>
<td>Tumble</td>
<td>500 1.64 ft./0.5 m tumbles (1,000 drops) at room temperature per IEC 68-2-32 tumble specification.</td>
</tr>
</tbody>
</table>
| Electrostatic Discharge (ESD) | +/-15 kV air discharge  
                             +/- 8 kV direct discharge  
                             +/- 8 kV indirect discharge                                                                                                                                                                             |
| Sealing              | IP54 category 2; meets applicable EN 60529 sealing specifications.                                                                                                                                          |
Table A-1  *MC31XX Technical Specifications (Continued)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wireless LAN Data and Voice Communications</strong></td>
<td></td>
</tr>
<tr>
<td>Wireless Local Area Network (WLAN) radio</td>
<td>Tri-mode IEEE® 802.11a/b/g</td>
</tr>
<tr>
<td>Data Rates Supported</td>
<td>1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps</td>
</tr>
<tr>
<td>Operating Channels</td>
<td>Chan 1-13 (2412-2472 MHz), Chan 14 (2484 MHz) Japan only; actual operating channels/frequencies depend on regulatory rules and certification agency</td>
</tr>
<tr>
<td>Security</td>
<td>WPA2 (Personal or Enterprise); 802.1x; EAP-TLS; TTLS (CHAP, MS-CHAP, MS-CHAPv2, PAP or MD5); PEAP (TLS, MSCHAPv2, EAP-GTC); LEAP, EAP-FAST (TLS, MS-CHAPv2, EAP-GTC); CCXv4 certified; support for IPv6; FIPS140-2 Certified</td>
</tr>
<tr>
<td>Spreading Technique</td>
<td>Direct Sequence Spread Spectrum (DSSS) and Orthogonal Frequency Division Multiplexing (OFDM)</td>
</tr>
<tr>
<td>Antenna</td>
<td>Internal antenna w/diversity</td>
</tr>
<tr>
<td>Voice Communication</td>
<td>Voice-over-IP ready, Wi-Fi™-certified, IEEE 802.11a/b/g direct sequence wireless LAN, Wi-Fi Multimedia™ (WMM), Motorola Voice Quality Manager (VQM)</td>
</tr>
<tr>
<td><strong>Wireless PAN Data and Voice Communications</strong></td>
<td></td>
</tr>
<tr>
<td>Bluetooth</td>
<td>Class II, v2.1 with Enhanced Data Rate (EDR); integrated antenna</td>
</tr>
<tr>
<td><strong>Regulatory</strong></td>
<td></td>
</tr>
<tr>
<td>Electrical Safety</td>
<td>Certified to UL60950-1, CSA C22.2 No. 60950-1, EN60950/IEC 60950-1</td>
</tr>
<tr>
<td>Environmental</td>
<td>RoHS-compliant</td>
</tr>
</tbody>
</table>
| WLAN and Bluetooth (PAN) | **USA**: FCC Part 15.247, 15.407  
**Canada**: RSS-210  
**EU**: EN 300 328, EN 301 893  
**Japan**: ARIB STD T33, T66, T70, T71  
**Australia**: AS/NZS 4268s |
| RF Exposure | **USA**: FCC Part 2, FCC OET Bulletin 65 Supplement C  
**Canada**: RSS-102  
**EU**: EN 62311  
**Australia**: Radio communications Standard 2003 |
| EMI/RFI Radio Version | **USA**: FCC Part 15  
**Canada**: RSS210 Class B  
**EU**: EN 301 489-1, 489-17 |
### Data Capture Specifications

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Options</td>
<td>1D laser scanner</td>
</tr>
<tr>
<td>Options</td>
<td>2D imager</td>
</tr>
</tbody>
</table>

#### Laser 1D Scanner (SE950) Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range on 100% UPCA</td>
<td>Near: 3.8 cm (1.5 in.) Far: 60 cm (24 in.)</td>
</tr>
<tr>
<td>Optical Resolution</td>
<td>0.004 in. minimum element width</td>
</tr>
<tr>
<td>Roll</td>
<td>+/- 35° from vertical</td>
</tr>
<tr>
<td>Pitch Angle</td>
<td>+/- 65° from normal</td>
</tr>
<tr>
<td>Skew Tolerance</td>
<td>+/- 50° from normal</td>
</tr>
<tr>
<td>Ambient Light</td>
<td>10,000 ft. candles/107,640 lux</td>
</tr>
<tr>
<td>Scan Rate</td>
<td>104 (+/- 12) scans/sec (bidirectional)</td>
</tr>
<tr>
<td>Scan Angle</td>
<td>47° ± 3° default; configurable narrow angle: 35° ± 3°</td>
</tr>
</tbody>
</table>

#### 2D Imager Engine (SE4500-SR) Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range on 100% UPCA at 30 ft./candles</td>
<td>Near: 6.35 cm (2.5 in.) Far: 36.07 cm (14.2 in.)</td>
</tr>
<tr>
<td>Field of View</td>
<td>Horizontal - 38° Vertical - 25°</td>
</tr>
<tr>
<td>Optical Resolution</td>
<td>752 x 480 pixels</td>
</tr>
<tr>
<td>Roll</td>
<td>360°</td>
</tr>
<tr>
<td>Pitch Angle</td>
<td>+/- 60° from normal</td>
</tr>
<tr>
<td>Skew Tolerance</td>
<td>+/- 60° from normal</td>
</tr>
<tr>
<td>Ambient Light</td>
<td>9,000 ft. candles (96,900 Lux)</td>
</tr>
<tr>
<td>Focal Distance from Front of Engine</td>
<td>Near: 4 cm (1.6 in.) Far: 38 cm (15 in.)</td>
</tr>
<tr>
<td>Aiming Element (VLD)</td>
<td>655 nm +/- 10 nm</td>
</tr>
<tr>
<td>Illumination Element (LED)</td>
<td>625 nm +/- 5 nm</td>
</tr>
</tbody>
</table>
### Table A-1  MC31XX Technical Specifications (Continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2D Imager Engine (SE4500-HD) Specifications</strong></td>
<td></td>
</tr>
<tr>
<td>Range on 100% UPCA at 30 ft./candles</td>
<td>Near: 6.65 cm (2.62 in.) Far: 15.49 cm (6.1 in.)</td>
</tr>
<tr>
<td>Field of View</td>
<td>Horizontal - 39°</td>
</tr>
<tr>
<td></td>
<td>Vertical - 25°</td>
</tr>
<tr>
<td>Optical Resolution</td>
<td>752 x 480 pixels</td>
</tr>
<tr>
<td>Roll</td>
<td>360°</td>
</tr>
<tr>
<td>Pitch Angle</td>
<td>+/- 60° from normal</td>
</tr>
<tr>
<td>Skew Tolerance</td>
<td>+/- 60° from normal</td>
</tr>
<tr>
<td>Ambient Light</td>
<td>9,000 ft. candles (96,900 Lux)</td>
</tr>
<tr>
<td>Focal Distance from Front of Engine</td>
<td>Near: 4 cm (1.6 in.)</td>
</tr>
<tr>
<td></td>
<td>Far: 17 cm (6.8 in.)</td>
</tr>
<tr>
<td>Aiming Element (VLD)</td>
<td>655 nm +/- 10 nm</td>
</tr>
<tr>
<td>Illumination Element (LED)</td>
<td>625 nm +/- 5 nm</td>
</tr>
<tr>
<td><strong>Motorola Interactive Sensor Technology</strong></td>
<td></td>
</tr>
<tr>
<td>Motion-sensor</td>
<td>3-axis accelerometer that enables motion-sensing applications on dynamic screen orientation, power management and free-fall detects</td>
</tr>
</tbody>
</table>

### Table A-2  Accessory Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Single Slot Serial/USB Cradle</th>
<th>Cables</th>
<th>Four Slot Charge Only and Ethernet Cradles</th>
<th>Four Slot Spare Battery Charger</th>
<th>Universal Battery Charger (UBC) Adapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>32°F to 122°F (0°C to +50°C)</td>
<td></td>
<td>32°F to 104°F (0°C to +40°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40°F to 158°F (-40°C to 70°C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery Charging Temperature</td>
<td>32°F to 104°F (0°C to +40°C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>5% to 95% non-condensing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size (L x D x H)</td>
<td>4.4 in x 5.7 in x 4.7 in</td>
<td>6 feet</td>
<td>18 in x 4 in x 5 in (45.7 cm x 10.1 cm x 12 cm)</td>
<td>8.25 in x 6.0 in x 1.7 in (20.96 cm x 15.24 cm x 4.32 cm)</td>
<td>2.5 in x 6.1 in x 1.5 in (6.4 cm x 15.5 cm x 3.8 cm)</td>
</tr>
<tr>
<td></td>
<td>Single Slot Serial/USB Cradle</td>
<td>Cables</td>
<td>Four Slot Charge Only and Ethernet Cradles</td>
<td>Four Slot Spare Battery Charger</td>
<td>Universal Battery Charger (UBC) Adapter</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------------</td>
<td>---------</td>
<td>-------------------------------------------</td>
<td>---------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Weight</td>
<td>0.60 lbs (0.27 kg)</td>
<td>N/A</td>
<td>Charge only: 2.25 lbs (1.02 kg) Ethernet: 2.38 lbs (1.08 kg)</td>
<td>13.6 oz (386 g)</td>
<td>0.25 lbs (0.11 kg)</td>
</tr>
<tr>
<td>Power</td>
<td>12V, 3.3 A</td>
<td>5.4V, 3 A</td>
<td>12V, 9 A</td>
<td>12V, 3.3 A</td>
<td>15V, 1.5 A</td>
</tr>
<tr>
<td>Drop</td>
<td>30 inches (76.2 centimeter)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrostatic Discharge (ESD)</td>
<td>+/-15 kV air discharge, +/- 8 kV direct discharge, +/- 8 kV indirect discharge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table A-2  Accessory Specifications (Continued)
Appendix B  Keypads

Introduction

The mobile computer is available with the following keypad configurations:

- 28-key keypad
- 38-key keypad
- 48-key keypad.

NOTE  For information about using the soft keyboard input panel. For more information, see Entering Information Using the Keyboard Input Panel on page 2-14.
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 and the alternate **ALPHA** key (orange) values. Note that keypad functions can be changed by an application so the mobile computer keypad may not function as described. See *Table B-1 on page B-2* for key and button descriptions and *Table B-2 on page B-4* for the keypad alternate functions.

**Figure B-1  28-Key Keypad**

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (red)</td>
<td>Powers the mobile computer screen on and off (resume and suspend).</td>
</tr>
<tr>
<td>Green Circle</td>
<td>Programmable application function key by default.</td>
</tr>
<tr>
<td>Red Circle</td>
<td>Programmable application function key by default.</td>
</tr>
<tr>
<td>Scan (yellow)</td>
<td>Used in scanning applications, press to scan a bar code. This key has the same function as activating the side mounted scan buttons.</td>
</tr>
<tr>
<td>Key</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Scroll Up and Down</td>
<td>Moves up and down from one item to another. Increases/decreases specified values.</td>
</tr>
<tr>
<td></td>
<td>Increases and decreases volume when the blue <strong>FUNC</strong> key is activated and the up and down arrow keys are pressed.</td>
</tr>
<tr>
<td>Scroll Left and Right</td>
<td>Moves left and right from one item to another. Increases/decreases specified values.</td>
</tr>
<tr>
<td></td>
<td>Produces a <strong>TAB</strong> when the blue <strong>FUNC</strong> key is activated and the right arrow key is pressed.</td>
</tr>
<tr>
<td>ESC</td>
<td>Produces the <strong>ESC</strong> function by default.</td>
</tr>
<tr>
<td>CTRL</td>
<td>Press and release the <strong>CTRL</strong> key to activate the keypad alternate <strong>CTRL</strong> functions.</td>
</tr>
<tr>
<td></td>
<td>The <strong>`</strong> icon appears on the taskbar on WinCE devices or the <strong>CTRL</strong> icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the <strong>CTRL</strong> key again to return to the default keypad functions.</td>
</tr>
<tr>
<td></td>
<td>Press and release the blue <strong>FUNC</strong> key and then the <strong>CTRL</strong> key to activate the <strong>ALT</strong> functions.</td>
</tr>
<tr>
<td></td>
<td>The <strong>ALT</strong> icon appears on the taskbar on WinCE devices or the <strong>ALT</strong> icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the <strong>CTRL</strong> key two times to return to the default keypad functions.</td>
</tr>
<tr>
<td>Numeric/Alpha/Special Function</td>
<td>Numeric, alpha or special function keys. Numeric by default.</td>
</tr>
<tr>
<td></td>
<td>Produces a special function when the blue <strong>FUNC</strong> key is activated.</td>
</tr>
<tr>
<td></td>
<td>Produces alpha values when the orange <strong>ALPHA</strong> key is activated.</td>
</tr>
<tr>
<td></td>
<td>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 <strong>ALPHA</strong> key and then press the 4 key once to produce the letter 'g'; press and release the <strong>ALPHA</strong> key and then press the 4 key three times to produce the letter 'i'.</td>
</tr>
<tr>
<td></td>
<td>When the <strong>SHIFT</strong> key is pressed in Alpha state, the upper case alphabetic characters on the key are produced. For example, press and release the <strong>ALPHA</strong> key, press and hold the <strong>SHIFT</strong> key and then press the 4 key once to produce the letter 'G'; press and release the <strong>ALPHA</strong> key, press and hold the <strong>SHIFT</strong> key and then press the 4 key three times to produce the letter 'I'.</td>
</tr>
<tr>
<td>Period/Decimal Point</td>
<td>Produces a period for alpha entries and a decimal point for numeric entries by default.</td>
</tr>
<tr>
<td></td>
<td>Increases brightness when the blue <strong>FUNC</strong> key is activated.</td>
</tr>
<tr>
<td>Enter</td>
<td>Executes a selected item or function.</td>
</tr>
<tr>
<td>BKSP</td>
<td>Backspace function by default.</td>
</tr>
<tr>
<td></td>
<td>Decreases brightness when the blue <strong>FUNC</strong> key is activated.</td>
</tr>
</tbody>
</table>
**Table B-1  28-Key Descriptions (Continued)**

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPACE</td>
<td>Space function by default.</td>
</tr>
<tr>
<td>Shift</td>
<td>Press and release the <strong>SHIFT</strong> key to activate the keypad alternate <strong>SHIFT</strong> functions. The ↑ icon appears on the taskbar on WinCE devices and the ⟩ icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the <strong>SHIFT</strong> key again to return to the default keypad functions.</td>
</tr>
<tr>
<td>ALPHA (orange)</td>
<td>Press the orange <strong>ALPHA</strong> key to access the alternate <strong>ALPHA</strong> characters (shown on the keypad in orange). The <strong>ALP</strong> icon appears on the taskbar on WinCE devices and the ○ icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the orange <strong>ALPHA</strong> key again to return to the default keypad functions.</td>
</tr>
<tr>
<td>FUNC (blue)</td>
<td>Press and release the blue <strong>FUNC</strong> key to activate the keypad alternate functions (shown on the keypad in blue). The <strong>F</strong> icon appears on the taskbar on WinCE devices or the ○ icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the blue <strong>FUNC</strong> key again to return to the default keypad functions.</td>
</tr>
<tr>
<td>Display backlight</td>
<td>Toggles the display backlight on and off.</td>
</tr>
</tbody>
</table>

**Table B-2  28-key Keypad Input Modes**

<table>
<thead>
<tr>
<th>Key</th>
<th>Numeric Mode</th>
<th>Orange Key (Alpha Lowercase Mode)</th>
<th>Orange + Shift Keys (Alpha Uppercase Mode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>!</td>
<td>*</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>@</td>
<td>a</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>#</td>
<td>d</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>$</td>
<td>g</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>%</td>
<td>j</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>^</td>
<td>m</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>&amp;</td>
<td>p</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>*</td>
<td>t</td>
</tr>
</tbody>
</table>

*Note: An application can change the key functions. The keypad may not function exactly as described.*
Table B-2  28-key Keypad Input Modes (Continued)

<table>
<thead>
<tr>
<th>Key</th>
<th>Numeric Mode</th>
<th>Orange Key (Alpha Lowercase Mode)</th>
<th>Orange + Shift Keys (Alpha Uppercase Mode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>9</td>
<td>(</td>
<td>w</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>)</td>
<td>0</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>&gt;</td>
<td>.</td>
</tr>
</tbody>
</table>

Note: An application can change the key functions. The keypad may not function exactly as described.
38-Key Keypad

The 38-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 keypad may not function as described. See *Table B-3 on page B-6* for key and button descriptions and *Table B-4 on page B-8* for the keypad alternate functions.

![38-Key Keypad](image)

**Figure B-2  38-Key Keypad**

**Table B-3  38-Key Descriptions**

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (red)</td>
<td>Powers the mobile computer screen on and off (resume and suspend).</td>
</tr>
<tr>
<td>Green Circle</td>
<td>Programmable application function key by default.</td>
</tr>
<tr>
<td>Red Circle</td>
<td>Programmable application function key.</td>
</tr>
</tbody>
</table>
### Table B-3  38-Key Descriptions (Continued)

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scan (yellow)</td>
<td>Used in scanning applications, press to scan a bar code.</td>
</tr>
<tr>
<td>Scroll Left and Right</td>
<td>Moves left and right from one item to another by default. Produces a <strong>TAB</strong> when the blue <strong>FUNC</strong> key is activated and the right arrow key is pressed.</td>
</tr>
<tr>
<td>Scroll Up and Down</td>
<td>Moves up and down from one item to another by default.</td>
</tr>
<tr>
<td>ALPHA (orange)</td>
<td>Press the orange <strong>ALPHA</strong> key to access the alternate <strong>ALPHA</strong> characters (shown on the keypad in orange). The <strong>ALP</strong> icon appears on the taskbar on WinCE devices and the <strong>Alpha</strong> icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the orange <strong>ALPHA</strong> key again to return to the default keypad functions.</td>
</tr>
<tr>
<td>CTRL</td>
<td>Press and release the <strong>CTRL</strong> key to activate the keypad alternate <strong>CTRL</strong> functions. The <strong>Ctrl</strong> icon appears on the taskbar on WinCE devices or the <strong>Alt</strong> icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the <strong>CTRL</strong> key again to return to the default keypad functions. Press and release the blue <strong>FUNC</strong> key and then the <strong>CTRL</strong> key to activate the <strong>ALT</strong> functions. The <strong>Alt</strong> icon appears on the taskbar on WinCE devices or the <strong>Alt</strong> icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the <strong>CTRL</strong> key two times to return to the default keypad functions.</td>
</tr>
<tr>
<td>ESC</td>
<td>Produces the escape function.</td>
</tr>
<tr>
<td>FUNC (blue)</td>
<td>Press and release the blue <strong>FUNC</strong> key to activate the keypad alternate functions (shown on the keypad in blue). The <strong>Func</strong> icon appears on the taskbar on WinCE devices or the <strong>Alpha</strong> icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the blue <strong>FUNC</strong> key again to return to the default keypad functions.</td>
</tr>
<tr>
<td>Numeric/Alpha/Special Function</td>
<td>Press for the default numeric value. Produces alpha values when the orange <strong>ALPHA</strong> key is activated.</td>
</tr>
<tr>
<td>BKSP</td>
<td>Backspace function by default. Produces the Space function when the orange <strong>ALPHA</strong> key is activated.</td>
</tr>
<tr>
<td>SHIFT</td>
<td>Press and release the <strong>SHIFT</strong> key to activate the keypad alternate <strong>SHIFT</strong> functions. The <strong>Shift</strong> icon appears on the taskbar on WinCE devices and the <strong>Shift</strong> icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the <strong>SHIFT</strong> key again to return to the default keypad functions.</td>
</tr>
</tbody>
</table>
### Table B-3  38-Key Descriptions (Continued)

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter</td>
<td>Executes a selected item or function.</td>
</tr>
<tr>
<td>Period</td>
<td>Produces a period for alpha entries and a decimal point for numeric entries.</td>
</tr>
<tr>
<td>Comma</td>
<td>Produces a comma by default.</td>
</tr>
<tr>
<td>Special Function/Alpha</td>
<td>Special function by default or when the blue FUNC key is activated.</td>
</tr>
<tr>
<td>Display backlight</td>
<td>Toggles the display backlight on and off.</td>
</tr>
</tbody>
</table>

### Table B-4  38-key Keypad Input Modes

<table>
<thead>
<tr>
<th>Key</th>
<th>Normal</th>
<th>SHIFT + Key</th>
<th>Orange + Key</th>
<th>Orange + Shift + Key</th>
<th>Blue + Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Arrow</td>
<td></td>
<td>a</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up Arrow</td>
<td></td>
<td>b</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Down Arrow</td>
<td></td>
<td>c</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left Arrow</td>
<td></td>
<td>d</td>
<td>D</td>
<td>Tab</td>
<td></td>
</tr>
<tr>
<td>CTRL</td>
<td></td>
<td>e</td>
<td>E</td>
<td>Ctrl</td>
<td></td>
</tr>
<tr>
<td>ESC</td>
<td></td>
<td>f</td>
<td>F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>&amp;</td>
<td>g</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>*</td>
<td>h</td>
<td>H</td>
<td>=</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>(</td>
<td>i</td>
<td>I</td>
<td>/</td>
</tr>
<tr>
<td>BKSP</td>
<td>Backspace</td>
<td>Backspace</td>
<td>Space</td>
<td>Space</td>
<td>Backspace</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>$</td>
<td>j</td>
<td>J</td>
<td>[</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>%</td>
<td>k</td>
<td>K</td>
<td>]</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>^</td>
<td>l</td>
<td>L</td>
<td>;</td>
</tr>
</tbody>
</table>

Note: An application can change the key functions. The keypad may not function exactly as described.
Table B-4  38-key Keypad Input Modes (Continued)

<table>
<thead>
<tr>
<th>Key</th>
<th>Normal</th>
<th>SHIFT + Key</th>
<th>Orange + Key</th>
<th>Orange + Shift + Key</th>
<th>Blue + Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>!</td>
<td>m</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>@</td>
<td>n</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>#</td>
<td>o</td>
<td>O</td>
<td>\</td>
</tr>
<tr>
<td>,</td>
<td>,</td>
<td>&lt;</td>
<td>p</td>
<td>P</td>
<td>,</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>)</td>
<td>q</td>
<td>Q</td>
<td>0</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>&gt;</td>
<td>r</td>
<td>R</td>
<td>.</td>
</tr>
<tr>
<td>F1</td>
<td></td>
<td>s</td>
<td>S</td>
<td>F11</td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td></td>
<td>t</td>
<td>T</td>
<td>F12</td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td></td>
<td>u</td>
<td>U</td>
<td>F13</td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td></td>
<td>v</td>
<td>V</td>
<td>F14</td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td></td>
<td>w</td>
<td>W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td></td>
<td>x</td>
<td>X</td>
<td>Increase Brightness</td>
<td></td>
</tr>
<tr>
<td>F7</td>
<td></td>
<td>y</td>
<td>Y</td>
<td>Increase Volume</td>
<td></td>
</tr>
<tr>
<td>F8</td>
<td></td>
<td>z</td>
<td>Z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F9</td>
<td></td>
<td></td>
<td></td>
<td>Decrease Brightness</td>
<td></td>
</tr>
<tr>
<td>F10</td>
<td></td>
<td>*</td>
<td></td>
<td>Decrease Volume</td>
<td></td>
</tr>
</tbody>
</table>

Note: An application can change the key functions. The keypad may not function exactly as described.
48-Key Keypad

The 48-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 keypad may not function as described. See Table B-5 on page B-10 for key and button descriptions and Table B-6 on page B-12 for the keypad special functions.

![48-Key Keypad](image)

**Table B-5  48-Key Descriptions**

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (red)</td>
<td>Powers the mobile computer screen on and off (resume and suspend).</td>
</tr>
<tr>
<td>Green Circle</td>
<td>Unassigned application function key by default.</td>
</tr>
<tr>
<td>Red Circle</td>
<td>Unassigned application function key.</td>
</tr>
<tr>
<td>Scan (yellow)</td>
<td>Scan key, used for scanning applications.</td>
</tr>
<tr>
<td>Key</td>
<td>Description</td>
</tr>
<tr>
<td>-----</td>
<td>-------------</td>
</tr>
<tr>
<td>Orange</td>
<td>Press the orange key to access the alternate navigation and selection functions. The icon appears on the taskbar on WinCE devices and the icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the orange key again to return to the default keypad functions.</td>
</tr>
<tr>
<td>Numeric/Scroll/Select</td>
<td>Numeric, scroll, select keys. Numeric by default. With the orange key activated, the 2, 4, 6, and 8 keys produce scroll functions and the 5 key produces a select function. With the FUNC key activated, 7 produces the ESC function and 9 produces the TAB function.</td>
</tr>
<tr>
<td>Shift</td>
<td>Press and release the SHIFT key to activate the keypad alternate SHIFT functions. The icon appears on the taskbar on WinCE devices and the icon appears at the bottom of the screen on Windows Mobile 6.1 device. Press and release the SHIFT key again to return to the default keypad functions.</td>
</tr>
<tr>
<td>Enter</td>
<td>Executes a selected item or function.</td>
</tr>
<tr>
<td>BKSP/SPACE</td>
<td>BKSP, backspace function by default. Produces the SPACE function when the blue FUNC key is activated.</td>
</tr>
<tr>
<td>Period/Decimal Point</td>
<td>Produces a period for alpha entries and a decimal point for numeric entries.</td>
</tr>
<tr>
<td>Control</td>
<td>Press and release the CTRL key to activate the keypad alternate CTRL functions. The icon appears on the taskbar on WinCE devices or the icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the CTRL key again to return to the default keypad functions. Press and release the blue FUNC key and then the CTRL key to activate the ALT functions. The ALT icon appears on the taskbar on WinCE devices or the ALT icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the CTRL key two times to return to the default keypad functions.</td>
</tr>
<tr>
<td>Alpha/Special Function</td>
<td>Alpha by default. Special function by default when the blue FUNC key is activated.</td>
</tr>
<tr>
<td>FUNC (blue)</td>
<td>Press and release the blue FUNC function key to activate the keypad alternate functions (shown on the keypad in blue). The icon appears on the taskbar on WinCE devices or the icon appears at the bottom of the screen on Windows Mobile 6.1 devices. Press and release the blue FUNC function key again to return to the default keypad functions.</td>
</tr>
<tr>
<td>Display Backlight</td>
<td>Toggles the display backlight on and off.</td>
</tr>
</tbody>
</table>
### 48-key Keypad Input Modes

<table>
<thead>
<tr>
<th>Key</th>
<th>Normal</th>
<th>Shift + Key</th>
<th>Blue + Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>a</td>
<td>A</td>
<td>F1</td>
</tr>
<tr>
<td>B</td>
<td>b</td>
<td>B</td>
<td>F2</td>
</tr>
<tr>
<td>C</td>
<td>c</td>
<td>C</td>
<td>F3</td>
</tr>
<tr>
<td>D</td>
<td>d</td>
<td>D</td>
<td>F4</td>
</tr>
<tr>
<td>E</td>
<td>e</td>
<td>E</td>
<td>F5</td>
</tr>
<tr>
<td>F</td>
<td>f</td>
<td>F</td>
<td>F6</td>
</tr>
<tr>
<td>G</td>
<td>g</td>
<td>G</td>
<td>F7</td>
</tr>
<tr>
<td>H</td>
<td>h</td>
<td>H</td>
<td>F8</td>
</tr>
<tr>
<td>I</td>
<td>i</td>
<td>I</td>
<td>F9</td>
</tr>
<tr>
<td>J</td>
<td>j</td>
<td>J</td>
<td>F10</td>
</tr>
<tr>
<td>K</td>
<td>k</td>
<td>K</td>
<td>F11</td>
</tr>
<tr>
<td>L</td>
<td>l</td>
<td>L</td>
<td>F12</td>
</tr>
<tr>
<td>M</td>
<td>m</td>
<td>M</td>
<td>F13</td>
</tr>
<tr>
<td>N</td>
<td>n</td>
<td>N</td>
<td>Increase Brightness</td>
</tr>
<tr>
<td>O</td>
<td>o</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>p</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>q</td>
<td>Q</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>r</td>
<td>R</td>
<td>Increase Volume</td>
</tr>
<tr>
<td>S</td>
<td>s</td>
<td>S</td>
<td>Decrease Brightness</td>
</tr>
<tr>
<td>T</td>
<td>t</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>u</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>v</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>w</td>
<td>W</td>
<td>Decrease Volume</td>
</tr>
<tr>
<td>X</td>
<td>x</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>z</td>
<td>Z</td>
<td>*</td>
</tr>
<tr>
<td>BKSP</td>
<td>Backspace</td>
<td>Backspace</td>
<td>Space</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>!</td>
<td></td>
</tr>
</tbody>
</table>

Note: An application can change the key functions. The keypad may not function exactly as described.
### Table B-6  48-key Keypad Input Modes (Continued)

<table>
<thead>
<tr>
<th>Key</th>
<th>Normal</th>
<th>Shift + Key</th>
<th>Blue + Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>@</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>#</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>^</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>&amp;</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>(</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>)</td>
<td></td>
</tr>
</tbody>
</table>

Note: An application can change the key functions. The keypad may not function exactly as described.
Glossary

Numeric

802.11/802.11abg. A radio protocol that may be used by the WLAN radio card.

A

**Access Point.** Access Point (AP) refers to Motorola’s Ethernet Access Point. It is a piece of communications equipment that manages communications between the host computer system and one or more wireless terminals. 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 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 Motorola’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.

**Aperture.** The opening in an optical system defined by a lens or baffle that establishes the field of view.

**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.
B

**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.

**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.

**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.

**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.

C

**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.

**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: ("-", "$", ":", "/", ",", and "+").

**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.

**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.

**Cradle.** A cradle is used for charging the terminal battery and for communicating with a host computer, and provides a storage place for the terminal when not in use.

---

**D**

**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.

**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.

---

**E**

**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.

**EMDK.** Enterprise Mobility Developer’s Kit.

**ESD.** Electro-Static Discharge
ESN. Electronic Serial Number. The unique hardware number associated with a cellular device, which is transmitted to the system when the device communicates with the cellular system.

Ethernet. Ethernet communication port. Allows a wired interface to a radio network.

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 be lost.

FTP. See File Transfer Protocol.

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 terminal 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.

Hz. Hertz; A unit of frequency equal to one cycle per second.

Host Computer. A computer that serves other terminals in a network, providing such services as computation, database access, supervisory programs and network control.

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.

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.
**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.

**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 an 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.

**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.

**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.

**MC.** Mobile Computer.

**MIL.** 1 mil = 1 thousandth of an inch.
MIN. Mobile Identification Number. The unique account number associated with a cellular device. It is broadcast by the cellular device when accessing the cellular system.

Mobile Computer. In this text, mobile computer refers to the Motorola handheld 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.

N

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).

P

Parameter. A variable that can have different values assigned to it.

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%.

Q

Quiet Zone. A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.

R

RAM. Random Access Memory. Data in RAM can be accessed in random order, and quickly written and read.

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.

ROM. Read-Only Memory. Data stored in ROM cannot be changed or removed.

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.
RS232. An Electronic Industries Association (EIA) standard that defines the connector, connector pins, and signals used to transfer data serially from one device to another.

---

**S**

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

Shared Key. Shared Key authentication is an algorithm where both the AP and the MU share an authentication key.

SID. System Identification code. An identifier issued by the FCC for each market. It is also broadcast by the cellular carriers to allow cellular devices to distinguish between the home and roaming service.

Soft Reset. See Warm Boot.

Space. The lighter element of a bar code formed by the background between bars.

Specular Reflection. The mirror-like direct reflection of light from a surface, which can cause difficulty decoding a bar code.

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.

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.

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.).

T

Tolerance. Allowable deviation from the nominal bar or space width.

U

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.

V

Visible Laser Diode (VLD). A solid state device which produces visible laser light.

W

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.

Wireless Local Area Network (WLAN). See LAN.
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