To switch from WZC to Fusion:

1. Tap the **Start** > > **Wireless Launcher** > **Options**.
2. Select **WLAN Management** from the drop-down list.
3. Select **Fusion Manages WLAN** radio button.
4. Tap **Save**.
5. Tap **OK**.
6. Perform a reset.

Supported Applications

The Fusion menu items and their corresponding applications are summarized in *Table 5-1*.

Table 5-1 *Supported Applications*

Application	Description	Fusion Support	WZC Support
Find WLANs	Invokes the **Find WLANs** application which displays a list of the WLANs active in your area.	Yes	No
Manage Profiles	Invokes the **Manage Profiles** application (which includes the **Profile Editor Wizard**) to manage and edit your list of WLAN profiles.	Yes	No
Wireless Zero Config	Invokes the Wireless Zero Config application to configure the WLAN.	No	Yes
Manage Certs	Invokes the **Certificate Manager** application which allows you to manage certificates used for authentication.	Yes	Yes
Manage PACs	Invokes the **PAC Manager** application which helps you manage the list of Protected Access Credentials used with EAP-FAST authentication.	Yes	No
Options	Invokes the **Options** application which allows you to configure the Fusion option settings.	Yes	Yes
Wireless Status	Invokes the **Wireless Status** application which allows you to view the status of the current wireless connection.	Yes	Yes
Wireless Diagnostics	Invokes the **Wireless Diagnostics** application which provides tools with which to diagnose problems with the wireless connection.	Yes	Yes
Log On/Off	Invokes the **Network Login** dialog which allows you to log on to a particular profile or to log off from the currently active profile	Yes	No
Fusion Help	Invokes the **Fusion Help** application which provides detailed explanations on all the available Fusion applications	Yes	No

Fusion Setup

To setup WLAN using Fusion refer to the *Wireless Fusion Enterprise Mobility Suite User Guide for Version H3.40* for detailed information on using and configuring Fusion.

To setup WLAN using Fusion:

NOTE Obtain the proper WLAN configuration information from your system administrator prior to performing the Fusion setup procedures.

The following setup procedure example shows setup of a WLAN using WEP encryption.

1. Tap the **Start** > > **Wireless Configuration Editor** > **Manage Profiles**. The **Manage Profiles** window appears.
2. Tap and hold in the window and select **Add** from the pop-up menu. The **Wireless LAN Profile Entry** window appears.
3. In the **Profile Name** text box enter a name for the profile.
4. In the **ESSID** text box enter the ESSID.

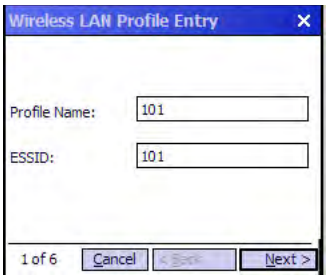

Figure 5-2 *Profile ID Dialog Box*

5. Tap **Next.** The **Operating Mode** dialog box displays.
6. In the **Operating Mode** drop-down list, select **Infrastructure** or **Ad-hoc**.

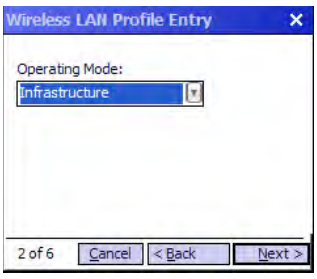

Figure 5-3 *Operating Mode Dialog Box*

7. Tap **Next**. The **Security Mode** dialog box displays.
8. In the **Security Mode** drop-down list, select **Legacy (Pre-WPA)**.

Figure 5-4 *Security/Authentication Dialog Box*

9. In the **Authentication** drop-down list, select **None**.
10. Tap **Next**. The **Encryption** dialog box displays.
11. In the **Encryption Type** drop-down list, select **WEP-40 (40/24)**.

Figure 5-5 *Encryption Dialog Box*

12. Select the **Pass-phrase** or **Hexadecimal Keys** radio button to indicate whether a pass-phrase or hexadecimal keys will be entered on the next page.
13. Select the **For added security - Mask characters entered** check box to hide characters entered. Deselect this to show characters entered.
14. Tap **Next**.

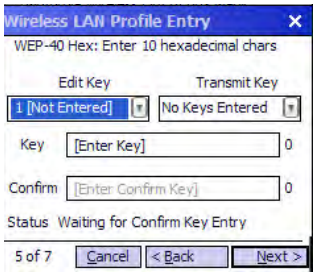

Figure 5-6 *WEP-40 WEP Keys Dialog Box*

15. In the **Edit Key** drop-down list, select the key to enter.
16. In the **Key** field, enter 10 hexadecimal characters.
17. In the **Confirm** field, re-enter the key. When the keys match, a message appears indicating that the keys match.
18. Repeat for each WEP key.
19. In the **Transmit Key** drop-down list, select the key to transmit.
20. Tap **Next**. The **IPv4 Address Entry** dialog box displays.

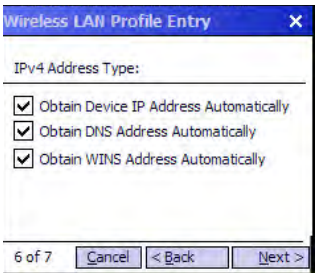

Figure 5-7 *IP Address Entry Dialog Box*

21. Ensure that all three check boxes are selected.
22. Tap **Next**. The **Battery Usage** dialog box appears.
23. In the **Battery Usage Mode** dialog box select a power consumption option.

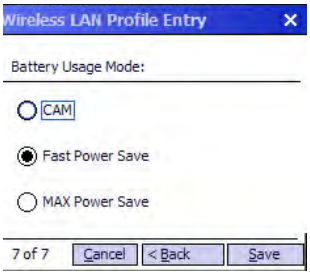

Figure 5-8 *Battery Usage Dialog Box*

24. Tap **Save**.

Wireless Zero Config Setup

To setup WLAN using WZC:

NOTE Obtain the proper WLAN configuration information from your system administrator prior to performing the WZC setup procedures.

The following setup procedure example shows setup of a WLAN using WEP encryption.

1. Tap **Start** > > **Wireless Launcher** > **Wireless Zero Config**.

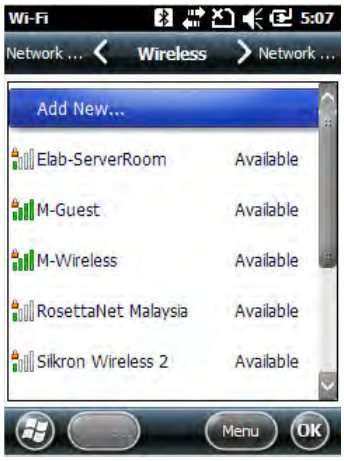

Figure 5-9 *Wireless Zero Config Window*

2. The MC45 searches for wireless networks in the area and displays them in the window.
3. Tap a network name.

Figure 5-10 *Configure Wireless Network Window*

4. In the **Connects to** drop-own list, select either **The Internet** or **Work**.
5. Check the **This is a hidden network** checkbox if the network is a hidden network.
6. Tap **Next**.

Figure 5-11 *Configure Network Authentication Window*

7. In the **Authentication** drop-down list, select the authentication type.
8. In the **Data Encryption** drop-down list, select the data encryption type.
9. If **WEP encryption** is selected, enter an encryption key in the **Network key** text box.
10. Tap **Next**.

Figure 5-12 *Configure Network Authentication Window*

11. If required, select **Use IEEE 802.1x network access control** check box.
12. In the **EAP type** drop-down list box, select the EAP type.
13. Tap **Finish**.

More Information on WZC

For more information on Microsoft Wireless Zero Config, see the Microsoft Software Developer Network (MSDN) at http://msdn.microsoft.com.

Chapter 6 Using GPS Navigation

Introduction

The MC45 includes Global Positioning System (GPS) technology using the QC Modem Solution chipset. GPS technology is based on a worldwide system of GPS satellites orbiting the earth that continuously transmit digital radio signals. These radio signals contain data on the satellites' locations and their exact clock time and are used to determine your location on the earth.

WARNING! **When using the MC45 in a vehicle, it is the user's responsibility to place, secure and use in a manner that will not cause accidents, personal injury or property damage or obstruct their view. It is the responsibility of the driver to operate the vehicle in a safe manner, maintain observation of all driving conditions at all times, and not become distracted by the device to the exclusion of safe driving practices. It is unsafe to operate the controls of the device while driving.**

Software Installation

Third-party GPS navigation software is required. Evaluation software is available from various suppliers. For example; VisualGPS, visit: http://www.visualgps.net/VisualGPSce/

If interested in purchasing GPS navigation software check with the GPS software vendor (before purchasing, downloading, or installing any software) to determine that the application is compatible with the MC45. Refer to the application's user guide for application installation and setup information.

MC45 GPS Setup

By default, the MC45 has the following settings:

1. Tap **Start** > **Settings** > **System** > **External GPS** icon.

2. In the **Programs** tab, the **GPS program port** is set to **COM6**.

3. In the **Hardware** tab, the **GPS hardware port** is set to **None**.

Multiple programs can simultaneously access GPS data. Each program must use Microsoft GPS API or COM8 to access the GPS data.

Operation

Acquiring satellite signals may take several seconds to a few minutes. It is best to be outside and have a clear, unobstructed view of the sky. Without a clear view, acquisition takes much longer and could result in the MC45 being unable to compute the initial position quickly. When operating the device indoors access to the GPS signals may be limited or unavailable.

NOTE When using a GPS navigation application, ensure that the MC45 does not go into suspend mode. If the MC45 suspends then the power to the GPS radio is removed. Upon resume the GPS receiver must reacquire a valid GPS signal, resulting in a a delay of positional information.

GPS Maps on microSD Cards

GPS navigation software vendors may sell maps on microSD cards. If using a microSD card with the GPS navigation software:

1. Remove the Memory Card Cover on the side of the MC45.
2. Insert the microSD card into the slot.
3. Replace the Memory Card Cover.

Answering a Phone Call While Using GPS

If you receive a phone call while using your GPS navigation software:

1. Answer the phone call by pressing the **Answer** button.
2. Once you end the phone call, press the **End Call** button to resume the audio on the GPS software.

NOTE Anytime you are using GPS on the MC45 and you receive a phone call, the audio on the GPS navigation software is muted until you finish the call.

Losing the GPS Signal While in a Vehicle

GPS performance on the MC45 may be affected if the vehicle has thermal glass windows and windshields, which can block the MC45 from receiving a GPS signal from satellites. To improve GPS signal strength, place the MC45 where there is a clear view of the sky. A direct line of sight is required between the MC45 and the GPS satellites to access information from the satellites.

Assisted GPS

GPS can be used in stand-alone or Assisted GPS (A-GPS) modes. A Stand-alone GPS receiver downloads data from GPS satellites. It can take several minutes to get a fix. By using GPS Location servers, A-GPS dramatically improves the performance of the Time To First Fix (TTFF) of GPS receivers by providing them with data that they would ordinarily have to download from the GPS satellites and other aiding data that helps the acquisition. With the A-GPS data, GPS receivers can operate faster and more reliably.

The **GPS Assist** application provides the ability to modify the settings associated with obtaining GPS data.

Tap **Start** > **Connections** > **GPS Assist** icon.

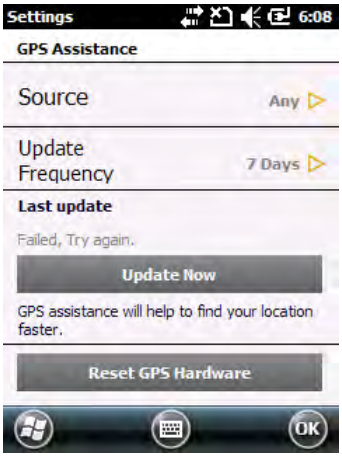

Figure 6-1 *GPS Assistance Window*

To set the source of the data tap **Source** and select one of the options: **Any** (default), **None**.

To set the frequency of updating the data tap **Update Frequency** and select one of the options: **On Demand** (default), **1 Day**, **2 Days**, **4 Days**, **7 Days**.

To manually update the data tap the **Update Now** button.

GPS Reset

To perform a factory reset of the GPS function:

1. Close all applications that are using GPS.
2. Tap the **Reset GPS Hardware** button. The **Reset GPS Hardware** dialog box appears indicating that the GPS chip has been reset.
3. Tap **OK**.

Chapter 7 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 (802.15.4). Bluetooth wireless technology is specifically designed for short-range (30 feet/10 meters) communication and low power consumption.

MC45 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 MC45 as a modem, create a dial-up modem connection between a computer and MC45.

The MC45 with Bluetooth technology uses the Microsoft Bluetooth stack. To write an application that uses the Microsoft 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 MC45 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.

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

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

The following services are supported

- A2DP/AVRCP Services
- Dial-Up Networking Services
- File Transfer profile
- General Audio/Video Distribution Profile
- Generic Access Profile
- Generic Object Exchange Profile
- Hands-Free Audio Gateway Services
- Headset Profile
- HID Client Services
- PBAP Services
- Personal Area Networking Services
- Serial Port Services
- Service Discovery Access profile
- SIM Access Profile.

COM2 through COM4 and COM8 are available unless being used by another service.

Bluetooth Power States

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.

NOTE If there is an active Bluetooth connection between the MC45 and another Bluetooth device and there is no data activity, the MC45 will timeout. However, if the user presses the Power button on the MC45, the MC45 will suspend (except when on a call) and upon receiving data from a remote Bluetooth device, the MC45 will wake from suspend mode. For example, headset redial or Bluetooth scanner sending data to the MC45.

Resume

When the MC45 resumes, Bluetooth turns on if it was on prior to suspend.

Turning Bluetooth 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 MC45. 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** > **Settings** > **Connections** > **Wireless Manager** > **Bluetooth** bar.

Figure 7-1 *Wireless Manager Window*

2. Tap on the **Bluetooth** bar to turn on Bluetooth.

Disabling Bluetooth

To disable Bluetooth:

1. Tap **Wireless Manager** and then tap the **Bluetooth** bar or

   Tap **Start** > **Settings** > **Connections** > **Wireless Manager** > **Bluetooth** bar.

2. Tap on the **Bluetooth** bar to turn off Bluetooth.

Discovering Bluetooth Device(s)

The MC45 can receive information from discovered devices without bonding. However, once bonded, the MC45 and a bonded device exchange information automatically when you turn the Bluetooth radio on. 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 > Wireless Manager** >**Menu** > **Bluetooth Settings** > **Devices**.

Figure 7-2 *Bluetooth - Devices Tab*

5. Tap **Add new device**. The MC45 begins searching for discoverable Bluetooth devices in the area.

Figure 7-3 *Searching for Bluetooth Devices*

6. Select a device from the list.

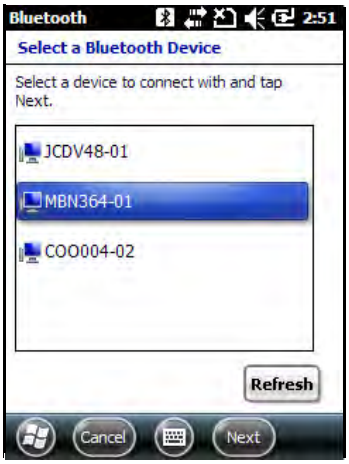

Figure 7-4 *Select a Bluetooth Device*

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.

Figure 7-5 *Enter Passcode*

8. Enter the Passcode on the other device. The device is added to the Bluetooth list.

Figure 7-6 *Bluetooth Connection Confirmation*

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

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 reprompted 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.

See the following sections for information on available 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 MC45 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** > **File Explorer.**
4. Navigate to the file to transfer.
5. Tap and hold on the filename until the pop-up menu appears.

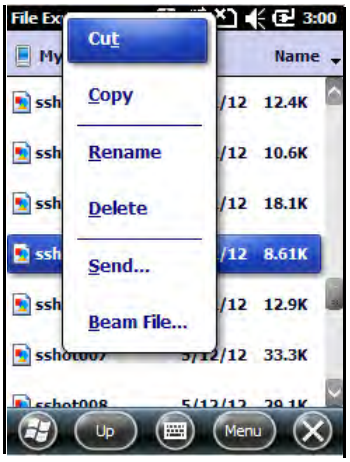

Figure 7-7 *File Explorer Window*

6. Select **Beam File**. The MC45 searches for Bluetooth devices in the area.
7. Tap **Tap to send** next to the Bluetooth device to send the file to. The MC45 communicates with the device and send the file. When completed, **Tap to send** changes to **Done**.

Figure 7-8 *Beam File Window*

To transfer a contact between the MC45 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.

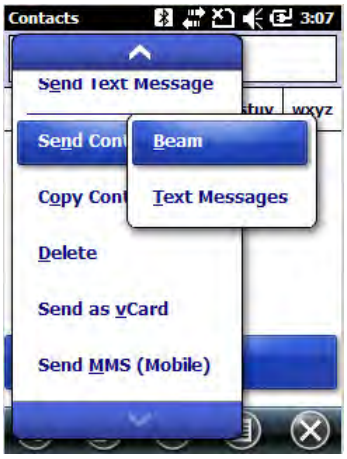

Figure 7-9 *Contact Window*

6. Select **Send Contact** > **Beam**. The MC45 searches for Bluetooth devices in the area.
7. Tap **Tap to send** next to the Bluetooth device to send the file to. The MC45 communicates with the device and send the contact. When completed, **Tap to send** changes to **Done**.

Internet Sharing

Internet Sharing allows the user to connect a computer or laptop to the MC45 and use the MC45 as a modem to connect to an office network or ISP.

To use MC45 as a modem using Bluetooth:

1. Ensure that the device is not connected to the computer or laptop.
2. On the MC45, ensure that the Phone is on and a data connection is configured.
3. Tap **Start** > **Internet Sharing**.
4. In the **PC Connection** list, select **Bluetooth PAN**.
5. In the **Network Connection** list, select the connection type.

   Select the network connection that the device should use to connect to the Internet.
6. Tap **Connect**.
7. On the computer or laptop, setup a Bluetooth PAN with your device.
   a. Select **Start** > **Control Panel** > **Network Connections**.
   b. Under **Personal Area Network**, select **Bluetooth Network Connection**.
   c. Right-click on **Bluetooth Network Connection** and select **View Bluetooth** network devices.
   d. In the **Bluetooth Personal Area Network Devices** window select your device.
   e. Click **Connect**. The computer connects to the device via Bluetooth.

NOTE If your computer is Bluetooth-enabled and you select Bluetooth as the PC connection, you must initiate and complete the Bluetooth PAN partnership before Internet Sharing will work. For more information, refer to Windows Help and Support.

8. To verify, on the PC or laptop, launch **Internet Explorer** and open a web site.
9. To end dial-up networking, on the MC45 tap **Disconnect**.

Hands-free Services

To connect to a Bluetooth headset:

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.

Only WAN audio is routed to the headset. System audio is still emitted through the MC45 speaker.

You can accept calls and re-dial using the Hands-free profile.

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 > Wireless Manager** >**Menu** > **Bluetooth Settings** > **Devices**.
4. Tap New device. The MC45 searches for Bluetooth devices in the area.
5. Select the headset name and tap **Next**. The Passcode window appears.
6. Enter the headset's passcode.
7. Tap **Next**. The MC45 connects to the headset. Refer to the headset user manual for instructions on communicating with a Bluetooth device.

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** > **Bluetooth** > **Devices**.
4. Tap **Add new device**. The MC45 begins searching for discoverable Bluetooth devices in the area.
5. Select a device from the list.
6. Tap **Next**. The **Enter Passcode** window appears.
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.

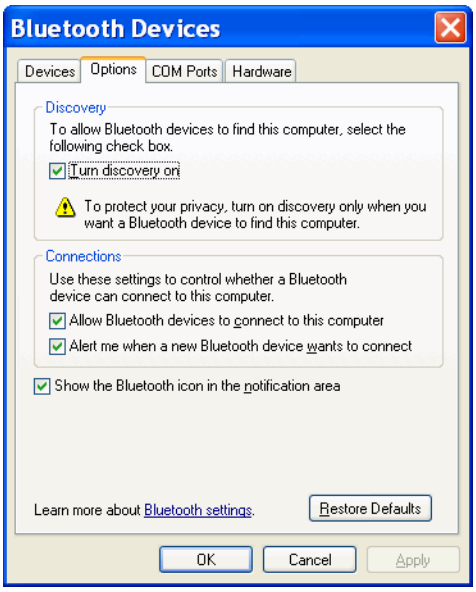

Figure 7-10 *Computer Bluetooth Devices Window*

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**.

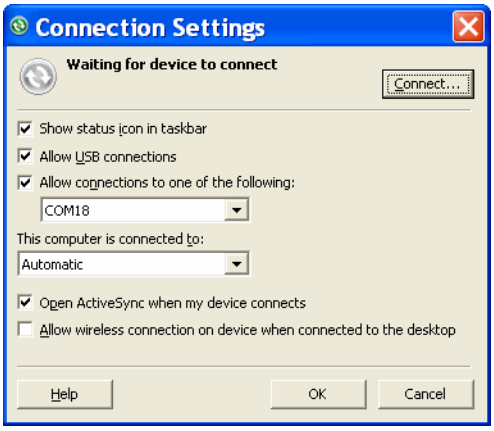

Figure 7-11 *ActiveSync Connection Settings*

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 MC45, tap **Start** > **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 **My Apps** > **Active Sync**.

15. Tap **Disconnect**.

Phone Book Access Profile Services

Phone Book Access profile (PBAP) is used to synchronize contacts between a remote device and the MC45. To establish an PBAP synchronization:

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** > **Bluetooth** > **Devices**.
4. Tap **Add New Device**.The MC45 searches for a Bluetooth device, such as a Car Kit.
5. Select a device from the list.
6. Tap **Next**. The **Enter Passcode** window appears.
7. Enter the Passcode and the tap **Next**. The device is added to the Bluetooth list.
8. A dialog box appears requesting if you want to transfer contacts to the car kit.
9. Select **Yes** or **No**.
10. If **Yes** is selected, contacts from the MC45 are transferred to the car kit.

Dial-Up Networking Services

Dial-up networking allows the user to connect a PC or laptop to the MC45 and use the MC45 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 MC45 is discoverable and connectable.
2. On the PC or laptop, set up Bluetooth according to the manufacturer’s instructions.
3. On the PC or laptop Bluetooth software, search for the MC45 and select the Dial-up Networking service.
4. Using dial-up software on the PC or laptop, connect to the MC45.
5. The MC45 phone function dials the ISP number and connects to the ISP.
6. To verify, on the PC or laptop, launch Internet Explorer and open a web site.

Connect to a HID Device

The MC45 can connect to an Human Interface Device (HID) device such as a Bluetooth keyboard or mouse:

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** > **Bluetooth** > **Devices**.
5. Tap **Add new device**. The MC45 begins searching for discoverable Bluetooth devices in the area.
6. Select a HID device from the list.
7. Tap **Next**. The **Enter Passcode** window appears. Refer to the device's User Manuals for more information.
8. Tap **Connect**. The MC45 connects to the HID device.

A2DP/AVRCP Services

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

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** > **Bluetooth** > **Devices**.
5. Tap **Add new device**. The MC45 begins searching for discoverable Bluetooth devices in the area.
6. Select a stereo headset from the list.
7. Tap **Next**. The **Enter Passcode** window appears. Refer to the device's User Manuals for more information.
8. Tap **Connect**. The MC45 connects to the stereo headset.

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

1. Tap **Start** > **Settings** > **Bluetooth** > **Devices**.
2. Tap **Add new device**. The MC45 begins searching for discoverable Bluetooth devices in the area.
3. Select a stereo headset from the list.
4. Tap **Next**. The **Enter Passcode** window appears. Refer to the device's User Manuals for more information.

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

5. Tap **Connect**. The MC45 connects to the stereo headset.

Chapter 8 Accessories

Introduction

MC45 accessories, listed below, provide a variety of product support capabilities.

Table 8-1 *MC45 Accessories*

Accessory	Part Number	Description
Cradles		
Single Slot Charge Cradle	CRDMC45-1000CR	Charges the MC45 device.
Multi Slot Universal Charge Only Cradle	CRDUNIVSL-5000R	Charges five MC45 devices simultaneously or four MC45 devices when configured with a Four Slot Battery Charger. Charger Cup and Power Supply sold separately.
Vehicle Charge Cradle	VCD4500-1000R	Installs in a vehicle and charges the MC45 battery.
Chargers		
Four Slot Battery Charger	SAC4500-4000CR	Charges four MC45 batteries simultaneously.
Cables		
Auto Charge Cable	25-70979-01R	Charges the MC45 using a vehicle's cigarette lighter.
DEX Cable	25-45793-01R	For use with electronic data exchange. For example, connecting MC45 to a vending machine.
USB Rapid Charge Cable	25-128458-01R	Charges the MC45 and provides USB communication with a host computer.
Miscellaneous		
Power Supply	PWRS-124306-01R	Provides power to the MC45 or Single Slot Charge Cradle using the USB Rapid Charge Cable.
Power Supply	PWRS-14000-148C	Provides power to the Multi Slot Universal Charge Only Cradle.

Table 8-1 *MC45 Accessories (Continued)*

Accessory	Part Number	Description
Spare 3080 mAh lithium-ion battery	BTRY-ES40EAB02	Replacement 3080 mAh battery.
MC45 Battery Door	KT-MC45-BTRYD-01R	Replacement battery door.
Mount Bracket	KT-UNIVLBRKT-01R	Rack mount bracket for the Multi Slot Universal Charge Only Cradle.
Charger Cup	CUPMC45XX-1000R	Charger cup for the Multi Slot Universal Charge Only Cradle.
Charger Cup	CUPMC45XX-5000R	Package of 5 charger cups for the Multi Slot Universal Charge Only Cradle.
Blank Slot Cover	CUPUNICVR-5000R	Package of 5 blank slot covers for the Multi Slot Universal Charge Only Cradle charge slot.
Four Slot Battery Charger Cup Adapter	CUPUNIBTRY-1000R	Mounts the Four Slot Battery Charger onto the Multi Slot Universal Charge Only Cradle.
Handstrap	SG-MC45-STRAP-01R	Single pivot handstrap.
Soft Holster	SG-MC45-HLSTR-01R	Soft case holder for added protection.
Stylus with Tether Kit	KT-MC45-STYTH-01R	Replacement Stylus and Tether (10-pack)
micro USB adapter	ADP4500-100R	Rugged micro USB adapter that connects to the MC45 micro USB port.
Screen Protector		Package of 3 screen protectors.

USB Rapid Charge Cable

Use the USB Rapid Charge cable to connect the MC45 to the power supply for charging or to a host computer for communication.

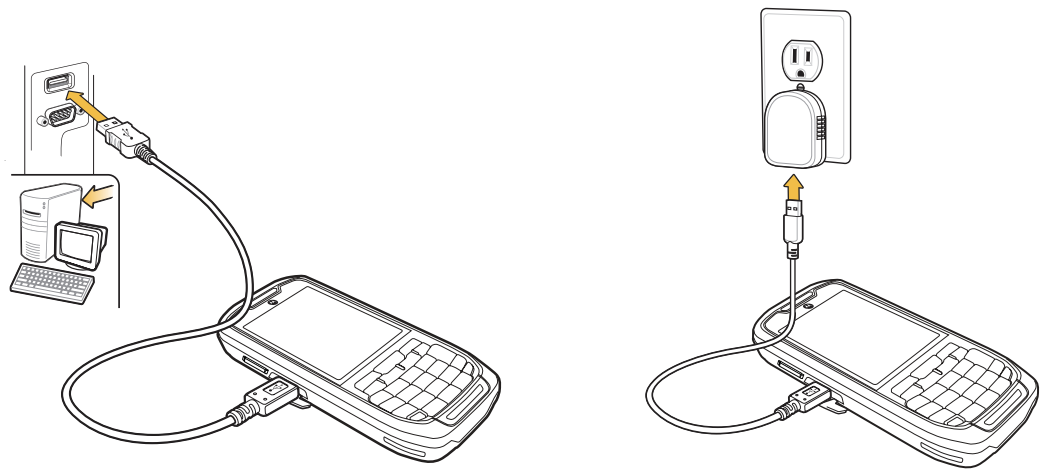

Figure 8-1 *USB Rapid Charge Cable*

Communication with Host Computer

To communicate with a host computer:

1. Ensure ActiveSync is installed and configured on the host computer. See *ActiveSync on page 8-12* for more information.
2. Connect USB Rapid Charge cable to the microUSB port on the side of the MC45.
3. Connect the USB connector of the USB Rapid Charge Cable to the USB Port on the host computer .
4. The **USB Connect** dialog box appears.
5. Tap **ActiveSync RNDIS** or **ActiveSync Serial**.
6. Tap **Connect**.

Single Slot Charge Cradle

Charging the MC45 Battery

To charge the MC45 battery:

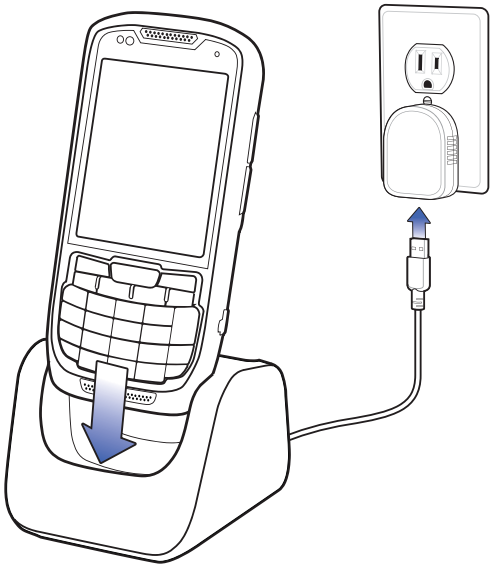

Figure 8-2 *Charging the MC45 Using the Single Slot Charge Cradle*

1. Place the MC45 into the cradle.

The MC45's LED indicates the status of the battery charging in the MC45. See *Table 1-1 on page 1-7* for charging status indications. The 3080mAh battery fully charges in less than six hours at room temperature of approximately 25 °C (77°F). Charging time may vary at different temperatures.

Multi Slot Universal Charge Only Cradle

NOTE The Multi Slot Universal Charge Only Cradle charges five MC45 devices simultaneously or four MC45 devices when configured with a Four Slot Battery Charger.

To charge the MC45 batteries:

1. Place the MC45 into the cradle.

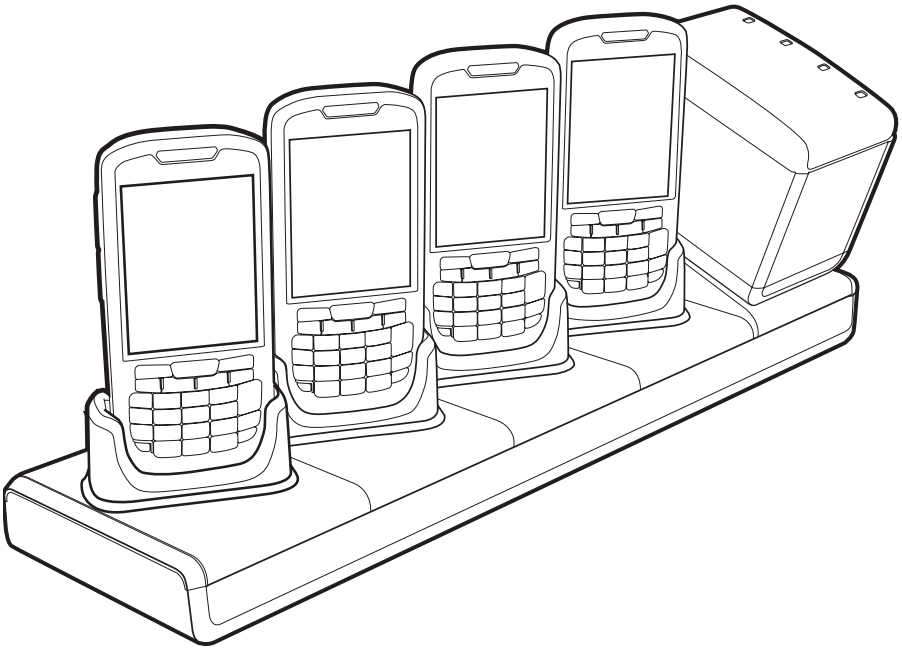

Figure 8-3 *Multi Slot Universal Charge Only Cradle*

NOTE The Four Slot Battery Charger can be attached to the Multi Slot Universal Charge Only Cradle using a Battery Charger Cup Adapter. The cup adapter angles the Battery Charger so that the user can see the LED indicators easily.

The Four Slot Battery Charger requires a separate power supply. See *Four Slot Battery Charger on page 8-10* for more information

The MC45's LED indicates the status of the battery charging in the MC45. See *Table 1-1 on page 1-7* for charging status indications. The 3080mAh battery fully charges in less than six hours at room temperature of approximately 25 °C (77°F). Charging time may vary at different temperatures.

Charging Temperature

Charge batteries in temperatures from 0°C to 40°C (32°F to 104°F). Charging is intelligently controlled by the MC45.

To accomplish this, for small periods of time, the MC45 or accessory alternately enables and disables battery charging to keep the battery at acceptable temperatures. The MC45 or accessory indicates when charging is disabled due to abnormal temperatures via its LED. See *Table 1-1 on page 1-7*.

Vehicle Charge Cradle

WARNING! **Some countries prohibit the mounting of any electronic device in any location on the vehicle dashboard. Be sure to check with local laws acceptable mounting areas before installing the auto mounting kit.**

Install the vehicle mount on the surface of the vehicle that is reasonably flat and free of dirt and oil. Clean the mounting surface with a glass cleaner and a clean cotton cloth. Install the vehicle mount on the windshield or other flat car surface using the supplied mounting disc.

Windshield Installation

1. Fix the suction cup mount to the selected area with the suction lever facing up.

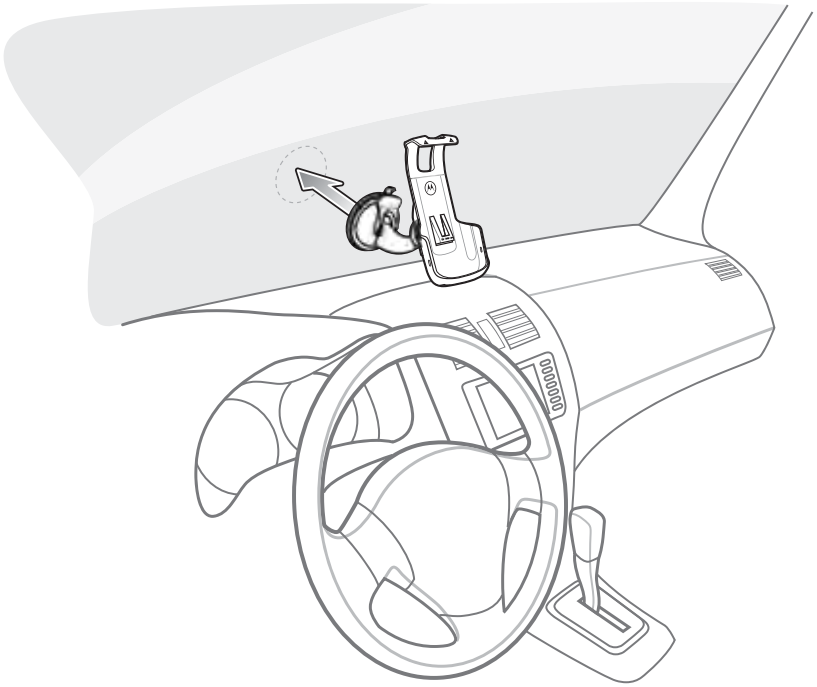

Figure 8-4 *Install on Windshield*

2. Flip the lever down to create a vacuum between the suction cup and the mounting surface.

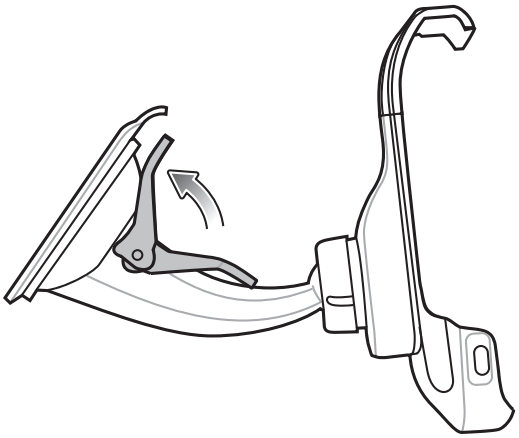

Figure 8-5 *Move lever Toward Windshield*

3. Make sure that the suction bond is strong enough before proceeding to the next step.

Install the MC45

To install the MC45 into the Vehicle Holder:

1. Place the MC45 bottom first into the holder.
2. Push the MC45 back until it snaps into place.

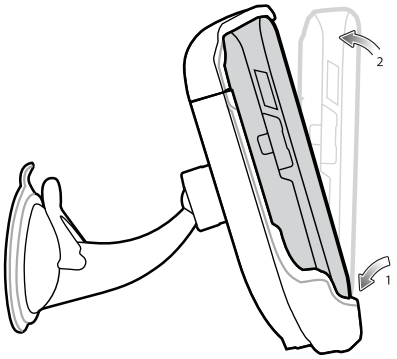

Figure 8-6 *Insert MC45 into Vehicle Holder*

3. Position the MC45 for best viewing.
4. Tighten the nuts to lock the holder in place.

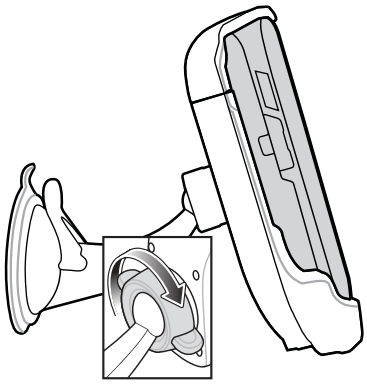

Figure 8-7 *Tighten Nut*

Connect Power

To connect power to the Vehicle Holder:

1. If required, connect the micro-USB connector of the auto charger to the input power connector in the vehicle holder.

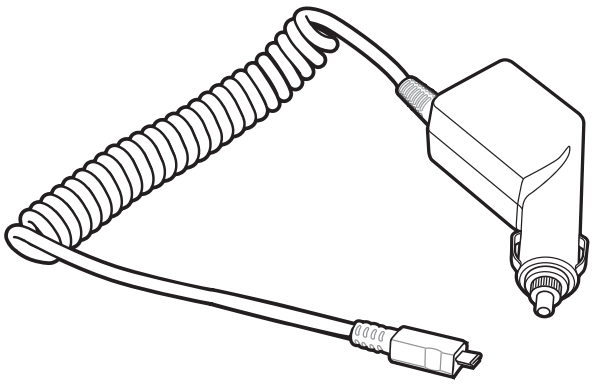

Figure 8-8 *Commercial Grade Auto-Charger*

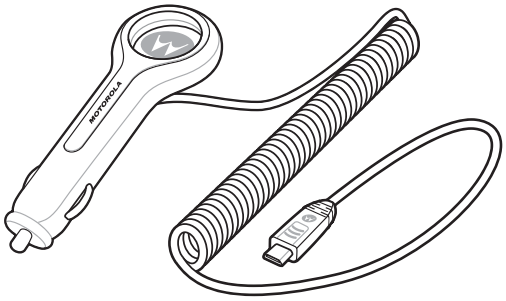

Figure 8-9 *Consumer Grade Auto Charger*

Pending picture

Figure 8-10 *Connect Auto-Charge Cable to Vehicle Holder*

1. Connect the other end to the cigarette lighter socket.

   The LED indicator flashes green indicating the MC45 is charging.

Remove the MC45

To remove the MC45 from the Vehicle Holder lift the MC45 up and then remove from the bottom of the holder.

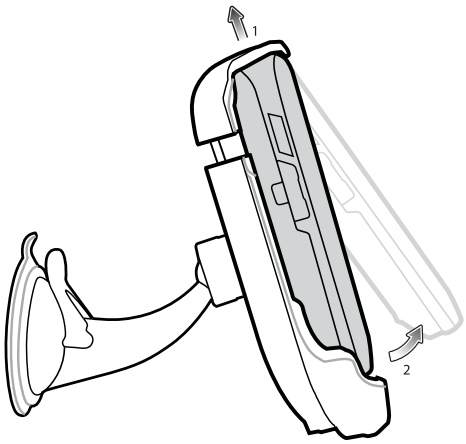

Figure 8-11 *Remove MC45 from Vehicle Holder*

Four Slot Battery Charger

To charge the MC45 batteries:

1. Connect the charger to a power source.
2. Insert the spare battery into a spare battery charging well and gently press down on the battery to ensure the battery is safely lock under the latch.

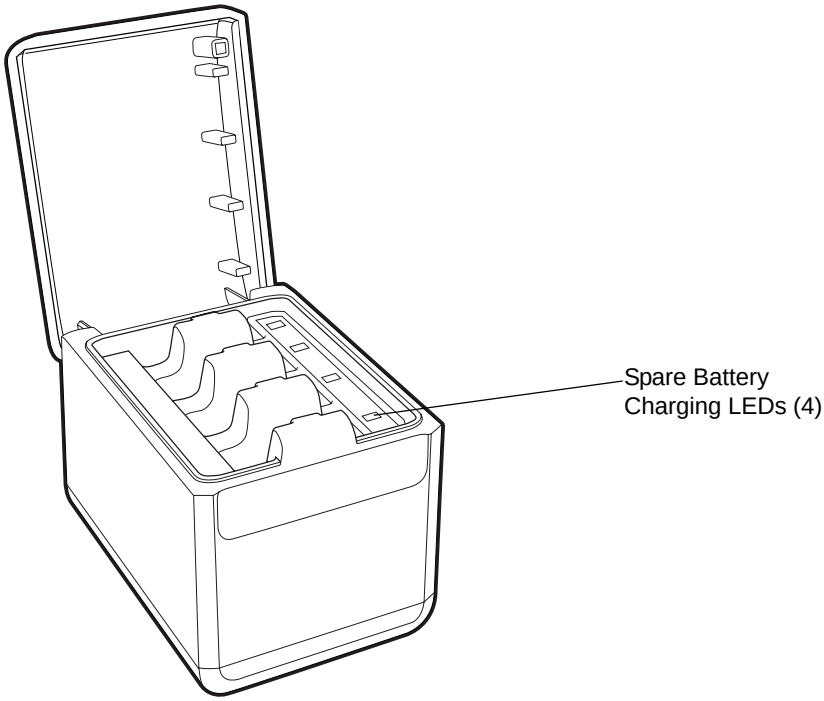

Figure 8-12 *Four Slot Battery Charger*

To remove the spare battery from the Four Slot Battery Charger:

1. Gently push the battery located in the spare battery charging well towards the back of the charger. The latch unlocks.
2. Remove the battery by pulling it upwards from the spare battery charging well.

Battery Charging Indicators

The charger has a green LED for each battery charging well. See *Table 8-2* for charging status indications. The 3080 mAh battery fully charges in less than six hours.

Charging Temperature

Charge batteries in temperatures from 0°C to 40°C (32°F to 104°F). Charging is intelligently controlled by the MC45.

To accomplish this, for small periods of time, the charger alternately enables and disables battery charging to keep the battery at acceptable temperatures. The charger indicates when charging is disabled due to abnormal temperatures via its LED. See *Table 1-1 on page 1-7*.

Table 8-2 *Spare Battery LED Charging Indicators*

LED	Indication
Off	No spare battery in slot; battery is not charging; battery is not inserted correctly in the charger; charger is not powered.
Slow Blinking Green	Spare battery is charging.
Solid Green	Charging complete.
Fast Blinking Red	Charging error.

micro USB Adapter

Use the micro USB Adapter to connect accessory devices (such as printers or USB flash drives) to the MC45.

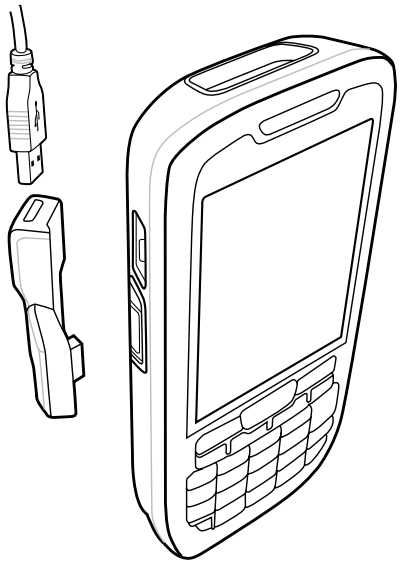

Figure 8-13 *micro USB Adapter Connection*

NOTE The micro USB Adapter can only be connected to the MC45 and not the Single Slot Charge Cradle.

The micro USB Adapter is intended to provide extension of the MC45 micro USB port. Use the micro USB Adapter to minimize mechanical wear and failures of the MC45.

CAUTION Do not connect a USB device that draws more than 100 mA. If a device that draws more than 100mA is connected, the MC45 displays a Warning dialog box. Remove the USB device from the micro USB Adapter.

1. Connect an accessory device's USB connector to the micro USB Adapter.

NOTE When connecting a USB Flash drive to the micro USB Adapter, the USB Flash Drive appears in **File Explorer** as **Hard Drive** under **My Device** folder.

ActiveSync

To communicate with various host devices, install Microsoft ActiveSync (version 4.5 or higher) on the host computer. Use ActiveSync to synchronize information on the MC45 with information on the host computer. Changes made on the MC45 or host computer appear in both places after synchronization.

NOTE When the MC45 is connected to a host computer and an ActiveSync connection is made, the WLAN radio is disabled. This is a Microsoft security feature to prevent connection to two networks at the same time.

ActiveSync software:

- Allows working with mobile computer-compatible host applications on the host computer. ActiveSync replicates data from the mobile computer so the host application can view, enter, and modify data on the mobile computer.
- Synchronizes files between the mobile computer and host computer, converting the files to the correct format.
- Backs up the data stored on the mobile computer. Synchronization is a one-step procedure that ensures the data is always safe and up-to-date.
- Copies (rather than synchronizes) files between the mobile computer and host computer.
- Controls when synchronization occurs by selecting a synchronization mode, e.g., set to synchronize continually while the mobile computer is connected to the host computer, or set to only synchronize on command.
- Selects the types of information to synchronize and control how much data is synchronized.

Installing ActiveSync

To install ActiveSync on the host computer, download version 4.5 or higher from the Microsoft web site at http://www.microsoft.com. Refer to the installation procedures included with the ActiveSync software.

MC45 Setup

NOTE Microsoft recommends installing ActiveSync on the host computer before connecting the MC45.

The MC45 can be set up to communicate with a USB connection. The MC45 communication settings must be set to match the communication settings used with ActiveSync.

1. On the MC45 tap **Start** > **ActiveSync**.
2. Tap **Menu** > **Connections**.
3. Select the connection type from the drop-down list.
4. Tap **OK** to exit the **Connections** window
5. Tap **OK** to exit the **ActiveSync** window.
6. Proceed with setting up a partnership with a host computer with ActiveSync installed.

Setting Up an ActiveSync Connection on the Host Computer

To start ActiveSync:

1. Select **Start** > **Programs** > **Microsoft ActiveSync** on the host computer.

NOTE Assign each MC45 a unique device name. Do not try to synchronize more than one MC45 to the same name.

2. In the **ActiveSync** window, select **File** > **Connection Settings**. The **Connection Settings** window appears.
3. Select **Allow USB connections** check box.
4. Select the **Show status** icon in **Taskbar** check box.
5. Select **OK** to save any changes made.

Synchronization with the MC45

NOTE When the MC45 is connected to a host computer and an ActiveSync connection is made, the WLAN radio (if applicable) is disabled. This is a Microsoft security feature to prevent connection to two networks at the same time.

To synchronize with the MC45:

1. If the **Get Connected** window does not appear on the host computer, select **Start** > **Active Sync** and then click **Next**.
2. Select the check box to synchronize with a server running Microsoft Exchange if applicable and then click **Next**.
3. Select the appropriate settings and click **Next** and then click **Finish**.

During the first synchronization, information stored on the MC45 is copied to the host computer. When the copy is complete and all data is synchronized, the MC45 can be disconnected from the host computer.

NOTE The first ActiveSync operation must be performed with a local, direct connection. Windows Mobile retains partnerships information after a cold boot.

For more information about using ActiveSync, start ActiveSync on the host computer, then see **ActiveSync Help**.

Chapter 9 Maintenance & Troubleshooting

Introduction

This chapter includes instructions on cleaning and storing the MC45, and provides troubleshooting solutions for potential problems during MC45 operation.

Maintaining the MC45

For trouble-free service, observe the following tips when using the MC45:

- Do not scratch the screen of the MC45. When working with the MC45, 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 MC45 screen.
- A screen protector, p/n KT-67525-01R, is applied to the MC45. 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.
- The touch-sensitive screen of the MC45 is glass. Do not to drop the MC45 or subject it to strong impact.
- Protect the MC45 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 MC45 in any location that is dusty, damp, or wet.
- Use a soft lens cloth to clean the MC45. If the surface of the MC45 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.

Removing the Screen Protector

A screen protector is applied to the MC45. Motorola recommends using this to minimize wear and tear. Screen protectors enhance the usability and durability of touch screen displays.

To remove the screen protector, lift the corner using a thin plastic card, such as a credit card, then carefully lift it off the display.

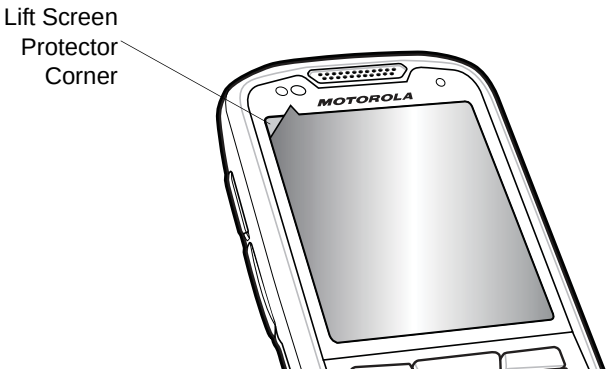

Figure 9-1 *Removing the Screen Protector*

CAUTION Do not use a sharp object to remove the protector. Doing so can damage the display.

NOTE Not using a screen protector can affect warranty coverage. To purchase replacement protectors, contact your local account manager or Motorola, Inc. These include screen protector installation instructions. Part number: KT-67525-01R Screen Protector 3/pk.

Battery Safety Guidelines

- 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.
- Improper battery use may result in a fire, explosion, or other hazard.
- To charge the mobile device battery, the battery and charger temperatures must be between +32 ºF and +104 ºF (0 ºC and +40 ºC)
- 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 Solutions Global Customer 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 promptly dispose of used re-chargeable batteries.
- Do not dispose of batteries in fire.
- Seek medical advice immediately if a battery has been swallowed.
- 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

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.**

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.

Materials Required

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

Cleaning the MC45

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 dried 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. Close battery door.
3. Dip the cotton portion of the cotton tipped applicator in isopropyl alcohol.
4. Rub the cotton portion of the cotton tipped applicator back-and-forth across the connector on the bottom of the MC45. Do not leave any cotton residue on the connector.
5. Repeat at least three times.
6. Use the cotton tipped applicator dipped in alcohol to remove any grease and dirt near the connector area.
7. Use a dry cotton tipped applicator and repeat steps 4 through 6.

CAUTION Do not point nozzle at yourself and others, ensure the nozzle or tube is away from your face.

8. Spray compressed air on the connector area by pointing the tube/nozzle about ½ inch away from the surface.
9. 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.

CAUTION Do not point nozzle at yourself and others, ensure the nozzle or tube is away from your face.

5. Spray compressed air in the connector area by pointing the tube/nozzle about ½ inch away from the surface.
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

MC45

Table 9-1 *Troubleshooting the MC45*

Problem	Cause	Solution
MC45 does not turn on.	Battery not charged.	Charge or replace the battery.
	Battery not installed properly.	Install the battery properly. See *Installing the Battery on page 1-5*.
	System crash.	Perform a warm boot. If the MC45 still does not turn on, perform a cold boot. See *Resetting the MC45 on page 2-17*.
Rechargeable battery did not charge.	Battery failed.	Replace battery. If the MC45 still does not operate, perform a warm boot, then a cold boot. See *Resetting the MC45 on page 2-17*.
	MC45 removed from cradle while battery was charging.	Insert MC45 in cradle and allow to charge.
	Extreme battery temperature.	Battery does not charge if ambient temperature is below 0°C (32°F) or above 40°C (104°F).
Cannot see characters on display.	MC45 not powered on.	Press the red **Power** button.

Table 9-1 *Troubleshooting the MC45 (Continued)*

Problem	Cause	Solution
During data communication, no data transmitted, or transmitted data was incomplete.	MC45 removed from cradle or disconnected from host computer during communication.	Replace the MC45 in the cradle, or reattach the communication cable and re-transmit.
	Incorrect cable configuration.	See the system administrator.
	Communication software was incorrectly installed or configured.	Perform setup. Refer to the *MC45 Enterprise Digital Assistant Integrator Guide* for details.
No sound.	Volume setting is low or turned off.	Adjust the volume. See *Adjusting Volume on page 2-14*.
MC45 shuts off.	MC45 is inactive.	The MC45 turns off after a period of inactivity. If the MC45 is running on battery power, set this period from 1 to 5 minutes, in one-minute intervals. If the MC45 is running on external power, set this period to 1, 2, 5, 10, 15, or 30 minutes. Check the **Power** window by selecting **Start** > **Settings** > **Power** icon. Select the **Advanced** tab and change the setting for a longer delay before the automatic shutoff feature activates.
	Battery is depleted.	Recharge or replace the battery.
	Battery is not inserted properly.	Insert the battery properly. See *Installing the Battery on page 1-5*.
Tapping the window buttons or icons does not activate the corresponding feature.	Screen is not calibrated correctly.	Re-calibrate the screen. See *Calibrating the Screen on page 1-8*.
	The system is not responding.	Warm boot the system. See *Resetting the MC45 on page 2-17*.
A message appears stating that the MC45 memory is full.	Too many files stored on the MC45.	Delete unused memos and records. If necessary, save these records on the host computer (or use an SD card for additional memory).
	Too many applications installed on the MC45.	Remove user-installed applications on the MC45 to recover memory. Select **Start** > **Settings** > **System** and tap the **Remove Programs** icon. Select the unused program and tap **Remove.**
MC45 keeps powering down to protect memory contents.	The MC45's battery is low.	Recharge or replace the battery. Configure the MC45 to conserve power. Refer to *Battery Management on page 1-9* for more information.

Table 9-1 *Troubleshooting the MC45 (Continued)*

Problem	Cause	Solution
The MC45 does not accept data capture input.	Scanning application is not loaded.	Load a scanning application on the MC45. See the system administrator.
	Unreadable bar code.	Ensure the symbol is not defaced.
	Distance between exit window and bar code is incorrect.	Place the MC45 within proper scanning range.
	MC45 is not programmed for the bar code.	Program the MC45 to accept the type of bar code being scanned.
	MC45 is not programmed to generate a beep.	If the MC45 does not beep on a good decode, set the application to generate a beep on good decode.
	Battery is low.	If the scanner stops emitting a laser beam upon a trigger press, check the battery level. When the battery is low, the scanner shuts off before the MC45 low battery condition notification. Note: If the scanner is still not reading symbols, contact the distributor or Motorola.
MC45 cannot find any Bluetooth devices nearby.	Too far from other Bluetooth devices.	Move closer to the other Bluetooth device(s), within a range of 10 meters.
	The Bluetooth device(s) nearby are not turned on.	Turn on the Bluetooth device(s).
	The Bluetooth device(s) are not in discoverable mode.	Set the Bluetooth device(s) to discoverable mode. If needed, refer to the device's user documentation for help.

Single Slot Charge Cradle

Table 9-2 *Troubleshooting the Single Slot Charge Cradle*

Symptom	Possible Cause	Action
LEDs do not light when MC45 is inserted.	Cradle is not receiving power.	Ensure the power cable is connected securely to both the cradle and to AC power.
	MC45 is not seated firmly in the cradle.	Remove and re-insert the MC45 into the cradle, ensuring it is firmly seated.
MC45 battery is not charging.	MC45 was removed from cradle or cradle was unplugged from AC power too soon.	Ensure cradle is receiving power. Ensure MC45 is seated correctly. Confirm battery is charging under **Start** > **Settings** > **Power**.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The MC45 is not fully seated in the cradle.	Remove and re-insert the MC45 into the cradle, ensuring it is firmly seated.
	Ambient temperature of the cradle is too warm.	Move the cradle to an area where the ambient temperature is between 0°C (32°F) and 35°C (95°F).
	Extreme battery temperature.	Battery does not charge if ambient temperature is below 0°C (32°F) or above 40°C (104°F).
During data communication, no data transmits, or transmitted data was incomplete.	MC45 removed from cradle during communications.	Replace MC45 in cradle and retransmit.
	Incorrect cable configuration.	See the system administrator.
	Communication software is not installed or configured properly.	Perform setup as described in the *MC45 Enterprise Digital Assistant Integrator Guide.*

Multi Slot Universal Charge Only Cradle

Table 9-3 *Troubleshooting the Multi Slot Universal Charge Only Cradle*

Symptom	Possible Cause	Action
LEDs do not light when MC45 is inserted.	Cradle is not receiving power.	Ensure the power cable is connected securely to both the cradle and to AC power.
	MC45 is not seated firmly in the cradle.	Remove and re-insert the MC45 into the cradle, ensuring it is firmly seated.
MC45 battery is not charging.	MC45 was removed from cradle or cradle was unplugged from AC power too soon.	Ensure cradle is receiving power. Ensure MC45 is seated correctly. Confirm battery is charging under **Start** > **Settings** > **Power**.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The MC45 is not fully seated in the cradle.	Remove and re-insert the MC45 into the cradle, ensuring it is firmly seated.
	Ambient temperature of the cradle is too warm.	Move the cradle to an area where the ambient temperature is between 0°C (32°F) and 35°C (95°F).
	Extreme battery temperature.	Battery does not charge if ambient temperature is below 0°C (32°F) or above 40°C (104°F).

Vehicle Charge Cradle

Table 9-4 *Troubleshooting the Vehicle Charge Cradle*

Symptom	Possible Cause	Action
LEDs do not light up when MC45 is inserted	Cradle is not receiving power.	Ensure the power input cable is securely connected to the cradle's power port.
MC45 battery is not charging.	MC45 was removed from the cradle too soon.	Replace the MC45 in the cradle.
	Battery is faulty.	Replace the battery.

Table 9-4 *Troubleshooting the Vehicle Charge Cradle*

Symptom	Possible Cause	Action
	MC45 is not placed correctly in the cradle.	Remove the MC45 from the cradle, and re-insert correctly. If the battery still does not charge, contact customer support. The MC45 battery charging LED slowly blinks amber when the MC45 is correctly inserted and charging.
	Ambient temperature of the cradle is too warm.	Move the cradle to an area where the ambient temperature is between 0°C (32°F) and 35°C (95°F).
	MC45 removed from cradle during communication.	Replace MC45 in cradle and retransmit.

Four Slot Battery Charger

Table 9-5 *Troubleshooting The Four Slot Battery Charger*

Symptom	Possible Cause	Action
LEDs do not light when MC45 is inserted.	Charger is not receiving power.	Ensure the power cable is connected securely to both the charger and to AC power.
	MC45 battery is not seated firmly in the charger.	Remove and re-insert the MC45 battery into the charging well, ensuring it is firmly seated.
MC45 battery is not charging.	Battery was removed from the charger or charger was unplugged from AC power too soon.	Re-insert the battery in the charger or re-connect the charger's power supply.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Battery contacts not connected to charger.	Verify that the battery is seated in the charging well correctly with the contacts facing down.
	Ambient temperature of the cradle is too warm.	Move the charger to an area where the ambient temperature is between 0°C (32°F) and 35°C (95°F).

Cables

Table 9-6 *Troubleshooting the Cables*

Symptom	Possible Cause	Action
MC45 battery is not charging.	MC45 was disconnected from AC power too soon.	Connect the power cable correctly. Confirm main battery is charging under **Start** > **Settings** > **Power**.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The MC45 is not fully attached to power.	Detach and re-attach the power cable to the MC45, ensuring it is firmly connected.
During data communication, no data transmits, or transmitted data was incomplete.	Cable was disconnected from MC45 during communications.	Re-attach the cable and retransmit.
	Incorrect cable configuration.	See the system administrator.
	Communication software is not installed or configured properly.	Perform setup as described in the *MC45 Integrator Guide*.

Appendix A Technical Specifications

MC45 Technical Specifications

The following tables summarize the MC45's intended operating environment and technical hardware specifications.

Table A-1 *MC45 Technical Specifications*

Item	Description
Physical Characteristics	
Dimensions	Length: 14.2 cm (5.6 in.) Width: 6.6 cm (2.6 in.) Depth: 2.5 cm (1.0 in.)
Weight	247.4 g (8.73 oz)
Display	16 bit color 3.2" QVGA with backlight, TFT-LCD, 65K colors, 240 W x 320 L (QVGA size)
Touch Panel	Glass analog resistive touch
Backlight	LED backlight
Battery	Rechargeable Lithium Ion 3.7V, 3080 mAh Smart Battery
Expansion Slot	User accessible microSD slot with UHS-I SDHC support up to 32GB
Network Connections	USB 2.0 High Speed (host and client), WLAN, WWAN and Bluetooth
Notification	Vibrator and audible tone plus multi-color LED
Keypad Options	Numeric
Audio	VoWWAN: handset mode with active noise reduction, speaker phone mode, Bluetooth wireless headset mode
Performance Characteristics	
CPU	600 MHz, ARM 11 processor, MSM 7627

Table A-1 *MC45 Technical Specifications (Continued)*

Item	Description
Operating System	Microsoft® Windows Embedded Handheld™ 6.5.3 Professional Edition
Memory	256 MB RAM / 1GB Flash
Interface/Communications	USB 2.0
Output Power	USB: 5 VDC @ 300mA max.
User Environment	
Operating Temperature	-10°C to 50°C (14°F to 122°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Charging Temperature	32°F to 104°F / 0° C to 40° C
Humidity	5% to 95% non-condensing
Drop Specification	Multiple 1.5 m (5 ft.) drop per MIL-STD 810F Multiple 0.9 m (3 ft.) drop to concrete, over operating temperature range
Tumble	250, 0.5 m (1.5 ft.) tumbles with standard batteries installed; per applicable IEC tumble specifications
Electrostatic Discharge (ESD)	+/-15kVdc air discharge, +/-8kVdc direct discharge, +/-8kVdc indirect discharge
Sealing	IP64 per applicable IEC sealing specifications
Vibration	.02g2/Hz Random, Non-Operating, 1 hour duration per axis
Termal Shock	-40°C to 70°C rapid transition
Wireless WAN Data and Voice Communications	
Radio	GSM and UMTS/HSDPA
Frequency Band	GSM – Quad Band : 850 / 900 / 1800 / 1900 MHz UMTS/HSDPA – MC4597-A: 2100 MHz UMTS/HSDPA – MC4597-B: 850 / 1900 MHz
GPS	Integrated, Autonomous and Assisted-GPS (A-GPS)
Wireless LAN Data and Voice Communications	
Radio	Tri-mode IEEE® 802.11a/b/g
Data Rates Supported	1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps
Operating Channels	Chan 8-169 (5040 – 5845 MHz) Chan 1-13 (2412-2472 MHz) Chan 14 (2484 MHz) Japan only Actual operating frequencies depend on regulatory rules and certification agency

Table A-1 *MC45 Technical Specifications (Continued)*

Item	Description
Security	WPA2, WEP (40 or 128 bit), TKIP, TLS, TTLS (MS-CHAP), TTLS (MS-CHAP v2), TTLS (CHAP), TTLS-MD5, TTLS-PAP, PEAP-TLS, PEAP (MS-CHAP v2), AES, LEAP, CCXv4 certified; FIPS 140-2 certified
Spreading Technique	Direct Sequence Spread Spectrum (DSSS) and Orthogonal Frequency Division Multiplexing (OFDM)
Antenna	Internal
Wireless PAN Data and Voice Communications	
Bluetooth	Class II, V2.1 with EDR
Data Capture Specifications	
Options	1D laser, color camera
Laser 1D Scanner (SE965) Specifications	
Optical Resolution	0.005 in. minimum element width
Roll	+/- 30° from vertical
Pitch Angle	+/- 65° from normal
Skew Tolerance	+/- 60° from normal
Ambient Light	Sunlight: 8,000 ft. candles (86,112 Lux) Artificial Light: 450 ft. candles (4,844 Lux)
Shock	2,000 +/- 5% G
Scan Rate	50 (+/- 6) scans/sec (bidirectional)
Scan Angle	46.5° (typical)
Laser Power	1.0 mW nominal
Camera Specifications	
Resolution	3.2 Mega pixel with auto focus and flash

Table A-2 *Data Capture Options*

Item	Description		
Camera Decode Capability	**1-D Bar Codes**		
	Codabar	Code 11	Code 39
	Code 93	Code 128	Chinese 2 of 5
	Coupon Code	Discrete 2 of 5	EAN 8
	EAN 13	Interleaved 2 of 5	ISBT 128
	Korean 3 of 5	MSI	RSS
	RSS 14	RSS Limited	RSS Expanded
	Trioptic Code 29	UCC / EAN 128	UPCA
	UPCE	UPCE1	Web Code
	2-D Bar Codes		
	Australian Postal	Aztec	Composite AB
	Composite C	Data Matrix	Dutch Postal
	Image	Japan Postal	Linked Aztec
	Macro Micro PRF	Micro PDF	Micro QR
	PDF	QR Code	Signature
	UK Postal	UK Intellimail	US Planet
	US Postnet		

MC45 Accessory Specifications

Single Slot Charge Cradle

Table A-3 *Single Slot Charge Cradle Technical Specifications*

Feature	Description
Dimensions	Length: 9.6 cm (3.8 in.) Width: 8.30 cm (3.3 in.) Height: 6.8 cm (2.7 in.)
Weight	245 g (8.6 oz)
Input Power	5 VDC
Power Consumption	6 watts
Interface	USB
Operating Temperature	0°C to 50°C (32°F to 122°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Charging Temperature	0°C to 40°C (32°F to 104°F)

Table A-3 *Single Slot Charge Cradle Technical Specifications (Continued)*

Feature	Description
Humidity	5% to 95% non-condensing
Drop	76 cm (30.0 in.) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 15 kV air +/- 8 kV contact

Multi Slot Universal Charge Only Cradle

Table A-4 *Multi Slot Universal Charge Only Cradle Technical Specifications*

Feature	Description
Dimensions	Length: 45.0 cm (17.7 in.) Width: 11.8 cm (4.7 in.) Height: 7.7 cm (3.0 in.)
Weight	1292 g (45.57 oz)
Input Power	12 VDC
Power Consumption	100 watts
Operating Temperature	0°C to 50°C (32°F to 122°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Charging Temperature	0°C to 40°C (32°F to 104°F)
Humidity	5% to 95% non-condensing
Drop	76 cm (30.0 in.) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 15 kV air +/- 8 kV contact

Four Slot Battery Charger

Table A-5 *Four Slot Battery Charger Technical Specifications*

Feature	Description
Dimensions	Length: 11.9 cm (4.7 in.) Width: 8.7 cm (3.4 in.) Height: 9.4 cm (3.7 in.)
Weight	366 g (12.91 oz)
Input Power	12 VDC
Power Consumption	30 watts

Table A-5 *Four Slot Battery Charger Technical Specifications (Continued)*

Feature	Description
Operating Temperature	0°C to 50°C (32°F to 122°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Charging Temperature	0°C to 40°C (32°F to 104°F)
Humidity	5% to 95% non-condensing
Drop	76 cm (30.0 in.) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 15 kV air +/- 8 kV contact

Appendix B Keypads

Numeric Keypad Configuration

The numeric keypad contains application keys, scroll keys, and function keys. The keypad is color-coded to indicate the alternate function key (blue) values. Note that an application can change keypad functions so the MC45's keypad may not function exactly as described. See *Table B-1* for key and button descriptions and *Table B-2 on page B-4* for the keypad's special functions.

Figure B-1 *MC45 Numeric Keypad*

Table B-1 *MC45 Numeric Keypad Descriptions*

Key	Description
Blue Key (left) 	Use this key to access function keys shown on the keypad in blue. Press the Blue key once to activate this mode, followed by another key. A single press illuminates the key and displays the following icon  at the bottom of the screen until a second key is pressed: Press the Blue key twice to lock the keypad in the blue keys mode. This displays the following icon  at the bottom of the screen. Press the Blue key again to return to the normal state.
Orange Key 	Use this key to access the secondary layer of characters and actions shown on the keypad in orange. Press the Orange key once to activate this mode, followed by another key. A single press illuminates the key and displays the following icon  at the bottom of the screen until a second key is pressed: Press the Orange key twice to lock the keypad in the orange keys mode.This displays the following icon  at the bottom of the screen. Press the Orang key twice, then press the Shift key to add a permanent shift (that applies until the Shift is pressed again). This displays the following icon  at the bottom of the screen. Press the Orange key again to return to the normal state.
Talk / Start Menu 	Talk (Green Phone): press to display the phone keypad window or to dial a phone number (from the phone keypad window). When on a phone call, press to place the call on hold. Use this key in conjunction with the Blue key to instantly display the *Start* menu from any application without tapping the screen. This function is user programmable.
End / OK 	End (Red Phone) : press when the phone keypad window displays to stop dialing or end a call. Use this key in conjunction with the Blue Key as an OK or close button. This function is user programmable.
Scan (yellow) 	Activates the scanner in a scan enabled application.
Scroll Up and Down / Scroll Left and Right 	Moves up one item. Moves left one item when pressed with the Orange key. Moves down one item. Moves right one item when pressed with the Orange key.

Table B-1 *MC45 Numeric Keypad Descriptions (Continued)*

Key	Description
Star / Backlight 	Produces a dash in default state. Produces an asterisk when pressed with the Orange key. Use this key in conjunction with the Blue Key to toggle the backlight on or off.
Alphanumeric 	In default state, produces the numeric value on the key. When pressed with the Orange key, 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 Orange key and then press the ‘4’ key once to produce the letter ‘g’; press and release the Orange key and then press the ‘4’ key three times to produce the letter ‘i’. Press the SHIFT key in Alpha state to produce the upper case alphabetic characters on the key. For example, press and release the Orange key, press and release the SHIFT key, and then press the ‘4’ key once to produce the letter ‘G’; press and release the Orange key, press and release the SHIFT key and then press the ‘4’ key three times to produce the letter ‘I’.
Pound / SPACE 	Produces a pound / number in default state. Produces a space when pressed with the Orange key.
BACKSPACE 	Produces a backspace.
SHIFT 	Press and release the SHIFT key to activate the keypad alternate SHIFT functions. A single press displays the following icon  at the bottom of the screen, until a second key is pressed: Press the Shift key twice to lock the keypad in the Shift mode.This displays the following icon  at the bottom of the screen. Press the Orang key twice, then press the Shift key to add a permanent shift (that applies until the Shift is pressed again). This displays the following icon  at the bottom of the screen.
ENT (Enter) 	Executes a selected item or function.

Table B-2 *Numeric Keypad Input Modes*

Key	Numeric Mode			Orange Key (Alpha Lowercase Mode)				Orange + Shift Keys (Alpha Uppercase Mode)			
		Blue+ Key	SHIFT + Key	1st Press	2nd Press	3rd Press	4th Press	1st Press	2nd Press	3rd Press	4th Press
1	1	F1	!								
2	2	F2	@	a	b	c		A	B	C	
3	3	F3	#	d	e	f		D	E	F	
4	4	F4	$	g	h	i		G	H	I	
5	5	F5	%	j	k	l		J	K	L	
6	6	F6	^	m	n	o		M	N	O	
7	7	F7	&	p	q	r	s	P	Q	R	S
8	8	F8	*	t	u	v		T	U	V	
9	9	F9	(	w	x	y	z	W	X	Y	Z
0	0	F10	)	.				>			
Up	Up	Up	Hilight Up	Left				Left			
Down	Down	Down	Hilight Down	Right				Right			
Enter	Action	Action	Action	Action				Action			

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

Special Character Key

To add special characters using the MC45 **áü** key, press the Orange key twice first then type the related character followed by the **áü (P)** key. Continue pressing the **áü** key until the special character displays. To modify an existing character, move the cursor to the right of the character then press the Orange key twice and then press the **áü** key until the special character replaces the original character. *Table B-3* lists the special characters you can generate.

Table B-3 *Special Characters*

Key	Special Characters		Key	Special Characters
a	à á â ä å ą ã ă æ		A	À Á Â Ä Å Ą Ã Ă Æ
c	ç ć č ©		C	ÇĆČ©
d	đ		D	Đ
e	è é ê ë ę		E	È É Ê Ë Ę
i	ì í î ï		I	Ì Í Î Ï

Table B-3 *Special Characters (Continued)*

Key	Special Characters		Key	Special Characters
l	ł		L	L Ł
n	ń		N	Ñ
o	ò ó ô õ ö ő ø œ		O	Ò Ó Ô Õ Ö Ő Ø Œ
p	þ ¶		P	Þ ¶
r	®		R	®
s	ş š ß		S	Ş Š ß
t	ţ		T	Ţ
u	ù ú û ü ű		U	Ù Ú Û Ü Ű
y	ý		Y	Ý
z	ź ż		Z	Ź Ż
$	€ £ ¥		/	\ |
“	' « ' »		(	[{ < «
)	] } > »		+	± & - _
!	¡ ? ¿		.	: , ;
*	#		@	~ %
%	^		,	; . :
#	*		&	- _ + ±
_	+ ± & -		‘	« » "
?	¿ ! ¡		:	, ; .
-	_ + ± &			

Glossary

A

API. An interface by means of which one software component communicates with or controls another. Usually used to refer to services provided by one software component to another, usually via software interrupts or function calls

Application Programming Interface. See **API**.

AKU. (Adaptation Kit Update) Updates to the Windows Mobile operating system.

AFH. Adaptive Frequency Hopping.

ActiveSync. ActiveSync is a data synchronization program developed by Microsfot for use with Windows Mobile operating systems.

B

Bar. The dark element in a printed bar code symbol.

Bar Code. A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a bar code symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format. See **Symbology**.

Bar Code Density. The number of characters represented per unit of measurement (e.g., characters per inch).

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.

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.

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.

C

Codabar. A discrete self-checking code with a character set consisting of digits 0 to 0 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.

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

Decode. To recognize a bar code symbology (e.g., UPC/EAN) and then analyze the content of the specific bar code scanned.

Discrete 2 of 5. A binary bar caode 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 numberic 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

F

File Transfer Protocol (FTP). A TCP/IP application protocol governing file transfer via network or telephone lines. See **TCP/IP.**

FTP. See **File Transfer Protocol**.

G

GPS (Global Positioning System). A satellite-based navigation system made up of a network of 24 satellites. GPS satellites circle the earth and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location.

H

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.

High-Speed Downlink Packet Access (HSDPA). A 3G (third generation) mobile telephony communications protocol in the High-Speed Packet Access (HSPA) family, which allows networks based on Universal Mobile Telecommunications System (UMTS) to have higher data transfer speeds and capacity.

I

Interleaved 2 of 5. A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

Internet Protocol Address. See **IP**.

IP. Internet Protocol. The IP part of the TCP/IP communications protocol. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or subnetwork. IP accepts “packets” from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a “datagram” to the layer 2 data link protocol. It may also break the packet into fragments to support the maximum transmission unit (MTU) of the network.

IP Address. (Internet Protocol address) The address of a computer attached to an IP network. Every client and server station must have a unique IP address. A 32-bit address used by a computer on a IP network. Client workstations have either a permanent address or one that is dynamically assigned to them each session. IP addresses are written as four sets of numbers separated by periods; for example, 204.171.64.2.

L

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 scanner. A type of bar code reader that uses a beam of laser light.

LCD. See **Liquid Crystal Display**.

LED Indicator. A semiconductor diode (LED - Light Emitting Diode) used as an indicator, often in digital displays. The semiconductor uses applied voltage to produce light of a certain frequency determined by the semiconductor's particular chemical composition.

Light Emitting Diode. See **LED**.

Liquid Crystal Display (LCD). A display that uses liquid crystal sealed between two glass plates. The crystals are excited by precise electrical charges, causing them to reflect light outside according to their bias. They use little electricity and react relatively quickly. They require external light to reflect their information to the user.

M

MC. Mobile Computer.

MDN. Mobile Directory Number. The directory listing telephone number that is dialed (generally using POTS) to reach a mobile unit. The MDN is usually associated with a MIN in a cellular telephone -- in the US and Canada, the MDN and MIN are the same value for voice cellular users. International roaming considerations often result in the MDN being different from the MIN.

Mobile Computer. In this text, *mobile computer* refers to the MC45. 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).

NVM. Non-Volatile Memory.

P

PAN . Personal area network. Using Bluetooth wireless technology, PANs enable devices to communicate wirelessly. Generally, a wireless PAN consists of a dynamic group of less than 255 devices that communicate within about a 33-foot range. Only devices within this limited area typically participate in the network.

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

PING. (Packet Internet Groper) An Internet utility used to determine whether a particular IP address is online. It is used to test and debug a network by sending out a packet and waiting for a response.

R

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

Reset. Restarts the mobile computer by closing all running programs. All data that is not saved to flash memory is lost.

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**.

S

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.

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

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.

Symbology. The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, Code 39, PDF417, etc.).

T

TCP/IP. (Transmission Control Protocol/Internet Protocol) A communications protocol used to internetwork dissimilar systems. This standard is the protocol of the Internet and has become the global standard for communications. TCP provides transport functions, which ensures that the total amount of bytes sent is received correctly at the other end. UDP is an alternate transport that does not guarantee delivery. It is widely used for real-time voice and video transmissions where erroneous packets are not retransmitted. IP provides the routing mechanism. TCP/IP is a routable protocol, which means that all messages contain not only the address of the destination station, but the address of a destination network. This allows TCP/IP messages to be sent to multiple networks within an organization or around the world, hence its use in the worldwide Internet. Every client and server in a TCP/IP network requires an IP address, which is either permanently assigned or dynamically assigned at startup.

Terminal. See **Mobile Computer**.

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

Transmission Control Protocol/Internet Protocol. See **TCP/IP.**

U

UDP. User Datagram Protocol. A protocol within the IP protocol suite that is used in place of TCP when a reliable delivery is not required. For example, UDP is used for real-time audio and video traffic where lost packets are simply ignored, because there is no time to retransmit. If UDP is used and a reliable delivery is required, packet sequence checking and error notification must be written into the applications.

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.

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