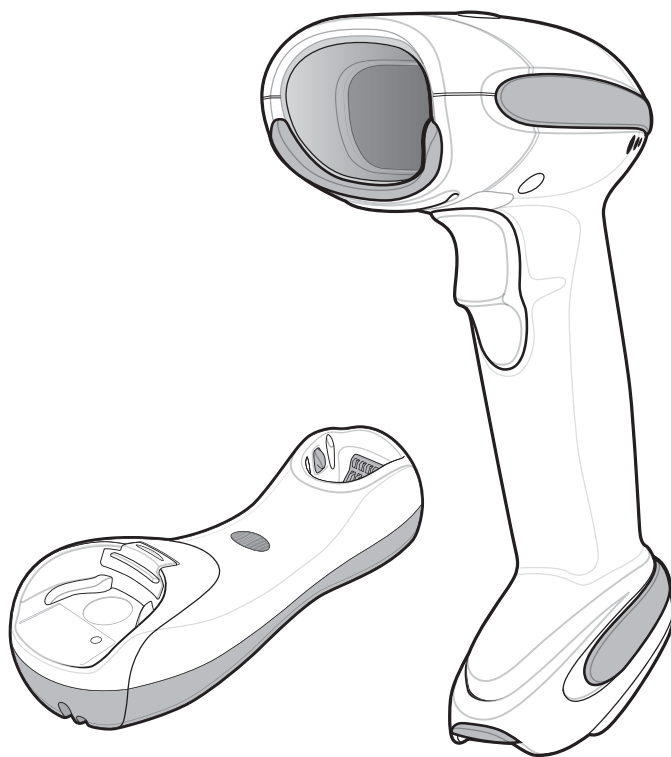


LS4278

Product Reference Guide



LS4278
Product Reference Guide

72E-69834-08

Revision A

September 2016

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Warranty

For the complete Zebra hardware product warranty statement, go to:
<http://www.zebra.com/warranty>.

Revision History

Changes to the original manual are listed below:

| Change | Date | Description |
|-----------|---------|--|
| -01 Rev A | 11/2005 | Initial release. |
| -02 Rev A | 3/2006 | Updated guide for the following enhancements: battery reconditioning, beep on insertion, intellistand idle timeout interval, reconnect attempt interval, out of range indicator, battery information. Added ADF chapter. |
| -03 Rev A | 2/2007 | Updated service information, added notes that Multipoint-to-Point mode doesn't support the Beep on <BEL> feature. |
| -04 Rev A | 10/2008 | Removed HID Profile (Master) option, updated auto-reconnect options, updated Pairing Mode information, added the following new parameters: Discoverable Mode, new UPC/EAN Supplemental options, User-Programmable Supplementals, Bookland ISBN format. |
| -05 Rev A | 04/2011 | Updated address and styles to Motorola Solutions; added note regarding multipoint-to-point connections; changed MSI Set Lengths default. |
| -06 Rev A | 11/2012 | Updated ambient light tolerance, and 123Scan ² chapter; removed Regulatory information from tech specs. |
| -07 Rev A | 4/2015 | Zebra Rebranding |
| -08 Rev A | 9/2016 | Update ADF chapter with cross reference to ADF Formatting Programmer's Guide. |

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Glossary

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Tell Us What You Think...

About This Guide

Introduction

The *LS4278 Product Reference Guide* provides general instructions for setting up, operating, maintaining, and troubleshooting the LS4278 scanner and cradles.

Chapter Descriptions

Topics covered in this guide are as follows:

- [Chapter 1, Getting Started](#) provides a product overview, unpacking instructions, and cable connection information.
- [Chapter 2, Scanning](#) describes parts of the scanner, beeper and LED definitions, and how to use the scanner in hand-held and hands-free modes.
- [Chapter 3, Maintenance, Troubleshooting & Technical Specifications](#) provides information on how to care for the scanner and cradle, troubleshooting, and technical specifications.
- [Chapter 4, Radio Communications](#) provides information about the modes of operation and features available for wireless communication. This chapter also includes programming bar codes to configure the scanner.
- [Chapter 5, User Preferences](#) provides programming bar codes for selecting user preference features for the scanner and commonly used bar codes to customize how the data is transmitted to the host device.
- [Chapter 6, Keyboard Wedge Interface](#) provides information for setting up the scanner and cradle for Keyboard Wedge operation.
- [Chapter 7, RS-232 Interface](#) provides information for setting up the scanner and cradle for RS-232 operation.
- [Chapter 8, USB Interface](#) provides information for setting up the scanner and cradle for USB operation.
- [Chapter 9, IBM Interface](#) provides all information for setting up the scanner and cradle with IBM 468X/469X POS systems.
- [Chapter 10, Wand Emulation Interface](#) provides all information for setting up the scanner and cradle for Wand Emulation operation.
- [Chapter 11, Scanner Emulation Interface](#) provides information for setting up the scanner and cradle for Scanner Emulation operation.

- [Chapter 12, 123Scan2](#) (PC based scanner configuration tool) provides the bar code that must be scanned to communicate with the 123Scan program.
- [Chapter 13, Symbologies](#) describes all symbology features and provides the programming bar codes necessary for selecting these features for the scanner.
- [Chapter 14, Advanced Data Formatting](#) (ADF) describes how to customize scanned data before transmitting to the host. This chapter also contains the bar codes for advanced data formatting.
- [Appendix A, Standard Default Parameters](#) provides a table of all host devices and miscellaneous scanner defaults.
- [Appendix B, Programming Reference](#) provides a table of AIM code identifiers, ASCII character conversions, and keyboard maps.
- [Appendix C, Sample Bar Codes](#) includes sample bar codes.
- [Appendix D, Numeric Bar Codes](#) includes the numeric bar codes to scan for parameters requiring specific numeric values.
- [Appendix E, Alphanumeric Bar Codes](#) includes the bar codes representing the alphanumeric keyboard, used when setting ADF rules.
- [Appendix F, ASCII Character Sets](#) provides ASCII character value tables.

Notational Conventions

The following conventions are used in this document:

- *Italics* are used to highlight chapters and sections in this and related documents.
- **Bold** text is used to highlight parameter names and options.
- bullets (•) indicate:
 - Action items
 - Lists of alternatives
 - Lists of required steps that are not necessarily sequential
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.
- Throughout the programming bar code menus, asterisks (*) are used to denote default parameter settings.



* Indicates Default ——— ***Baud Rate 9600** ——— Feature/Option



NOTE This symbol indicates something of special interest or importance to the reader. Failure to read the note will not result in physical harm to the reader, equipment or data.



CAUTION This symbol indicates that if this information is ignored, the possibility of data or material damage may occur.



WARNING! This symbol indicates that if this information is ignored the possibility that serious personal injury may occur.

Related Documents

- The *LS4278 Quick Reference Guide* (p/n 72-69835-xx) provides general information to help the user get started with the scanner. It includes basic operation instructions and start up bar codes.
- The *STB4208/4278 Cradle Quick Reference Guide* (p/n 72-71010-xx) provides information to help the user set up and use the charge only and host interface cradles. It includes set up and mounting instructions.

For the latest version of this guide and all guides, go to: <http://www.zebra.com/support>.

Service Information

If you have a problem with your equipment, contact Zebra Support for your region. Contact information is available at: <http://www.zebra.com/support>.

When contacting support, please have the following information available:

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

Zebra responds to calls by E-mail, telephone or fax within the time limits set forth in support agreements.

If your problem cannot be solved by Zebra Support, you may need to return your equipment for servicing and will be given specific directions. Zebra is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

If you purchased your business product from a Zebra business partner, contact that business partner for support.

Chapter 1 Getting Started

Introduction

The LS4278 combines excellent scanning performance and advanced ergonomics to provide the best value in a lightweight laser scanner. Whether used as a hand-held scanner or in hands-free mode in a stand, the scanner ensures comfort and ease of use for extended periods of time.



Figure 1-1 *LS4278 Scanner*

In addition to single-line laser scanning, the scanner supports multi-line rastering. Multi-line rastering allows the scanner to capture stacked GS1 DataBar codes and increases angular tolerances, minimizing product orientation and hand movements. Multi-line rastering also allows the scanner to read poor quality bar codes. For more information about scanning modes and stacked GS1 DataBar codes, see [Scan Pattern on page 5-9](#) and [GS1 DataBar on page C-3](#).

✓ **NOTE** The scanner does not currently support PDF417 bar codes and its variants.

This STB4278 cradle supports the following interfaces:

- Keyboard Wedge connection to a host. The host interprets scanned data as keystrokes. This interface supports the following international keyboards (for Windows® environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Portuguese-Brazilian, and Japanese.
- Standard RS-232 connection to a host. Scan bar code menus to set up proper communication of the cradle with the host.
- USB connection to a host. The cradle autodetects a USB host and defaults to the HID keyboard interface type. Select other USB interface types by scanning programming bar code menus. This interface supports the following international keyboards (for Windows® environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Portuguese-Brazilian, and Japanese.
- Connection to IBM® 468X/469X hosts. Scan bar code menus to set up communication of the cradle with the IBM terminal.
- Wand Emulation connection to a host. The cradle is connected to a portable data terminal, a controller, or host which collects the data as wand data and decodes it.
- Scanner Emulation connection to a host. The cradle is connected to a portable data terminal, a controller which collects the data and interprets it for the host.
- Synapse capability which allows connection to a wide variety of host systems using a Synapse and Synapse adapter cable. The cradle autodetects the host.
- Configuration via 123Scan.

Unpacking the Scanner and Cradle

Remove the scanner and cradle from their respective packing and inspect for damage. If the scanner or cradle was damaged in transit, contact Zebra Support. See [page xv](#) for contact information. **KEEP THE PACKING.** It is the approved shipping container and should be used if the equipment ever needs to be returned for servicing.

Parts

Scanner

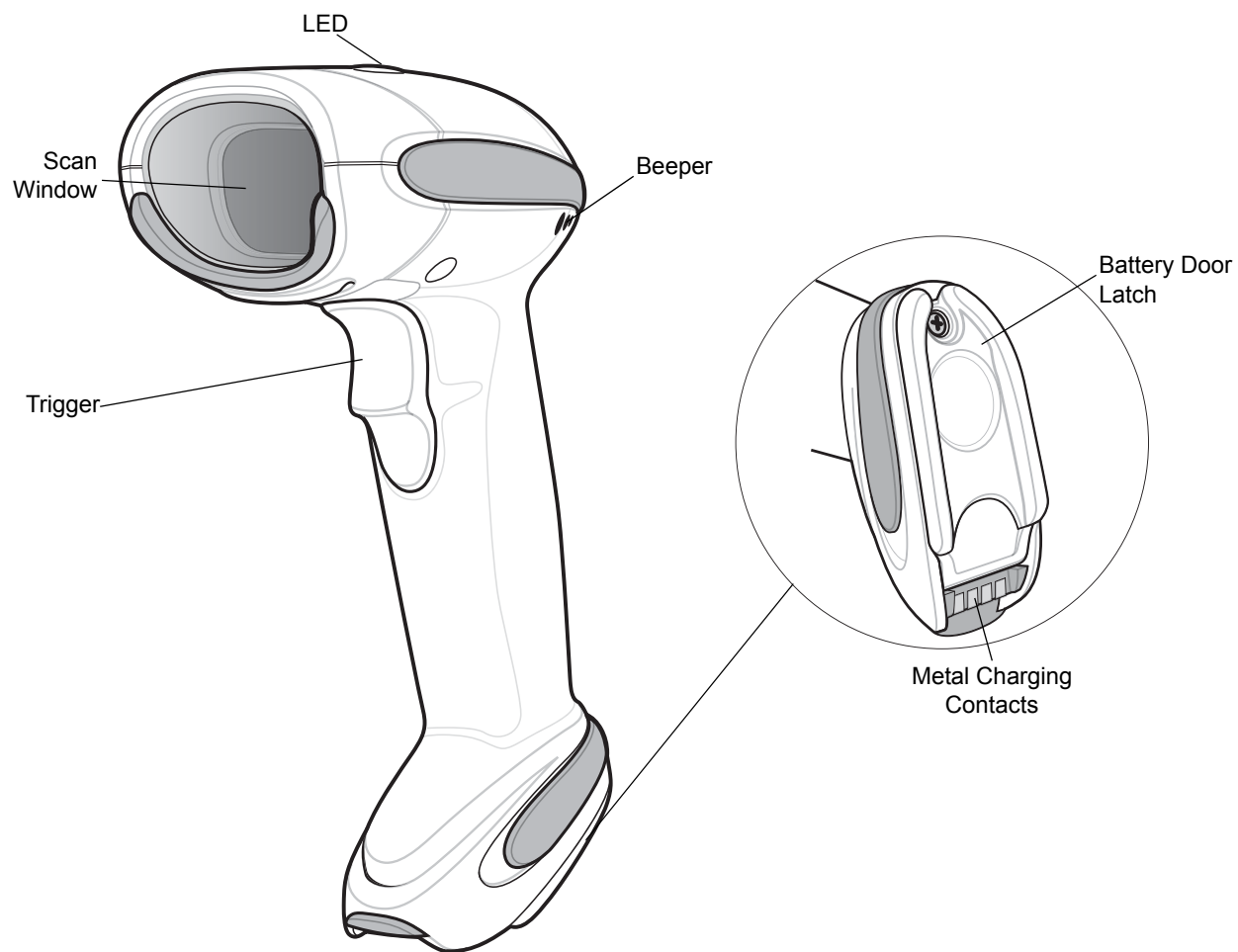


Figure 1-2 *Parts of the Scanner*

Cradle

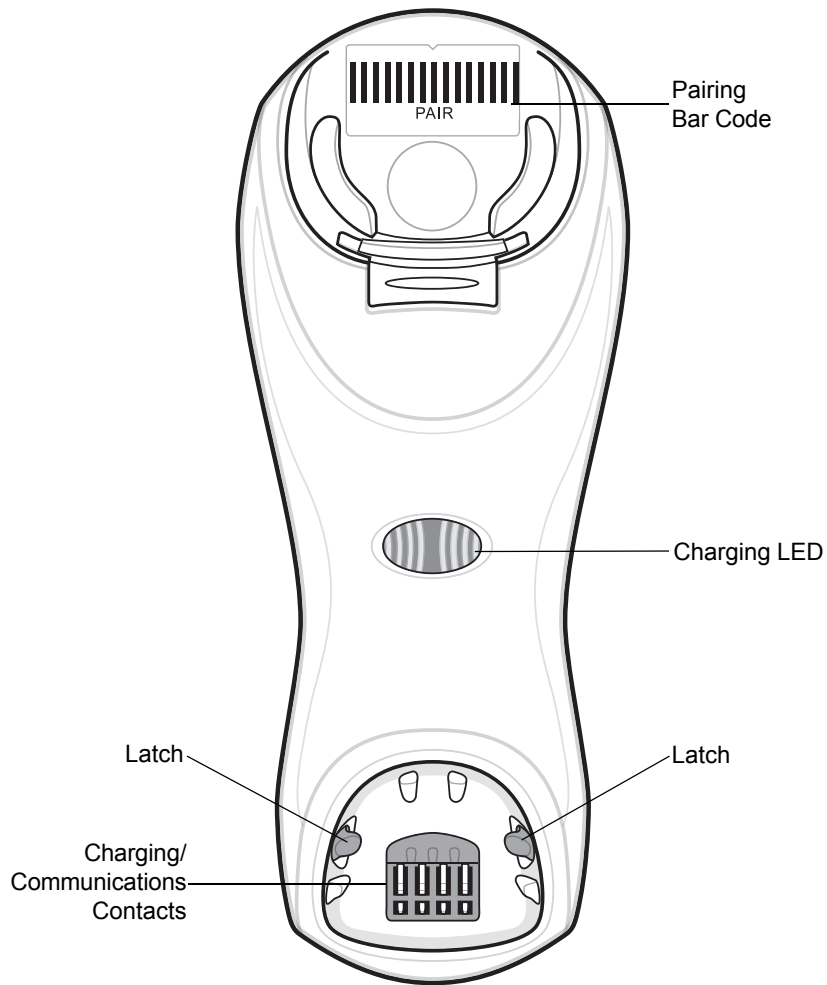


Figure 1-3 *Cradle Front View*

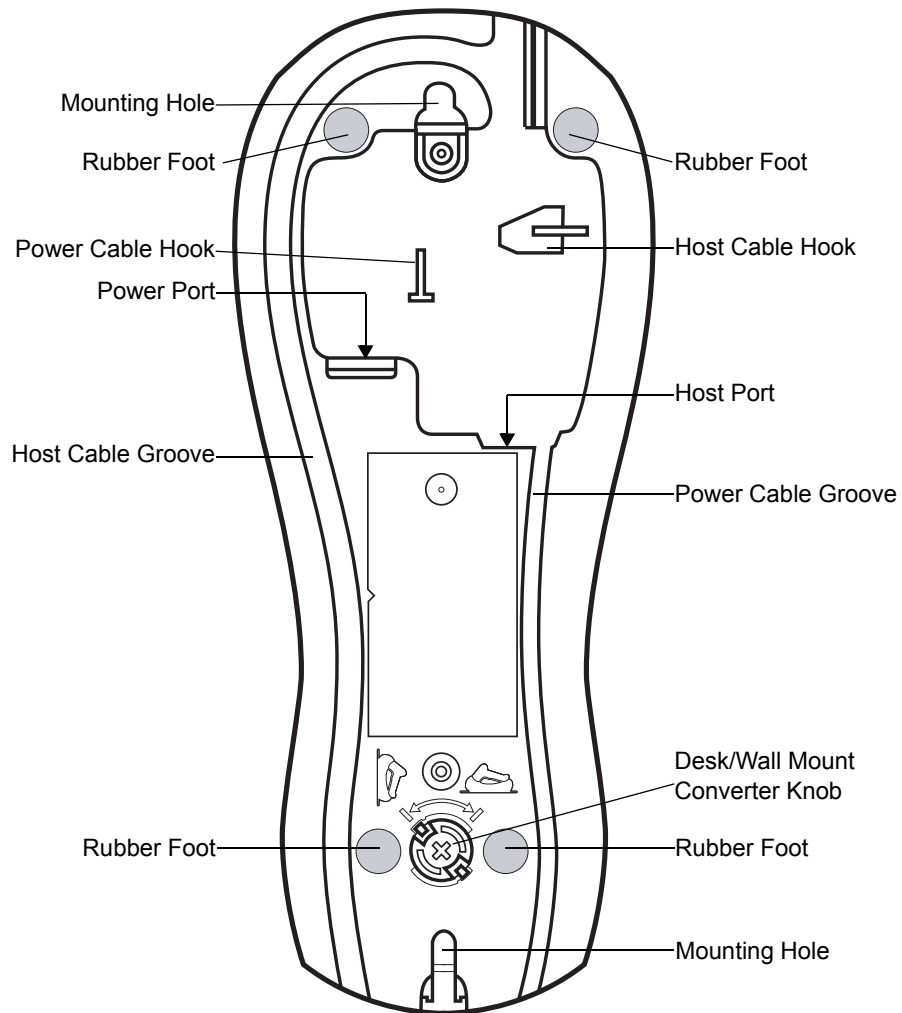


Figure 1-4 *Cradle Back View*

Scanner Cradle

The scanner cradle serves as a stand, charger, and host interface for the scanner. The cradle sits on a desktop or mounts on a vertical surface (such as a wall). For more information about mounting options and procedures, refer to the documentation included with the cradle.

There are two versions of the cradle:

- **Charging cradle with radio:** When the cordless scanner is paired to the cradle, all communication between the scanner and the host computer is accomplished through the cradle. Each bar code contains programming instructions or other data unique to the bar code pattern. The scanner is paired to the cradle and transmits bar code data to the cradle via Bluetooth Technology Profile Support. The cradle then sends that information via an interface cable to the host computer for interpretation.
- **Charge-only cradle:** This cradle serves as a stand and battery charger. It does not contain a radio and has no communication capability.

✓ **NOTE** For more information about communication between the scanner, cradle and host, see [Chapter 4, Radio Communications](#).

Connecting the Cradle

Important: Connect the interface cable and power supply (if necessary) in the following order to ensure proper operation of the scanner and cradle:

1. If a power supply is connected to the cradle, disconnect it. See [Figure 1-5](#).
2. If using an interface cable, insert the cable into the cradle's host port.
3. If using a power supply that connects to the interface cable, insert this power supply into the power connector on the interface cable, and the other end to an AC supply.
4. Insert the other end of the interface cable into the appropriate port on the host computer (see the specific host chapter for information on host connections).
5. If using an external power supply (if required by the interface, or to allow fast charging of the scanner), insert the power cable into the power port on the back of the cradle, and connect the power supply to an approved AC supply (see the *STB4208/4278 Cradle Quick Reference Guide* for more information).

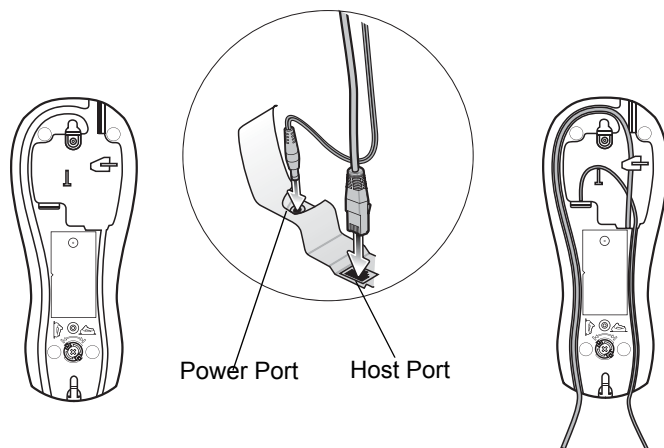


Figure 1-5 Connecting the Cables to the Cradle

6. If applicable, thread the interface cable over the cable support hook and run the host and power cables into their respective cable grooves.
7. Mount the cradle, as necessary. (For information on mounting the cradle, refer to the documentation included with the cradle.)

✓ **NOTE** Disconnect the power supply before changing host cables, or the cradle may not recognize the new host. Different cables are required for different hosts. The connectors illustrated in each host chapter are examples only. The connectors may be different from those illustrated, but the steps to connect the cradle remain the same.

Supplying Power to the Cradle

The cradle receives power from one of two sources:

- An external power supply.
- When connected to the host through a host cable that supplies power.

The cradle detects whether the host or the external supply is supplying power. It always draws power from the external supply when available, regardless of the presence of power from a host.

Using the USB Interface to Supply Power

When the cradle is connected to the host via the USB interface, it can be powered by the USB port instead of an external power supply. Powering from a USB host limits charging. The scanner charges at a slower rate than when charging from an external power supply.

✓ **NOTE** The radio link functions normally when the cradle draws power from a USB host.

Connecting a Synapse Cable Interface

✓ **NOTE** Refer to the *Synapse Interface Guide* provided with the Synapse cable for detailed setup instructions.

Zebra's Synapse Smart Cables enable interfacing to a variety of hosts. The appropriate Synapse cable has the built-in intelligence to detect the host to which it is connected.

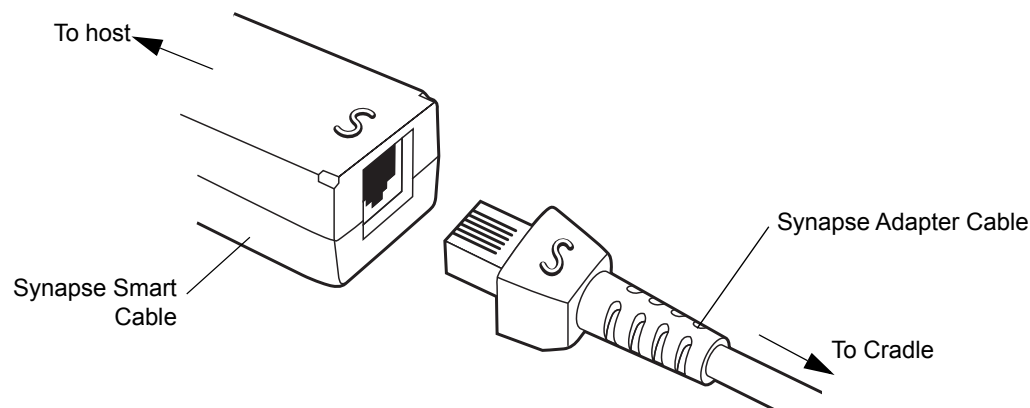


Figure 1-6 Synapse Cable Connection

1. Insert the Synapse adapter cable (p/n 25-32463-xx) into the host port on the bottom of the cradle, as described in [Connecting the Cradle on page 1-6](#).

2. Align the 'S' on the Synapse adapter cable with the 'S' on the Synapse Smart Cable and plug the cable in.
3. Connect the other end of the Synapse Smart Cable to the host.

Lost Connection to Host

If scanned data does not transmit to the cradle's host, ensure that all cables are firmly inserted and the power supply is connected to an appropriate AC outlet. If scanned data still does not transmit to the host, reestablish a connection with the host:

1. Disconnect the power supply from the cradle.
2. Disconnect the host interface cable from the cradle.
3. Wait three seconds.
4. Reconnect the host interface cable to the cradle.
5. Reconnect the power supply to the cradle, if required.
6. Reestablish pairing with the cradle by scanning the pairing bar code.

✓ **NOTE** The STB4278 does not always require a power supply whereas the STB4208 always requires a power supply.

Mounting the Cradle

For information on mounting the cradle, refer to the documentation included with the cradle.

Replacing the Scanner Battery

The battery is installed in the cordless scanner by the factory and resides in a chamber in the scanner handle. To replace the battery:

1. Insert a Phillips screwdriver in the screw at the base of the scanner, then turn the screw counterclockwise to release the latch.
2. Remove the latch.
3. If a battery is already installed, turn the scanner upright to slide the battery out. Disconnect the battery connector clip.

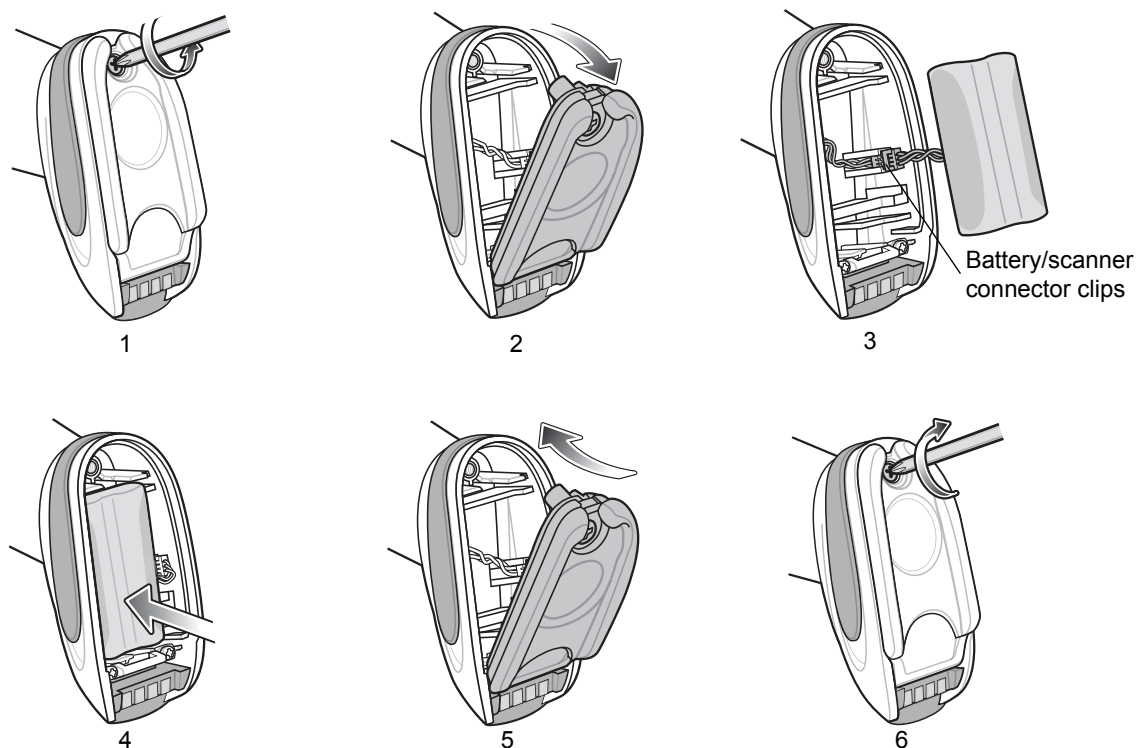


Figure 1-7 *Inserting the Battery*

4. With the contacts on the connector clips facing in the same direction, attach the new battery's connector clip to the connector clip in the base of the scanner.
5. Slide the new battery into the battery well and ensure the battery leads are visible. The battery should sit securely in the well.
6. Attach and close the latch.
7. Insert a Phillips screwdriver in the screw at the base of the scanner, press down gently, and turn the screw clockwise to lock the latch in place.

Charging the Scanner Battery

Fully charge the scanner battery before using the scanner for the first time. To charge the scanner battery, place the scanner in the cradle, ensuring that the metal contacts on the bottom of the scanner touch the contacts on the cradle. The battery begins charging when the scanner LED indicator starts flashing green. A complete charge of a fully discharged battery can take up to three hours using external power and up to five hours using non-external cable power.



CAUTION To avoid a battery temperature fault, always charge the battery in the scanner within the recommended temperature of 32° to 104° F (0° to 40° C) nominal, 41° to 95° F (5° to 35° C) ideal.

Charging LED

When powered up, the cradle LED is always green. The scanner LED flashes a green during charging. See [Table 2-2 on page 2-3](#) for all charging LED indications.

Reconditioning the Scanner Battery

To maintain optimal performance of the scanner NiMH battery, perform a battery recondition approximately once a year.

To begin the battery recondition cycle:

1. Scan **Battery Recondition** below.



Battery Recondition

2. Place the scanner into the cradle.
3. The scanner must perform two charge cycles to complete the battery reconditioning process (discharge/charge/discharge/charge). See [Table 1-1](#).



CAUTION If the scanner is removed from the cradle during the battery reconditioning cycle, the scanner exits the battery reconditioning mode of operation and returns to the normal mode of battery charging (see [Charging the Scanner Battery](#)). To restart the battery reconditioning cycle, re-scan the Battery Recondition parameter and place the scanner in the cradle..

Battery Reconditioning LED Definitions

Table 1-1 Battery Reconditioning LED Definitions

| Battery Reconditioning Mode | LED | Comments |
|-----------------------------|---------------------------|---|
| Discharging | Red Flash | Time to discharge is approximately 2.5 hours. |
| Charging | Green Flash | Time to charge is approximately 2.5 hours with an external power supply. |
| Reconditioning Complete | Green - Solid (always on) | The scanner enters a trickle charge until the scanner is removed from the cradle. |

Inserting the Scanner in the Cradle

Insert the scanner in the cradle so that the metal contacts on the bottom of the scanner handle touch the contacts on the cradle. Push the handle lightly to ensure a proper connection, engaging the contacts in the cradle and scanner. Ensure the desk/wall mount converter knob on the back of the cradle is in the correct position for the horizontal or vertical mounting.

Horizontal Cradle Mount

When mounting the cradle horizontally, where no fastening is necessary:

1. Ensure the rubber feet are attached to the cradle. These feet provide traction and prevent surface damage.
2. Ensure the desk/wall mount converter knob is in the position shown in [Figure 1-8](#).

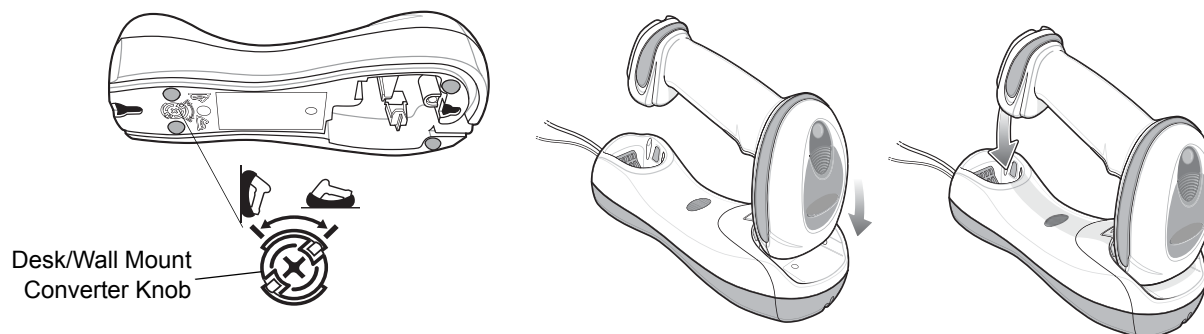


Figure 1-8 Horizontal Mount - Inserting the Scanner in the Cradle

Vertical Cradle Mount

When mounting the cradle vertically:

1. Ensure the rubber feet are attached to the cradle. These feet provide traction and prevent surface damage.
2. Ensure the convertible mount hook on the front of the cradle is inserted with the hook facing up. If not, remove and reverse the hook so that it is in position to secure the scanner in place. (See [Figure 1-3 on page 1-4](#) for the location of the convertible mount hook.)

3. Ensure the desk/wall mount converter knob is in the position shown in [Figure 1-9](#).

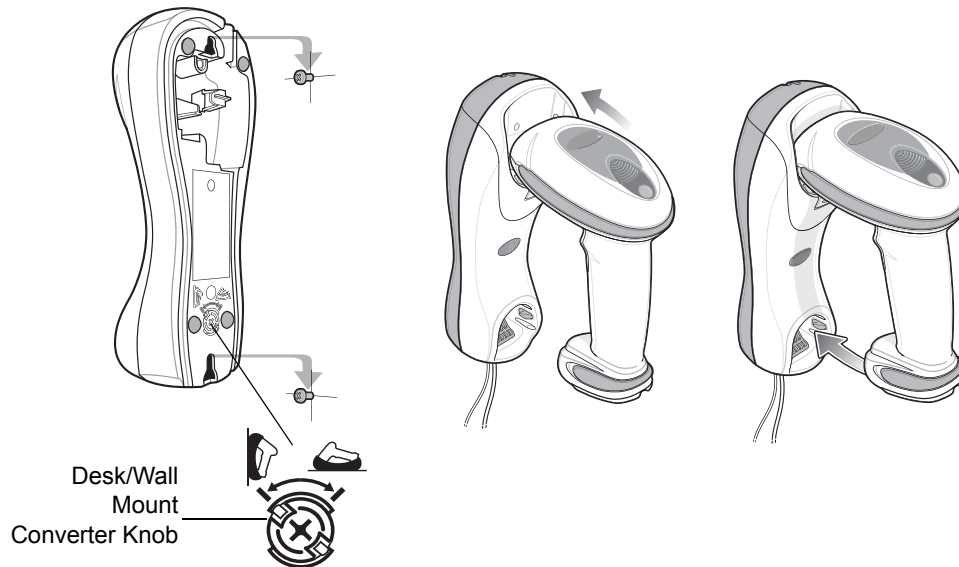


Figure 1-9 Vertical Mount - Inserting the Scanner in the Cradle



NOTE For your convenience, a wall mount bracket can be purchased from Zebra. For the appropriate measurements, and instructions on mounting the cradle, refer to the *STB4208/4278 Quick Reference Guide* (p/n 72-71010-xx).

Radio Communications

The scanner can communicate with remote devices via Bluetooth Technology Profile Support, or by pairing with a cradle. For radio communication parameters, detailed information about operational modes, Bluetooth Technology Profile Support and pairing, see [Chapter 4, Radio Communications](#).

Configuring the Scanner

Use the bar codes in this manual or the 123Scan configuration program to configure the scanner. See [Chapter 5, User Preferences](#) and each host chapter for information about programming the scanner using bar code menus. See [Chapter 12, 123Scan2](#) to configure the scanner using this configuration program. 123Scan includes a help file.

Accessories

The scanner and cradle accessories that are available separately include:

- Intellistand for scanning in hands-free mode. For information about set up and use of Intellistand, see [Scanning in Hands-Free Mode on page 2-6](#).
- Power supplies for applications that do not supply power over the host cable. See each host interface chapter for set up information.
- Wall-mount bracket for mounting the cradle vertically. Refer to the *STB4208/4278 Cradle Quick Reference Guide* (p/n 72-71010-xx) for a wall mounting template and installation instructions.
- Lanyard for wearing the scanner on a wrist.

Lanyard

The lanyard attaches to the inside of the scanner battery door latch.

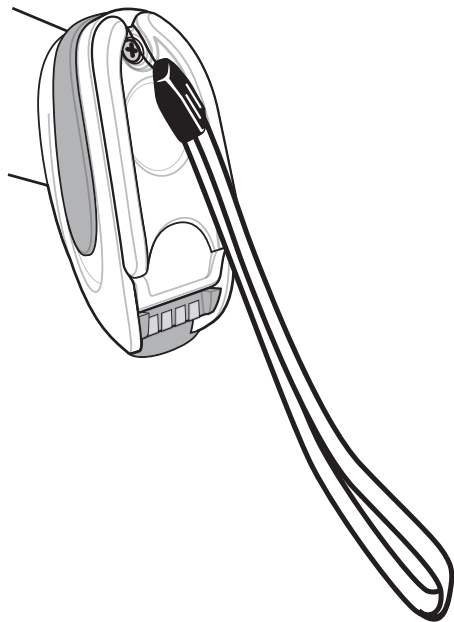


Figure 1-10 Attached Lanyard

To attach the lanyard:

1. Open the battery door latch as described in [Replacing the Scanner Battery on page 1-9](#). Do not remove the battery.

2. Hook the loop of the lanyard around the screw container inside the battery door latch, between the loop guides.

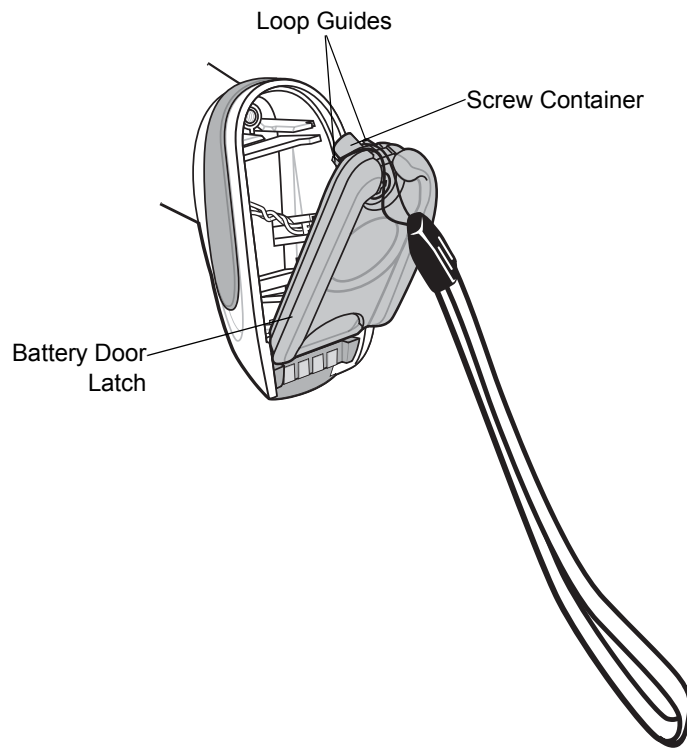


Figure 1-11 *Attaching Lanyard*

3. Close the battery door latch.
4. Tighten the screw.

Chapter 2 Scanning

Introduction

This chapter provides beeper and LED definitions, scanning techniques, general instructions and tips about scanning, and decode zone diagrams.

Beeper Definitions

The scanner issues different beep sequences and patterns to indicate status. [Table 2-1](#) defines beep sequences that occur during both normal scanning and while programming the scanner. (For additional beeper definitions, see [Wireless Beeper Definitions on page 4-3](#).)

Table 2-1 *Standard Beeper Definitions*

| Beeper Sequence | Indication |
|-----------------------|---|
| Standard Use | |
| Low/medium/high beeps | Power up. |
| High beep | A bar code symbol was decoded (if decode beeper is enabled). |
| Four long low beeps | <ol style="list-style-type: none">1. A transmission error was detected in a scanned symbol. The data is ignored. This occurs if a unit is not properly configured. Check option setting.2. When communicating with a cradle, the cradle acknowledges receipt of data. If the acknowledgment is not received, this transmission error beep sequence sounds. Data may still have been received by the host. Check the host system for receipt of transmitted data. If data was not received by the host, re-scan the bar code. |
| Five low long beeps | Conversion or format error. |
| Low beep | Scanner detects power when inserted into a cradle. Note: This feature is enabled by default and can be disabled (see Beep on Insertion on page 5-5). |

Table 2-1 Standard Beeper Definitions (Continued)

| Beeper Sequence | Indication |
|---|---|
| Low/high/low/high beeps | Out of memory - unable to store a new bar code. |
| Low/high/low beeps | ADF transmit error. |
| High/high/high/low beeps | RS-232 receive error. |
| Parameter Menu Scanning | |
| Long low/long high beeps | Input error, incorrect bar code or Cancel scanned, wrong entry, incorrect bar code programming sequence; remain in program mode. |
| High/low beeps | Keyboard parameter selected. Enter value using bar code keypad. |
| High/low/high/low beeps | Successful program exit with change in the parameter setting. |
| Long low/long high/long low/long high beeps | Out of host parameter storage space. Scan Default Parameters on page 5-3 . |
| Wireless Operation | |
| High/low/high/low beeps | Pairing bar code scanned. |
| Low/high beeps | Bluetooth connection established. |
| High/low beeps | Bluetooth disconnection event. Note: When connected to a remote device using SPP or HID, if a disconnect beep sequence sounds immediately after a bar code is scanned, check the host device for receipt of transmitted data. It is possible that an attempt was made to transmit the last bar code scanned after the connection was lost. |
| Long low/long high beeps | Page timeout; remote device is out of range/not powered. |
| Long low/long high/long low/long high beeps | Connection attempt was rejected by remote device. |
| Code 39 Buffering | |
| High/low beeps | New Code 39 data was entered into the buffer. |
| Three long high beeps | Code 39 buffer is full. |
| Low/high/low beeps | The Code 39 buffer was erased or there was an attempt to clear or transmit an empty buffer. |
| Low/high beeps | A successful transmission of buffered data. |
| Host Specific | |
| USB only | |
| Four high beeps | Scanner has not completed initialization. Wait several seconds and scan again. |
| Scanner gives a power-up beep after scanning a USB Device Type. | Communication with the bus must be established before the scanner can operate at the highest power level. |

Table 2-1 Standard Beeper Definitions (Continued)

| Beeper Sequence | Indication |
|---|--|
| This power-up beep occurs more than once. | The USB bus may put the scanner in a state where power to the scanner is cycled on and off more than once. This is normal and usually happens when the host PC cold boots. |
| RS-232 only | |
| High beep | A <BEL> character is received and Beep on <BEL> is enabled (Point-to-Point mode only). |

LED Definitions

In addition to beeper sequences, the scanner communicates with the user using a two-color LED display. [Table 2-2](#) defines LED colors that display during scanning.

Table 2-2 Standard LED Definitions

| LED | Indication |
|--|--|
| Scanning LED | |
| Green Flash | A bar code was successfully decoded. |
| Charging LED | |
| Green - Slow Continuous Flash ¹ | Non-critical battery temperature fault. Battery is above or below normal operating temperature. If this occurs, do not use the scanner and move the scanner to a location within normal operating temperature. The scanner can remain in the cradle while the battery warms or cools to normal operating temperature. Note: For appropriate charging temperatures, see Table 3-3 on page 3-8 . |
| Green - Fast Continuous Flash ² | Scanner is charging. |
| Green - Solid | Scanner is fully charged. |
| Amber - Continuous Flash | Critical battery temperature fault. Battery is above or below normal operating temperature. If this occurs, do not use the scanner and move the scanner to a location within normal operating temperature. The scanner can remain in the cradle while the battery warms or cools to normal operating temperature. Note: For appropriate charging temperatures, see Table 3-3 on page 3-8 . |

¹ A slow continuous flash is estimated at 1 flash per second.

² A fast continuous flash is estimated at 2 flashes per second.

Scanning in Hand-Held Mode

To program the scanner, see the appropriate host chapter, [Chapter 4, Radio Communications](#) and [Chapter 13, Symbologies](#). (In addition to the parameters included in the chapters mentioned, user preference and miscellaneous scanner option parameters are also available in this guide.)

To scan:

1. Aim the scanner at the bar code.
2. Press the trigger.

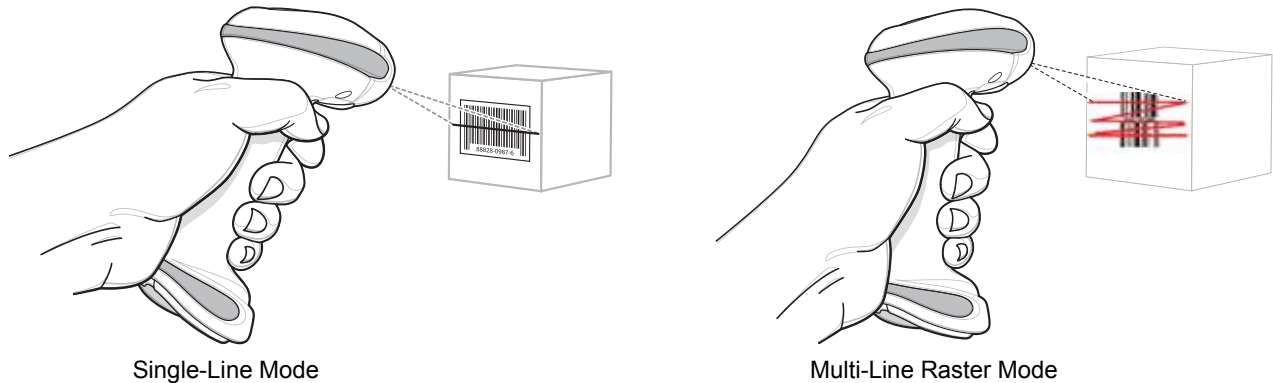


Figure 2-1 Scanning in Hand-Held Mode

3. Upon successful decode, the scanner beeps and the LED turns green. (For more information about beeper and LED definitions, see [Table 2-1](#) and [Table 2-2](#).)

✓ **NOTE** Scan line lengths vary depending on the scan line width selected (see [Scan Line Width on page 5-10](#)). A full scan line width is the default. Medium and short scan line widths are useful for scanning menus or pick-lists.

Aiming

On a typical UPC 100% hold the scanner between contact and 19 inches from the symbol (see [Decode Zone on page 2-9](#)). When scanning using a single-line scan mode, ensure the scan line crosses every bar and space of the symbol.



Figure 2-2 Acceptable and Incorrect Single-Line Aiming

When scanning using a multi-line scan mode, at least one scan line must cross every bar and space of the symbol.



Figure 2-3 Acceptable and Incorrect Multi-Line Aiming

Regardless of the scan mode, the scan line is smaller when the scanner is closer to the symbol and larger when it is farther from the symbol. Scan symbols with smaller bars or elements (mil size) closer to the scanner, and those with larger bars or elements (mil size) farther from the scanner.

Do not hold the scanner directly over the bar code. Laser light reflecting *directly* back into the scanner from the bar code is known as specular reflection. This specular reflection can make decoding difficult.

- ✓ **NOTE** Scan line lengths vary depending on the scan line width selected. A full scan line width is the default. Medium and short scan line widths are useful for scanning menus or pick-lists.

For more information about scan line widths and scanning modes, see [page 5-9](#) and [page 5-10](#), respectively.

The scanner can be tilted up to 65° forward or back and achieve a successful decode ([Figure 2-4](#)). Simple practice quickly shows what tolerances to work within.

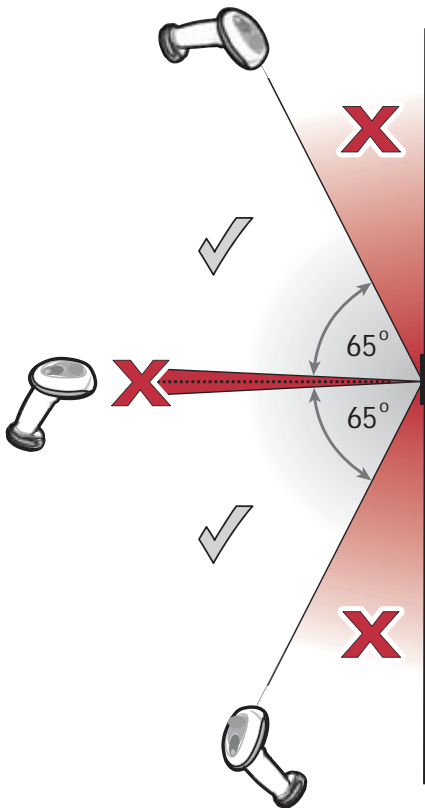


Figure 2-4 Maximum Tilt Angles and Dead Zone

Scanning in Hands-Free Mode

The optional Intellistand adds greater flexibility to scanning operation. When the scanner is seated in the stand's "cup," the scanner's built-in sensor places the scanner in hands-free mode. When the scanner is removed from the stand, it automatically switches modes to operate in its normal hand-held triggered mode.

While in Intellistand, the scanner enters low power mode (Intellistand Idle Timeout) when no bar code is decoded within 15 minutes. See [Intellistand Idle Timeout on page 5-5](#) to set timeout intervals.

- ✓ **NOTE** When the scanner enters Intellistand Idle Timeout (low power mode in the stand), scanning capability suspends. To restart scanning capability, press the trigger or remove the scanner and replace it into the stand.

Assemble the Stand

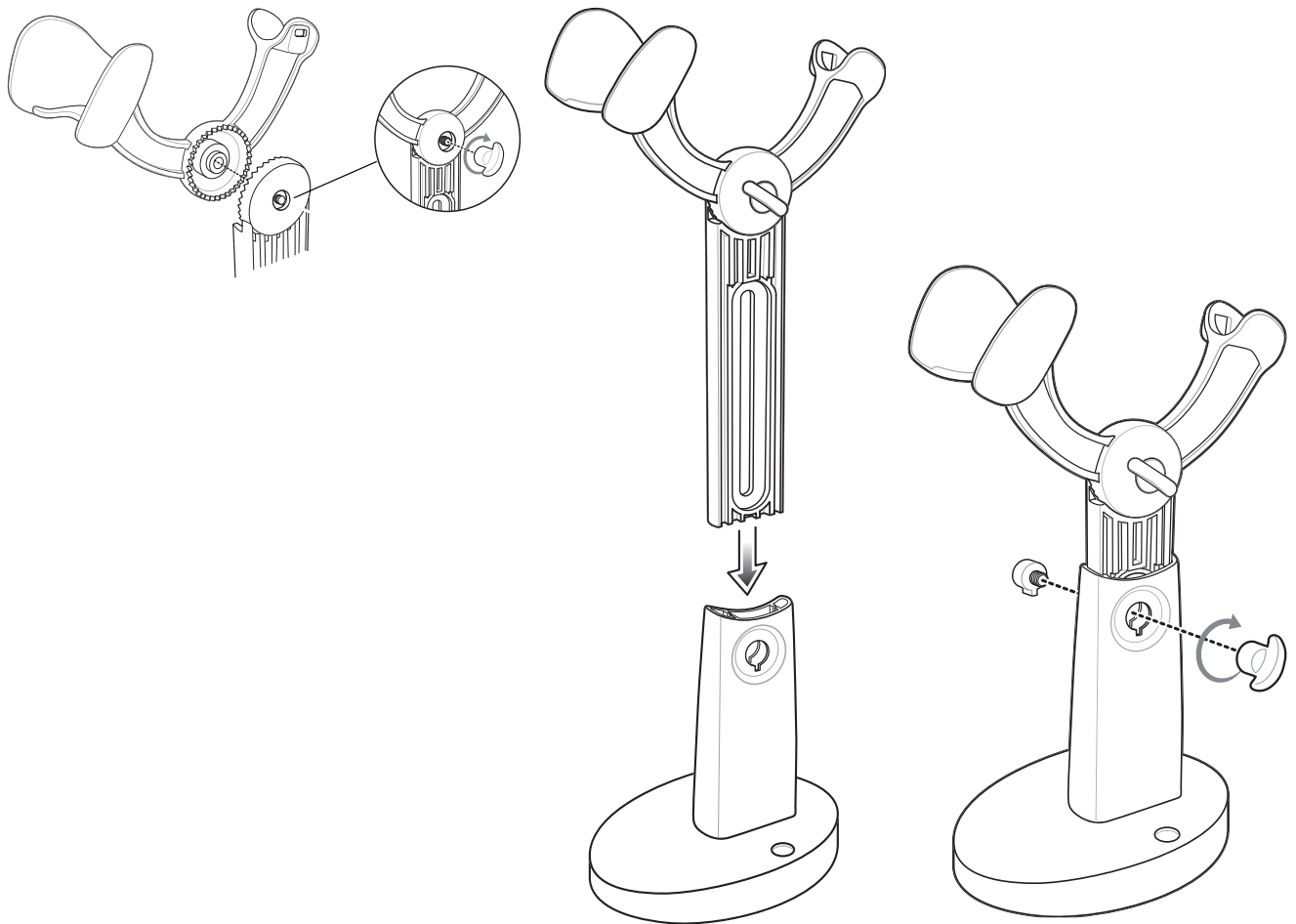


Figure 2-5 Assembling Intellistand

Scanning with Intellistand

When the scanner is placed in Intellistand, the scan pattern selected in hand-held triggered mode continues (see [Scan Pattern on page 5-9](#)).

- ✓ **NOTE** When the scanner is configured as a Master or Cradle Host and the Bluetooth connection to the remote device is lost, the scanner must be removed from Intellistand and re-paired to the remote device. To accomplish this, pull the trigger which engages the auto-reconnect feature, or scan the pairing bar code for the remote device.



CAUTION When the scanner is not used for an extended period of time, place it in the cradle for charging. This prolongs battery life symbol indicates that if this information is ignored, the possibility of data or material damage may occur.

To operate the scanner in Intellistand:

1. Ensure the scanner is set up to communicate with the cradle, and the cradle is properly connected to the host and (see the appropriate host chapter for information on host connections).
2. Insert the scanner in Intellistand by placing the front of the scanner into the stand's "cup."

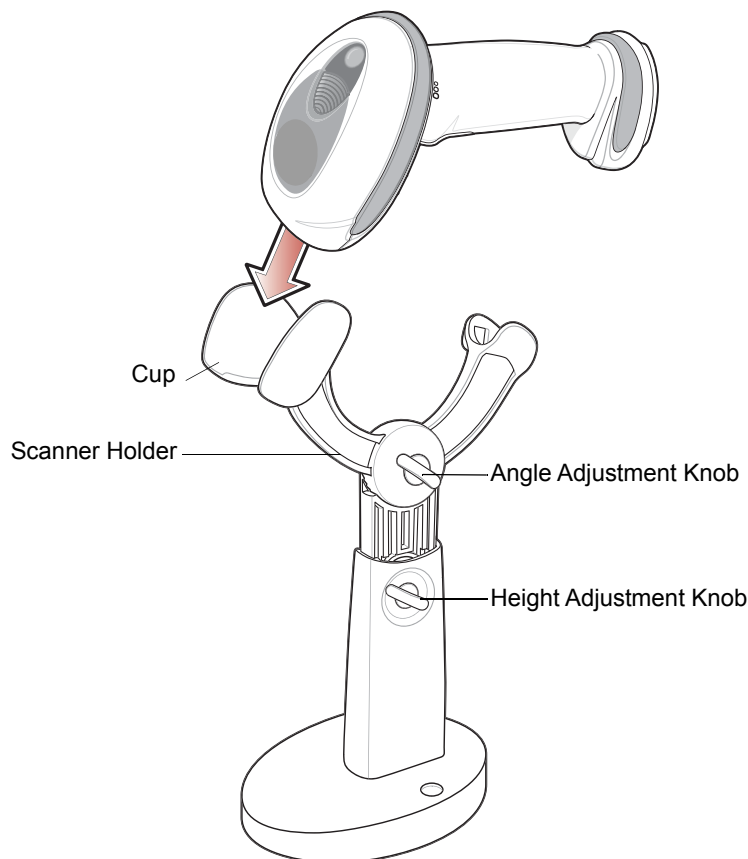


Figure 2-6 *Inserting the Scanner in the Intellistand*

3. Use the Intellistand's adjustment knobs to adjust the height and angle of the scanner.

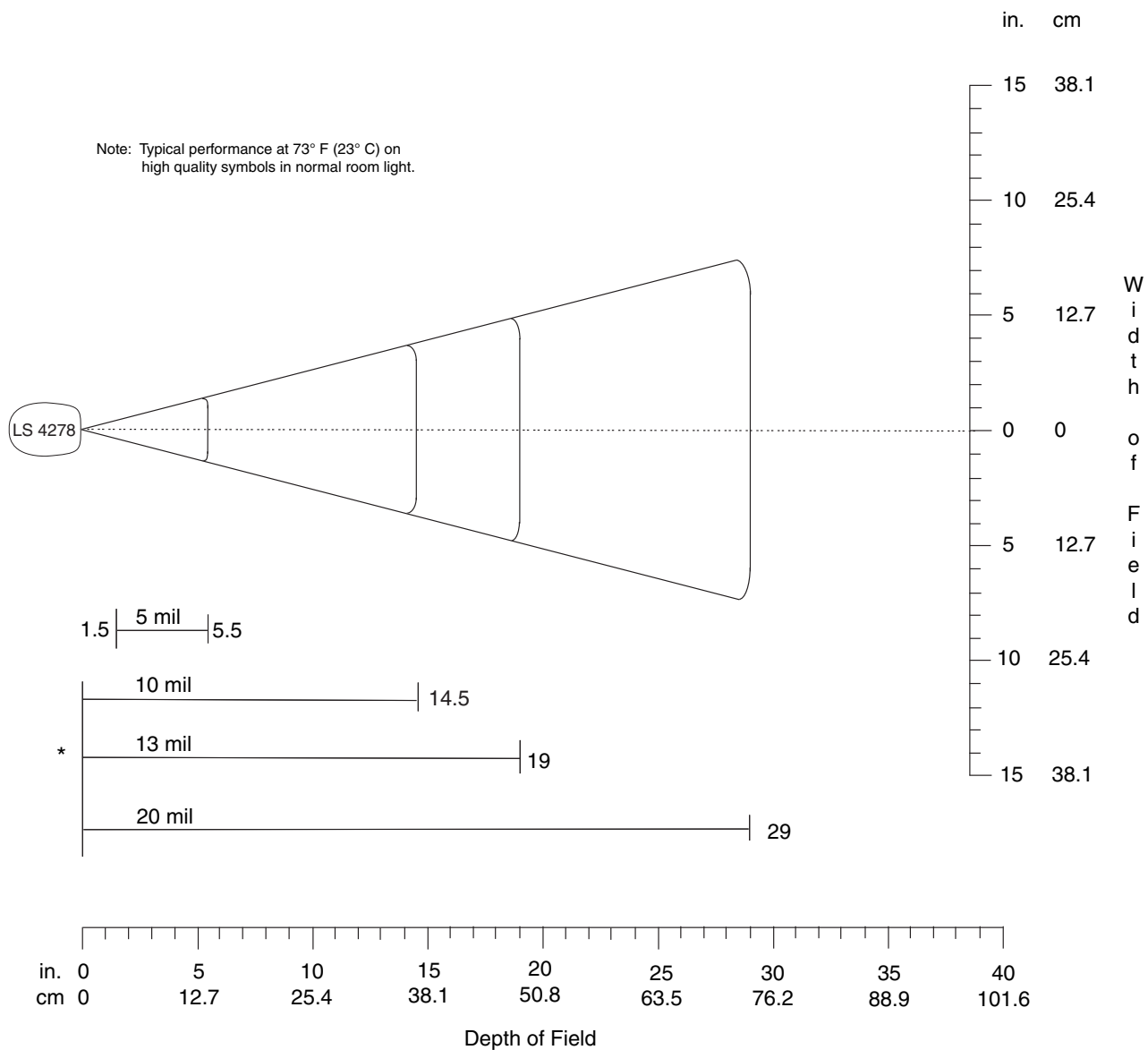
4. Present the bar code.

✓ **NOTE** When the bar code is in view, the scanner emits a full scan line. After a decode, the scan line blinks.

5. Upon successful decode, the scanner beeps and the LED turns green. For more information about beeper and LED definitions, see [Table 2-1](#) and [Table 2-2](#).

✓ **NOTE** If no bar code is decoded after 15 minutes in the Intellistand, the scanner enters low power mode, or Intellistand idle timeout. See [Intellistand Idle Timeout on page 5-5](#) to set the Intellistand idle timeout interval.

Decode Zone



*Minimum distance determined by symbol length and scan angle

Figure 2-7 LS4278 Decode Zone

Chapter 3 Maintenance, Troubleshooting & Technical Specifications

Introduction

This chapter provides suggested scanner and cradle maintenance, troubleshooting, technical specifications, and signal descriptions (pinouts).

Maintenance

Scanner

Cleaning the exit window is the only maintenance required. A dirty window may affect scanning accuracy.

- Do not allow any abrasive material to touch the window.
- Remove any dirt particles with a damp cloth.
- Wipe the window using a tissue moistened with ammonia/water.
- Do not spray water or other cleaning liquids directly into the window.

Cradle

- Do not pour, spray, or spill any liquid on the cradle.

Battery Information

Zebra rechargeable battery packs are designed and constructed to the highest standards within the industry. However, there are limitations to how long a battery can operate or be stored before needing replacement. Many factors affect the life of a battery pack such as heat, cold, customer usage profiles, age and severe drops.

When batteries are stored over a year, battery cell manufacturers advise that some irreversible deterioration in overall battery quality may occur. To minimize this loss, they recommend storing batteries half charged in a dry, cool place between 41° F and 77° F (5° C and 25° C), the cooler the better, and removed from the equipment to prevent the loss of capacity. Batteries should be charged to half capacity at least once a year. If an electrolyte leakage is observed, avoid any contact with the affected area and properly dispose of the battery.

Replace the battery when a significant loss of run time is detected. Batteries must be charged within the 32° F to 104° F (0° C to 40° C) temperature range.

The standard warranty period for all Zebra batteries is 30 days, regardless if the battery was purchased separately or included as part of the device.

Troubleshooting

Table 3-1 *Troubleshooting*

| Problem | Possible Causes | Possible Solutions |
|---|---|---|
| Battery | | |
| Scanner battery requires frequent charging. | Battery may need reconditioning. | Restore the battery by performing a battery reconditioning cycle. See Reconditioning the Scanner Battery on page 1-10 for more information. |
| Beeper Indications | | |
| Scanner emits low/high/low beeps. | ADF transmit error. | See Chapter 14, Advanced Data Formatting for information about ADF programming. |
| | Invalid ADF rule is detected. | See Chapter 14, Advanced Data Formatting for information about ADF programming. |
| | The Code 39 buffer was erased or there was an attempt to clear or transmit an empty buffer. | Normal when scanning the Code 39 Buffering Clear Buffer bar code or upon attempt to transmit an empty Code 39 buffer. |
| Scanner emits a low/high/low/high beep sequence while it is being programmed. | Out of ADF parameter storage space. | Erase all rules and re-program with shorter rules. |

Table 3-1 Troubleshooting (Continued)

| Problem | Possible Causes | Possible Solutions |
|--|--|--|
| Scanner emits long low/long high beeps. | Input error, incorrect bar code or Cancel bar code was scanned. | Scan the correct numeric bar codes within range for the parameter programmed. |
| | Page timeout; remote device is out of range/not powered. | Move the scanner back into range of the remote device; try to re-connect; check remote device configuration. |
| Scanner emits long low/long high/long low/long high beeps. | Out of host parameter storage space. | Scan Default Parameters on page 5-3 . |
| | Out of memory for ADF rules. | Reduce the number of ADF rules or the number of steps in the ADF rules. |
| | Connection attempt was rejected by remote device. | Free up remote device resources. |
| Scanner emits high/high/high/low beeps. | RS-232 receive error. | Normal during host reset. Otherwise, set the scanner's RS-232 parity to match the host setting. |
| Scanner emits high/low beeps. | The scanner is buffering Code 39 data. Or Keyboard parameter selected. | Normal. Or Enter value using bar code keypad. |
| | Bluetooth disconnection event. | Move the scanner back into range of the remote device. In Master (SPP) mode, re-pair the scanner and cradle by scanning the PAIR bar code on the cradle; check cradle power. In Slave (SPP/HID) mode, reestablish connection between the scanner and remote device from the remote device side. |
| Scanner emits three long high beeps. | Code 39 buffer is full. | Scan the Code 39 bar code without a leading space or scan Do Not Buffer Code 39 on page 13-28 to transmit stored Code 29 data. |
| Scanner emits four high beeps on trigger release. | Low battery. | Place scanner in cradle to charge the battery. |

Table 3-1 Troubleshooting (Continued)

| Problem | Possible Causes | Possible Solutions |
|---|---|---|
| Scanner emits four long low beeps. | A transmission error was detected in a scanned symbol. The data is ignored. | This occurs if a unit is not properly configured. Check option setting. |
| | The scanner is either: - Out of range - Not paired to the cradle - Not connected to a remote Bluetooth device. | Move the scanner back into range of the remote device. Or Scan the PAIR bar code on the cradle. |
| | Acknowledgment that transmitted data was not received by the cradle. | Data may have been received by the host. Check the host system for receipt of transmitted data. If data was not received by the host, re-scan the bar code. |
| Scanner emits five low long beeps. | Conversion or format error. | Check ADF rules for the host. |
| Decoding Bar Codes | | |
| Scanner emits the laser, but does not decode the bar code. | Scanner is not programmed for the correct bar code type. | Program the scanner to read that type of bar code. See Chapter 13, Symbologies . |
| | Bar code symbol is unreadable. | Scan test symbols of the same bar code type to determine if the bar code is defaced. |
| | Distance between scanner and bar code is incorrect. | Move the scanner closer to or further from the bar code. See Decode Zone on page 2-9 . |
| | The scan line is not crossing every bar and space of the symbol. | Move the symbol until the scan line is within the acceptable aiming pattern. See Figure 2-2 on page 2-4 . |
| Scanner decodes bar code, but does not transmit the data to the host. | Scanner is not programmed for the correct host type. | Scan the appropriate host type programming bar code. See the chapter corresponding to the host type. |
| | Interface cable is loose. | Ensure all cable connections are secure. |
| | Cradle is not programmed for the correct host interface. | Check scanner host parameters or edit options. |
| | Scanner not paired to host-connected interface. | Pair the scanner to the cradle by scanning the PAIR bar code on the cradle. |

Table 3-1 Troubleshooting (Continued)

| Problem | Possible Causes | Possible Solutions |
|---|--|---|
| | Cradle has lost connection to host. | <i>In this exact order:</i> disconnect power supply; disconnect host cable; wait three seconds; reconnect host cable; reconnect power supply; reestablish pairing. |
| Scanner emits five long low beep after a bar code is decoded. | Conversion or format error was detected. The scanner's conversion parameters are not properly configured. | Ensure the scanner's conversion parameters are properly configured. |
| | Conversion or format error was detected. An ADF rule was set up with characters that can't be sent for the host selected. | Change the ADF rule, or change to a host that can support the ADF rule. |
| | Conversion or format error was detected. A bar code was scanned with characters that can't be sent for that host. | Change the bar code, or change to a host that can support the bar code. |
| Host Displays | | |
| Host displays scanned data incorrectly. | Scanner is not programmed to work with the host. | Ensure the proper host is selected. Scan the appropriate host type programming bar code. |
| | | For RS-232, ensure the scanner's communication parameters match the host's settings. |
| | | For a USB HID keyboard or Keyboard Wedge configuration, ensure the system is programmed for the correct keyboard type and language, and turn off the CAPS LOCK key. |
| | | Ensure editing options (e.g., ADF, UPC-E to UPC-A Conversion) are properly programmed. |
| | | Check the scanner's host type parameters or editing options. |

Table 3-1 Troubleshooting (Continued)

| Problem | Possible Causes | Possible Solutions |
|---|---|---|
| Trigger | | |
| Nothing happens when the trigger is pulled. | No power to the scanner. | Check the system power. If the configuration requires a power supply, re-connect the power supply. Check the battery. Ensure that end cap to battery chamber is secured. |
| | Interface/power cables are loose. | Check for loose cable connections and re-connect cables. |
| | Scanner is disabled. | For Synapse or IBM-468x mode, enable the scanner via the host interface. |
| The laser does not appear when the trigger is pulled. | No power to the scanner. | Check the system power. If the configuration requires a power supply, re-connect the power supply. |
| | Incorrect host interface cable is used. | Verify that the correct host interface cable is used. If not, connect the correct host interface cable. |
| | Interface/power cables are loose. | Check for loose cable connections and re-connect cables. |



NOTE If after performing these checks the symbol still does not scan, contact the distributor or contact Zebra Support. See [page xv](#) for contact information.

Technical Specifications

Table 3-2 *Technical Specifications - LS4278 Scanner*

| Item | Description |
|------------------------------------|--|
| Physical Characteristics | |
| Dimensions | 7.3 in. H x 3.85 in. L x 2.7 in. W (18.5 cm H x 9.7 cm L x 6.9 cm W) |
| Weight (with battery) | Approximately 8.4 oz. (238 g) |
| Color | Cash Register White or Twilight Black |
| Performance Characteristics | |
| Light Source (Laser) | 650nm laser diode |
| Scan Element Frequency | 50Hz |
| Decode Rate | 200 decodes per second |
| Radio Range | Minimum 33 ft (10m) / Typical warehouse environment 50 ft. (15m) |
| Battery Specifications | 720mAh NiMH - (3) AAA number of scans per full charge: 32,000+ @ 1 scan/second Charge Time: Fully discharged battery: < 3 hours via external power / approximately 4.5 hours via host power through cable Note: Typical daily scans are less than 4,000, which fully charges within 1 hour |
| Roll Tolerance | ± 35° |
| Pitch Tolerance | ± 60° |
| Yaw Tolerance | ± 60° |
| Nominal Working Distance | 5 mil (Code 39): 1.5 to 5.5 in. (3.81 to 13.97 cm) 13 mil (100% UPC/EAN): 0 to 19 in. (0 to 48.25 cm) 10 mil (Code 39): 0 to 14 in. (0 to 35.56 cm) 20 mil (Code 39): 0 to 29 in. (0 to 73.66 cm) (See Decode Zone on page 2-9) |
| Print Contrast Minimum | 25% minimum reflectance |
| Multi-Line Aiming Coverage | At 5 in. reading distance: ~ 0.5 in. (1.3 cm) At 10 in. reading distance: ~ 1 in. (2.5 cm) |
| Motion Tolerances | Horizontal Velocity: 200 in. (508 cm) / sec Vertical Velocity: 200 in. (508 cm) / sec Angular Velocity: 200 in. (508 cm) / sec |

Table 3-2 Technical Specifications - LS4278 Scanner (Continued)

| Item | Description |
|-------------------------|--|
| Decode Capability | UPC/EAN and with supplementals, Code 39, Code 39 Full ASCII, Tri-optic Code 39, GS1 DataBar Variants, GS1-128, Code 128, Code 128 Full ASCII, Code 93, Codabar (NW1), Interleaved 2 of 5, Discrete 2 of 5 MSI, Codell, IATA, Bookland EAN, Code 32 |
| Interfaces Supported | See Table 3-3 . |
| User Environment | |
| Operating Temperature | 32° to 122° F (0° to 50° C) |
| Storage Temperature | -40° to 158° F (-40° to 70° C) |
| Humidity | 5% to 95%, non-condensing |
| Drop Specifications | Withstands multiple 5 ft./1.5 m drops to concrete |
| # of Cradle Insertions | 250,000+ insertions |
| Ambient Light Tolerance | Tolerant to typical artificial indoor and natural outdoor (direct sunlight) lighting conditions. Fluorescent, Incandescent, Mercury Vapor, Sodium Vapor, LED: 450 Ft Candles (4,844 Lux) Sunlight: 8000 Ft Candles (86,111 Lux) Note: LED lighting with high AC ripple content can impact scanning performance. |
| Accessories | |
| Mounting Options | Intellistand with adjustable height: 5-10 in. (12.7 cm -25.4 cm) Adjustable angle: 0° - 90° A desktop / wall-mount bracket is also available. |
| Lanyard | Lanyard attaches to the battery door. |

Table 3-3 Technical Specifications - STB4208/4278 Cradle

| Item | Description | | | | | | | | | | |
|---------------------------------|---|---------|---------|--------------|-------------------------|--------------|-----------------------------------|---------------|-------------------------|---------------|-----------------------------------|
| Physical Characteristics | | | | | | | | | | | |
| Dimensions: | 2.0 in. H x 8.35 in. L x 3.4 in. W (5 cm H x 21.1 cm L x 8.6 cm W) | | | | | | | | | | |
| Weight | Approximately 6.4 oz. (183 gm) | | | | | | | | | | |
| Voltage & Current | Charging Cradle: <table border="0"> <tr> <td>Voltage</td> <td>Current</td> </tr> <tr> <td>5 +/-10% VDC</td> <td>620 mA (External power)</td> </tr> <tr> <td>5 +/-10% VDC</td> <td>450 mA (Host power through cable)</td> </tr> <tr> <td>12 +/-10% VDC</td> <td>270 mA (External power)</td> </tr> <tr> <td>12 +/-10% VDC</td> <td>230 mA (Host power through cable)</td> </tr> </table> Non-charging Cradle: 5V @ 70ma or 12 V @ 50 mA | Voltage | Current | 5 +/-10% VDC | 620 mA (External power) | 5 +/-10% VDC | 450 mA (Host power through cable) | 12 +/-10% VDC | 270 mA (External power) | 12 +/-10% VDC | 230 mA (Host power through cable) |
| Voltage | Current | | | | | | | | | | |
| 5 +/-10% VDC | 620 mA (External power) | | | | | | | | | | |
| 5 +/-10% VDC | 450 mA (Host power through cable) | | | | | | | | | | |
| 12 +/-10% VDC | 270 mA (External power) | | | | | | | | | | |
| 12 +/-10% VDC | 230 mA (Host power through cable) | | | | | | | | | | |
| Color | Cash Register White or Twilight Black | | | | | | | | | | |

Table 3-3 *Technical Specifications - STB4208/4278 Cradle (Continued)*

| Item | Description |
|------------------------------------|---|
| Power Requirements | 4.75 - 14.0 VDC |
| Performance Characteristics | |
| Interfaces Supported | Features on-board Multiple Interface with: RS-232C (Standard, Nixdorf, ICL, & Fujitsu); IBM 468x/469x; Keyboard Wedge; USB (Standard, IBM SurePOS, Macintosh); Laser/Wand Emulation; 123Scan; Remote Scanner Management. In addition, Synapse Adaptive Connectivity allows for connectivity to all of the above plus many non-standard interfaces. |
| User Environment | |
| Operating Temperature | 32° to 122° F (0° to 50° C) |
| Storage Temperature | -40° to 158° F (-40° to 70° C) |
| Charging Temperature | 32° to 104° F (0° to 40° C) nominal, 41° to 95° F (5° to 35° C) ideal |
| Humidity | 5% to 95% (non-condensing) |
| Regulatory | |
| Electrical Safety | UL1950, CSA C22.2 No. 950, EN60950/IEC950 |
| EMI/RFI | FCC Part 15 Class B, ICES-003 Class B, European Union EMC Directive, Australian SMA |
| Radio | Bluetooth, Class 2, Version 1.2, Serial Port & HID Profiles 2.402 to 2.480 GHz Adaptive Frequency Hopping (co-existence with 802.11 wireless networks) Data rate: 720 kbps |
| Accessories | |
| Mounting Options | Desktop / wall-mount bracket is available |
| Power Supplies | Power supplies are available for applications that do not supply power over host cable. |

Cradle Signal Descriptions

The signal descriptions in [Table 3-4](#) apply to the connector on the scanner and are for reference only.

Table 3-4 Cradle Signal Pin-outs

| Pin | IBM | Synapse | RS-232 | Keyboard Wedge | Wand | USB |
|-----|----------|----------|----------|----------------|----------|---------------|
| 1 | Reserved | SynClock | Reserved | Reserved | Reserved | Jump to Pin 6 |
| 2 | Power | Power | Power | Power | Power | Power |
| 3 | Ground | Ground | Ground | Ground | Ground | Ground |
| 4 | IBM_A(+) | Reserved | TxD | KeyClock | DBP | Reserved |
| 5 | Reserved | Reserved | RxD | TermData | CTS | D + |
| 6 | IBM_B(-) | SynData | RTS | KeyData | RTS | Jump to Pin 1 |
| 7 | Reserved | Reserved | CTS | TermClock | Reserved | D - |
| 8 | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved |
| 9 | N/A | N/A | N/A | N/A | N/A | N/A |
| 10 | N/A | N/A | N/A | N/A | N/A | N/A |

[Figure 3-1](#) illustrates the positions of the cradle pins.

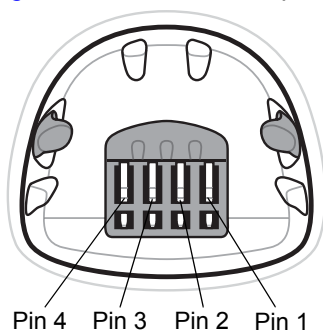


Figure 3-1 Cradle Pin Assignments

The signal descriptions in [Table 3-5](#) apply to the connector from the scanner to the scanner cradle and are for reference only.

Table 3-5 Cradle Pin-outs

| Pin | Description |
|-----|-------------|
| 1 | CRADLE_TXD |
| 2 | VCC |
| 3 | GND |
| 4 | CRADLE_RXD |

Chapter 4 Radio Communications

Introduction

This chapter provides information about the modes of operation and features available for wireless communication between scanners, cradles and hosts. The chapter also includes the parameters necessary to configure the scanner.

The scanner ships with the settings shown in the [Radio Communication Default Table on page 4-2](#) (also see [Appendix A, Standard Default Parameters](#) for all host device and miscellaneous scanner defaults). If the default values suit requirements, programming is not necessary.

To set feature values, scan a single bar code or a short bar code sequence. The settings are stored in non-volatile memory and are preserved even when the scanner is powered down.

If not using a Synapse or USB cable with the cradle, select a host type (see each host chapter for specific host information) after the power-up beeps sound. This is only necessary upon the first power-up when connected to a new host.

To return all features to default values, scan a default bar code in [Default Parameters on page 5-3](#). Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default ***Disable Pair on Contacts** Feature/Option

Scanning Sequence Examples

In most cases, scan one bar code to set a specific parameter value.

Errors While Scanning

Unless otherwise specified, to correct an error during a scanning sequence, just re-scan the correct parameter.

Radio Communications Parameter Defaults

[Table 4-1](#) lists the defaults for radio communication parameters. If you wish to change any option, scan the appropriate bar code(s) provided in the Radio Communications Parameters section beginning on [page 4-4](#).

✓ **NOTE** See [Appendix A, Standard Default Parameters](#) for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 4-1 Radio Communication Default Table

| Parameter | Default | Page Number |
|---|--------------------|----------------------|
| Bluetooth Host (Host Type) | Cradle Host | 4-4 |
| Discoverable Mode | General | 4-7 |
| Country Keyboard Types (Country Code) | North American | 4-8 |
| HID Keyboard Keystroke Delay | No Delay (0 msec) | 4-10 |
| CAPS Lock Override | Disable | 4-10 |
| Ignore Unknown Characters | Enable | 4-11 |
| Emulate Keypad | Disable | 4-11 |
| Keyboard FN1 Substitution | Disable | 4-12 |
| Function Key Mapping | Disable | 4-12 |
| Simulated Caps Lock | Disable | 4-13 |
| Convert Case | No Case Conversion | 4-13 |
| Beep on Reconnect Attempt | Disable | 4-14 |
| Reconnect Attempt Interval | 30 sec | 4-15 |
| Auto-reconnect in Bluetooth Keyboard Emulation (HID Slave) Mode | On Bar Code Data | 4-17 |
| Modes of Operation (Point-to-Point/Multipoint-to-Point) | Point-to-Point | 4-18 |
| Parameter Broadcast (Cradle Host Only) | Enable | 4-19 |
| Pairing Modes | Unlocked | 4-20 |
| Pairing on Contacts | Disable | 4-21 |
| Connection Maintenance Interval | 15 min | 4-23 |
| Authentication | Disable | 4-25 |
| Variable Pin Code | Static | 4-26 |
| Encryption | Disable | 4-27 |

Wireless Beeper Definitions

When the scanner scans the pairing bar code it issues various beep sequences indicating successful or unsuccessful operations. [Table 4-2](#) defines beep sequences that occur during pairing operations. (For additional beeper definitions, see [Beeper Definitions on page 2-1](#).)

Table 4-2 *Wireless Beeper Definitions*

| Beeper Sequence | Indication |
|---|--|
| Four long low beeps | <ol style="list-style-type: none"> 1. A transmission error was detected in a scanned symbol. The data is ignored. This occurs if a unit is not properly configured. Check option setting. 2. When communicating with a cradle, the cradle acknowledges receipt of data. If the acknowledgment is not received, this transmission error beep sequence sounds. Data may still have been received by the host. Check the host system for receipt of transmitted data. If data was not received by the host, re-scan the bar code. |
| Five high beeps | Emitted every 5 seconds while a reconnection attempt is in progress. (See Auto-reconnect Feature on page 4-14 .) |
| High/low/high/low beeps | Pairing bar code scanned. |
| Low/high beeps | Bluetooth connection established. |
| High/low beeps | Bluetooth disconnection event. Note: When connected to a remote device using SPP or HID, if a disconnect beep sequence sounds immediately after a bar code is scanned, check the host device for receipt of transmitted data. It is possible that an attempt was made to transmit the last bar code scanned after the connection was lost. |
| Long low/long high beeps | Page timeout; remote device is out of range/not powered. (See Auto-reconnect Feature on page 4-14 .) |
| Long low/long high/long low/long high beeps | Connection attempt was rejected by remote device. Note: In the case of Pairing Methods on page 4-21 , the cradle may already be connected to another scanner in single Point-to-Point locked mode, or the piconet may be full in Multipoint-to-Point mode. If Pair On Contacts is enabled and the scanner that is inserted is already connected to the cradle, no beeping occurs. |

Radio Communications Host Types

To set up the scanner for communication with a cradle, or to use standard Bluetooth profiles, scan the appropriate host type bar code below.

- **Cradle Host (default)** - Select this host type for scanner(s) to cradle operation. The scanner must then be paired to the cradle and the cradle communicates directly to the host via the host interface cable connection.
- **Serial Port Profile (Master)** - Select this host type for Bluetooth Technology Profile Support (see [page 4-6](#)). The scanner connects to the PC/host via Bluetooth and performs like there's a serial connection. The scanner initiates the connection to the remote device and is the Master. Scan **Serial Port Profile (Master)**, then scan the **PAIR** bar code for the remote device. See [Pairing Bar Code Format on page 4-22](#) for information about creating a pairing bar code for a remote device.
- **Serial Port Profile (Slave)** - Select this host type for Bluetooth Technology Profile Support (see [page 4-6](#)). The scanner connects to the PC/host via Bluetooth and performs like there's a serial connection. The scanner accepts incoming connection requested from a remote device and is the Slave. Scan **Serial Port Profile (Slave)** and wait for the incoming connection.
- **Bluetooth Keyboard Emulation (HID Slave)** - Select this host type for Bluetooth Technology Profile Support. (See [page 4-6](#) for Bluetooth Technology Profile Support and Master/Slave definitions.) The scanner connects to the PC/host via Bluetooth and performs like a keyboard. The scanner accepts incoming connection requested from a remote device and is the slave. Scan **Bluetooth Keyboard Emulation (HID Slave)** and wait for the incoming connection.

- ✓ **NOTE** 1. The scanner supports keyboard emulation over the Bluetooth HID profile. For detailed information, and HID host parameters, see [HID Host Parameters on page 4-8](#).
2. When the scanner is paired to the cradle in SPP Master or Cradle Host mode, the scanner automatically tries to reconnect to a remote device when a disconnection occurs that is due to the radio losing communication. For more information see [Auto-reconnect Feature on page 4-14](#).

Radio Communications Host Types (continued)



***Cradle Host**



Serial Port Profile (Master)



Serial Port Profile (Slave)



Bluetooth Keyboard Emulation (HID Slave)

Bluetooth Technology Profile Support

With Bluetooth Technology Profile Support, the cradle is not required for wireless communication. The scanner communicates directly to the host using Bluetooth technology. The scanner supports the standard Bluetooth Serial Port Profile (SPP) and HID Profiles which enable the scanner to communicate with other Bluetooth devices that support these profiles.

- SPP - the scanner connects to the PC/host via Bluetooth and performs like there's a serial connection.
- HID - the scanner connects to the PC/host via Bluetooth and performs like a keyboard.

Master/Slave Set Up

The scanner can be set up as a Master or Slave.

When the scanner is set up as a Slave, it is discoverable and connectable to other devices. When the scanner is set up as a Master, the Bluetooth address of the remote device to which a connection is requested is required. A pairing bar code with the remote device address must be created and scanned to attempt a connection to the remote device. See the [Pairing Bar Code Format on page 4-22](#) for information about creating a pairing bar code.

Master

When the scanner is set up as a Master (SPP), it initiates the radio connection to a slave device. Initiating the connection is done by scanning a pairing bar code for the remote device (see [Pairing Bar Code Format on page 4-22](#)).

Slave

When the scanner is set up as a Slave device (SPP), the scanner accepts an incoming connection request from a remote device.



NOTE The number of scanners is dependent on the host's capability.

Bluetooth Friendly Name

You can set a meaningful name for the scanner that appears in the application during device discovery. The default name is the scanner name followed by its serial number, e.g., **LS4278 123456789ABCDEF**. Scanning **Set Defaults** reverts the scanner to this name; use custom defaults to maintain the user-programmed name through a **Set Defaults** operation.

To set a new Bluetooth Friendly Name, scan the following bar code, then scan up to 23 characters from [Appendix E, Alphanumeric Bar Codes](#). If the name contains less than 23 characters, scan [End of Message on page E-7](#) after entering the name.



NOTE If your application allows you to set a device name, this takes precedence over the Bluetooth Friendly Name.



Bluetooth Friendly Name

Discoverable Mode

Select a discoverable mode based on the device initiating discovery:

- Select **General Discoverable Mode** when initiating connection from a PC.
- Select **Limited Discoverable Mode** when initiating connection from a mobile device (e.g., Zebra Q), and the device does not appear in General Discoverable Mode. Note that it can take longer to discover the device in this mode.

The device remains in Limited Discoverable Mode for 30 seconds, and green LEDs flash while in this mode. It is then non-discoverable. To re-active Limited Discoverable Mode, press the trigger.



***General Discoverable Mode**



Limited Discoverable Mode

HID Host Parameters

The scanner supports keyboard emulation over the Bluetooth HID profile. In this mode the scanner can interact with Bluetooth enabled hosts supporting the HID profile as a Bluetooth keyboard. Scanned data is transmitted to the host as keystrokes.

Following are the keyboard parameters supported by the HID host.

HID Country Keyboard Types (Country Codes)

Scan the bar code corresponding to the keyboard type.



***North American Standard Keyboards**



French Windows



German Windows



French Canadian Windows 98



Spanish Windows



Italian Windows

HID Country Keyboard Types (Country Codes - continued)



Swedish Windows



UK English Windows



Japanese Windows



French Canadian Windows 2000/XP



Portuguese/Brazilian Windows

HID Keyboard Keystroke Delay

This parameter sets the delay, in milliseconds, between emulated keystrokes. Scan a bar code below to increase the delay when the HID host requires a slower transmission of data.



***No Delay (0 msec)**



Medium Delay (20 msec)



Long Delay (40 msec)

HID CAPS Lock Override

When enabled, the case of the data is preserved regardless of the state of the caps lock key. This setting is always enabled for the “Japanese, Windows (ASCII)” keyboard type and can not be disabled.



***Do Not Override Caps Lock Key
(Disable)**



**Override Caps Lock Key
(Enable)**

HID Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is scanned, all bar code data is sent except for unknown characters, and no error beeps sound. When **Do Not Send Bar Codes With Unknown Characters** is scanned, bar codes containing at least one unknown character are not sent to the host, and an error beep sounds.



***Send Bar Codes With Unknown Characters
(Enable)**



**Do Not Send Bar Codes With Unknown Characters
(Disable)**

Emulate Keypad

When enabled, all characters are sent as ASCII sequences over the numeric keypad. For example, ASCII A is sent as "ALT make" 0 6 5 "ALT Break."



***Disable Keypad Emulation**



Enable Keypad Emulation

HID Keyboard FN1 Substitution

When enabled, this parameter allows replacement of any FN1 character in an EAN128 bar code with a Key Category and value chosen by the user. See [FN1 Substitution Values on page 5-15](#) to set the Key Category and Key Value.



***Disable Keyboard FN1 Substitution**



Enable Keyboard FN1 Substitution

HID Function Key Mapping

ASCII values under 32 are normally sent as control-key sequences. When this parameter is enabled, the keys in bold are sent in place of the standard key mapping (see [Table 8-2 on page 8-120](#). Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.



***Disable Function Key Mapping**



Enable Function Key Mapping

Simulated Caps Lock

When enabled, the scanner inverts upper and lower case characters on the scanner bar code as if the Caps Lock state is enabled on the keyboard. This inversion is done regardless of the current state of the keyboard Caps Lock state.



***Disable Simulated Caps Lock**



Enable Simulated Caps Lock

Convert Case

When enabled, the scanner converts all bar code data to the selected case.



***No Case Conversion**



Convert All to Upper Case



Convert All to LowerCase

Auto-reconnect Feature

When in SPP Master or Cradle Host mode, the scanner automatically tries to reconnect to a remote device when a disconnection occurs that is due to the radio losing communication. This can happen if the scanner goes out of range with the remote device, or if the remote device powers down. The scanner tries to reconnect for the period of time specified by the Reconnect Attempt Interval setting. During that time the green LED continues to blink.

If the auto-reconnect process fails due to page time-outs, the scanner sounds a page timeout beep (long low/long high) and enters low power mode. The auto-reconnect process can be re-started by pulling the scanner trigger.

If the auto-reconnect process fails because the remote device rejects the connection attempt, the scanner sounds a connection reject beep sequence (see [Wireless Beeper Definitions on page 4-3](#)) and deletes the remote pairing address. If this happens, a pairing bar code must be scanned to attempt a new connection to the remote device.

- ✓ **NOTE** If a bar code is scanned while the auto-reconnect sequence is in process, a transmission error beep sequence sounds and the data is not transmitted to the host. After a connection is reestablished, normal scanning operation returns. For error beep sequence definitions, see [Beeper Definitions on page 2-1](#).

The scanner has memory available for storing a remote Bluetooth address for each Master mode (SPP, Cradle). When switching between these modes, the scanner automatically tries to reconnect to the last device it was connected to in that mode.

- ✓ **NOTE** Switching between Bluetooth host types by scanning a host type bar code ([page 4-4](#)) causes the radio to be reset. Scanning is disabled during this time. It takes several seconds for the scanner to re-initialize the radio at which time scanning is enabled.

Reconnect Attempt Beep Feedback

When a scanner disconnects as it goes out of range, it immediately attempts to reconnect. While the scanner attempts to reconnect, the green LED continues to blink. If the auto-reconnect process fails, the scanner emits a page timeout beep (long low/long high) and stops blinking the LED. The process can be restarted by pulling the trigger.

The Beep on Reconnect Attempt feature is disabled by default. When enabled, the scanner emits 5 short high beeps every 5 seconds while the reconnection attempt is in progress.

Scan a bar code below to enable or disable Beep on Reconnect Attempt.



***Disable Beep on Reconnect Attempt**



Enable Beep on Reconnect Attempt

Reconnect Attempt Interval

When a scanner disconnects as it goes out of range, it immediately attempts to reconnect for the default time interval of 30 seconds. This time interval can be changed to one of the following options:

- 30 seconds
- 1 minute
- 5 minutes
- 30 minutes
- 1 hour
- Indefinitely.

To set the Reconnect Attempt Interval, scan one of the bar codes below



***Attempt to Reconnect for 30 Seconds**



Attempt to Reconnect for 1 Minute



Attempt to Reconnect for 5 Minutes

Reconnect Attempt Interval (continued)



Attempt to Reconnect for 30 Minutes



Attempt to Reconnect for 1 Hour

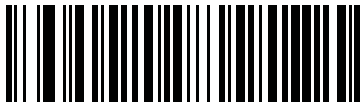


Attempt to Reconnect Indefinitely

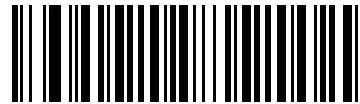
Auto-reconnect in Bluetooth Keyboard Emulation (HID Slave) Mode

In Bluetooth Keyboard Emulation (HID Slave) mode, select a re-connect option for when the scanner loses its connection with a remote device:

- **Auto-reconnect on Bar Code Data:** The scanner auto-reconnects when you scan a bar code. With this option, a delay can occur when transmitting the first characters. The scanner sounds a decode beep upon bar code scan, followed by a connection, a page timeout, a rejection beep, or a transmission error beep. Select this option to optimize battery life on the scanner and mobile device. Note that auto-reconnect does not occur on rejection and cable unplug commands.
- **Auto-reconnect Immediately:** When the scanner loses connection, it attempts to reconnect. If a page timeout occurs, the scanner attempts reconnect on a trigger pull. Select this option if the scanner's battery life is not an issue and you do not want a delay to occur when the first bar code is transmitted. Note that auto-reconnect does not occur on rejection and cable unplug commands.
- **Disable Auto-reconnect:** When the scanner loses connection, you must re-establish it manually.



*Auto-reconnect on Bar Code Data



Auto-reconnect Immediately



Disable Auto-reconnect

Out of Range Indicator

An out of range indicator can be set by scanning [Enable Beep on Reconnect Attempt on page 4-14](#) and extending the time using the [Reconnect Attempt Interval on page 4-15](#).

For example, with Beep on Reconnect Attempt disabled while the scanner loses radio connection when it is taken out of range, the scanner attempts to reconnect silently during the time interval set by scanning a Reconnect Attempt Interval.

When Beep on Reconnect Attempt is enabled, the scanner emits 5 high beeps every 5 seconds while the reconnection attempt is in progress. If the Reconnect Attempt Interval is adjusted to a longer period of time, such as 30 minutes, the scanner emits 5 high beeps every 5 seconds for 30 minutes providing an out of range indicator.

Scanner(s) To Cradle Support

Modes of Operation

The charging cradle with radio supports two radio communication modes of operation, allowing the scanner to communicate wirelessly:

- Point-to-Point
- Multipoint-to-Point.

Point-to-Point Communication

In Point-to-Point communication mode, the cradle allows one scanner to connect to it at a time. In this mode, the scanner is paired to the cradle either by insertion into the cradle (if pairing on contacts is enabled, [page 4-21](#)), or by scanning the **PAIR** bar code on the cradle. Communication can be locked, unlocked (default), or in a lock override state (see [Pairing Modes on page 4-20](#)). In locked mode, locking intervals must be set by scanning a connection maintenance interval bar code beginning on [page 4-23](#).

To activate this mode of operation, scan **Point-to-Point**.

Multipoint-to-Point Communication

In Multipoint-to-Point communication mode, up to three scanners can be paired to one cradle.

✓ **NOTE** To connect multiple LS4278 scanners to a single CR0078-P base using multipoint-to-point mode, consult your Zebra channel partner.

To activate this mode, the first scanner connected to the cradle must scan the **Multipoint-to-Point** bar code. This mode allows a parameter broadcast ([page 4-19](#)) feature that forwards parameter bar code settings to all connected scanners. In this mode, programming one scanner applies the settings to all connected scanners.

To select Point-to-Point or Multipoint-to-Point mode, scan the appropriate bar code.



Multipoint-to-Point Mode



***Point-to-Point Mode**

Parameter Broadcast (Cradle Host Only)

When in multipoint-to-point mode, enable Parameter Broadcast to broadcast all parameter bar codes scanned to all other scanners in the piconet. If disabled, parameter bar codes are processed by the individual scanner only, and the scanner ignores parameters broadcast from other scanners or from the cradle.



***Enable Parameter Broadcast**



Disable Parameter Broadcast

Pairing

Pairing is the process by which a scanner initiates communication with a cradle. Scanning **Multipoint-to-Point** activates multi scanner-to-cradle operation and allows up to three scanners to pair to one cradle. The cradle includes a pairing bar code.

To pair the scanner with the cradle, scan the pairing bar code on the cradle. A high/low/high/low beep sequence indicates that the pairing bar code was decoded. When a connection between the cradle and scanner is established, a low/high beep sounds.



- NOTE**
1. The pairing bar code that connects the scanner to a cradle is unique to each cradle.
 2. Do not scan data or parameters until pairing completes.
 3. When the scanner is paired to the cradle in SPP Master or Cradle Host mode, the scanner automatically tries to reconnect to a remote device when a disconnection occurs that is due to the radio losing communication. For more information see [Auto-reconnect Feature on page 4-14](#).

Pairing Modes

When operating with the cradle, two modes of pairing are supported:

- **Locked Pairing Mode** - When a cradle is paired (connected) to the scanner (or to three scanners in Multipoint-to-Point mode), any attempt to connect a different scanner, by either scanning the **PAIR** bar code on the cradle or by inserting it into the cradle with the pairing on contacts feature enabled ([page 4-21](#)), is rejected. The currently connected scanner(s) maintain connection. In this mode, you must set a [Connection Maintenance Interval on page 4-23](#).
- **Unlocked Pairing Mode** - Pair (connect) a new scanner to a cradle at any time by either scanning the **PAIR** bar code on the cradle or by inserting it into the cradle with the pairing on contacts feature enabled. This unpairs the previous scanner from the cradle (Point-to-Point mode only).



NOTE In Multipoint-to-Point mode, pairing a fourth scanner while in Unlocked Pairing Mode replaces any disconnected (out of range) scanner. However, if three scanners are actively connected to the cradle, a fourth scanner cannot connect unless you first disconnect one of the original scanners by scanning the Unpair bar code.

To set the cradle pairing mode, scan the appropriate bar code below.



***Unlocked Pairing Mode**



Locked Pairing Mode

Lock Override

Lock Override overrides a locked scanner base pairing and connects a new scanner. In Multipoint-to-Point mode, this unpairs any disconnected (out of range) scanner first, in order to connect the new scanner.

To use **Lock Override**, scan the bar code below, followed by the pairing bar code on the cradle.



LockOverride

Pairing Methods

There are two pairing methods. The default method allows the scanner and cradle to pair (connect) when the pairing bar code on the cradle is scanned. A second method pairs the scanner and cradle when the scanner is inserted in the cradle. To enable this feature, scan **Enable Pair On Contacts** below. With this feature enabled it is not necessary to scan the pairing bar code on the cradle. If the pairing is successful, a low/high connection beep sequence sounds a few seconds after the scanner is placed in the cradle. See [Wireless Beeper Definitions on page 4-3](#) for other beep sequences.

To enable or disable pairing on contacts, scan the appropriate bar code below.



Enable Pair On Contacts



***Disable Pair on Contacts**

Unpairing

Unpair the scanner from the cradle or PC/host to make the cradle available for pairing with another scanner. Scan the bar code below to disconnect the scanner from its cradle/PC host.

An unpairing bar code is also included in the *LS4278 Quick Reference Guide*.



Unpairing

Pairing Bar Code Format

When the scanner is configured as an SPP Master, you must create a pairing bar code for the remote Bluetooth device to which the scanner can connect. The Bluetooth address of the remote device must be known. Pairing bar codes are Code 128 bar codes and are formatted as follows:

<Fnc 3>Bxxxxxxxxxxxx

where:

- **B** (or **LNKB**) is the prefix
- **xxxxxxxxxxxx** represents the 12-character Bluetooth address.

Pairing Bar Code Example

If the remote device to which the scanner can connect has a Bluetooth address of 11:22:33:44:55:66, then the pairing bar code is:



Connection Maintenance Interval

- ✓ **NOTE** The Connection Maintenance Interval only applies in locked pairing mode (see [page 4-20](#)).

When a scanner disconnects from a cradle due to a Link Supervision Timeout, the scanner immediately attempts to reconnect to the cradle for 30 seconds. If the auto-reconnect process fails, it can be restarted by pulling the scanner trigger.

To guarantee that a disconnected scanner can reconnect when it comes back in range, the cradle reserves the connection for that scanner for a period of time defined by the Connection Maintenance Interval. If the cradle is supporting the maximum three scanners and one scanner disconnects, a fourth scanner cannot pair to the cradle during this interval. To connect another scanner: either wait until the connection maintenance interval expires then scan the **PAIR** bar code on the cradle with the new scanner; or, scan **Lock Override** ([page 4-20](#)) with the new scanner then scan the **PAIR** bar code on the cradle.

- ✓ **NOTE** When the cradle supports the maximum three scanners, it stores the remote pairing address of each scanner in memory regardless of the scanner condition (e.g., discharged battery). When you want to change the scanners paired to the cradle, unpair each scanner currently connected to the cradle by scanning the [Unpairing](#) bar code prior and reconnect each appropriate scanner by scanning the PAIR bar code on the cradle.

Connection Maintenance Interval options are:

- 15 minutes
- 30 minutes
- One hour
- Two hours
- Four hours
- Eight hours
- 24 hours
- Indefinitely.

Considerations

The system administrator determines the Connection Maintenance Interval. A shorter interval allows new users to gain access to abandoned connections more quickly, but causes problems if users leave the work area for extended periods. A longer interval allows existing users to leave the work area for longer periods of time, but ties up the system for new users.

To avoid this conflict, users who are going off-shift can scan the unpair bar code on [page 4-21](#) to ignore the Connection Maintenance Interval and make the connection immediately available.

To set the Connection Maintenance Interval, scan one of the bar codes below



***Set Interval to 15 Minutes**



Set Interval to 30 Minutes



Set Interval to 60 Minutes



Set Interval to 2 Hours



Set Interval to 4 Hours



Set Interval to 8 Hours



Set Interval to 24 Hours



Set Interval to Forever

Bluetooth Security

The scanner supports Bluetooth Authentication and Encryption. Authentication can be requested by either the remote device or the scanner. When Authentication is requested, the scanner uses its programmed PIN code to generate a link key. Once Authentication is complete, either device may then negotiate to enable Encryption.

✓ **NOTE** A remote device can still request Authentication.

Authentication

To force Authentication with a remote device (including the cradle), scan the **Enable Authentication** bar code below. To prevent the scanner from forcing Authentication, scan the **Disable Authentication** bar code below.



Enable Authentication



***Disable Authentication**

PIN Code

To set the PIN code (e.g., password) on the scanner, scan the bar code below followed by five alphanumeric programming bar codes (see [Appendix E, Alphanumeric Bar Codes](#)). The default PIN code is **12345**.

If the scanner communicates with a cradle with security enabled, synchronize the PIN codes on the scanner and cradle. To achieve this, connect the scanner to the cradle when setting the PIN codes. If the scanner is not connected to a cradle, the PIN code change only takes effect on the scanner. If security is required between the scanner and cradle, and the PIN codes do not match, pairing fails. If the PIN codes are not synchronized, re-synchronize them by disabling security, establishing a connection to the cradle, and then programming a new PIN code.



Set PIN Code

Variable PIN Code

The default PIN code is the user-programmed Static PIN Code. Typically, however, HID connections require entering a Variable PIN Code. If, when attempting connection, the application presents a text box that includes a PIN, scan the **Variable PIN Code** bar code, then re-attempt connection. When you hear a beep indicating the scanner is waiting for an alphanumeric entry, enter the provided variable PIN using the [Alphanumeric Bar Codes on page E-1](#), then scan [End of Message on page E-7](#) if the code is less than 16 characters. The scanner discards the variable PIN code after connection.



***Static PIN Code**



Variable PIN Code

Encryption

✓ **NOTE** Authentication must be performed before Encryption can take effect.

To set up the scanner for enabling Encryption, scan **Enable Encryption**. To prevent the scanner from enabling Encryption, scan **Disable Encryption**. When enabled, the radio encrypts data.



Enable Encryption



*** Disable Encryption**

Chapter 5 User Preferences

Introduction

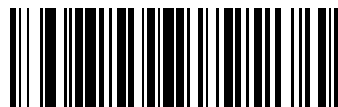
If desired, program the scanner to perform various functions, or activate different features. This chapter describes each user preference feature and provides the programming bar codes necessary for selecting these features.

The scanner ships with the settings shown in the [User Preferences Default Table on page 5-2](#) (also see [Appendix A, Standard Default Parameters](#) for all host device and miscellaneous defaults). If the default values suit requirements, programming may not be necessary.

To set feature values, scan a single bar code or a short bar code sequence. The settings are stored in non-volatile memory and are preserved even when the scanner is powered down.

If not using a Synapse or USB cable, select a host type (see each host chapter for specific host information) after the power-up beeps sound. This is only necessary upon the first power-up when connected to a new host.

To return all features to their default values, see [Default Parameters on page 5-3](#). Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default — ***High Frequency** — Feature/Option

Scanning Sequence Examples

In most cases, scanning one bar code sets the parameter value. For example, to set the beeper tone to high, scan the **High Frequency** (beeper tone) bar code listed under [Beeper Tone on page 5-4](#). The scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

Other parameters, such as **Serial Response Time-Out** or **Data Transmission Formats**, require scanning several bar codes. See these parameter descriptions for this procedure.

Errors While Scanning

Unless otherwise specified, when an error is made during a scanning sequence, just re-scan the correct parameter.

User Preferences Parameter Defaults

[Table 5-1](#) lists the defaults for user preferences parameters. To change any option, scan the appropriate bar code(s) provided in the User Preferences section beginning on [page 5-3](#).

✓ **NOTE** See [Appendix A, Standard Default Parameters](#) for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 5-1 User Preferences Default Table

| Parameter | Default | Page Number |
|----------------------------------|----------------------------|----------------------|
| User Preferences | | |
| Beeper Tone | Medium | 5-4 |
| Beeper Volume | High | 5-4 |
| Beep on Insertion | Enabled | 5-5 |
| Power Mode | Reduced Power Mode | 5-7 |
| Time Delay to Reduced Power Mode | 1 sec | 5-8 |
| Intellistand Idle Timeout | 15 min | 5-5 |
| Scan Pattern | Multi-line Always Raster | 5-9 |
| Scan Line Width | Full Width | 5-10 |
| Laser On Time | 3.0 sec | 5-10 |
| Beep After Good Decode | Enable | 5-11 |
| Transmit Code ID Character | None | 5-12 |
| Prefix Value | 7013 <CR><LF> | 5-13 |
| Suffix Value | 7013 <CR><LF> | 5-13 |
| Scan Data Transmission Format | Data as is | 5-15 |
| FN1 Substitution Values | Set | 5-15 |
| Transmit "No Read" Message | Disable | 5-15 |
| Synapse Interface | Standard | 5-16 |
| Batch Mode | Normal (Do Not Batch Data) | 5-17 |

User Preferences

Default Parameters

The scanner can be reset to two types of defaults: factory defaults or custom defaults. Scan the appropriate bar code below to reset the scanner to its default settings and/or set the scanner's current settings as the custom default.

- **Restore Defaults** - Resets all default parameters as follows:
 - If custom default values were configured (see **Write to Custom Defaults**), the custom default values are set for all parameters each time the **Restore Defaults** bar code below is scanned.
 - If no custom default values were configured, the factory default values are set for all parameters each time the **Restore Defaults** bar code below is scanned. (For factory default values, see [Table A-1](#) beginning on [page A-1.](#))
- **Set Factory Defaults** - Scan the **Set Factory Defaults** bar code below to eliminate all custom default values and set the scanner to factory default values. (For factory default values, see [Table A-1](#) beginning on [page A-1.](#))
- **Write to Custom Defaults** - Custom default parameters can be configured to set unique default values for all parameters. After changing all parameters to the desired default values, scan the **Write to Custom Defaults** bar code below to configure custom defaults.



***Restore Defaults**



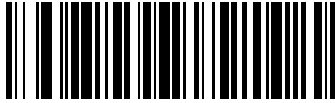
Set Factory Defaults



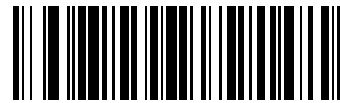
Write to Custom Defaults

Beeper Tone

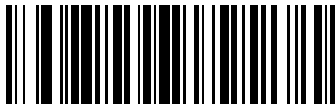
To select a decode beep frequency (tone), scan the **Low Frequency**, **Medium Frequency**, or **High Frequency** bar code.



Low Frequency



***Medium Frequency
(Optimum Settings)**



High Frequency

Beeper Volume

To select a beeper volume, scan the **Low Volume**, **Medium Volume**, or **High Volume** bar code.



Low Volume



Medium Volume



***High Volume**

Beep on Insertion

When a scanner is inserted into a cradle and detects power, it emits a short low beep. This feature is enabled by default.

To enable or disable beeping on insertion, scan the appropriate bar code below.



***Enable Beep on Insertion**



Disable Beep on Insertion

Intellistand Idle Timeout

While in Intellistand, the scanner enters low power mode when no bar code is decoded within 15 minutes. In the stand, this low power mode is called Intellistand Idle Timeout.

The default Intellistand idle timeout is 15 minutes. The Intellistand idle timeout can be set to the following intervals:

- 5 minutes
- 10 minutes
- 15 minutes (default)
- 30 minutes
- 1 hour
- 2 hours.

✓ **NOTE** When the scanner enters Intellistand Idle Timeout (low power mode in the stand), scanning capability suspends. To restart scanning capability, press the trigger or remove the scanner and replace it into the stand.

Scan a bar code below to set the Intellistand idle timeout interval.

Intellistand Idle Timeout (continued)



5 min



10 min



***15 min**



30 min



1 hour



2 hours

Power Mode

This parameter determines whether or not power remains on after a decode attempt. When in reduced power mode, the scanner enters into a low power consumption mode to preserve battery life after each decode attempt. When in continuous power mode, power remains on after each decode attempt.



Continuous On



***Reduced Power Mode**

Time Delay to Reduced Power Mode

This parameter sets the time it takes the scanner to enter reduced power mode after any scanning activity. Scan the appropriate bar code below to set the time.



***1 sec**



2 secs



3 secs



4 secs

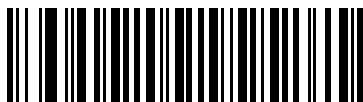


5 secs

Scan Pattern

This parameter determines the pattern (mode) of scanning. Scan the appropriate bar code below to set the scanning mode.

- **Single-line Only** - Scan **Single-line Only** for a single-line scan mode. The laser has no up and down scan line movement (no raster). (For an example of a single-line scan, see [Figure 2-2 on page 2-4.](#))
- **Multi-line Smart Raster** - Scan **Multi-line Smart Raster** for a scan line begins as a single line and moves up and down (rasters) when a partial scan of a bar code is detected, or no bar code is decoded 500 ms after the trigger is pulled. Upon seeing a stacked GS1 DataBar code, the scanner immediately rasters. (For an example of a multi-line scan, see [Figure 2-3 on page 2-5.](#))
- **Multi-line Always Raster** (default) - Scan **Multi-line Always Raster** for rastering (up and down scan line movement) to begin immediately.



**Single-line Only
(No Raster)**



Multi-line Smart Raster



***Multi-line Always Raster**

Scan Line Width

Scan a bar code below to set the scan line width.



***Full Width**



Medium Width



Small Width

Laser On Time

This parameter sets the maximum time that decode processing continues during a scan attempt. It is programmable in 0.1 second increments from 0.5 to 9.9 seconds. The default Laser On Time is 3.0 seconds.

To set a Laser On Time, scan the bar code below. Next, scan two numeric bar codes beginning on [page D-1](#) in [Appendix D, Numeric Bar Codes](#) that correspond to the desired on time. Single digit numbers must have a leading zero. For example, to set an On Time of 0.5 seconds, scan the bar code below, then scan the “0” and “5” bar codes. If an error is made, or the selection needs to be changed, scan **Cancel** on [page D-3](#).



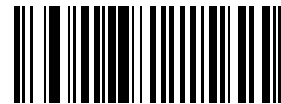
Laser On Time

Beep After Good Decode

Scan a bar code below to select whether or not the scanner beeps after a good decode. If **Do Not Beep After Good Decode** is selected, the beeper still operates during parameter menu scanning and indicates error conditions.



***Beep After Good Decode
(Enable)**



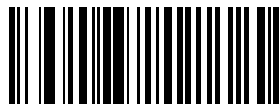
**Do Not Beep After Good Decode
(Disable)**

Transmit Code ID Character

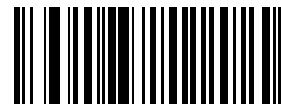
A Code ID character identifies the code type of a scanned bar code. This is useful when the scanner is decoding more than one code type. In addition to any single character prefix already selected, the Code ID character is inserted between the prefix and the decoded symbol.

Select no Code ID character, a Symbol Code ID character, or an AIM Code ID character. For Code ID Characters, see [Symbol Code Identifiers on page B-1](#) and [AIM Code Identifiers on page B-2](#).

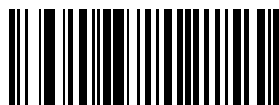
- ✓ **NOTE** If you enable Symbol Code ID Character or AIM Code ID Character, and enable [Transmit "No Read" Message on page 5-15](#), the scanner appends the code ID for Code 39 to the NR message.



Symbol Code ID Character



AIM Code ID Character



*None

Prefix/Suffix Values

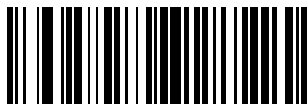
A prefix and/or suffix can be appended to scan data for use in data editing.

To set a value for a prefix or suffix:

1. Change the scan data format by scanning the appropriate [Scan Data Transmission Format on page 5-13](#).
2. Scan the appropriate prefix/suffix bar code on [page 5-13](#).
3. Scan a four-digit number (i.e., four bar codes from [Appendix D, Numeric Bar Codes](#)) that corresponds to that value.

✓ **NOTE** When using host commands to set the prefix or suffix, set the key category parameter to 1, then set the 3-digit decimal value. See [Table F-1 on page F-1](#) for the four-digit codes.

4. To correct an error or change a selection, scan **Cancel** on [page D-3](#).



Scan Prefix



Scan Suffix

Scan Data Transmission Format

To change the scan data format, scan **Scan Options** and one of the following four bar codes corresponding to the desired format:

- **Data As Is**
- **<DATA> <SUFFIX>**
- **<PREFIX> <DATA>**
- **<PREFIX> <DATA> <SUFFIX>**.

Scan **Enter** on [page 5-14](#) to complete the change. To set values for the prefix and/or suffix, see [Prefix/Suffix Values on page 5-13](#). Scan **Data Format Cancel** on [page 5-14](#) to cancel the change.

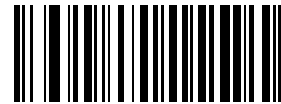
If a carriage return/enter is required after each scanned bar code, scan the following bar codes in order:

1. **Scan Options**
2. **<DATA> <SUFFIX>**
3. **Enter** (on [page 5-14](#)).

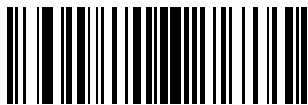
Scan Data Transmission Format (continued)



Scan Options



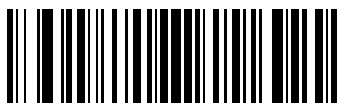
*Data As Is



<DATA> <SUFFIX>



<PREFIX> <DATA>



<PREFIX> <DATA> <SUFFIX>



Enter



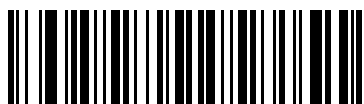
Data Format Cancel

FN1 Substitution Values

The Wedge and USB HID Keyboard hosts support an FN1 substitution feature. When enabled any FN1 character (0x1b) in an EAN128 bar code is substituted with a value. This value defaults to 7013 (Enter Key).

To select an FN1 substitution value via bar code menus:

1. Scan the bar code below.



***Set FN1 Substitution Value**

2. Look up the keystroke desired for FN1 Substitution in the [ASCII Value Standard Default Parameters Table on page F-1](#) for the currently installed host interface.
3. Enter the 4-digit substitution value by scanning each digit in [Appendix D, Numeric Bar Codes](#).

To correct an error or change the selection, scan **Cancel**.

To enable FN1 substitution for keyboard wedge, scan the **Enable FN1 Substitution** bar code on [page 6-10](#).

To enable FN1 Substitution for USB HID keyboard, scan the **Enable FN1 Substitution** bar code on [page 8-9](#).

Transmit “No Read” Message

Scan a bar code below to select whether or not to transmit a No Read message. Enable this to transmit the characters NR when a bar code does not decode. Disable this to send nothing to the host if a symbol does not decode.

- ✓ **NOTE** If you enable **Transmit No Read**, and also enable Symbol Code ID Character or AIM Code ID Character for [Transmit Code ID Character on page 5-12](#), the scanner appends the code ID for Code 39 to the NR message.



Enable No Read



***Disable No Read**

Synapse Interface

The auto-detection of a Synapse cable varies in duration depending on the type of Synapse connection. If a scanner is connected to another scanner using a Synapse cable, use the Auxiliary Synapse Port connection. In all other cases, where the cable is used, the default setting is recommended.

To disconnect and reconnect the scanner from a Synapse cable that is connected to a live host via a Synapse, use the "Plug and Play" setting. Do not change this setting from the default if an on-board wedge host is enabled.



***Standard Synapse Connection**



Auxiliary Synapse Port Connection



"Plug and Play" Synapse Connection

Batch Mode

The scanner supports three versions of batch mode. When the scanner is configured for any of the batch modes, it attempts to store bar code data (not parameter bar codes) until transmission is initialized, or the maximum number of bar codes are stored. When a bar code is saved successfully, a good decode beep sounds and the LED flashes green. If the scanner is unable to store a new bar code, a low/high/low/high out of memory beep sounds. (See pages 2-1, 2-3 and 4-3 for all beeper and LED definitions.)

In all modes, calculate the amount of data (number of bar codes) the scanner can store as follows:

$$\text{Number of storable bar codes} = 2,000 \text{ bytes of memory} / (\text{number of characters in the bar code} + 3).$$

Modes of Operation

- **Normal (default)** - Do not batch data. The scanner attempts to transmit every scanned bar code.
- **Out of Range Batch Mode** - The scanner starts storing bar code data when it loses its connection to a remote device (for example, when a user holding the scanner walks out of range). Data transmission is triggered by reestablishing the connection with the remote device (for example, when a user holding the scanner walks back into range).
- **Standard Batch Mode** - The scanner starts storing bar code data after **Enter Batch Mode** is scanned. Data transmission is triggered by scanning **Send Batch Data**.

✓ **NOTE** Transmission is halted if the connection to the remote device is lost.

- **Cradle Contact Batch Mode** - The scanner starts storing bar code data when **Enter Batch Mode** is scanned. Data transmission is triggered by insertion of the scanner into the cradle.

✓ **NOTE** If the scanner is removed from the cradle during batch data transfer, transmission halts until the scanner is re-inserted in the cradle.

In all modes, transmissions are halted if the scanner is moved out of range. The scanner resumes when it is back in range. If a bar code is scanned while batch data is transmitted it is appended to the end of the batched data; parameter bar codes are not stored.

Batch Mode (continued)



***Normal**



Out of Range Batch Mode



Standard Batch Mode



Cradle Contact Batch Mode



Enter Batch Mode



Send Batch Data

Chapter 6 Keyboard Wedge Interface

Introduction

This chapter provides instructions for programming the cradle for keyboard wedge host interface, used to connect the cradle between the keyboard and host computer. The scanner translates the bar code data into keystrokes, and transmits the information to the host computer via the cradle interface. The host computer accepts the keystrokes as if they originated from the keyboard.

This interface adds bar code reading functionality to a system designed for manual keyboard input. In this mode the keyboard keystrokes are simply passed through.

Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default ***North American** — Feature/Option

Connecting a Keyboard Wedge Interface

✓ **NOTE** See [Chapter 4, Radio Communications](#) for information about scanner/cradle pairing and wireless communication.

The scanner must be connected to the cradle for the host parameter setting to take effect. When the scanner is not connected to a cradle, and a host parameter bar code is scanned, a long low/long high beep sequence sounds.

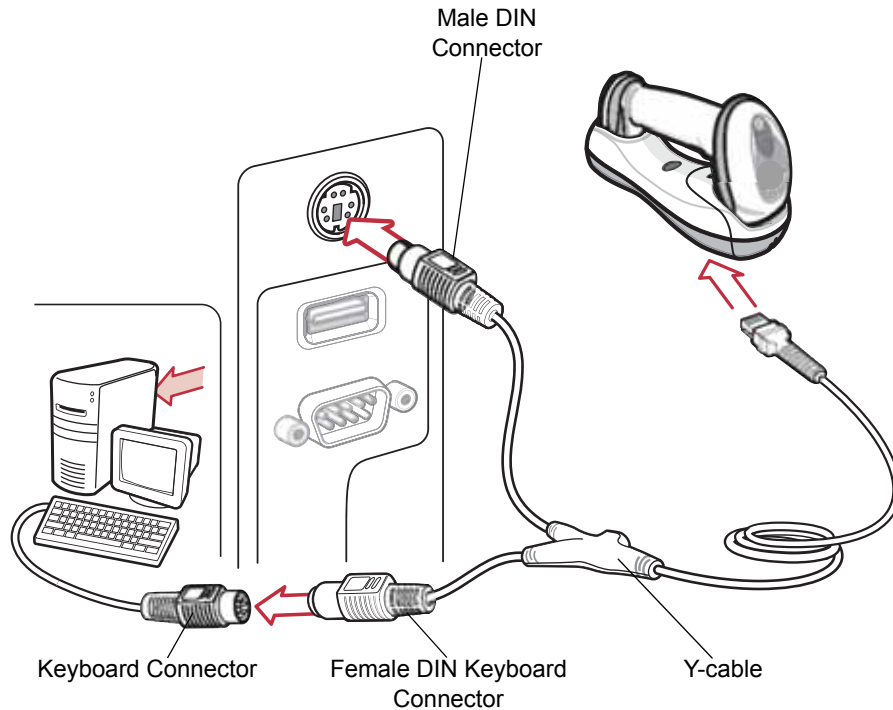


Figure 6-1 Keyboard Wedge Connection with Y-cable

To connect the Keyboard Wedge interface Y-cable:

1. Turn off the host and unplug the keyboard connector.
2. Attach the modular connector of the Y-cable to the host port on the bottom of the scanner cradle. See [Connecting the Cradle on page 1-6](#).
3. Connect the round male DIN host connector of the Y-cable to the keyboard port on the host device.
4. Connect the round female DIN keyboard connector of the Y-cable to the keyboard connector.
5. If needed, attach the optional power supply to the connector in the middle of the Y-cable.
6. Ensure that all connections are secure.
7. Turn on the host system.
8. Select the Keyboard Wedge host type by scanning the appropriate bar code from [Keyboard Wedge Host Parameters on page 6-4](#).
9. To modify any other parameter options, scan the appropriate bar codes in this chapter.

- ✓ **NOTE** Interface cables vary depending on configuration. The connectors illustrated in [Figure 6-1](#) are examples only. The connectors may be different than those illustrated, but the steps to connect the cradle remain the same.

If a power supply is used, disconnect the power supply before changing host cables or the cradle may not recognize the new host.

Keyboard Wedge Parameter Defaults

[Table 6-1](#) lists the defaults for Keyboard Wedge host parameters. To change any option, scan the appropriate bar code(s) in the Keyboard Wedge Host Parameters section beginning on [page 6-4](#).

- ✓ **NOTE** See [Appendix A, Standard Default Parameters](#) for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 6-1 Keyboard Wedge Host Default Table

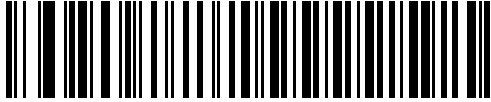
| Parameter | Default | Page Number |
|---------------------------------------|--|----------------------|
| Keyboard Wedge Host Parameters | | |
| Keyboard Wedge Host Type | IBM PC/AT& IBM PC Compatibles ¹ | 6-4 |
| Country Types (Country Codes) | North American | 6-5 |
| Ignore Unknown Characters | Send | 6-6 |
| Keystroke Delay | No Delay | 6-7 |
| Intra-Keystroke Delay | Disable | 6-7 |
| Alternate Numeric Keypad Emulation | Disable | 6-8 |
| Caps Lock On | Disable | 6-8 |
| Caps Lock Override | Disable | 6-9 |
| Convert Wedge Data | No Convert | 6-9 |
| Function Key Mapping | Disable | 6-10 |
| FN1 Substitution | Disable | 6-10 |
| Send and Make Break | Send | 6-11 |

¹User selection is required to configure this interface and this is the most common selection.

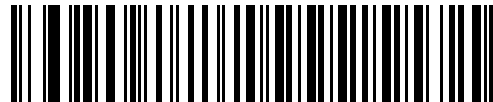
Keyboard Wedge Host Parameters

Keyboard Wedge Host Types

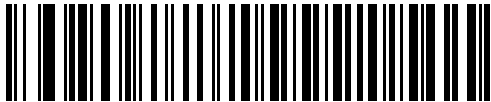
Select the Keyboard Wedge host by scanning one of the bar codes below.



IBM PC/AT & IBM PC Compatibles¹



IBM AT Notebook



NCR 7052



NOTE ¹User selection is required to configure this interface and this is the most common selection.

Keyboard Wedge Country Types (Country Codes)

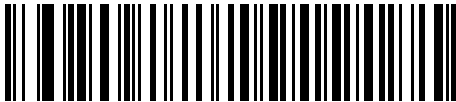
Scan the bar code corresponding to the keyboard type. If the keyboard type is not listed, see [Alternate Numeric Keypad Emulation on page 6-8](#).



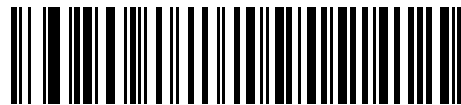
***North American**



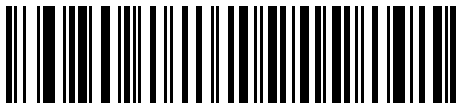
German Windows



French Windows



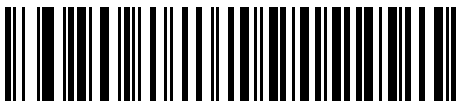
French Canadian Windows 95/98



French Canadian Windows XP/2000

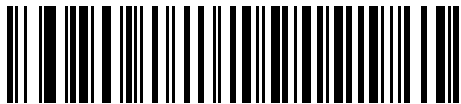


Spanish Windows



Italian Windows

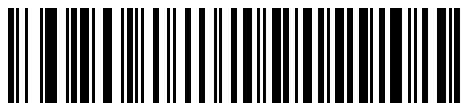
Keyboard Wedge Country Types (Country Codes continued)



Swedish Windows



UK English Windows



Japanese Windows



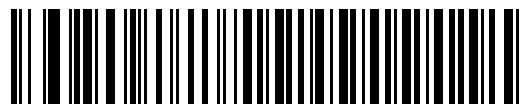
Portuguese-Brazilian Windows

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound on the scanner. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar code data is sent up to the first unknown character, then the scanner issues an error beep.



*Send Bar Codes with Unknown Characters



Do Not Send Bar Codes with Unknown Characters

Keystroke Delay

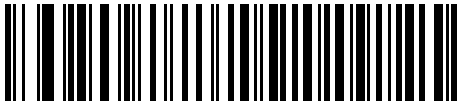
This is the delay in milliseconds between emulated keystrokes. Scan a bar code below to increase the delay when hosts require a slower transmission of data.



***No Delay**



Medium Delay (20 msec)



Long Delay (40 msec)

Intra-Keystroke Delay

When enabled, an additional delay is inserted between each emulated key depression and release. This sets the Keystroke Delay parameter to a minimum of 5 msec as well.



Enable Intra-Keystroke Delay



***Disable Intra-Keystroke Delay**

Alternate Numeric Keypad Emulation

This allows emulation of most other country keyboard types not listed in *Keyboard Wedge Country Types (Country Codes)* on page 6-5 in a Microsoft® operating system environment.



Enable Alternate Numeric Keypad



*Disable Alternate Numeric Keypad

Caps Lock On

When enabled, the scanner emulates keystrokes as if the Caps Lock key is always pressed. Note that if both **Caps Lock On** and **Caps Lock Override** are enabled, **Caps Lock Override** takes precedence



Enable Caps Lock On



*Disable Caps Lock On

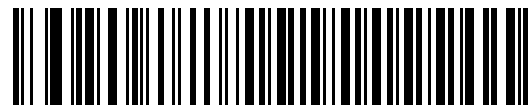
Caps Lock Override

When enabled, on AT or AT Notebook hosts, the keyboard ignores the state of the Caps Lock key. Therefore, an 'A' in the bar code is sent as an 'A' no matter what the state of the keyboard's Caps Lock key.

Note that if both **Caps Lock On** and **Caps Lock Override** are enabled, **Caps Lock Override** takes precedence.



Enable Caps Lock Override



***Disable Caps Lock Override**

Convert Wedge Data

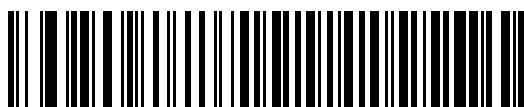
When enabled, the scanner converts all bar code data to the selected case.



Convert to Upper Case



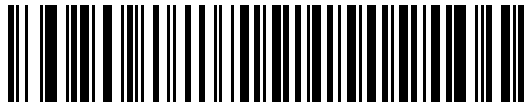
Convert to Lower Case



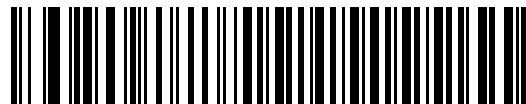
***No Convert**

Function Key Mapping

ASCII values under 32 are normally sent as control key sequences (see [Table 6-2 on page 6-13](#)). When this parameter is enabled, the keys in bold are sent in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.



Enable Function Key Mapping



***Disable Function Key Mapping**

FN1 Substitution

When enabled, the scanner replaces FN1 characters in an EAN128 bar code with a keystroke chosen by the user (see [FN1 Substitution Values on page 5-15](#)).



Enable FN1 Substitution



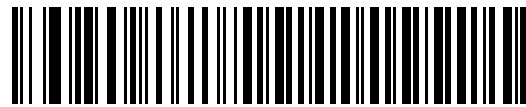
***Disable FN1 Substitution**

Send Make and Break

When enabled, the scan codes for releasing a key are not sent.



***Send Make and Break Scan Codes**



Send Make Scan Code Only

Keyboard Maps

The following keyboard maps are provided for prefix/suffix keystroke parameters. To program the prefix/suffix values, see the bar codes on [page 5-13](#).

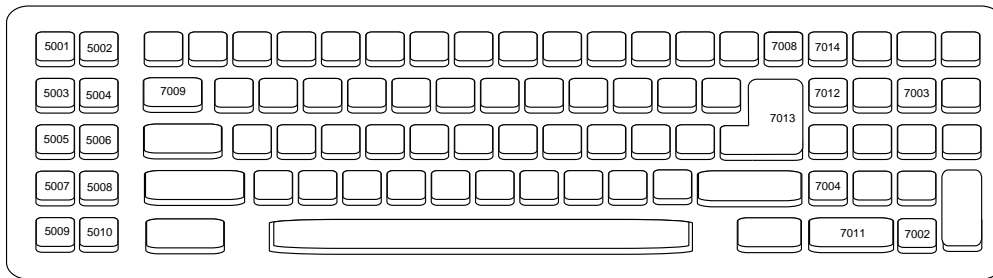


Figure 6-2 IBM PC/AT

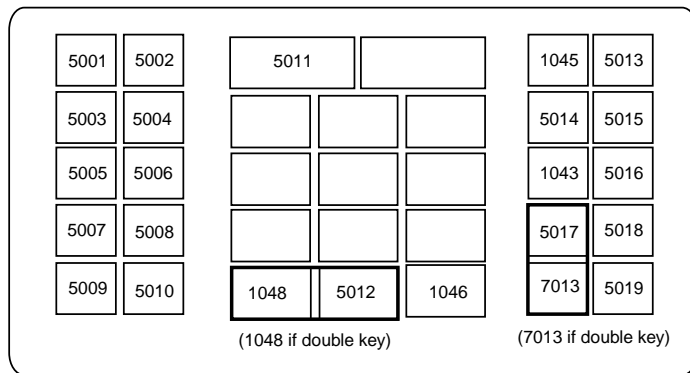


Figure 6-3 NCR 7052 32-KEY

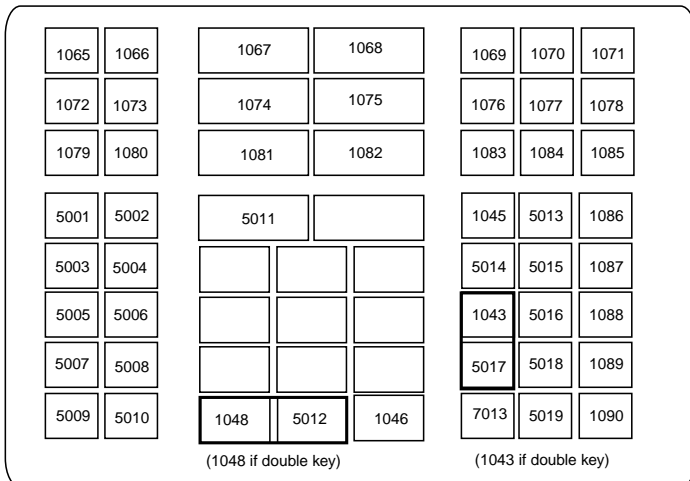


Figure 6-4 NCR 7052 58-KEY

ASCII Character Set for Keyboard Wedge

- ✓ **NOTE** Code 39 Full ASCII interprets the bar code special character (\$ + % /) preceding a Code 39 character and assigns an ASCII character value to the pair. For example, when Code 39 Full ASCII is enabled and a **+B** is scanned, it is interpreted as **b**, **%J** as **?**, and **%V** as **@**. Scanning **ABC%I** outputs the keystroke equivalent of **ABC >..**

Table 6-2 Keyboard Wedge ASCII Character Set

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|--|
| 1001 | \$A | CTRL A |
| 1002 | \$B | CTRL B |
| 1003 | \$C | CTRL C |
| 1004 | \$D | CTRL D |
| 1005 | \$E | CTRL E |
| 1006 | \$F | CTRL F |
| 1007 | \$G | CTRL G |
| 1008 | \$H | CTRL H/ BACKSPACE ¹ |
| 1009 | \$I | CTRL I/ HORIZONTAL TAB ¹ |
| 1010 | \$J | CTRL J |
| 1011 | \$K | CTRL K |
| 1012 | \$L | CTRL L |
| 1013 | \$M | CTRL M/ ENTER ¹ |
| 1014 | \$N | CTRL N |
| 1015 | \$O | CTRL O |
| 1016 | \$P | CTRL P |
| 1017 | \$Q | CTRL Q |
| 1018 | \$R | CTRL R |
| 1019 | \$S | CTRL S |
| 1020 | \$T | CTRL T |
| 1021 | \$U | CTRL U |

¹The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-2 Keyboard Wedge ASCII Character Set (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|----------------------------------|
| 1022 | \$V | CTRL V |
| 1023 | \$W | CTRL W |
| 1024 | \$X | CTRL X |
| 1025 | \$Y | CTRL Y |
| 1026 | \$Z | CTRL Z |
| 1027 | %A | CTRL [/ ESC ¹ |
| 1028 | %B | CTRL \ |
| 1029 | %C | CTRL] |
| 1030 | %D | CTRL 6 |
| 1031 | %E | CTRL - |
| 1032 | Space | Space |
| 1033 | /A | ! |
| 1034 | /B | " |
| 1035 | /C | # |
| 1036 | /D | \$ |
| 1037 | /E | % |
| 1038 | /F | & |
| 1039 | /G | ' |
| 1040 | /H | (|
| 1041 | /I |) |
| 1042 | /J | * |
| 1043 | /K | + |
| 1044 | /L | , |
| 1045 | - | - |
| 1046 | . | . |
| 1047 | /O | / |
| 1048 | 0 | 0 |
| 1049 | 1 | 1 |

¹The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-2 Keyboard Wedge ASCII Character Set (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1050 | 2 | 2 |
| 1051 | 3 | 3 |
| 1052 | 4 | 4 |
| 1053 | 5 | 5 |
| 1054 | 6 | 6 |
| 1055 | 7 | 7 |
| 1056 | 8 | 8 |
| 1057 | 9 | 9 |
| 1058 | /Z | : |
| 1059 | %F | ; |
| 1060 | %G | < |
| 1061 | %H | = |
| 1062 | %I | > |
| 1063 | %J | ? |
| 1064 | %V | @ |
| 1065 | A | A |
| 1066 | B | B |
| 1067 | C | C |
| 1068 | D | D |
| 1069 | E | E |
| 1070 | F | F |
| 1071 | G | G |
| 1072 | H | H |
| 1073 | I | I |
| 1074 | J | J |
| 1075 | K | K |
| 1076 | L | L |
| 1077 | M | M |

¹The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-2 Keyboard Wedge ASCII Character Set (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1078 | N | N |
| 1079 | O | O |
| 1080 | P | P |
| 1081 | Q | Q |
| 1082 | R | R |
| 1083 | S | S |
| 1084 | T | T |
| 1085 | U | U |
| 1086 | V | V |
| 1087 | W | W |
| 1088 | X | X |
| 1089 | Y | Y |
| 1090 | Z | Z |
| 1091 | %K | [|
| 1092 | %L | \ |
| 1093 | %M |] |
| 1094 | %N | ^ |
| 1095 | %O | _ |
| 1096 | %W | ' |
| 1097 | +A | a |
| 1098 | +B | b |
| 1099 | +C | c |
| 1100 | +D | d |
| 1101 | +E | e |
| 1102 | +F | f |
| 1103 | +G | g |
| 1104 | +H | h |
| 1105 | +I | i |

¹The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-2 Keyboard Wedge ASCII Character Set (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1106 | +J | j |
| 1107 | +K | k |
| 1108 | +L | l |
| 1109 | +M | m |
| 1110 | +N | n |
| 1111 | +O | o |
| 1112 | +P | p |
| 1113 | +Q | q |
| 1114 | +R | r |
| 1115 | +S | s |
| 1116 | +T | t |
| 1117 | +U | u |
| 1118 | +V | v |
| 1119 | +W | w |
| 1120 | +X | x |
| 1121 | +Y | y |
| 1122 | +Z | z |
| 1123 | %P | { |
| 1124 | %Q | |
| 1125 | %R | } |
| 1126 | %S | ~ |

¹The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table 6-3 Keyboard Wedge ALT Key Character Set

| ALT Keys | Keystroke |
|----------|-----------|
| 2065 | ALT A |
| 2066 | ALT B |
| 2067 | ALT C |
| 2068 | ALT D |
| 2069 | ALT E |

Table 6-3 Keyboard Wedge ALT Key Character Set (Continued)

| ALT Keys | Keystroke |
|----------|-----------|
| 2070 | ALT F |
| 2071 | ALT G |
| 2072 | ALT H |
| 2073 | ALT I |
| 2074 | ALT J |
| 2075 | ALT K |
| 2076 | ALT L |
| 2077 | ALT M |
| 2078 | ALT N |
| 2079 | ALT O |
| 2080 | ALT P |
| 2081 | ALT Q |
| 2082 | ALT R |
| 2083 | ALT S |
| 2084 | ALT T |
| 2085 | ALT U |
| 2086 | ALT V |
| 2087 | ALT W |
| 2088 | ALT X |
| 2089 | ALT Y |
| 2090 | ALT Z |

Table 6-4 Keyboard Wedge GIU Key Character Set

| GUI Keys | Keystrokes |
|----------|-------------------|
| 3000 | Right Control Key |
| 3048 | GUI 0 |
| 3049 | GUI 1 |
| 3050 | GUI 2 |
| 3051 | GUI 3 |
| 3052 | GUI 4 |
| 3053 | GUI 5 |

Table 6-4 Keyboard Wedge GIU Key Character Set (Continued)

| GUI Keys | Keystrokes |
|----------|------------|
| 3054 | GUI 6 |
| 3055 | GUI 7 |
| 3056 | GUI 8 |
| 3057 | GUI 9 |
| 3065 | GUI A |
| 3066 | GUI B |
| 3067 | GUI C |
| 3068 | GUI D |
| 3069 | GUI E |
| 3070 | GUI F |
| 3071 | GUI G |
| 3072 | GUI H |
| 3073 | GUI I |
| 3074 | GUI J |
| 3075 | GUI K |
| 3076 | GUI L |
| 3077 | GUI M |
| 3078 | GUI N |
| 3079 | GUI O |
| 3080 | GUI P |
| 3081 | GUI Q |
| 3082 | GUI R |
| 3083 | GUI S |
| 3084 | GUI T |
| 3085 | GUI U |
| 3086 | GUI V |
| 3087 | GUI W |
| 3088 | GUI X |
| 3089 | GUI Y |
| 3090 | GUI Z |

Table 6-5 *Keyboard Wedge F Key Character Set*

| F Keys | Keystroke |
|---------------|------------------|
| 5001 | F1 |
| 5002 | F2 |
| 5003 | F3 |
| 5004 | F4 |
| 5005 | F5 |
| 5006 | F6 |
| 5007 | F7 |
| 5008 | F8 |
| 5009 | F9 |
| 5010 | F10 |
| 5011 | F11 |
| 5012 | F12 |
| 5013 | F13 |
| 5014 | F14 |
| 5015 | F15 |
| 5016 | F16 |
| 5017 | F17 |
| 5018 | F18 |
| 5019 | F19 |
| 5020 | F20 |
| 5021 | F21 |
| 5022 | F22 |
| 5023 | F23 |
| 5024 | F24 |

Table 6-6 *Keyboard Wedge Numeric Keypad Character Set*

| Numeric Keypad | Keystroke |
|-----------------------|------------------|
| 6042 | * |
| 6043 | + |
| 6044 | undefined |
| 6045 | - |
| 6046 | . |
| 6047 | / |
| 6048 | 0 |
| 6049 | 1 |
| 6050 | 2 |
| 6051 | 3 |
| 6052 | 4 |
| 6053 | 5 |
| 6054 | 6 |
| 6055 | 7 |
| 6056 | 8 |
| 6057 | 9 |
| 6058 | Enter |
| 6059 | Num Lock |

Table 6-7 *Keyboard Wedge Extended Keypad Character Set*

| Extended Keypad | Keystroke |
|-----------------|--------------|
| 7001 | Break |
| 7002 | Delete |
| 7003 | Pg Up |
| 7004 | End |
| 7005 | Pg Dn |
| 7006 | Pause |
| 7007 | Scroll Lock |
| 7008 | Backspace |
| 7009 | Tab |
| 7010 | Print Screen |
| 7011 | Insert |
| 7012 | Home |
| 7013 | Enter |
| 7014 | Escape |
| 7015 | Up Arrow |
| 7016 | Dn Arrow |
| 7017 | Left Arrow |
| 7018 | Right Arrow |

Chapter 7 RS-232 Interface

Introduction

This chapter provides instructions for programming the cradle to interface with an RS-232 host interface. The RS-232 interface is used to attach the scanner cradle to point-of-sale devices, host computers, or other devices with an available RS-232 port (i.e., COM port).

If the particular host is not listed in Table 6-2, set the communication parameters to match the host device. Refer to the documentation for the host device.

- ✓ **NOTE** This scanner uses TTL RS-232 signal levels, which interface with most system architectures. For system architectures requiring RS-232C signal levels, Zebra offers different cables providing the TTL to RS-232C conversion. Contact Zebra Support for more information.

Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default *Baud Rate 57,600 Feature/Option

Connecting an RS-232 Interface

- ✓ **NOTE** See [Chapter 4, Radio Communications](#) for information about scanner/cradle pairing and wireless communication

The scanner must be connected to the cradle for the host parameter setting to take effect. When the scanner is not connected to a cradle, and a host parameter bar code is scanned, a long low/long high beep sequence sounds.

This connection is made directly from the cradle to the host computer.

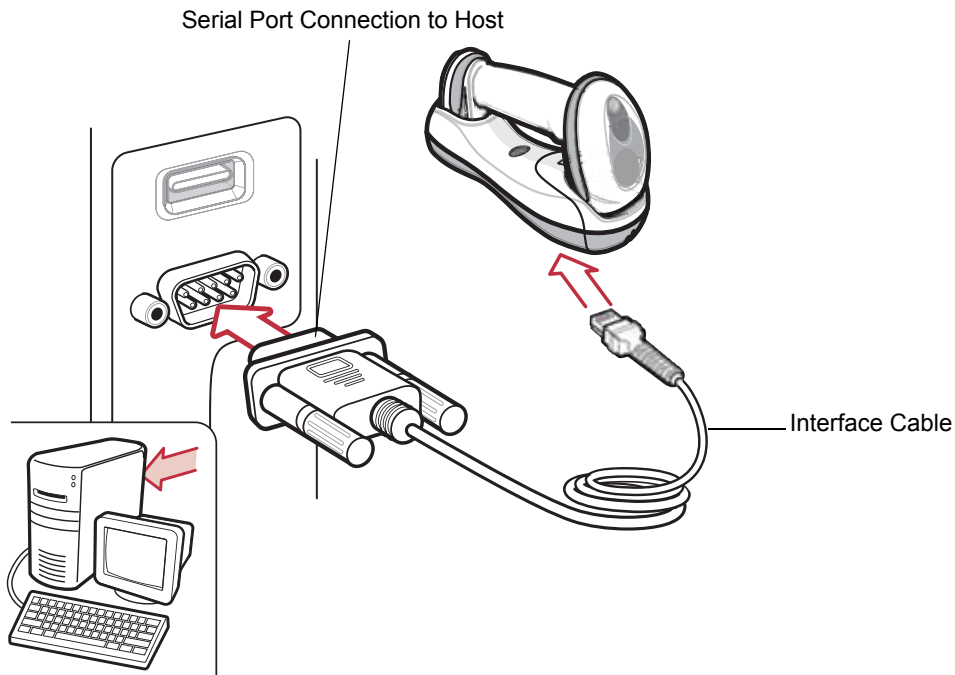


Figure 7-1 RS-232 Direct Connection

To connect the RS-232 interface:

1. Attach the modular connector of the RS-232 interface cable to the host port on the bottom of the scanner cradle (see [Connecting the Cradle on page 1-6](#)).
2. Connect the other end of the RS-232 interface cable to the serial port on the host.
3. Connect the power supply to the serial connector end of the RS-232 interface cable. Plug the power supply into an appropriate outlet.
4. Select the RS-232 host type by scanning the appropriate bar code from [RS-232 Host Types on page 7-6](#).
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

- ✓ **NOTE** Interface cables vary depending on configuration. The connectors illustrated in [Figure 7-1](#) are examples only. The connectors may be different than those illustrated, but the steps to connect the cradle remain the same.

If a power supply is used, disconnect the power supply before changing host cables or the cradle may not recognize the new host.

RS-232 Parameter Defaults

[Table 7-1](#) lists the defaults for RS-232 host parameters. If any option needs to be changed, scan the appropriate bar code(s) provided in the Parameter Descriptions section beginning on [page 7-4](#).

✓ **NOTE** See [Appendix A, Standard Default Parameters](#) for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 7-1 RS-232 Host Default Table

| Parameter | Default | Page Number |
|-------------------------------|------------------|----------------------|
| RS-232 Host Parameters | | |
| RS-232 Host Types | Standard | 7-6 |
| Baud Rate | 9600 | 7-7 |
| Parity Type | None | 7-8 |
| Stop Bit Select | 1 Stop Bit | 7-9 |
| Data Bits (ASCII Format) | 8-Bit | 7-9 |
| Check Receive Errors | Enable | 7-10 |
| Hardware Handshaking | None | 7-10 |
| Software Handshaking | None | 7-12 |
| Host Serial Response Time-out | 2 sec | 7-14 |
| RTS Line State | Low RTS | 7-15 |
| Beep on <BEL> | Disable | 7-15 |
| Intercharacter Delay | 0 msec | 7-16 |
| Nixdorf Beep/LED Options | Normal Operation | 7-17 |
| Ignore Unknown Characters | Send Bar Code | 7-17 |

RS-232 Host Parameters

Various RS-232 hosts are set up with their own parameter default settings ([Table 7-2](#)). Selecting the ICL, Fujitsu, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, Olivetti, Omron, or terminal sets the defaults listed below.

Table 7-2 Terminal Specific RS-232

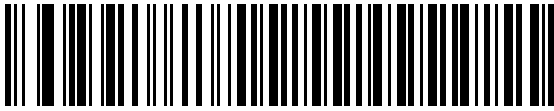
| Parameter | Standard (Default) | ICL | Fujitsu | Wincor-Nixdorf Mode A | Wincor-Nixdorf Mode B/OPOS | Olivetti | Omron |
|--------------------------|--------------------|------------------|-------------|-----------------------|----------------------------|--------------------|-------------|
| Transmit Code ID | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Data Transmission Format | Data as is | Data/Suffix | Data/Suffix | Data/Suffix | Data/Suffix | Prefix/Data/Suffix | Data/Suffix |
| Suffix | CR/LF (7013) | CR (1013) | CR (1013) | CR (1013) | CR (1013) | ETX (1002) | CR (1013) |
| Baud Rate | 9600 | 9600 | 9600 | 9600 | 9600 | 9600 | 9600 |
| Parity | None | Even | None | Odd | Odd | Even | None |
| Hardware Handshaking | None | RTS/CTS Option 3 | None | RTS/CTS Option 3 | RTS/CTS Option 3 | None | None |
| Software Handshaking | None | None | None | None | None | Ack/Nak | None |
| Serial Response Time-out | 2 sec. | 9.9 sec. | 2 sec. | 9.9 sec. | 9.9 sec. | 9.9 sec. | 9.9 sec. |
| Stop Bit Select | One | One | One | One | One | One | One |
| ASCII Format | 8-Bit | 8-Bit | 8-Bit | 8-Bit | 8-Bit | 7-Bit | 8-Bit |
| Beep On <BEL> | Disable | Disable | Disable | Disable | Disable | Disable | Disable |
| RTS Line State | Low | High | Low | Low | Low = No data to send | Low | High |
| Prefix | None | None | None | None | None | STX (1003) | None |

***In the Nixdorf Mode B, if CTS is Low, scanning is disabled. When CTS is High, the user can scan bar codes.**

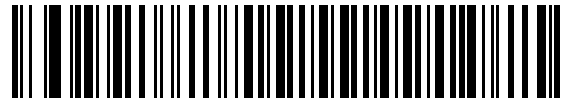
****If Nixdorf Mode B is scanned without the cradle connected to the proper host, the scanner may appear unable to scan. If this happens, scan a different RS-232 host type within 5 seconds of cycling power to the cradle.**

RS-232 Host Types

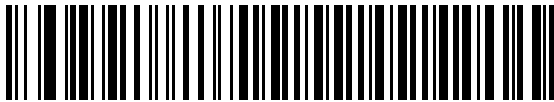
To select an RS-232 host interface, scan one of the following bar codes.



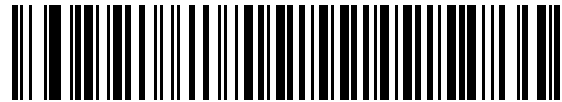
***Standard RS-232**



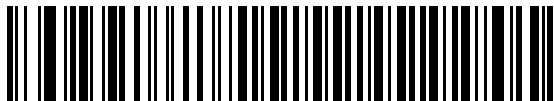
ICL RS-232



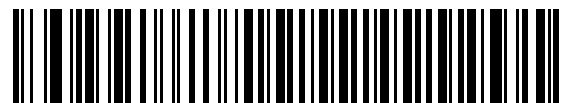
Wincor-Nixdorf RS-232 Mode A



Wincor-Nixdorf RS-232 Mode B



Olivetti ORS4500



Omron



OPOS/JPOS



Fujitsu RS-232

Baud Rate

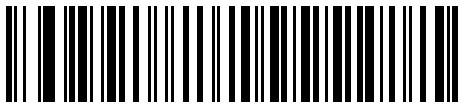
Baud rate is the number of bits of data transmitted per second. Set the scanner's baud rate to match the baud rate setting of the host device. Otherwise, data may not reach the host device or may reach it in distorted form.



Baud Rate 600



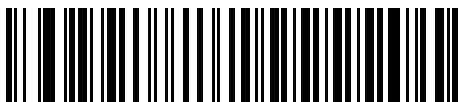
Baud Rate 1200



Baud Rate 2400



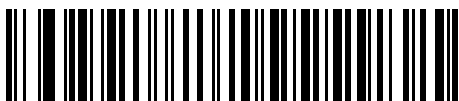
Baud Rate 4800



***Baud Rate 9600**



Baud Rate 19,200



Baud Rate 38,400

Parity

A parity check bit is the most significant bit of each ASCII coded character. Select the parity type according to host device requirements.

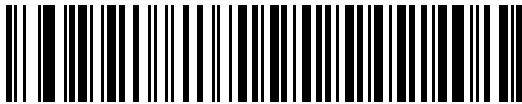
- Select **Odd** parity and the parity bit value is set to 0 or 1, based on data, to ensure that an odd number of 1 bits are contained in the coded character.
- Select **Even** parity and the parity bit value is set to 0 or 1, based on data, to ensure that an even number of 1 bits are contained in the coded character.
- Select **Mark** parity and the parity bit is always 1.
- Select **Space** parity and the parity bit is always 0.
- Select **None** when no parity bit is required.



Odd



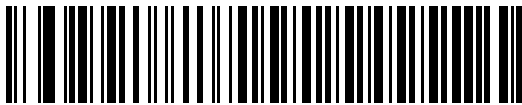
Even



Mark



Space



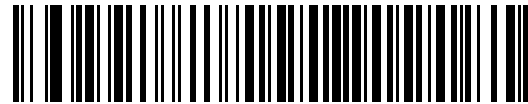
***None**

Stop Bit Select

The stop bit(s) at the end of each transmitted character marks the end of transmission of one character and prepares the receiving device for the next character in the serial data stream. The number of stop bits selected (one or two) depends on the number the receiving terminal is programmed to accommodate. Set the number of stop bits to match host device requirements.



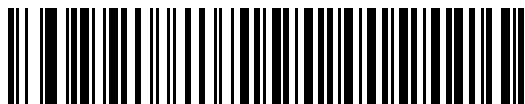
***1 Stop Bit**



2 Stop Bits

Data Bits (ASCII Format)

This parameter allows the scanner to interface with devices requiring a 7-bit or 8-bit ASCII protocol.



7-Bit



***8-Bit**

Check Receive Errors

Select whether or not the parity, framing, and overrun of received characters are checked. The parity value of received characters is verified against the parity parameter selected above.



***Check For Received Errors
(Enable)**



**Do Not Check For Received Errors
(Disable)**

Hardware Handshaking

The data interface consists of an RS-232 port designed to operate either with or without the hardware handshaking lines, *Request to Send* (RTS), and *Clear to Send* (CTS).

If Standard RTS/CTS handshaking is not selected, scan data is transmitted as it becomes available. If Standard RTS/CTS handshaking is selected, scan data is transmitted according to the following sequence:

- The scanner reads the CTS line for activity. If CTS is asserted, the scanner waits up to Host Serial Response Time-out for the host to de-assert the CTS line. If, after Host Serial Response Time-out, the CTS line is still asserted, the scanner sounds a transmit error, and any scanned data is lost.
- When the CTS line is de-asserted, the scanner asserts the RTS line and waits up to Host Serial Response Time-out for the host to assert CTS. When the host asserts CTS, data is transmitted. If, after Host Serial Response Time-out, the CTS line is not asserted, the scanner sounds a transmit error, and discards the data.
- When data transmission is complete, the scanner de-asserts RTS 10 msec after sending the last character.
- The host should respond by negating CTS. The scanner checks for a de-asserted CTS upon the next transmission of data.

During the transmission of data, the CTS line should be asserted. If CTS is de-asserted for more than 50 ms between characters, the transmission is aborted, the scanner sounds a transmission error, and the data is discarded.

If the above communication sequence fails, the scanner issues an error indication. In this case, the data is lost and must be rescanned.

If Hardware Handshaking and Software Handshaking are both enabled, Hardware Handshaking takes precedence.

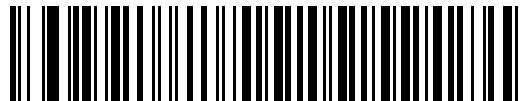
✓ **NOTE** The DTR signal is jumpered to the active state.

Hardware Handshaking (continued)

- **None:** Scan the bar code below if no Hardware Handshaking is desired.
- **Standard RTS/CTS:** Scan the bar code below to select Standard RTS/CTS Hardware Handshaking.
- **RTS/CTS Option 1:** When RTS/CTS Option 1 is selected, the scanner asserts RTS before transmitting and ignores the state of CTS. The scanner de-asserts RTS when the transmission is complete.
- **RTS/CTS Option 2:** When Option 2 is selected, RTS is always high or low (user-programmed logic level). However, the scanner waits for CTS to be asserted before transmitting data. If CTS is not asserted within Host Serial Response Time-out, the scanner issues an error indication and discards the data.
- **RTS/CTS Option 3:** When Option 3 is selected, the scanner asserts RTS prior to any data transmission, regardless of the state of CTS. The scanner waits up to Host Serial Response Time-out for CTS to be asserted. If CTS is not asserted during this time, the scanner issues an error indication and discards the data. The scanner de-asserts RTS when transmission is complete.



***None**



Standard RTS/CTS



RTS/CTS Option 1



RTS/CTS Option 2



RTS/CTS Option 3

Software Handshaking

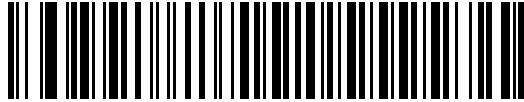
This parameter offers control of the data transmission process in addition to, or instead of, that offered by hardware handshaking. There are five options.

If Software Handshaking and Hardware Handshaking are both enabled, Hardware Handshaking takes precedence.

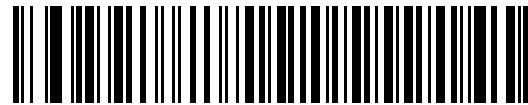
- **None:** When this option is selected, data is transmitted immediately. No response is expected from host.
- **ACK/NAK:** When this option is selected, after transmitting data, the scanner expects either an ACK or NAK response from the host. When a NAK is received, the scanner transmits the same data again and waits for either an ACK or NAK. After three unsuccessful attempts to send data when NAKs are received, the scanner issues an error indication and discards the data.

The scanner waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the scanner does not get a response in this time, it issues an error indication and discards the data. There are no retries when a time-out occurs.

- **ENQ:** When this option is selected, the scanner waits for an ENQ character from the host before transmitting data. If an ENQ is not received within the Host Serial Response Time-out, the scanner issues an error indication and discards the data. The host must transmit an ENQ character at least every Host Serial Response Time-out to prevent transmission errors.
- **ACK/NAK with ENQ:** This combines the two previous options. For re-transmissions of data, due to a NAK from the host, an additional ENQ is not required.
- **XON/XOFF:** An XOFF character turns the scanner transmission off until the scanner receives an XON character. There are two situations for XON/XOFF:
 - XOFF is received before the scanner has data to send. When the scanner has data to send, it waits up to Host Serial Response Time-out for an XON character before transmission. If the XON is not received within this time, the scanner issues an error indication and discards the data.
 - XOFF is received during a transmission. Data transmission then stops after sending the current byte. When the scanner receives an XON character, it sends the rest of the data message. The scanner waits up to 30 seconds for the XON.

Software Handshaking (continued)

***None**



ACK/NAK



ENQ



ACK/NAK with ENQ



XON/XOFF

Host Serial Response Time-out

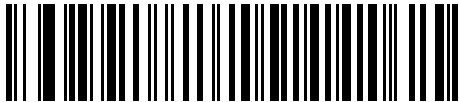
This parameter specifies how long the scanner waits for an ACK, NAK, ENQ, XON, or CTS before determining that a transmission error occurred.



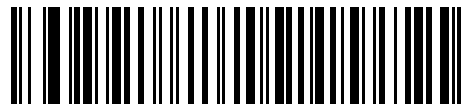
***Minimum: 2 sec**



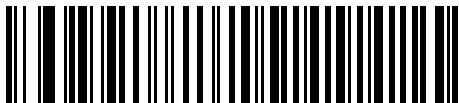
Low: 2.5 sec



Medium: 5 sec



High: 7.5 sec



Maximum: 9.9 sec

RTS Line State

This parameter sets the idle state of the Serial Host RTS line. Scan a bar code below to select **Low RTS** or **High RTS** line state.



***Host: Low RTS**



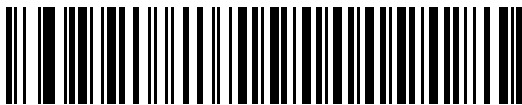
Host: High RTS

Beep on <BEL>

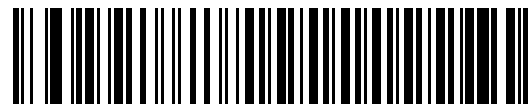
Point-to-Point Mode Only

When this parameter is enabled, the scanner issues a beep when a <BEL> character is detected on the RS-232 serial line. <BEL> is issued to gain a user's attention to an illegal entry or other important event.

✓ **NOTE** This parameter is not supported in Multipoint-to-Point mode.



**Beep On <BEL> Character
(Enable)**



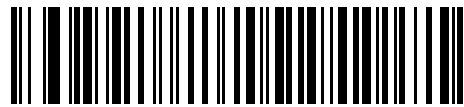
***Do Not Beep On <BEL> Character
(Disable)**

Intercharacter Delay

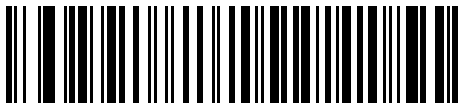
This parameter specifies the intercharacter delay inserted between character transmissions.



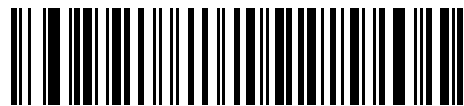
***Minimum: 0 msec**



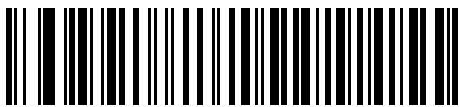
Low: 25 msec



Medium: 50 msec



High: 75 msec



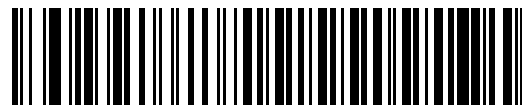
Maximum: 99 msec

Nixdorf Beep/LED Options

When Nixdorf Mode B is selected, this indicates when the scanner should beep and turn on its LED after a decode.



***Normal Operation**
(Beep/LED immediately after decode)



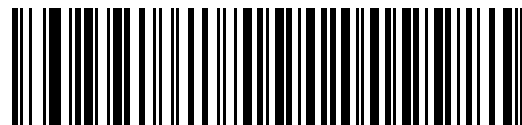
Beep/LED After Transmission



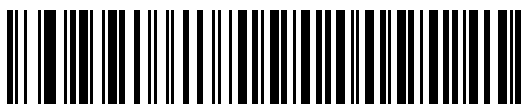
Beep/LED After CTS Pulse

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes with Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound on the scanner. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar code data is sent up to the first unknown character and then an error beep sounds on the scanner.



***Send Bar Code with Unknown Characters**



Do Not Send Bar Codes with Unknown Characters

ASCII Character Set for RS-232

The values in [Table 7-4](#) can be assigned as prefixes or suffixes for ASCII character data transmission.

Table 7-4 ASCII Character Set for RS-232

| ASCII Value | Full ASCII Code 39 Encode Character | ASCII Character |
|-------------|-------------------------------------|-----------------|
| 1000 | %U | NUL |
| 1001 | \$A | SOH |
| 1002 | \$B | STX |
| 1003 | \$C | ETX |
| 1004 | \$D | EOT |
| 1005 | \$E | ENQ |
| 1006 | \$F | ACK |
| 1007 | \$G | BELL |
| 1008 | \$H | BCKSPC |
| 1009 | \$I | HORIZ TAB |
| 1010 | \$J | LF/NW LN |
| 1011 | \$K | VT |
| 1012 | \$L | FF |
| 1013 | \$M | CR/ENTER |
| 1014 | \$N | SO |
| 1015 | \$O | SI |
| 1016 | \$P | DLE |
| 1017 | \$Q | DC1/XON |
| 1018 | \$R | DC2 |
| 1019 | \$S | DC3/XOFF |
| 1020 | \$T | DC4 |
| 1021 | \$U | NAK |
| 1022 | \$V | SYN |
| 1023 | \$W | ETB |
| 1024 | \$X | CAN |
| 1025 | \$Y | EM |
| 1026 | \$Z | SUB |

Table 7-4 ASCII Character Set for RS-232 (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | ASCII Character |
|-------------|-------------------------------------|-----------------|
| 1027 | %A | ESC |
| 1028 | %B | FS |
| 1029 | %C | GS |
| 1030 | %D | RS |
| 1031 | %E | US |
| 1032 | Space | Space |
| 1033 | /A | ! |
| 1034 | /B | " |
| 1035 | /C | # |
| 1036 | /D | \$ |
| 1037 | /E | % |
| 1038 | /F | & |
| 1039 | /G | ' |
| 1040 | /H | (|
| 1041 | /I |) |
| 1042 | /J | * |
| 1043 | /K | + |
| 1044 | /L | , |
| 1045 | - | - |
| 1046 | . | . |
| 1047 | /O | / |
| 1048 | 0 | 0 |
| 1049 | 1 | 1 |
| 1050 | 2 | 2 |
| 1051 | 3 | 3 |
| 1052 | 4 | 4 |
| 1053 | 5 | 5 |
| 1054 | 6 | 6 |
| 1057 | 7 | 7 |
| 1056 | 8 | 8 |

Table 7-4 ASCII Character Set for RS-232 (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | ASCII Character |
|-------------|-------------------------------------|-----------------|
| 1057 | 9 | 9 |
| 1058 | /Z | : |
| 1059 | %F | ; |
| 1060 | %G | < |
| 1061 | %H | = |
| 1062 | %I | > |
| 1063 | %J | ? |
| 1064 | %V | @ |
| 1065 | A | A |
| 1066 | B | B |
| 1067 | C | C |
| 1068 | D | D |
| 1069 | E | E |
| 1070 | F | F |
| 1071 | G | G |
| 1072 | H | H |
| 1073 | I | I |
| 1074 | J | J |
| 1075 | K | K |
| 1076 | L | L |
| 1077 | M | M |
| 1078 | N | N |
| 1079 | O | O |
| 1080 | P | P |
| 1081 | Q | Q |
| 1082 | R | R |
| 1083 | S | S |
| 1084 | T | T |
| 1085 | U | U |
| 1086 | V | V |

Table 7-4 ASCII Character Set for RS-232 (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | ASCII Character |
|-------------|-------------------------------------|-----------------|
| 1087 | W | W |
| 1088 | X | X |
| 1089 | Y | Y |
| 1090 | Z | Z |
| 1091 | %K | [|
| 1092 | %L | \ |
| 1093 | %M |] |
| 1094 | %N | ^ |
| 1095 | %O | _ |
| 1096 | %W | ` |
| 1097 | +A | a |
| 1098 | +B | b |
| 1099 | +C | c |
| 1100 | +D | d |
| 1101 | +E | e |
| 1102 | +F | f |
| 1103 | +G | g |
| 1104 | +H | h |
| 1105 | +I | i |
| 1106 | +J | j |
| 1107 | +K | k |
| 1108 | +L | l |
| 1109 | +M | m |
| 1110 | +N | n |
| 1111 | +O | o |
| 1112 | +P | p |
| 1113 | +Q | q |
| 1114 | +R | r |
| 1115 | +S | s |
| 1116 | +T | t |

Table 7-4 ASCII Character Set for RS-232 (Continued)

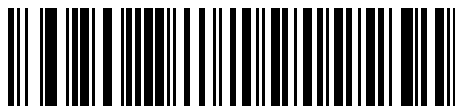
| ASCII Value | Full ASCII Code 39 Encode Character | ASCII Character |
|-------------|-------------------------------------|-----------------|
| 1117 | +U | u |
| 1118 | +V | v |
| 1119 | +W | w |
| 1120 | +X | x |
| 1121 | +Y | y |
| 1122 | +Z | z |
| 1123 | %P | { |
| 1124 | %Q | |
| 1125 | %R | } |
| 1126 | %S | ~ |
| 1127 | | Undefined |
| 7013 | | ENTER |

Chapter 8 USB Interface

Introduction

This chapter provides instructions for programming the cradle to interface with a USB host. The scanner cradle connects directly to a USB host, or a powered USB hub. The USB host can power the cradle and recharge the scanner battery, but this charging method has limitations. See [Using the USB Interface to Supply Power on page 1-7](#).

Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default — ***North American Standard USB Keyboard** — Feature/Option

Connecting a USB Interface

- ✓ **NOTE** See [Chapter 4, Radio Communications](#) for information about scanner/cradle pairing and wireless communication

The scanner must be connected to the cradle for the host parameter setting to take effect. When the scanner is not connected to a cradle, and a host parameter bar code is scanned, a long low/long high beep sequence sounds.

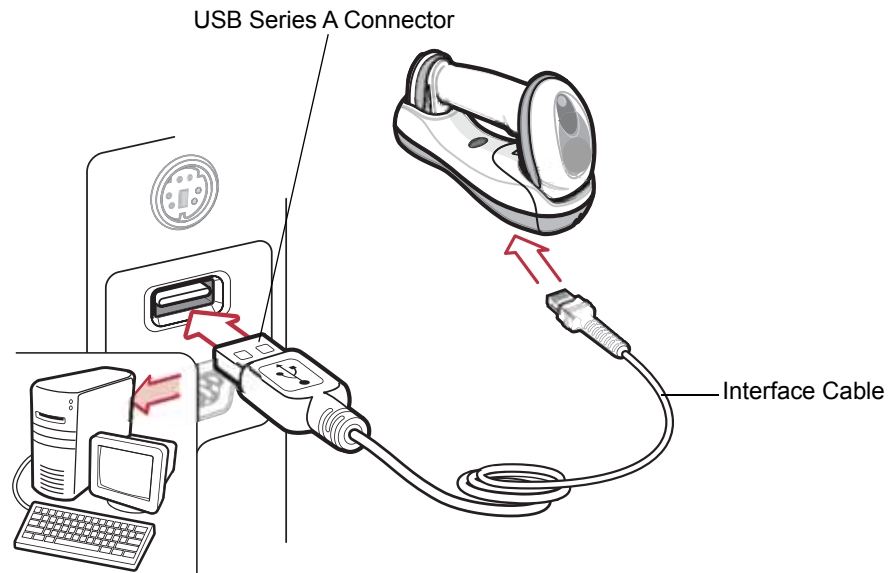


Figure 8-1 USB Connection

The scanner cradle connects with USB capable hosts including:

- Desktop PCs and Notebooks
- Apple™ iMac, G4, iBooks (North America only)
- IBM SurePOS terminals
- Sun, IBM, and other network computers that support more than one keyboard.

The following operating systems support the scanner cradle through USB:

- Windows 98, 2000, ME, XP
- MacOS 8.5 and above
- IBM 4690 OS.

The scanner cradle also interfaces with other USB hosts which support USB Human Interface Devices (HID).

To connect the USB interface:

1. Attach the modular connector of the USB interface cable to the host port on the bottom of the scanner cradle (see [Connecting the Cradle on page 1-6](#)).
2. Plug the series A connector in the USB host or hub, or plug the Plus Power connector in an available port of the IBM SurePOS terminal.

3. Select the USB device type by scanning the appropriate bar code from [USB Device Type on page 8-4](#).
4. On first installation when using Windows, the software prompts to select or install the Human Interface Device driver. To install this driver, provided by Windows, click *Next* through all the choices and click *Finished* on the last choice. The cradle powers up during this installation.
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

✓ **NOTE** Interface cables vary depending on configuration. The connectors illustrated in [Figure 8-1](#) are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner cradle remain the same.

If problems occur with the system, see [Troubleshooting on page 3-2](#).

USB Parameter Defaults

[Table 8-1](#) lists the defaults for USB host parameters. If any option needs to be changed, scan the appropriate bar code(s) provided in the Parameter Descriptions section beginning on [page 8-4](#).

✓ **NOTE** See [Appendix A, Standard Default Parameters](#) for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 8-1 *USB Host Default Table*

| Parameter | Default | Page Number |
|--|------------------------|----------------------|
| USB Host Parameters | | |
| USB Device Type | HID Keyboard Emulation | 8-4 |
| USB Country Keyboard Types (Country Codes) | North American | 8-5 |
| USB Keystroke Delay | No Delay | 8-7 |
| USB CAPS Lock Override | Disable | 8-7 |
| USB Ignore Unknown Characters | Send | 8-8 |
| Emulate Keypad | Disable | 8-9 |
| USB FN1 Substitution | Disable | 8-9 |
| Function Key Mapping | Disable | 8-9 |
| Simulated Caps Lock | Disable | 8-10 |
| Convert Case | No Case Conversion | 8-10 |
| Ignore Beep | Disable | 8-11 |
| Ignore Bar Code Configuration | Disable | 8-11 |

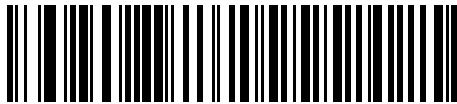
USB Host Parameters

USB Device Type

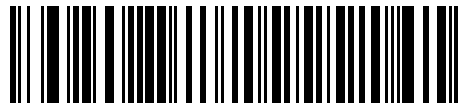
Select the desired USB device type.



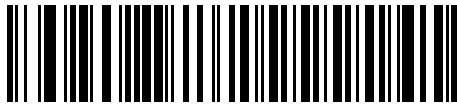
NOTE When changing USB Device Types, the scanner automatically restarts. The scanner issues the standard startup beep sequences.



***HID Keyboard Emulation**



IBM Table Top USB



IBM Hand-Held USB

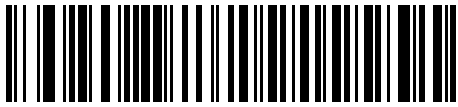


USB OPOS Handheld

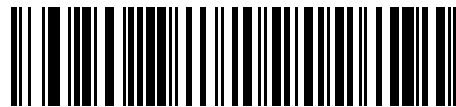
USB Country Keyboard Types (Country Codes)

Scan the bar code corresponding to the keyboard type. This setting applies only to the USB HID Keyboard Emulation device.

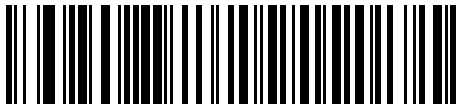
- ✓ **NOTE** When changing USB country keyboard types the scanner automatically resets. The scanner issues the standard startup beep sequences.



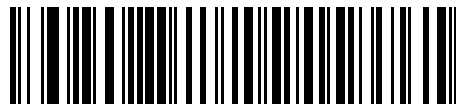
*North American Standard USB Keyboard



German Windows



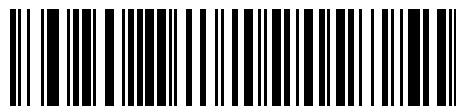
French Windows



French Canadian Windows 95/98



French Canadian Windows 2000/XP



Spanish Windows

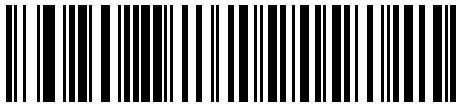
USB Country Keyboard Types (Country Codes continued)



Italian Windows



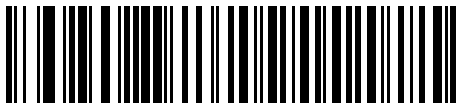
Swedish Windows



UK English Windows



Japanese Windows (ASCII)



Portuguese-Brazilian Windows

USB Keystroke Delay

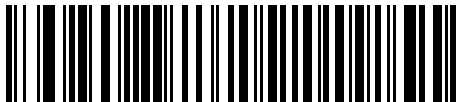
This parameter sets the delay, in milliseconds, between emulated keystrokes. Scan a bar code below to increase the delay when hosts require a slower transmission of data.



***No Delay**



Medium Delay (20 msec)



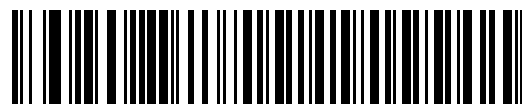
Long Delay (40 msec)

USB CAPS Lock Override

This option applies only to the HID Keyboard Emulation device. When enabled, the case of the data is preserved regardless of the state of the caps lock key. This setting is always enabled for the “Japanese, Windows (ASCII)” keyboard type and can not be disabled.



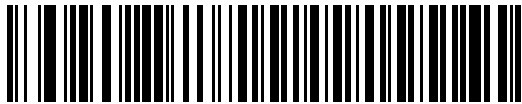
**Override Caps Lock Key
(Enable)**



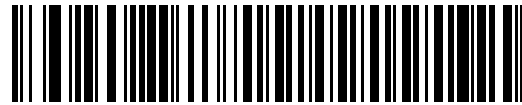
***Do Not Override Caps Lock Key
(Disable)**

USB Ignore Unknown Characters

This option applies only to the HID Keyboard Emulation device and IBM device. Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar code data is sent up to the first unknown character, then the scanner issues an error beep.



***Send Bar Codes with Unknown Characters**



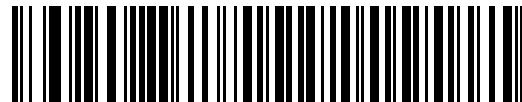
Do Not Send Bar Codes with Unknown Characters

Emulate Keypad

When enabled, all characters are sent as ASCII sequences over the numeric keypad. For example ASCII A would be sent as “ALT make” 0 6 5 “ALT Break.”



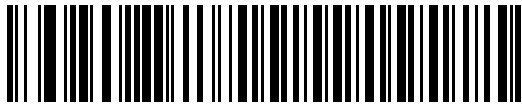
***Disable Keypad Emulation**



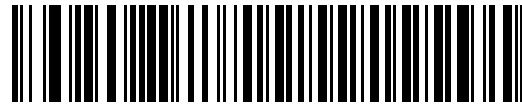
Enable Keypad Emulation

USB Keyboard FN 1 Substitution

This option applies only to the USB HID Keyboard Emulation device. When enabled, this allows replacement of any FN 1 characters in an EAN 128 bar code with a Key Category and value chosen by the user (see [FN1 Substitution Values on page 5-15](#) to set the Key Category and Key Value).



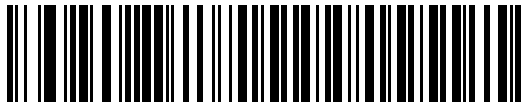
Enable FN1 Substitution



*Disable FN1 Substitution

Function Key Mapping

ASCII values under 32 are normally sent as a control-key sequences (see [Table 8-2 on page 8-12](#)). When this parameter is enabled, the keys in bold are sent in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.



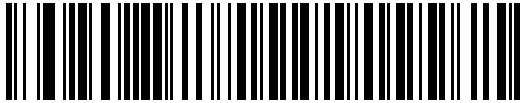
*Disable Function Key Mapping



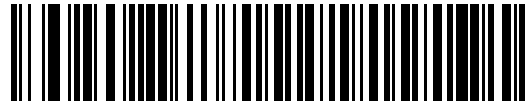
Enable Function Key Mapping

Simulated Caps Lock

When enabled, the scanner inverts upper and lower case characters on the scanner bar code as if the Caps Lock state is enabled on the keyboard. This inversion is done regardless of the current state of the keyboard's Caps Lock state.



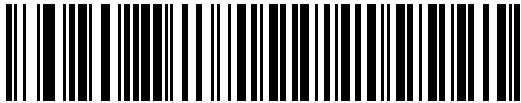
***Disable Simulated Caps Lock**



Enable Simulated Caps Lock

Convert Case

When enabled, the scanner converts all bar code data to the selected case.



***No Case Conversion**



Convert All to Upper Case



Convert All to Lower Case

Optional USB Parameters

If you configure the scanner and find the settings were not saved, or changed, when the system is restarted scan the bar codes that follow to override USB interface defaults.

Scan a bar code below after setting defaults and before configuring the scanner.

Ignore Beep

The host can send a beep request to the scanner. When this parameter is enabled, the request is not sent to the attached scanner. All directives are still acknowledged to the USB host as if it were processed.



***Disable**



Enable

Ignore Bar Code Configuration

The host has the ability to enable/disable code types. When this parameter is enabled, the request is not sent to the attached scanner. All directives are still acknowledged to the USB host as if it were processed.



***Disable**



Enable

ASCII Character Set for USB

Table 8-2 ASCII Character Set for USB

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|--|
| 1000 | %U | CTRL 2 |
| 1001 | \$A | CTRL A |
| 1002 | \$B | CTRL B |
| 1003 | \$C | CTRL C |
| 1004 | \$D | CTRL D |
| 1005 | \$E | CTRL E |
| 1006 | \$F | CTRL F |
| 1007 | \$G | CTRL G |
| 1008 | \$H | CTRL H/ BACKSPACE ¹ |
| 1009 | \$I | CTRL I/ HORIZONTAL TAB ¹ |
| 1010 | \$J | CTRL J |
| 1011 | \$K | CTRL K |
| 1012 | \$L | CTRL L |
| 1013 | \$M | CTRL M/ ENTER ¹ |
| 1014 | \$N | CTRL N |
| 1015 | \$O | CTRL O |
| 1016 | \$P | CTRL P |
| 1017 | \$Q | CTRL Q |
| 1018 | \$R | CTRL R |
| 1019 | \$S | CTRL S |
| 1020 | \$T | CTRL T |
| 1021 | \$U | CTRL U |
| 1022 | \$V | CTRL V |
| 1023 | \$W | CTRL W |
| 1024 | \$X | CTRL X |

¹The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-2 ASCII Character Set for USB (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|---------------------------------|
| 1025 | \$Y | CTRL Y |
| 1026 | \$Z | CTRL Z |
| 1027 | %A | CTRL [/ESC ¹ |
| 1028 | %B | CTRL \ |
| 1029 | %C | CTRL] |
| 1030 | %D | CTRL 6 |
| 1031 | %E | CTRL - |
| 1032 | Space | Space |
| 1033 | /A | ! |
| 1034 | /B | “ |
| 1035 | /C | # |
| 1036 | /D | \$ |
| 1037 | /E | % |
| 1038 | /F | & |
| 1039 | /G | ‘ |
| 1040 | /H | (|
| 1041 | /I |) |
| 1042 | /J | * |
| 1043 | /K | + |
| 1044 | /L | , |
| 1045 | - | - |
| 1046 | . | . |
| 1047 | /O | / |
| 1048 | 0 | 0 |
| 1049 | 1 | 1 |
| 1050 | 2 | 2 |
| 1051 | 3 | 3 |
| 1052 | 4 | 4 |

¹The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-2 ASCII Character Set for USB (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1053 | 5 | 5 |
| 1054 | 6 | 6 |
| 1055 | 7 | 7 |
| 1056 | 8 | 8 |
| 1057 | 9 | 9 |
| 1058 | /Z | : |
| 1059 | %F | ; |
| 1060 | %G | < |
| 1061 | %H | = |
| 1062 | %I | > |
| 1063 | %J | ? |
| 1064 | %V | @ |
| 1065 | A | A |
| 1066 | B | B |
| 1067 | C | C |
| 1068 | D | D |
| 1069 | E | E |
| 1070 | F | F |
| 1071 | G | G |
| 1072 | H | H |
| 1073 | I | I |
| 1074 | J | J |
| 1075 | K | K |
| 1076 | L | L |
| 1077 | M | M |
| 1078 | N | N |
| 1079 | O | O |
| 1080 | P | P |

¹The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-2 ASCII Character Set for USB (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1081 | Q | Q |
| 1082 | R | R |
| 1083 | S | S |
| 1084 | T | T |
| 1085 | U | U |
| 1086 | V | V |
| 1087 | W | W |
| 1088 | X | X |
| 1089 | Y | Y |
| 1090 | Z | Z |
| 1091 | %K | [|
| 1092 | %L | \ |
| 1093 | %M |] |
| 1094 | %N | ^ |
| 1095 | %O | _ |
| 1096 | %W | ` |
| 1097 | +A | a |
| 1098 | +B | b |
| 1099 | +C | c |
| 1100 | +D | d |
| 1101 | +E | e |
| 1102 | +F | f |
| 1103 | +G | g |
| 1104 | +H | h |
| 1105 | +I | i |
| 1106 | +J | j |
| 1107 | +K | k |
| 1108 | +L | l |

¹The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-2 ASCII Character Set for USB (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1109 | +M | m |
| 1110 | +N | n |
| 1111 | +O | o |
| 1112 | +P | p |
| 1113 | +Q | q |
| 1114 | +R | r |
| 1115 | +S | s |
| 1116 | +T | t |
| 1117 | +U | u |
| 1118 | +V | v |
| 1119 | +W | w |
| 1120 | +X | x |
| 1121 | +Y | y |
| 1122 | +Z | z |
| 1123 | %P | { |
| 1124 | %Q | |
| 1125 | %R | } |
| 1126 | %S | ~ |

¹The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table 8-3 USB ALT Key Character Set

| ALT Keys | Keystroke |
|----------|-----------|
| 2064 | ALT 2 |
| 2065 | ALT A |
| 2066 | ALT B |
| 2067 | ALT C |
| 2068 | ALT D |
| 2069 | ALT E |
| 2070 | ALT F |
| 2071 | ALT G |
| 2072 | ALT H |
| 2073 | ALT I |
| 2074 | ALT J |
| 2075 | ALT K |
| 2076 | ALT L |
| 2077 | ALT M |
| 2078 | ALT N |
| 2079 | ALT O |
| 2080 | ALT P |
| 2081 | ALT Q |
| 2082 | ALT R |
| 2083 | ALT S |
| 2084 | ALT T |
| 2085 | ALT U |
| 2086 | ALT V |
| 2087 | ALT W |
| 2088 | ALT X |
| 2089 | ALT Y |
| 2090 | ALT Z |

Table 8-4 USB GUI Key Character Set

| GUI Key | Keystroke |
|---------|-------------------|
| 3000 | Right Control Key |
| 3048 | GUI 0 |
| 3049 | GUI 1 |
| 3050 | GUI 2 |
| 3051 | GUI 3 |
| 3052 | GUI 4 |
| 3053 | GUI 5 |
| 3054 | GUI 6 |
| 3055 | GUI 7 |
| 3056 | GUI 8 |
| 3057 | GUI 9 |
| 3065 | GUI A |
| 3066 | GUI B |
| 3067 | GUI C |
| 3068 | GUI D |
| 3069 | GUI E |
| 3070 | GUI F |
| 3071 | GUI G |
| 3072 | GUI H |
| 3073 | GUI I |
| 3074 | GUI J |
| 3075 | GUI K |
| 3076 | GUI L |
| 3077 | GUI M |
| 3078 | GUI N |
| 3079 | GUI O |
| 3080 | GUI P |

Note: GUI Shift Keys - The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.

Table 8-4 USB GUI Key Character Set (Continued)

| GUI Key | Keystroke |
|---------|-----------|
| 3081 | GUI Q |
| 3082 | GUI R |
| 3083 | GUI S |
| 3084 | GUI T |
| 3085 | GUI U |
| 3086 | GUI V |
| 3087 | GUI W |
| 3088 | GUI X |
| 3089 | GUI Y |
| 3090 | GUI Z |

Note: GUI Shift Keys - The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.

Table 8-5 USB F Key Character Set

| F Keys | Keystroke |
|--------|-----------|
| 5001 | F1 |
| 5002 | F2 |
| 5003 | F3 |
| 5004 | F4 |
| 5005 | F5 |
| 5006 | F6 |
| 5007 | F7 |
| 5008 | F8 |
| 5009 | F9 |
| 5010 | F10 |
| 5011 | F11 |
| 5012 | F12 |
| 5013 | F13 |
| 5014 | F14 |
| 5015 | F15 |

Table 8-5 *USB F Key Character Set (Continued)*

| F Keys | Keystroke |
|---------------|------------------|
| 5016 | F16 |
| 5017 | F17 |
| 5018 | F18 |
| 5019 | F19 |
| 5020 | F20 |
| 5021 | F21 |
| 5022 | F22 |
| 5023 | F23 |
| 5024 | F24 |

Table 8-6 *USB Numeric Keypad Character Set*

| Numeric Keypad | Keystroke |
|-----------------------|------------------|
| 6042 | * |
| 6043 | + |
| 6044 | undefined |
| 6045 | - |
| 6046 | . |
| 6047 | / |
| 6048 | 0 |
| 6049 | 1 |
| 6050 | 2 |
| 6051 | 3 |
| 6052 | 4 |
| 6053 | 5 |
| 6054 | 6 |
| 6055 | 7 |
| 6056 | 8 |
| 6057 | 9 |
| 6058 | Enter |
| 6059 | Num Lock |

Table 8-7 *USB Extended Keypad Character Set*

| Extended Keypad | Keystroke |
|------------------------|------------------|
| 7001 | Break |
| 7002 | Delete |
| 7003 | PgUp |
| 7004 | End |
| 7005 | Pg Dn |
| 7006 | Pause |
| 7007 | Scroll Lock |
| 7008 | Backspace |
| 7009 | Tab |
| 7010 | Print Screen |
| 7011 | Insert |
| 7012 | Home |
| 7013 | Enter |
| 7014 | Escape |
| 7015 | Up Arrow |
| 7016 | Down Arrow |
| 7017 | Left Arrow |
| 7018 | Right Arrow |

Chapter 9 IBM Interface

Introduction

This chapter provides instructions for programming the cradle to interface with an IBM 468X/469X host computer. Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default — ***Disable Convert to Code 39** — Feature/Option

Connecting to an IBM 468X/469X Host

- ✓ **NOTE** See [Chapter 4, Radio Communications](#) for information about scanner/cradle pairing and wireless communication

The scanner must be connected to the cradle for the host parameter setting to take effect. When the scanner is not connected to a cradle, and a host parameter bar code is scanned, a long low/long high beep sequence sounds.

This connection is made directly from the cradle to the host interface.

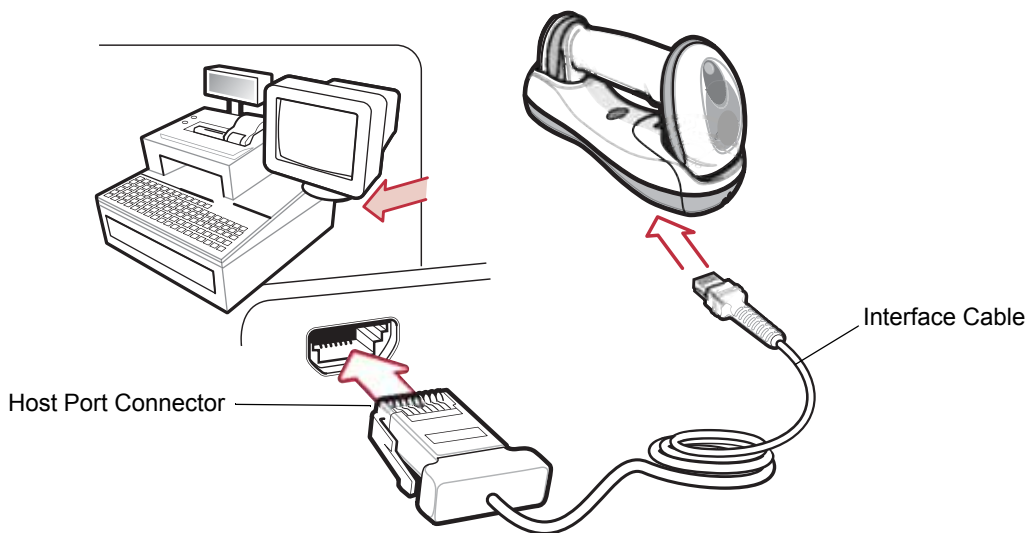


Figure 9-1 IBM Direct Connection

To connect the IBM 46XX interface:

1. Attach the modular connector of the IBM 46XX interface cable to the host port on the bottom of the scanner cradle (see [Connecting the Cradle on page 1-6](#)).
2. Connect the other end of the IBM 46XX interface cable to the appropriate port on the host (typically Port 9).
3. Select the port address by scanning the appropriate bar code from [Port Address on page 9-4](#).
4. To modify any other parameter options, scan the appropriate bar codes in this chapter.

- ✓ **NOTE** Interface cables vary depending on configuration. The connectors illustrated in [Figure 9-1](#) are examples only. The connectors may be different than those illustrated, but the steps to connect the cradle remain the same.

If a power supply is used, disconnect the power supply before changing host cables or the cradle may not recognize the new host.

The only required configuration is the port number. Other scanner parameters are typically controlled by the IBM system.

IBM Parameter Defaults

Table 9-1 lists the defaults for IBM host parameters. To change any option, scan the appropriate bar code(s) provided in the Parameter Descriptions section beginning on [page 9-4](#).

✓ **NOTE** See [Appendix A, Standard Default Parameters](#) for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 9-1 *IBM Host Default Table*

| Parameter | Default | Page Number |
|--------------------------------------|---------------|---------------------|
| IBM 468X/469X Host Parameters | | |
| Port Address | None Selected | 9-4 |
| Convert Unknown to Code 39 | Disable | 9-5 |
| Ignore Beep | Disable | 9-5 |
| Ignore Bar Code Configuration | Disable | 9-6 |

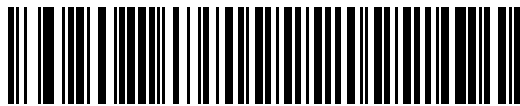
IBM 468X/469X Host Parameters

Port Address

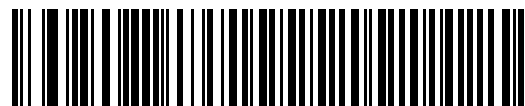
This parameter sets the IBM 468X/469X port used.



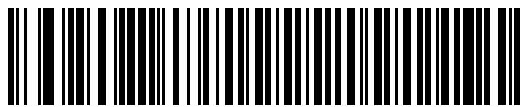
NOTE Scanning one of these bar codes enables the RS-485 interface on the scanner.



* None Selected



Hand-held Scanner Emulation (Port 9B)¹



Non-IBM Scanner Emulation (Port 5B)

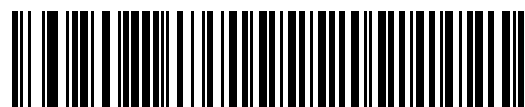


Table-top Scanner Emulation (Port 17)



NOTE ¹User selection is required to configure this interface and this is the most common selection.

Convert Unknown to Code 39

Scan a bar code below to enable or disable the conversion of unknown bar code type data to Code 39.



Enable Convert Unknown to Code 39



***Disable Convert Unknown to Code 39**

Optional IBM Parameters

If you configure the scanner and find the settings were not saved, or changed, when the system is restarted scan the bar codes that follow to override IBM interface defaults.

Scan a bar code below after setting defaults and before configuring the scanner.

Ignore Beep

The host can send a beep request to the scanner. When this parameter is enabled, the request is not sent to the attached scanner. All directives are still acknowledged to the IBM RS485 host as if it were processed.



***Disable**



Enable

Ignore Bar Code Configuration

The host has the ability to enable/disable code types. When this parameter is enabled, the request is not sent to the attached scanner. All directives are still acknowledged to the IBM RS485 host as if it were processed.



***Disable**



Enable

Chapter 10 Wand Emulation Interface

Introduction

This chapter provides instructions for programming the cradle to interface with a wand emulation host. This mode is used whenever wand emulation communication is needed. The scanner cradle connects either to an external wand decoder or to a decoder integrated in a portable terminal or Point-of-Sale (POS) terminal.

In this mode the scanner emulates the signal of a digital wand to make it “readable” by a wand decoder.

Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default — ***Transmit Unknown Characters** — Feature/Option

Connecting Using Wand Emulation

- ✓ **NOTE** See [Chapter 4, Radio Communications](#) for information about scanner/cradle pairing and wireless communication

The scanner must be connected to the cradle for the host parameter setting to take effect. When the scanner is not connected to a cradle, and a host parameter bar code is scanned, a long low/long high beep sequence sounds.

To perform Wand Emulation, connect the cradle to a portable data terminal, or a controller which collects the wand data and interprets it for the host.

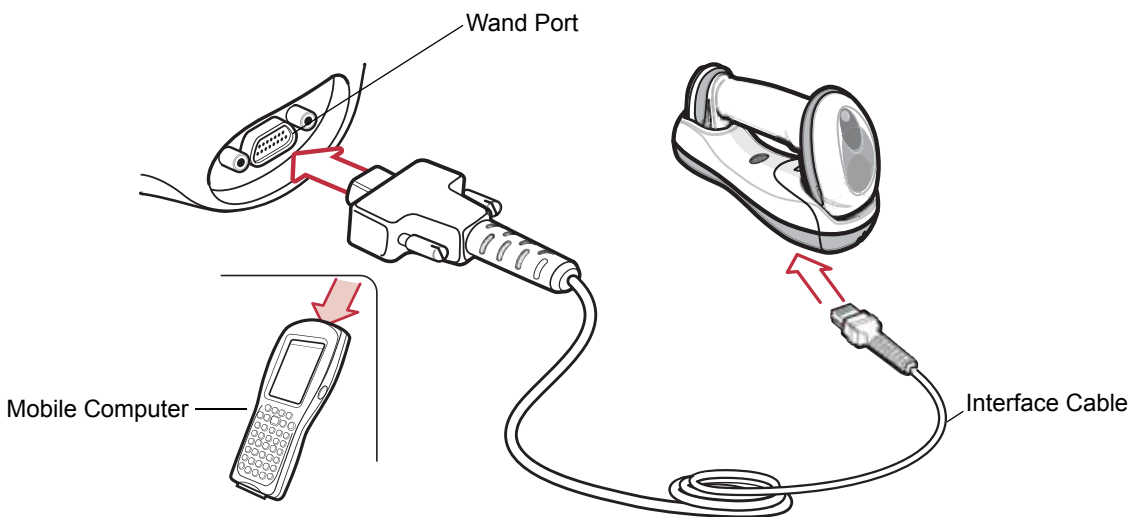


Figure 10-1 Wand Emulation Connection

To connect the Wand Emulation interface:

1. Attach the modular connector of the Wand Emulation interface cable to the host port on the bottom of the scanner cradle (see [Connecting the Cradle on page 1-6](#)).
2. Connect the other end of the Wand Emulation interface cable to the wand port on the mobile computer or controller.
3. Select the Wand Emulation host type by scanning the appropriate bar code from [Wand Emulation Host Types on page 10-4](#).
4. To modify any other parameter options, scan the appropriate bar codes in this chapter.

- ✓ **NOTE** Interface cables vary depending on configuration. The connectors illustrated in [Figure 10-1](#) are examples only. The connectors may be different than those illustrated, but the steps to connect the cradle remain the same.

If a power supply is used, disconnect the power supply before changing host cables or the cradle may not recognize the new host.



CAUTION Connect the cradle to a 5 volt decoder only. Connecting the cradle to a 12 volt decoder can damage the scanner and invalidate the warranty.

Wand Emulation Parameter Defaults

Table 10-1 lists the defaults for Wand Emulation host types. To change any option, scan the appropriate bar code(s) provided in Wand Emulation Host Parameters beginning on page 10-4.

✓ **NOTE** See Appendix A, Standard Default Parameters for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 10-1 Wand Emulation Default Table

| Parameter | Default | Page Number |
|---------------------------------------|---|-------------|
| Wand Emulation Host Parameters | | |
| Wand Emulation Host Types | Symbol OmniLink Interface Controller ¹ | 10-4 |
| Leading Margin | 80 msec | 10-5 |
| Polarity | Bar High/Margin Low | 10-6 |
| Ignore Unknown Characters | Send | 10-6 |
| Convert All Bar Codes to Code 39 | Disable | 10-7 |
| Convert Code 39 to Full ASCII | Disable | 10-8 |

¹User selection is required to configure this interface and this is the most common selection.

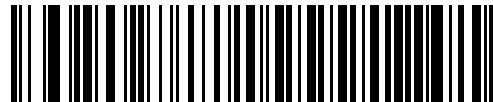
Wand Emulation Host Parameters

Wand Emulation Host Types

Select a Wand Emulation host by scanning one of the bar codes below.



Symbol OmniLink Interface Controller¹



Symbol PDT Terminal (MSI)



Symbol PTC Terminal (Telxon)

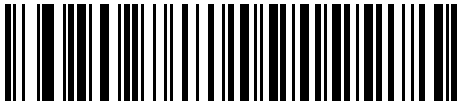


NOTE ¹User selection is required to configure this interface and this is the most common selection.

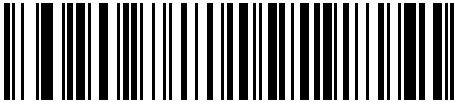
Leading Margin (Quiet Zone)

Scan a bar code below to select a leading margin duration. A leading margin is the time that precedes the first bar of the scan, (in milliseconds). The minimum allowed value is 80 msec and the maximum is 250 msec. This parameter accommodates older wand decoders which cannot handle short leading margins.

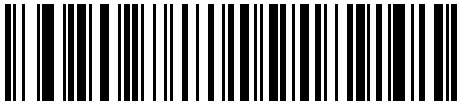
✓ **NOTE** 250 msec is the maximum value that this parameter can attain, however, 200 msec is sufficient.



*80 msec



140 msec



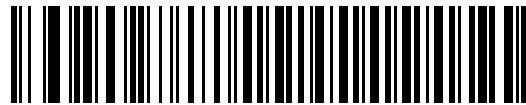
200 msec

Polarity

Scan a bar code below to select the polarity required by the decoder. Polarity determines how the cradle's Wand Emulation interface creates the Digitized Barcode Pattern (DBP). DBP is a digital signal that represents the scanned bar code. Different decoders expect the DBP to be in a certain format. The DBP either has the "highs" represent bars and the "lows" represent spaces (margins), or the "highs" represent spaces (margins) and the "lows" represent bars.



***Bar High/Margin Low**



Bar Low/Margin High

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When **Send Bar Codes With Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound on the scanner. When **Do Not Send Bar Codes With Unknown Characters** is selected, bar codes containing at least one unknown character are not sent to the host, and the scanner emits an error beep.



***Send Bar Codes With Unknown Characters**



Do Not Send Bar Codes With Unknown Characters

Convert All Bar Codes to Code 39

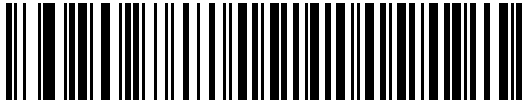
By default, the Wand Emulation interface sends data to the attached host in the same symbology that was decoded. This can be a problem for customers with older systems that do not recognize newer symbologies (for example, GS1 DataBar).

Enabling this parameter ignores the original symbology decoded, and outputs the data as if it were a Code 39 bar code. Any lowercase characters in the original data stream are transmitted as uppercase characters. This also allows ADF rules.

If **Ignore Unknown Characters** is enabled, any characters that do not have a corresponding character in the Code 39 symbology set are replaced by a space.

If **Ignore Unknown Characters** is disabled, if any characters that do not have a corresponding character are encountered, the scanner emits an error beep and no data is transmitted.

✓ **NOTE** ADF Note: By default, the Wand Emulation interface does not allow scanned data to be processed by ADF rules. Enabling this parameter has the side effect of allowing the scanned data to be processed by the ADF rules (see [Chapter 14, Advanced Data Formatting](#)).



Enable Convert to Code 39 for Wand Host

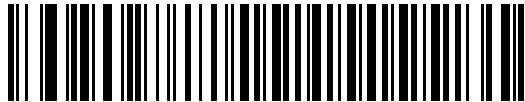


*Disable Convert to Code 39 for Wand Host

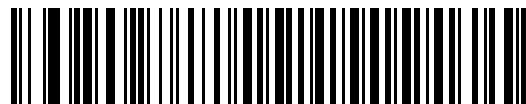
Convert Code 39 to Full ASCII

By default, any characters that do not have a corresponding character in the Code 39 symbology set are replaced by a space. If this parameter is enabled, the data sent to the wand interface is encoded in Code 39 Full ASCII. This setting requires that the host be able to interpret Code 39 Full ASCII data.

This setting applies only if **Convert to Code 39** is also enabled.



***Disable Code 39 Full ASCII Conversion**



Enable Code 39 Full ASCII Conversion

Chapter 11 Scanner Emulation Interface

Introduction

This chapter provides instructions for programming the cradle to interface with a scanner emulation host. With scanner emulation, the cradle connects either to an external decoder or to a decoder integrated in a portable terminal or Point-of-Sale (POS) terminal.

Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default — ***Parameter Process and Pass-Through** — Feature/Option

Connecting Using Scanner Emulation

- ✓ **NOTE** See [Chapter 4, Radio Communications](#) for information about scanner/cradle pairing and wireless communication

The scanner must be connected to the cradle for the host parameter setting to take effect. When the scanner is not connected to a cradle, and a host parameter bar code is scanned, a long low/long high beep sequence sounds.

To perform Scanner Emulation, connect the cradle to a mobile computer, or a controller which collects the data and interprets it for the host.

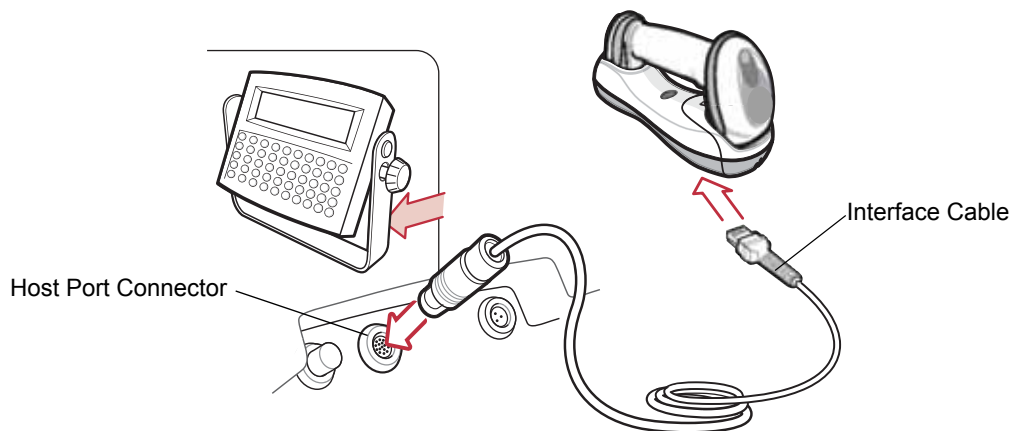


Figure 11-1 Scanner Emulation Connection

To connect the Scanner Emulation interface:

1. Attach the modular connector of the Scanner Emulation interface cable to the host port on the bottom of the scanner cradle (see [Connecting the Cradle on page 1-6](#)).
2. Connect the other end of the Scanner Emulation interface cable to the scanner port on the mobile computer or controller.
3. Scan the Scanner Emulation host bar code from [Scanner Emulation Host on page 11-3](#) to enable the Scanner Emulation host interface.
4. To modify any other parameter options, scan the appropriate bar codes in this chapter.

- ✓ **NOTE** Interface cables vary depending on configuration. The connectors illustrated in [Figure 11-1](#) are examples only. The connectors may be different than those illustrated, but the steps to connect the cradle remain the same.

If a power supply is used, disconnect the power supply before changing host cables or the cradle may not recognize the new host.



CAUTION Connect the cradle to a 5 volt decoder only. Connecting the cradle to a 12 volt decoder can damage the scanner and invalidate the warranty.

Scanner Emulation Parameter Defaults

[Table 11-1](#) lists the defaults for the Scanner Emulation host. To change any option, scan the appropriate bar code(s) provided in the Scanner Emulation Host Parameters section beginning on [page 11-4](#).

✓ **NOTE** See [Appendix A, Standard Default Parameters](#) for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 11-1 Scanner Emulation Default Table

| Parameter | Default | Page Number |
|----------------------------------|-------------------------------------|-----------------------|
| Beep Style | Beep on Successful Transmit | 11-4 |
| Parameter Pass-Through | Parameter Process and Pass Through | 11-5 |
| Convert Newer Code Types | Convert Newer Code Types | 11-6 |
| Module Width | 20 μ s | 11-6 |
| Convert All Bar Codes to Code 39 | Do Not Convert Bar Codes to Code 39 | 11-7 |
| Code 39 Full ASCII Conversion | Disable | 11-7 |
| Transmission Timeout | 3 sec | 11-8 |
| Ignore Unknown Characters | Ignore Unknown Characters | 11-9 |
| Leading Margin | 2 ms | 11-9 |
| Check for Decode LED | Check for Decode LED | 11-10 |

¹User selection is required to configure this interface and this is the most common selection.

Scanner Emulation Host

Scan the bar code below to enable the Scanner Emulation host.



Undecoded Scanner Emulation Host

Scanner Emulation Host Parameters

Beep Style

The Scanner Emulation host supports three beep styles.

- **Beep On Successful Transmit:** The scanner beeps when the attached decoder issues the decode signal to the scanner, so the scanner and the attached decoder beep at the same time.
- **Beep At Decode Time:** The scanner beeps upon decode. This results in a double beep sequence from most decoders, since the scanner beeps, and the decoder beeps (at a different frequency) when it successfully decodes the output.
- **Do Not Beep:** Only the attached decoder issues the decode beep.



***Beep On Successful Transmit**



Beep At Decode Time



Do Not Beep

Parameter Pass-Through

The Scanner Emulation host can process parameter bar code messages and send them to the attached decoder. In this way, customers using Symbol compliant decoders can control the behavior of the entire system by scanning the necessary parameters only once.

For example, to enable D 2 of 5, scan the **D 2 of 5 Enable** parameter bar code. The scanner and the attached decoder both process the parameter.



***Parameter Process and Pass-Through**



Parameter Process Only

Convert Newer Code Types

The scanner supports a variety of code types that are not decodable by attached decoder systems. To allow compatibility in these environments, the scanner converts these code types to more commonly decodable symbologies, as per the following chart. Symbologies not listed on this chart are transmitted normally.

| Scan this code type: | Transmitted as: |
|---|-----------------|
| Code 11 | Code 39 |
| Chinese 2 of 5 | Code 39 |
| GS1 DataBar (14, Limited, and Expanded) | Code 128 |
| Coupon Code | Code 128 |

When decoding these code types with this parameter disabled, the scanner issues Convert Error beeps and transmits no data.



***Convert Newer Code Types**



Reject Newer Code Types

Module Width

The standard module width is 20 μ s. For an extremely slow decoder system, select **50 μ s Module Width**.



***20 μ s Module Width**



50 μ s Module Width

Convert All Bar Codes to Code 39

Scan the bar code below to enable or disable the conversion of all bar code data to Code 39.



***Do Not Convert Bar Codes To Code 39**



Convert All To Code 39

Code 39 Full ASCII Conversion

By default, any characters that do not have a corresponding character in the Code 39 symbology set are replaced by a space. If this parameter is enabled, the data sent to the Scanner Emulation host is encoded in Code 39 Full ASCII. The host must be able to interpret Code 39 Full ASCII data. This setting applies only if **Convert to Code 39** is also enabled.



***Disable Convert Code 39 To Full ASCII**



Enable Convert Code 39 To Full ASCII

Transmission Timeout

The Scanner Emulation host transmits bar code data to the attached decoder and waits for the decoder to assert the Decode signal, indicating successful transmission. If, after a specified amount of time, the Decode signal is not asserted (indicating that the attached decoder has not successfully received the bar code data), the scanner issues transmit error beeps.

Scan a bar code below to select the desired transmission timeout.



***3 Second Transmission Timeout**



4 Second Transmission Timeout



5 Second Transmission Timeout



10 Second Transmission Timeout



30 Second Transmission Timeout

Ignore Unknown Characters

Unknown characters are characters the decoder does not recognize. When **Ignore Unknown Characters** is selected, all bar code data is sent except for unknown characters, and no error beeps sound. When **Convert Error on Unknown Characters** is selected, bar codes containing at least one unknown character are not sent to the decoder, and a convert error beep sounds.



***Ignore Unknown Characters**



Convert Error On Unknown Characters

Leading Margin

Scan a bar code below to select a leading margin duration.



1 ms Leading Margin



***2 ms Leading Margin**



3 ms Leading Margin

Leading Margin (continued)



5 ms Leading Margin



10 ms Leading Margin

Check For Decode LED

The attached decoder normally asserts the Decode line to signal to the Scanner Emulation host that it successfully decoded the transmitted bar code. Some decoders, however, do not assert the Decode signal. In this case, the scanner emits transmit error beeps to indicate that the bar code was not successfully transmitted. Scan the **Ignore Decode LED** bar code to disable the Transmit Error beeps.



*Check For Decode LED



Ignore Decode LED

Chapter 12 123Scan2

Introduction

123Scan² is an easy-to-use, PC-based software tool that enables the quick and easy setup of Zebra scanners.

123Scan² uses a wizard tool to guide users through a streamlined set up process. Once parameters are set, the values are saved to a configuration file that can be distributed via e-mail, electronically downloaded via a USB or RS-232 cable, or used to generate a sheet of programming bar codes that can be scanned.

123Scan² can generate multiple reports that can be easily rebranded using Microsoft Word or Access. Report options include programmed parameters, asset tracking information and proof of scanner output.

Additionally, 123Scan² can display scanned bar code data including non-printable characters. It can display, optimize and save pictures from an imaging scanner. It can also upgrade scanner firmware, automatically check online to enable support for newly released products, generate a single 2D bar code for one scan programming and stage large numbers of scanners simultaneously via USB hub(s).

Communication with 123Scan2

To communicate with the 123Scan² program which runs on a host computer running a Windows XP SP2 and Windows 7 operating system, use a USB cable to connect the scanner cradle to the host computer (see [Connecting a USB Interface on page 8-2](#)).

123Scan2 Requirements

- Host computer with Windows XP SP2 or Windows 7
- Scanner
- Cradle (cordless scanning only)
- USB cable.

For more information on 123Scan², go to:

<http://www.zebra.com/123Scan2>

For a one minute tour of 123Scan², go to:

<http://www.zebra.com/scannersoftwarevideos>

To download 123Scan² software and access the Help file integrated in the utility, go to:

<http://www.zebra.com/123Scan2>

Scanner SDK, Other Software Tools, and Videos

Tackle all your scanner programming needs with our diversified set of software tools. Whether you need to simply stage a device, or develop a fully featured application with image and data capture as well as asset management, these tools help you every step of the way. To download any of the free tools listed below, go to: <http://www.zebra.com/software>

- 123Scan² Configuration Utility (described in this chapter)
- Scanner SDK for Windows
- How-to-Videos
- Virtual Com Port Driver
- OPOS Driver
- JPOS Driver
- Scanner User Documentation

Archive of Older Drivers.

Chapter 13 Symbologies

Introduction

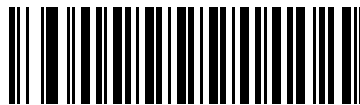
This chapter describes symbology features and provides the programming bar codes for selecting these features. Before programming, follow the instructions in [Chapter 1, Getting Started](#).

The scanner is shipped with the settings shown in the [Symbology Parameter Defaults on page 13-2](#) (also see [Appendix A, Standard Default Parameters](#) for all host device and miscellaneous defaults). If the default values suit requirements, programming is not necessary.

To set feature values, scan a single bar code or a short bar code sequence. The settings are stored in non-volatile memory and are preserved even when the scanner is powered down.

If not using a Synapse or USB cable, select a host type (see each host chapter for specific host information) after the power-up beeps sound. This is only necessary upon the first power-up when connected to a new host.

To return all features to default values, scan the appropriate default bar code on [page 5-3](#). Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default — ***Enable UPC-A** — Feature/Option

Scanning Sequence Examples

In most cases, scanning one bar code sets the parameter value. For example, to transmit bar code data without the UPC-A check digit, simply scan the **Do Not Transmit UPC-A Check Digit** bar code under [Transmit UPC-A Check Digit on page 13-13](#). The scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

Other parameters, such as **Set Length(s) for D 2 of 5**, require scanning several bar codes. See the individual parameter, such as **Set Length(s) for D 2 of 5**, for this procedure.

Errors While Scanning

Unless otherwise specified, to correct an error during a scanning sequence, just re-scan the correct parameter.

Symbology Parameter Defaults

[page 13-2](#) lists the defaults for all symbologies parameters. To change any option, scan the appropriate bar code(s) provided in the Symbologies Parameters section beginning on [page 13-5](#).

✓ **NOTE** See [Appendix A, Standard Default Parameters](#) for all user preferences, hosts, symbologies and miscellaneous default parameters.

Table 13-1 Symbology Parameter Defaults

| Parameter | Default | Page Number |
|---|------------------|-----------------------|
| UPC/EAN | | |
| UPC-A | Enable | 13-5 |
| UPC-E | Enable | 13-5 |
| UPC-E1 | Disable | 13-6 |
| EAN-8/JAN 8 | Enable | 13-6 |
| EAN-13/JAN 13 | Enable | 13-6 |
| Bookland EAN | Disable | 13-8 |
| Decode UPC/EAN/JAN Supplementals (2 and 5 digits) | Ignore | 13-9 |
| User-Programmable Supplementals | | 13-12 |
| Decode UPC/EAN/JAN Supplemental Redundancy | 7 | 13-12 |
| Transmit UPC-A Check Digit | Enable | 13-13 |
| Transmit UPC-E Check Digit | Enable | 13-13 |
| Transmit UPC-E1 Check Digit | Enable | 13-14 |
| UPC-A Preamble | System Character | 13-14 |
| UPC-E Preamble | System Character | 13-15 |
| UPC-E1 Preamble | System Character | 13-16 |
| Convert UPC-E to A | Disable | 13-17 |
| Convert UPC-E1 to A | Disable | 13-17 |
| EAN-8/JAN-8 Extend | Disable | 13-18 |
| Bookland ISBN Format | ISBN-10 | 13-19 |
| UCC Coupon Extended Code | Disable | 13-20 |
| Code 128 | | |
| Code 128 | Enable | 13-21 |
| GS1-128 (formerly UCC/EAN-128) | Enable | 13-21 |

Table 13-1 Symbology Parameter Defaults (Continued)

| Parameter | Default | Page Number |
|--|---------|-------------|
| ISBT 128 (non-concatenated) | Enable | 13-22 |
| Code 39 | | |
| Code 39 | Enable | 13-23 |
| Trioptic Code 39 | Disable | 13-23 |
| Convert Code 39 to Code 32 (Italian Pharmacy Code) | Disable | 13-24 |
| Code 32 Prefix | Disable | 13-24 |
| Set Length(s) for Code 39 | 2 to 55 | 13-25 |
| Code 39 Check Digit Verification | Disable | 13-26 |
| Transmit Code 39 Check Digit | Disable | 13-26 |
| Code 39 Full ASCII Conversion | Disable | 13-27 |
| Buffer Code 39 | Disable | 13-27 |
| Code 93 | | |
| Code 93 | Disable | 13-30 |
| Set Length(s) for Code 93 | 4 to 55 | 13-30 |
| Code 11 | | |
| Code 11 | Disable | 13-32 |
| Set Lengths for Code 11 | 4 to 55 | 13-32 |
| Code 11 Check Digit Verification | Disable | 13-34 |
| Transmit Code 11 Check Digit(s) | Disable | 13-34 |
| Interleaved 2 of 5 (ITF) | | |
| Interleaved 2 of 5 (ITF) | Enable | 13-35 |
| Set Lengths for I 2 of 5 | 14 | 13-35 |
| I 2 of 5 Check Digit Verification | Disable | 13-37 |
| Transmit I 2 of 5 Check Digit | Disable | 13-37 |
| Convert I 2 of 5 to EAN 13 | Disable | 13-38 |
| Discrete 2 of 5 (DTF) | | |
| Discrete 2 of 5 | Disable | 13-39 |
| Set Length(s) for D 2 of 5 | 12 | 13-39 |
| Chinese 2 of 5 | | |
| Enable/Disable Chinese 2 of 5 | Disable | 13-41 |

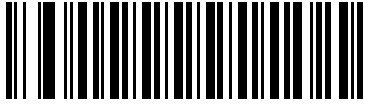
Table 13-1 Symbology Parameter Defaults (Continued)

| Parameter | Default | Page Number |
|---|---------------|-------------|
| Codabar (NW - 7) | | |
| Codabar | Disable | 13-42 |
| Set Lengths for Codabar | 5 to 55 | 13-42 |
| CLSI Editing | Disable | 13-44 |
| NOTIS Editing | Disable | 13-44 |
| MSI | | |
| MSI | Disable | 13-45 |
| Set Length(s) for MSI | 1 to 55 | 13-45 |
| MSI Check Digits | One | 13-46 |
| Transmit MSI Check Digit | Disable | 13-47 |
| MSI Check Digit Algorithm | Mod 10/Mod 10 | 13-47 |
| GS1 DataBar | | |
| GS1 DataBar-14 | Disable | 13-48 |
| GS1 DataBar Limited | Disable | 13-48 |
| GS1 DataBar Expanded | Disable | 13-48 |
| Convert GS1 DataBar to UPC/EAN | Disable | 13-49 |
| Symbology - Specific Security Levels | | |
| Redundancy Level | 1 | 13-50 |
| Security Levels | 0 | 13-52 |
| Bi-directional Redundancy | Disable | 13-53 |

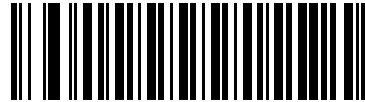
UPC/EAN

Enable/Disable UPC-A/UPC-E

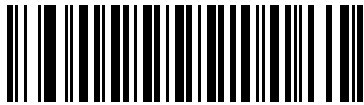
To enable or disable UPC-A or UPC-E, scan the appropriate bar code below.



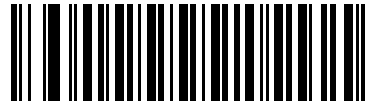
***Enable UPC-A**



Disable UPC-A



***Enable UPC-E**



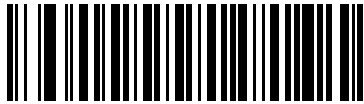
Disable UPC-E

Enable/Disable UPC-E1

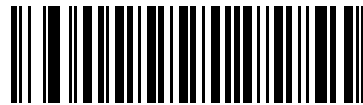
UPC-E1 is disabled by default.

To enable or disable UPC-E1, scan the appropriate bar code below.

✓ **NOTE** UPC-E1 is not a UCC (Uniform Code Council) approved symbology.



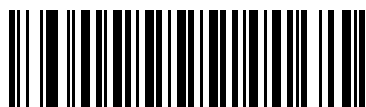
Enable UPC-E1



*Disable UPC-E1

Enable/Disable EAN-13/EAN-8

To enable or disable EAN-13 or EAN-8, scan the appropriate bar code below.



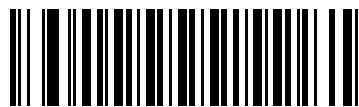
***Enable EAN-13**



Disable EAN-13



***Enable EAN-8**



Disable EAN-8

Enable/Disable Bookland EAN

To enable or disable Bookland EAN, scan the appropriate bar code below.



Enable Bookland EAN



***Disable Bookland EAN**



NOTE If you enable Bookland EAN, select a [Bookland ISBN Format on page 13-19](#). Also select either Decode UPC/EAN Supplementals, Autodiscriminate UPC/EAN Supplementals, or Enable 978/979 Supplemental Mode in [Decode UPC/EAN/JAN Supplementals on page 13-9](#).

Decode UPC/EAN/JAN Supplementals

Supplementals are bar codes appended according to specific format conventions (e.g., UPC A+2, UPC E+2, EAN 13+2). The following options are available:

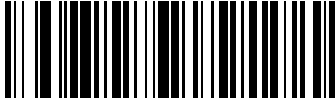
- If you select **Ignore UPC/EAN with Supplementals**, and the scanner is presented with a UPC/EAN plus supplemental symbol, the scanner decodes UPC/EAN and ignores the supplemental characters.
- If you select **Decode UPC/EAN with Supplementals**, the scanner only decodes UPC/EAN symbols with supplemental characters, and ignores symbols without supplementals.
- If you select **Autodiscriminate UPC/EAN Supplementals**, the scanner decodes UPC/EAN symbols with supplemental characters immediately. If the symbol does not have a supplemental, the scanner must decode the bar code the number of times set via [UPC/EAN/JAN Supplemental Redundancy on page 13-12](#) before transmitting its data to confirm that there is no supplemental.
- If you select one of the following **Supplemental Mode** options, the scanner immediately transmits EAN-13 bar codes starting with that prefix that have supplemental characters. If the symbol does not have a supplemental, the scanner must decode the bar code the number of times set via [UPC/EAN/JAN Supplemental Redundancy on page 13-12](#) before transmitting its data to confirm that there is no supplemental. The scanner transmits UPC/EAN bar codes that do not have that prefix immediately.
 - **Enable 378/379 Supplemental Mode**
 - **Enable 978/979 Supplemental Mode**

✓ **NOTE** If you select 978/979 Supplemental Mode and are scanning Bookland EAN bar codes, see [Enable/Disable Bookland EAN on page 13-8](#) to enable Bookland EAN, and select a format using [Bookland ISBN Format on page 13-19](#).

- **Enable 977 Supplemental Mode**
- **Enable 414/419/434/439 Supplemental Mode**
- **Enable 491 Supplemental Mode**
- **Enable Smart Supplemental Mode** - applies to EAN-13 bar codes starting with any prefix listed previously.
- **Supplemental User-Programmable Type 1** - applies to EAN-13 bar codes starting with a 3-digit user-defined prefix. [User-Programmable Supplementals on page 13-12](#).
- **Supplemental User-Programmable Type 1 and 2** - applies to EAN-13 bar codes starting with either of two 3-digit user-defined prefixes. Set the 3-digit prefixes using [User-Programmable Supplementals on page 13-12](#).
- **Smart Supplemental Plus User-Programmable 1** - applies to EAN-13 bar codes starting with any prefix listed previously or the user-defined prefix set using [User-Programmable Supplementals on page 13-12](#).
- **Smart Supplemental Plus User-Programmable 1 and 2** - applies to EAN-13 bar codes starting with any prefix listed previously or one of the two user-defined prefixes set using [User-Programmable Supplementals on page 13-12](#).

✓ **NOTE** To minimize the risk of invalid data transmission, select either to decode or ignore supplemental characters.

Decode UPC/EAN/JAN Supplementals (continued)



**Decode UPC/EAN/JAN Only With Supplementals
(01h)**



***Ignore Supplementals
(00h)**



**Autodiscriminate UPC/EAN/JAN Supplementals
(02h)**



**Enable 378/379 Supplemental Mode
(04h)**



**Enable 978/979 Supplemental Mode
(05h)**



**Enable 977 Supplemental Mode
(07h)**

Decode UPC/EAN/JAN Supplementals (continued)

**Enable 414/419/434/439 Supplemental Mode
(06h)**



**Enable 491 Supplemental Mode
(08h)**



**Enable Smart Supplemental Mode
(03h)**



**Supplemental User-Programmable Type 1
(09h)**



**Supplemental User-Programmable Type 1 and 2
(0Ah)**



**Smart Supplemental Plus User-Programmable 1
(0Bh)**



**Smart Supplemental Plus User-Programmable 1 and 2
(0Ch)**

User-Programmable Supplementals

If you selected a Supplemental User-Programmable option from [Decode UPC/EAN/JAN Supplementals on page 13-9](#), select **User-Programmable Supplemental 1** to set the 3-digit prefix. Then select the 3 digits using the numeric bar codes beginning on [page D-1](#). Select **User-Programmable Supplemental 2** to set a second 3-digit prefix. Then select the 3 digits using the numeric bar codes beginning on [page D-1](#).



User-Programmable Supplemental 1



User-Programmable Supplemental 2

UPC/EAN/JAN Supplemental Redundancy

With **Autodiscriminate UPC/EAN/JAN Supplementals** selected, this option adjusts the number of times a symbol without supplementals is decoded before transmission. The range is from two to thirty times. Five or above is recommended when decoding a mix of UPC/EAN symbols with and without supplementals, and the autodiscriminate option is selected. The default is set at 7.

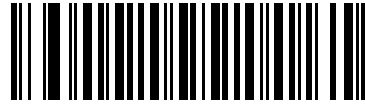
Scan the bar code below to set a decode redundancy value. Next, scan two numeric bar codes in [Appendix D, Numeric Bar Codes](#). Single digit numbers must have a leading zero. To correct an error or change a selection, scan **Cancel** on [page D-3](#).



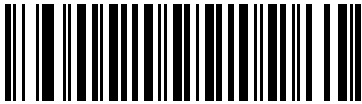
UPC/EAN/JAN Supplemental Redundancy

Transmit UPC-A Check Digit

The check digit is the last character of the symbol used to verify the integrity of the data. Scan the appropriate bar code below to transmit the bar code data with or without the UPC-A check digit. It is always verified to guarantee the integrity of the data.



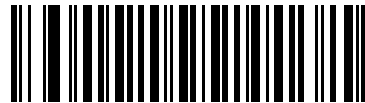
***Transmit UPC-A Check Digit**



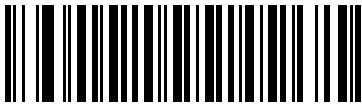
Do Not Transmit UPC-A Check Digit

Transmit UPC-E Check Digit

The check digit is the last character of the symbol used to verify the integrity of the data. Scan the appropriate bar code below to transmit the bar code data with or without the UPC-E check digit. It is always verified to guarantee the integrity of the data.



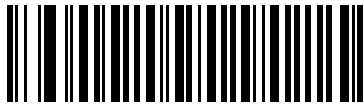
***Transmit UPC-E Check Digit**



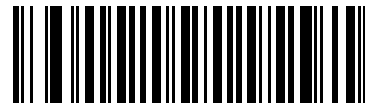
Do Not Transmit UPC-E Check Digit

Transmit UPC-E1 Check Digit

The check digit is the last character of the symbol used to verify the integrity of the data. Scan the appropriate bar code below to transmit the bar code data with or without the UPC-E1 check digit. It is always verified to guarantee the integrity of the data.



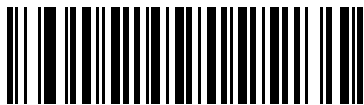
***Transmit UPC-E1 Check Digit**



Do Not Transmit UPC-E1 Check Digit

UPC-A Preamble

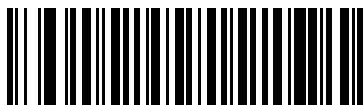
Preamble characters are part of the UPC symbol consisting of Country Code and System Character. Three options are given for transmitting UPC-A preamble to the host device: transmit System Character only, transmit System Character and Country Code (“0” for USA), and no preamble transmitted. Scan a bar code below to match the host system.



**No Preamble
(<DATA>)**



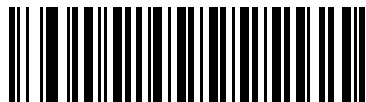
***System Character
(<SYSTEM CHARACTER> <DATA>)**



**System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER>
<DATA>)**

UPC-E Preamble

Preamble characters are part of the UPC symbol consisting of Country Code and System Character. Three options are given for transmitting UPC-E preamble to the host device: transmit System Character only, transmit System Character and Country Code ("0" for USA), and no preamble transmitted. Scan a bar code below to match the host system.



No Preamble
(<DATA>)



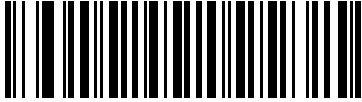
***System Character**
(<SYSTEM CHARACTER> <DATA>)



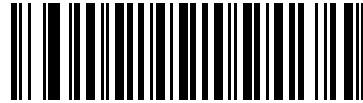
System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER>
<DATA>)

UPC-E1 Preamble

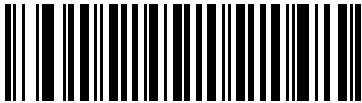
Preamble characters are part of the UPC symbol consisting of Country Code and System Character. Three options are given for transmitting UPC-E1 preamble to the host device: transmit System Character only, transmit System Character and Country Code ("0" for USA), and no preamble transmitted. Scan a bar code below to match the host system.



No Preamble
(<DATA>)



***System Character**
(<SYSTEM CHARACTER> <DATA>)

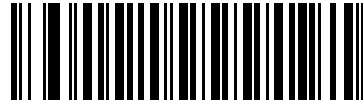


System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER>
<DATA>)

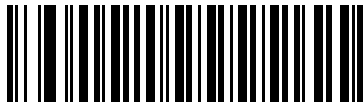
Convert UPC-E to UPC-A

Enable this to convert UPC-E (zero suppressed) decoded data to UPC-A format before transmission. After conversion, the data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

When disabled, UPC-E decoded data is transmitted as UPC-E data, without conversion.



**Convert UPC-E to UPC-A
(Enable)**

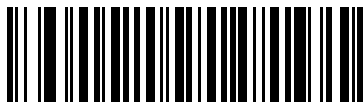


***Do Not Convert UPC-E to UPC-A
(Disable)**

Convert UPC-E1 to UPC-A

Enable this to convert UPC-E1 decoded data to UPC-A format before transmission. After conversion, the data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

When disabled, UPC-E1 decoded data is transmitted as UPC-E1 data, without conversion.



**Convert UPC-E1 to UPC-A
(Enable)**

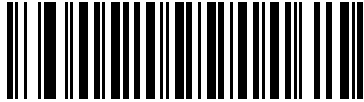


***Do Not Convert UPC-E1 to UPC-A
(Disable)**

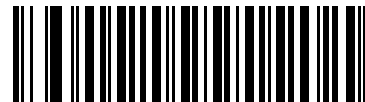
EAN-8/JAN-8 Extend

When enabled, this parameter adds five leading zeros to decoded EAN-8 symbols to make them compatible in format to EAN-13 symbols.

When disabled, EAN-8 symbols are transmitted as is.



Enable EAN/JAN Zero Extend



***Disable EAN/JAN Zero Extend**

Bookland ISBN Format

Parameter # F1h 40h

If you enabled Bookland EAN using [Enable/Disable Bookland EAN on page 13-8](#), select one of the following formats for Bookland data:

- **Bookland ISBN-10** - The scanner reports Bookland data starting with 978 in traditional 10-digit format with the special Bookland check digit for backward-compatibility. Data starting with 979 is not considered Bookland in this mode.
- **Bookland ISBN-13** - The scanner reports Bookland data (starting with either 978 or 979) as EAN-13 in 13-digit format to meet the 2007 ISBN-13 protocol.



***Bookland ISBN-10**
(00h)



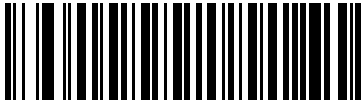
Bookland ISBN-13
(01h)



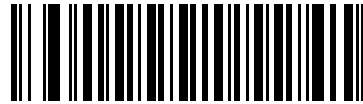
NOTE For Bookland EAN to function properly, first enable Bookland EAN using [Enable/Disable Bookland EAN on page 13-8](#), then select either Decode UPC/EAN Supplementals, Autodiscriminate UPC/EAN Supplementals, or Enable 978/979 Supplemental Mode in [Decode UPC/EAN/JAN Supplementals on page 13-9](#).

UCC Coupon Extended Code

When enabled, this parameter decodes UPCA bar codes starting with digit '5', EAN-13 bar codes starting with digit '99', and UPCA/GS1-128 Coupon Codes. UPCA, EAN-13 and GS1-128 must be enabled to scan all types of Coupon Codes.



Enable UCC Coupon Extended Code



***Disable UCC Coupon Extended Code**

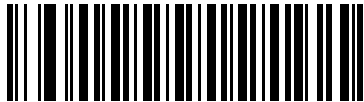


NOTE Use the Decode UPC/EAN Supplemental Redundancy parameter to control autodiscrimination of the GS1-128 (right half) of a coupon code.

Code 128

Enable/Disable Code 128

To enable or disable Code 128, scan the appropriate bar code below.



***Enable Code 128**



Disable Code 128

Enable/Disable GS1-128 (formerly UCC/EAN-128)

To enable or disable GS1-128, scan the appropriate bar code below.



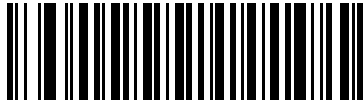
***Enable GS1-128**



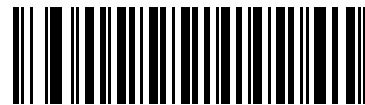
Disable GS1-128

Enable/Disable ISBT 128

ISBT 128 is a variant of Code 128 used in the blood bank industry. Scan the appropriate bar code below to enable or disable ISBT 128. If necessary, the host must perform concatenation of the ISBT data.



***Enable ISBT 128**

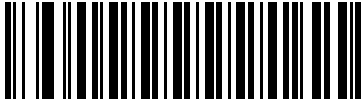


Disable ISBT 128

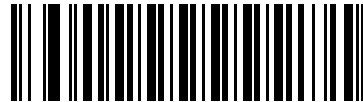
Code 39

Enable/Disable Code 39

To enable or disable Code 39, scan the appropriate bar code below.



***Enable Code 39**



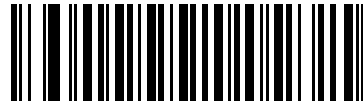
Disable Code 39

Enable/Disable Trioptic Code 39

Trioptic Code 39 is a variant of Code 39 used in the marking of computer tape cartridges. Trioptic Code 39 symbols always contain six characters. To enable or disable Trioptic Code 39, scan the appropriate bar code below.



Enable Trioptic Code 39



***Disable Trioptic Code 39**

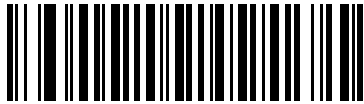


NOTE Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously.

Convert Code 39 to Code 32

Code 32 is a variant of Code 39 used by the Italian pharmaceutical industry. Scan the appropriate bar code below to enable or disable converting Code 39 to Code 32.

✓ **NOTE** Code 39 must be enabled for this parameter to function.



Enable Convert Code 39 to Code 32

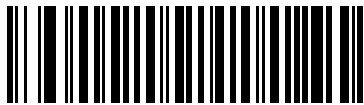


***Disable Convert Code 39 to Code 32**

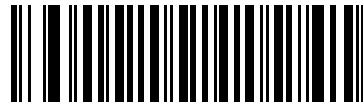
Code 32 Prefix

Scan the appropriate bar code below to enable or disable adding the prefix character “A” to all Code 32 bar codes.

✓ **NOTE** Convert Code 39 to Code 32 must be enabled for this parameter to function.



Enable Code 32 Prefix



***Disable Code 32 Prefix**

Set Lengths for Code 39

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 39 to any length, one or two discrete lengths, or lengths within a specific range. If Code 39 Full ASCII is enabled, **Length Within a Range** or **Any Length** are the preferred options.

- ✓ **NOTE** When setting lengths for different bar code types by scanning single digit numbers, single digit numbers must always be preceded by a leading zero.
- **One Discrete Length** - Select this option to decode only Code 39 symbols containing a selected length. Select the length using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only Code 39 symbols with 14 characters, scan **Code 39 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or change the selection, scan **Cancel** on [page D-3](#).
 - **Two Discrete Lengths** - Select this option to decode only Code 39 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select **Code 39 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To correct an error or change the selection, scan **Cancel** on [page D-3](#).
 - **Length Within Range** - Select this option to decode a Code 39 symbol with a specific length range. Select lengths using numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan **Code 39 - Length Within Range**. Then scan **0**, **4**, **1**, and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on [page D-3](#).
 - **Any Length** - Select this option to decode Code 39 symbols containing any number of characters within the scanner capability.



Code 39 - One Discrete Length



Code 39 - Two Discrete Lengths



Code 39 - Length Within Range



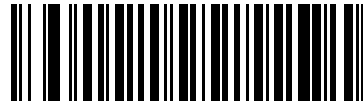
Code 39 - Any Length

Code 39 Check Digit Verification

When this feature is enabled, the scanner checks the integrity of all Code 39 symbols to verify that the data complies with specified check digit algorithm. Only Code 39 symbols which include a modulo 43 check digit are decoded. Enable this feature if the Code 39 symbols contain a Modulo 43 check digit.



Enable Code 39 Check Digit



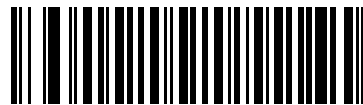
***Disable Code 39 Check Digit**

Transmit Code 39 Check Digit

Scan the appropriate bar code below to transmit Code 39 data with or without the check digit.



**Transmit Code 39 Check Digit
(Enable)**



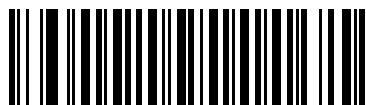
***Do Not Transmit Code 39 Check Digit
(Disable)**



NOTE Code 39 Check Digit Verification must be enabled for this parameter to function.

Code 39 Full ASCII Conversion

Code 39 Full ASCII is a variant of Code 39 which pairs characters to encode the full ASCII character set. To enable or disable Code 39 Full ASCII, scan the appropriate bar code below.



Enable Code 39 Full ASCII



***Disable Code 39 Full ASCII**



NOTE Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously.

Code 39 Full ASCII to Full ASCII Correlation is host-dependent and is described in the ASCII Character Set table for the appropriate interface. See [Keyboard Wedge ASCII Character Set on page 6-13](#), [ASCII Character Set for RS-232 on page 7-18](#) and [ASCII Character Set for USB on page 8-12](#) for the appropriate interface.

Code 39 Buffering (Scan & Store)

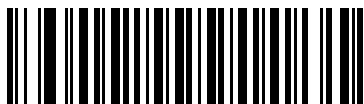
This feature allows the scanner to accumulate data from multiple Code 39 symbols.

Selecting the Scan and Store option (Buffer Code 39) temporarily buffers all Code 39 symbols having a leading space as a first character for later transmission. The leading space is not buffered.

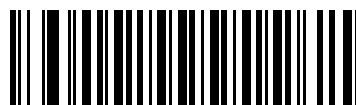
Decode of a valid Code 39 symbol with no leading space causes transmission in sequence of all buffered data in a first-in first-out format, plus transmission of the “triggering” symbol. See the following pages for further details.

When the **Do Not Buffer Code 39** option is selected, all decoded Code 39 symbols are transmitted immediately without being stored in the buffer.

This feature affects Code 39 only. If selecting **Buffer Code 39**, we recommend configuring the scanner to decode Code 39 symbology only.



**Buffer Code 39
(Enable)**



***Do Not Buffer Code 39
(Disable)**

While there is data in the transmission buffer, selecting **Do Not Buffer Code 39** is not allowed. The buffer holds 200 bytes of information.

To disable Code 39 buffering when there is data in the transmission buffer, first force the buffer transmission (see [Transmit Buffer on page 13-29](#)) or clear the buffer.

Buffer Data

To buffer data, Code 39 buffering must be enabled and a Code 39 symbol must be read with a space immediately following the start pattern.

- Unless the data overflows the transmission buffer, the scanner issues a low/high beep to indicate successful decode and buffering. (For overflow conditions, see [Overfilling Transmission Buffer](#).)
- The scanner adds the decoded data excluding the leading space to the transmission buffer.
- No transmission occurs.

Clear Transmission Buffer

To clear the transmission buffer, scan the **Clear Buffer** bar code below, which contains only a start character, a dash (minus), and a stop character.

- The scanner issues a short high/low/high beep.
- The scanner erases the transmission buffer.
- No transmission occurs.



Clear Buffer

- ✓ **NOTE** Because the Clear Buffer contains only the dash (minus) character, set the Code 39 length to include length 1 before scanning this bar code.

Transmit Buffer

There are two methods to transmit the Code 39 buffer.

1. Scan the **Transmit Buffer** bar code below which contains only a start character, a plus (+), and a stop character.
 - The scanner transmits and clears the buffer.
 - The scanner issues a low/high beep.



Transmit Buffer

2. Scan a Code 39 bar code with a leading character other than a space.
 - The scanner appends new decode data to buffered data.
 - The scanner transmits and clears the buffer.
 - The scanner signals that the buffer was transmitted with a low/high beep.
 - Scanner transmits and clears the buffer.

- ✓ **NOTE** Because the Transmit Buffer contains only a plus (+) character, set the Code 39 length to include length 1 before scanning this bar code.

Overfilling Transmission Buffer

The Code 39 buffer holds 200 characters. If the symbol just read results in an overflow of the transmission buffer:

- The scanner indicates that the symbol was rejected by issuing three long, high beeps.
- No transmission occurs. The data in the buffer is not affected.

Attempt to Transmit an Empty Buffer

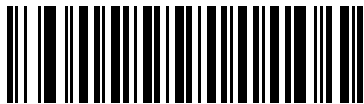
If the symbol just read was the **Transmit Buffer** symbol and the Code 39 buffer is empty:

- A short low/high/low beep signals that the buffer is empty.
- No transmission occurs.
- The buffer remains empty.

Code 93

Enable/Disable Code 93

To enable or disable Code 93, scan the appropriate bar code below.



Enable Code 93



***Disable Code 93**

Set Lengths for Code 93

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 93 to any length, one or two discrete lengths, or lengths within a specific range.

- One Discrete Length** - Select this option to decode only Code 93 symbols containing a selected length. Select the length using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only Code 93 symbols with 14 characters, scan **Code 93 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- Two Discrete Lengths** - Select this option to decode only Code 93 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those Code 93 symbols containing either 2 or 14 characters, select **Code 93 - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- Length Within Range** - Select this option to decode a Code 93 symbol with a specific length range. Select lengths using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Code 93 symbols containing between 4 and 12 characters, first scan **Code 93 - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on [page D-3](#).
- Any Length** - Scan this option to decode Code 93 symbols containing any number of characters within the scanner's capability.

Set Lengths for Code 93 (continued)



Code 93 - One Discrete Length



Code 93 - Two Discrete Lengths



Code 93 - Length Within Range

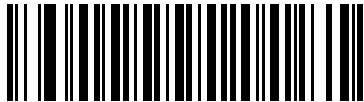


Code 93 - Any Length

Code 11

Code 11

To enable or disable Code 11, scan the appropriate bar code below.



Enable Code 11



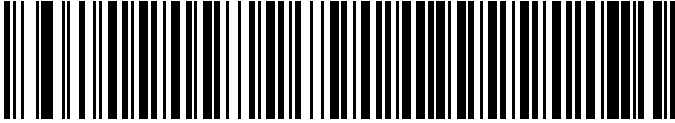
***Disable Code 11**

Set Lengths for Code 11

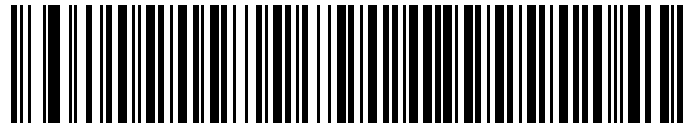
The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 11 to any length, one or two discrete lengths, or lengths within a specific range.

- One Discrete Length** - Select this option to decode only Code 11 symbols containing a selected length. Select the length using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only Code 11 symbols with 14 characters, scan **Code 11 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- Two Discrete Lengths** - Select this option to decode only Code 11 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those Code 11 symbols containing either 2 or 14 characters, select **Code 11 - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- Length Within Range** - Select this option to decode a Code 11 symbol with a specific length range. Select lengths using numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Code 11 symbols containing between 4 and 12 characters, first scan **Code 11 - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on [page D-3](#).
- Any Length** - Scan this option to decode Code 11 symbols containing any number of characters within the scanner capability.

Set Lengths for Code 11 (continued)



Code 11 - One Discrete Length



Code 11 - Two Discrete Lengths



Code 11 - Length Within Range

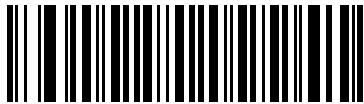


Code 11 - Any Length

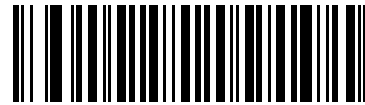
Code 11 Check Digit Verification

This feature allows the scanner to check the integrity of all Code 11 symbols to verify that the data complies with the specified check digit algorithm. This selects the check digit mechanism for the decoded Code 11 bar code. The options are to check for one check digit, check for two check digits, or disable the feature.

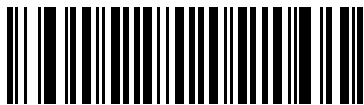
To enable this feature, scan the bar code below corresponding to the number of check digits encoded in your Code 11 symbols.



***Disable**



One Check Digit



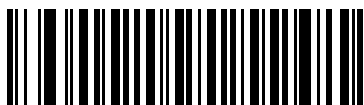
Two Check Digits

Transmit Code 11 Check Digits

This feature selects whether or not to transmit the Code 11 check digit(s).



**Transmit Code 11 Check Digit(s)
(Enable)**



***Do Not Transmit Code 11 Check Digit(s)
(Disable)**



NOTE Code 11 Check Digit Verification must be enabled for this parameter to function.

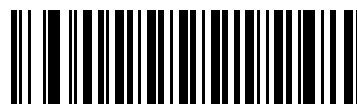
Interleaved 2 of 5 (ITF)

Enable/Disable Interleaved 2 of 5

To enable or disable Interleaved 2 of 5, scan the appropriate bar code below, and select an Interleaved 2 of 5 length from the following pages.



*Enable Interleaved 2 of 5



Disable Interleaved 2 of 5

Set Lengths for Interleaved 2 of 5

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for I 2 of 5 to any length, one or two discrete lengths, or lengths within a specific range.

- **One Discrete Length** - Select this option to decode only I 2 of 5 symbols containing a selected length. Select the length using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only I 2 of 5 symbols with 14 characters, scan **I 2 of 5 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- **Two Discrete Lengths** - Select this option to decode only I 2 of 5 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those I 2 of 5 symbols containing either 2 or 14 characters, select **I 2 of 5 - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- **Length Within Range** - Select this option to decode an I 2 of 5 symbol with a specific length range. Select lengths using numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode I 2 of 5 symbols containing between 4 and 12 characters, first scan **I 2 of 5 - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on [page D-3](#).
- **Any Length** - Scan this option to decode I 2 of 5 symbols containing any number of characters within the scanner capability.

✓ **NOTE** Due to the construction of the I 2 of 5 symbology, it is possible for a scan line covering only a portion of the code to be interpreted as a complete scan, yielding less data than is encoded in the bar code. To prevent this, select specific lengths (**I 2 of 5 - One Discrete Length - Two Discrete Lengths**) for I 2 of 5 applications.

Set Lengths for Interleaved 2 of 5 (continued)



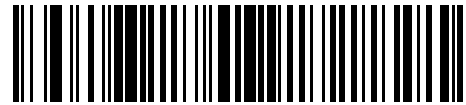
I 2 of 5 - One Discrete Length



I 2 of 5 - Two Discrete Lengths



I 2 of 5 - Length Within Range



I 2 of 5 - Any Length

I 2 of 5 Check Digit Verification

When this feature is enabled, the scanner checks the integrity of all I 2 of 5 symbols to verify the data complies with either the specified Uniform Symbology Specification (USS), or the Optical Product Code Council (OPCC) check digit algorithm.



***Disable**



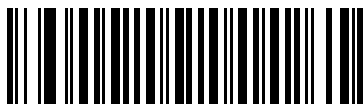
USS Check Digit



OPCC Check Digit

Transmit I 2 of 5 Check Digit

Scan the appropriate bar code below to transmit I 2 of 5 data with or without the check digit.



**Transmit I 2 of 5 Check Digit
(Enable)**



***Do Not Transmit I 2 of 5 Check Digit
(Disable)**

Convert I 2 of 5 to EAN-13

Enable this parameter to convert 14-character I 2 of 5 codes to EAN-13, and transmit to the host as EAN-13. To accomplish this, the I 2 of 5 code must be enabled, and the code must have a leading zero and a valid EAN-13 check digit.



**Convert I 2 of 5 to EAN-13
(Enable)**

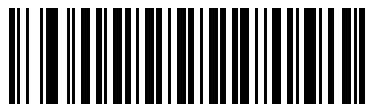


***Do Not Convert I 2 of 5 to EAN-13
(Disable)**

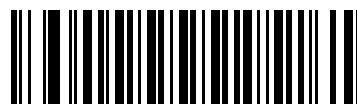
Discrete 2 of 5 (DTF)

Enable/Disable Discrete 2 of 5

To enable or disable Discrete 2 of 5, scan the appropriate bar code below.



Enable Discrete 2 of 5



*Disable Discrete 2 of 5

Set Lengths for Discrete 2 of 5

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for D 2 of 5 to any length, one or two discrete lengths, or lengths within a specific range.

- **One Discrete Length** - Select this option to decode only D 2 of 5 symbols containing a selected length. Select the length using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only D 2 of 5 symbols with 14 characters, scan **D 2 of 5 - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- **Two Discrete Lengths** - Select this option to decode only D 2 of 5 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those D 2 of 5 symbols containing either 2 or 14 characters, select **D 2 of 5 - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- **Length Within Range** - Select this option to decode a D 2 of 5 symbol with a specific length range. Select lengths using numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode D 2 of 5 symbols containing between 4 and 12 characters, first scan **D 2 of 5 - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on [page D-3](#).
- **Any Length** - Scan this option to decode D 2 of 5 symbols containing any number of characters within the scanner capability.



NOTE Due to the construction of the D 2 of 5 symbology, it is possible for a scan line covering only a portion of the code to be interpreted as a complete scan, yielding less data than is encoded in the bar code. To prevent this, select specific lengths (**D 2 of 5 - One Discrete Length - Two Discrete Lengths**) for D 2 of 5 applications.

Set Lengths for Discrete 2 of 5 (continued)



D 2 of 5 - One Discrete Length



D 2 of 5 - Two Discrete Lengths



D 2 of 5 - Length Within Range

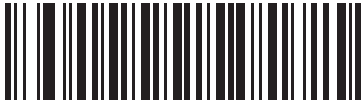


D 2 of 5 - Any Length

Chinese 2 of 5

Enable/Disable Chinese 2 of 5

To enable or disable Chinese 2 of 5, scan the appropriate bar code below.



Enable Chinese 2 of 5



***Disable Chinese 2 of 5**

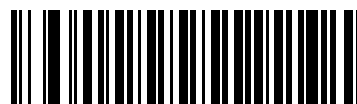
Codabar (NW - 7)

Enable/Disable Codabar

To enable or disable Codabar, scan the appropriate bar code below.



Enable Codabar



***Disable Codabar**

Set Lengths for Codabar

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Codabar to any length, one or two discrete lengths, or lengths within a specific range.

- One Discrete Length** - Select this option to decode only Codabar symbols containing a selected length. Select the length using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only Codabar symbols with 14 characters, scan **Codabar - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- Two Discrete Lengths** - Select this option to decode only Codabar symbols containing either of two selected lengths. Select lengths using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only Codabar symbols containing either 2 or 14 characters, select **Codabar - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- Length Within Range** - Select this option to decode a Codabar symbol with a specific length range. Select lengths using numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Codabar symbols containing between 4 and 12 characters, first scan **Codabar - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on [page D-3](#).
- Any Length** - Scan this option to decode Codabar symbols containing any number of characters within the scanner capability.

Set Lengths for Codabar (continued).



Codabar - One Discrete Length



Codabar - Two Discrete Lengths



Codabar - Length Within Range

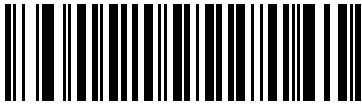


Codabar - Any Length

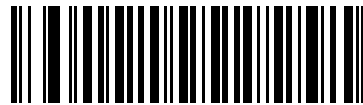
CLSI Editing

When enabled, this parameter strips the start and stop characters and inserts a space after the first, fifth, and tenth characters of a 14-character Codabar symbol. Enable this feature if your host system requires this data format.

✓ **NOTE** Symbol length does not include start and stop characters.



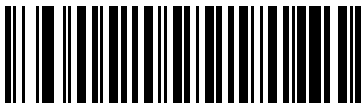
Enable CLSI Editing



*Disable CLSI Editing

NOTIS Editing

When enabled, this parameter strips the start and stop characters from a decoded Codabar symbol. Enable this feature if your host system requires this data format.



Enable NOTIS Editing



*Disable NOTIS Editing

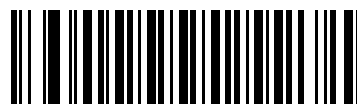
MSI

Enable/Disable MSI

To enable or disable MSI, scan the appropriate bar code below.



Enable MSI



*Disable MSI

Set Lengths for MSI

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for MSI to any length, one or two discrete lengths, or lengths within a specific range.

- **One Discrete Length** - Select this option to decode only MSI symbols containing a selected length. Select the length using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only MSI symbols with 14 characters, scan **MSI - One Discrete Length**, then scan **1** followed by **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- **Two Discrete Lengths** - Select this option to decode only MSI symbols containing either of two selected lengths. Select lengths using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only MSI symbols containing either 2 or 14 characters, select **MSI - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To correct an error or to change the selection, scan **Cancel** on [page D-3](#).
- **Length Within Range** - Select this option to decode a MSI symbol with a specific length range. Select lengths using numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode MSI symbols containing between 4 and 12 characters, first scan **MSI - Length Within Range**. Then scan **0**, **4**, **1**, and **2** (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan **Cancel** on [page D-3](#).
- **Any Length** - Scan this option to decode MSI symbols containing any number of characters within the scanner capability.

✓ **NOTE** Due to the construction of the MSI symbology, it is possible for a scan line covering only a portion of the code to be interpreted as a complete scan, yielding less data than is encoded in the bar code. To prevent this, select specific lengths (**MSI - One Discrete Length - Two Discrete Lengths**) for MSI applications..

Set Lengths for MSI (continued)



MSI - One Discrete Length



MSI - Two Discrete Lengths



MSI - Length Within Range

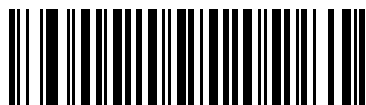


MSI - Any Length

MSI Check Digits

With MSI symbols, one check digit is mandatory and always verified by the reader. The second check digit is optional. If the MSI codes include two check digits, scan the **Two MSI Check Digits** bar code to enable verification of the second check digit.

See [MSI Check Digit Algorithm on page 13-47](#) for the selection of second digit algorithms.



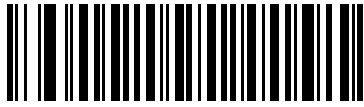
*One MSI Check Digit



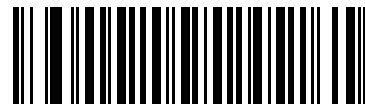
Two MSI Check Digits

Transmit MSI Check Digit(s)

Scan the appropriate bar code below to transmit MSI data with or without the check digit.



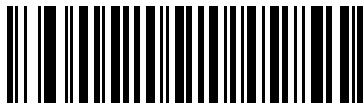
**Transmit MSI Check Digit(s)
(Enable)**



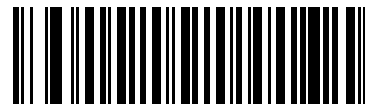
***Do Not Transmit MSI Check Digit(s)
(Disable)**

MSI Check Digit Algorithm

Two algorithms are possible for the verification of the second MSI check digit. Select the bar code below corresponding to the algorithm used to encode your check digit.



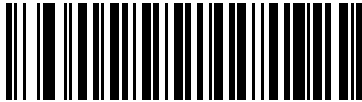
MOD 10/MOD 11



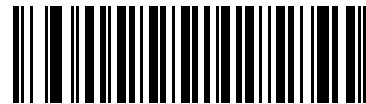
***MOD 10/MOD 10**

GS1 DataBar

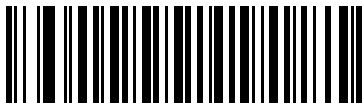
The variants of GS1 DataBar are DataBar-14, DataBar Expanded and DataBar Limited. DataBar-14 and DataBar Expanded include stacked versions. Scan the appropriate bar code below to enable or disable each variant of GS1 DataBar.



Enable GS1 DataBar-14



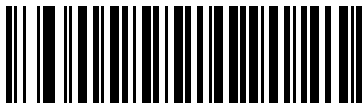
***Disable GS1 DataBar 14**



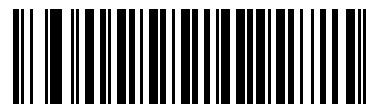
Enable GS1 DataBar Limited



***Disable GS1 DataBar Limited**



Enable GS1 DataBar Expanded



***Disable GS1 DataBar Expanded**

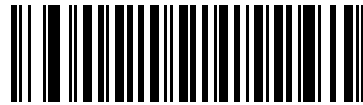
Convert GS1 DataBar to UPC/EAN

This parameter only applies to DataBar-14 and DataBar Limited symbols not decoded as part of a Composite symbol. Enable this to strip the leading '010' from DataBar-14 and DataBar Limited symbols encoding a single zero as the first digit, and report the bar code as EAN-13.

For bar codes beginning with two or more zeros but not six zeros, this parameter strips the leading '0100' and reports the bar code as UPC-A. The UPC-A Preamble parameter that transmits the system character and country code applies to converted bar codes. Note that neither the system character nor the check digit can be stripped.



Enable Convert GS1 DataBar to UPC/EAN



***Disable Convert GS1 DataBar to UPC/EAN**

Symbology - Specific Security Levels

Redundancy Level

The scanner offers four levels of decode redundancy. Select higher redundancy levels for decreasing levels of bar code quality. As redundancy levels increase, the scanner's aggressiveness decreases.

Select the redundancy level appropriate for the bar code quality.

Redundancy Level 1

The following code types must be successfully read twice before being decoded:

| Code Type | Code Length |
|-----------|----------------------|
| Codabar | 8 characters or less |
| MSI | 4 characters or less |
| D 2 of 5 | 8 characters or less |
| I 2 of 5 | 8 characters or less |

Redundancy Level 2

The following code types must be successfully read twice before being decoded:

| Code Type | Code Length |
|-----------|-------------|
| All | All |

Redundancy Level 3

Code types other than the following must be successfully read twice before being decoded. The following codes must be read three times:

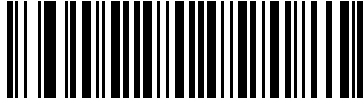
| Code Type | Code Length |
|-----------|----------------------|
| MSI | 4 characters or less |
| D 2 of 5 | 8 characters or less |
| I 2 of 5 | 8 characters or less |
| Codabar | 8 characters or less |

Redundancy Level 4

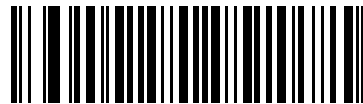
The following code types must be successfully read three times before being decoded:

| Code Type | Code Length |
|-----------|-------------|
| All | All |

Redundancy Level (continued)



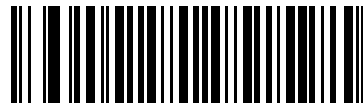
***Redundancy Level 1**



Redundancy Level 2



Redundancy Level 3

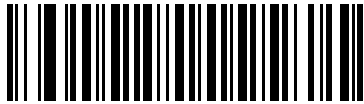


Redundancy Level 4

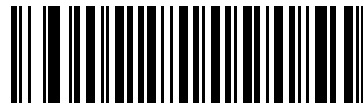
Security Level

The scanner offers four levels of decode security for delta bar codes, which include the Code 128 family, UPC/EAN, and Code 93. Select increasing levels of security for decreasing levels of bar code quality. There is an inverse relationship between security and scanner aggressiveness, so choose only that level of security necessary for any given application.

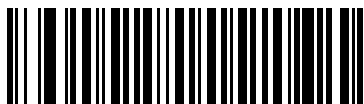
- **Security Level 0:** This default setting allows the scanner to operate in its most aggressive state, while providing sufficient security in decoding most “in-spec” bar codes.
- **Security Level 1:** Select this option if misdecodes occur. This security level should eliminate most misdecodes.
- **Security Level 2:** Select this option if Security level 1 fails to eliminate misdecodes.
- **Security Level 3:** If Security Level 2 was selected and misdecodes still occur, select this security level. Be advised, selecting this option is an extreme measure against mis-decoding severely out of spec bar codes. Selecting this level of security significantly impairs the decoding ability of the scanner. If this level of security is necessary, try to improve the quality of the bar codes.



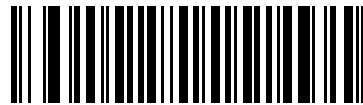
***Security Level 0**



Security Level 1



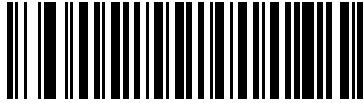
Security Level 2



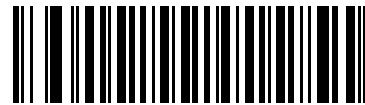
Security Level 3

Bi-directional Redundancy

Enable Bi-directional Redundancy to add security to linear code type security levels. When enabled, a bar code must be successfully scanned in both directions (forward and reverse) before reporting a good decode.



Enable Bi-directional Redundancy



*Disable Bi-directional Redundancy

Symbology - Intercharacter Gap

The Code 39 and Codabar symbologies have an intercharacter gap that is customarily quite small. Due to various bar code printing technologies, this gap may grow larger than the maximum size allowed, causing the scanner to be unable to decode the symbol. If this problem is encountered, scan **Large Intercharacter Gaps** to tolerate out-of-specification bar codes.



*Normal Intercharacter Gaps



Large Intercharacter Gaps

Chapter 14 Advanced Data Formatting

Introduction

Advanced Data Formatting (ADF) is a means of customizing data before transmission to the host device. Use ADF to edit scan data to suit requirements. Implement ADF by scanning a related series of bar codes which program the scanner with ADF rules.

For ADF information and programming bar codes, refer to the *Advanced Data Formatting Programmer Guide*, p/n 72E-69680-xx located at www.zebra.com/support.

Appendix A Standard Default Parameters

Table A-1 Standard Default Parameters Table

| Parameter | Default | Page Number |
|---|--------------------|-------------|
| Radio Communications | | |
| Bluetooth Host | Cradle Host | 4-5 |
| Country Keyboard Types (Country Code) | North American | 4-8 |
| HID Keyboard Keystroke Delay | No Delay (0 msec) | 4-10 |
| CAPS Lock Override | Disable | 4-10 |
| Ignore Unknown Characters | Enable | 4-11 |
| Emulate Keypad | Disable | 4-11 |
| Keyboard FN1 Substitution | Disable | 4-12 |
| Function Key Mapping | Disable | 4-12 |
| Convert Case | No Case Conversion | 4-13 |
| Simulated Caps Lock | Disable | 4-13 |
| Beep on Reconnect Attempt | Disable | 4-14 |
| Reconnect Attempt Interval | 30 sec | 4-15 |
| Modes of Operation (Point-to-Point/Multipoint-to-Point) | Point-to-Point | 4-18 |
| Parameter Broadcast (Cradle Host Only) | Enable | 4-19 |
| Pairing Modes | Unlocked | 4-20 |
| Pairing on Contacts | Disable | 4-21 |
| Connection Maintenance Interval | 15 min | 4-24 |

¹User selection is required to configure this interface and this is the most common selection.

Table A-1 Standard Default Parameters Table (Continued)

| Parameter | Default | Page Number |
|---|--|-------------|
| Remote Address (All Bluetooth Host Modes) | No Address | 4-26 |
| Authentication | Disable | 4-25 |
| Encryption | Disable | 4-27 |
| User Preferences | | |
| Beeper Tone | Medium | 5-4 |
| Beeper Volume | High | 5-4 |
| Beep on Insertion | Enabled | 5-5 |
| Intellistand Idle Timeout | 15 min | 5-5 |
| Power Mode | Reduced Power Mode | 5-7 |
| Time Delay to Reduced Power Mode | 1 sec | 5-8 |
| Scan Pattern | Multi-line Always Raster | 5-9 |
| Scan Line Width | Full Width | 5-10 |
| Laser On Time | 3.0 sec | 5-10 |
| Beep After Good Decode | Enable | 5-11 |
| Transmit Code ID Character | None | 5-12 |
| Prefix Value | 7013 <CR><LF> | 5-13 |
| Suffix Value | 7013 <CR><LF> | 5-13 |
| Scan Data Transmission Format | Data As Is | 5-13 |
| FN1 Substitution Values | Set | 5-15 |
| Transmit "No Read" Message | Disable | 5-15 |
| Synapse Interface | Standard | 5-16 |
| Batch Mode | Normal (Do Not Batch Data) | 5-17 |
| Keyboard Wedge Host Parameters | | |
| Keyboard Wedge Host Type | IBM PC/AT& IBM PC Compatibles ¹ | 6-4 |
| Country Types (Country Codes) | North American | 6-5 |
| Ignore Unknown Characters | Send | 6-6 |
| Keystroke Delay | No Delay | 6-7 |

¹User selection is required to configure this interface and this is the most common selection.

Table A-1 Standard Default Parameters Table (Continued)

| Parameter | Default | Page Number |
|--|------------------------|-------------|
| Intra-Keystroke Delay | Disable | 6-7 |
| Alternate Numeric Keypad Emulation | Disable | 6-8 |
| Caps Lock On | Disable | 6-8 |
| Caps Lock Override | Disable | 6-9 |
| Convert Wedge Data | No Convert | 6-9 |
| Function Key Mapping | Disable | 6-10 |
| FN1 Substitution | Disable | 6-10 |
| Send and Make Break | Send | 6-11 |
| RS-232 Host Parameters | | |
| RS-232 Host Types | Standard | 7-6 |
| Baud Rate | 9600 | 7-7 |
| Parity Type | None | 7-8 |
| Stop Bit Select | 1 Stop Bit | 7-9 |
| Data Bits (ASCII Format) | 8-Bit | 7-9 |
| Check Receive Errors | Enable | 7-10 |
| Hardware Handshaking | None | 7-10 |
| Software Handshaking | None | 7-12 |
| Host Serial Response Time-out | 2 sec | 7-14 |
| RTS Line State | Low RTS | 7-15 |
| Beep on <BEL> | Disable | 7-15 |
| Intercharacter Delay | 0 msec | 7-16 |
| Nixdorf Beep/LED Options | Normal Operation | 7-17 |
| Ignore Unknown Characters | Send Bar Code | 7-17 |
| USB Host Parameters | | |
| USB Device Type | HID Keyboard Emulation | 8-4 |
| USB Country Keyboard Types (Country Codes) | North American | 8-5 |
| USB Keystroke Delay | No Delay | 8-7 |
| USB CAPS Lock Override | Disable | 8-7 |

¹User selection is required to configure this interface and this is the most common selection.

Table A-1 Standard Default Parameters Table (Continued)

| Parameter | Default | Page Number |
|---------------------------------------|---|-------------|
| USB Ignore Unknown Characters | Send | 8-8 |
| Emulate Keypad | Disable | 8-8 |
| USB FN1 Substitution | Disable | 8-9 |
| Function Key Mapping | Disable | 8-9 |
| Simulated Caps Lock | Disable | 8-10 |
| Convert Case | No Case Conversion | 8-10 |
| Ignore Beep | Disable | 8-11 |
| Ignore Bar Code Configuration | Disable | 8-11 |
| IBM 468X/469X Host Parameters | | |
| Port Address | None Selected | 9-4 |
| Convert Unknown to Code 39 | Disable | 9-5 |
| Ignore Beep | Disable | 9-5 |
| Ignore Bar Code Configuration | Disable | 9-6 |
| Wand Emulation Host Parameters | | |
| Wand Emulation Host Types | Symbol OmniLink Interface Controller ¹ | 10-4 |
| Leading Margin | 80 msec | 10-5 |
| Polarity | Bar High/Margin Low | 10-6 |
| Ignore Unknown Characters | Send | 10-6 |
| Convert All Bar Codes to Code 39 | Disable | 10-7 |
| Convert Code 39 to Full ASCII | Disable | 10-8 |
| Scanner Emulation | | |
| Beep Style | Beep on Successful Transmit | 11-4 |
| Parameter Pass-Through | Parameter Process and Pass Through | 11-5 |
| Convert Newer Code Types | Convert Newer Code Types | 11-6 |
| Module Width | 20 µs | 11-6 |
| Convert All Bar Codes to Code 39 | Do Not Convert Bar Codes to Code 39 | 11-7 |

¹User selection is required to configure this interface and this is the most common selection.

Table A-1 Standard Default Parameters Table (Continued)

| Parameter | Default | Page Number |
|---|---------------------------|-------------|
| Code 39 Full ASCII Conversion | Disable | 11-7 |
| Transmission Timeout | 3 sec | 11-8 |
| Ignore Unknown Characters | Ignore Unknown Characters | 11-9 |
| Leading Margin | 2 ms | 11-9 |
| Check for Decode LED | Check for Decode LED | 11-10 |
| UPC/EAN | | |
| UPC-A | Enable | 13-5 |
| UPC-E | Enable | 13-5 |
| UPC-E1 | Disable | 13-6 |
| EAN-8/JAN 8 | Enable | 13-6 |
| EAN-13/JAN 13 | Enable | 13-6 |
| Bookland EAN | Disable | 13-8 |
| Decode UPC/EAN/JAN Supplementals (2 and 5 digits) | Ignore | 13-9 |
| User-Programmable Supplementals | | 13-12 |
| Decode UPC/EAN/JAN Supplemental Redundancy | 7 | 13-12 |
| Transmit UPC-A Check Digit | Enable | 13-13 |
| Transmit UPC-E Check Digit | Enable | 13-13 |
| Transmit UPC-E1 Check Digit | Enable | 13-14 |
| UPC-A Preamble | System Character | 13-14 |
| UPC-E Preamble | System Character | 13-15 |
| UPC-E1 Preamble | System Character | 13-16 |
| Convert UPC-E to A | Disable | 13-17 |
| Convert UPC-E1 to A | Disable | 13-17 |
| EAN-8/JAN-8 Extend | Disable | 13-18 |
| Bookland ISBN Format | ISBN-10 | 13-19 |
| UCC Coupon Extended Code | Disable | 13-20 |
| Code 128 | | |
| Code 128 | Enable | 13-21 |

¹User selection is required to configure this interface and this is the most common selection.

Table A-1 Standard Default Parameters Table (Continued)

| Parameter | Default | Page Number |
|--|---------|-------------|
| GS1-128 (formerly UCC/EAN-128) | Enable | 13-21 |
| ISBT 128 (non-concatenated) | Enable | 13-22 |
| Code 39 | | |
| Code 39 | Enable | 13-23 |
| Trioptic Code 39 | Disable | 13-23 |
| Convert Code 39 to Code 32 (Italian Pharmacy Code) | Disable | 13-24 |
| Code 32 Prefix | Disable | 13-24 |
| Set Length(s) for Code 39 | 2 to 55 | 13-25 |
| Code 39 Check Digit Verification | Disable | 13-26 |
| Transmit Code 39 Check Digit | Disable | 13-26 |
| Code 39 Full ASCII Conversion | Disable | 13-27 |
| Buffer Code 39 | Disable | 13-27 |
| Code 93 | | |
| Code 93 | Disable | 13-30 |
| Set Length(s) for Code 93 | 4 to 55 | 13-30 |
| Code 11 | | |
| Code 11 | Disable | 13-32 |
| Set Lengths for Code 11 | 4 to 55 | 13-32 |
| Code 11 Check Digit Verification | Disable | 13-34 |
| Transmit Code 11 Check Digit(s) | Disable | 13-34 |
| Interleaved 2 of 5 (ITF) | | |
| Interleaved 2 of 5 (ITF) | Enable | 13-35 |
| Set Lengths for I 2 of 5 | 14 | 13-35 |
| I 2 of 5 Check Digit Verification | Disable | 13-37 |
| Transmit I 2 of 5 Check Digit | Disable | 13-37 |
| Convert I 2 of 5 to EAN 13 | Disable | 13-38 |

¹User selection is required to configure this interface and this is the most common selection.

Table A-1 Standard Default Parameters Table (Continued)

| Parameter | Default | Page Number |
|---|---------------|-------------|
| Discrete 2 of 5 (DTF) | | |
| Discrete 2 of 5 | Disable | 13-39 |
| Set Length(s) for D 2 of 5 | 12 | 13-39 |
| Chinese 2 of 5 | | |
| Enable/Disable Chinese 2 of 5 | Disable | 13-41 |
| Codabar (NW - 7) | | |
| Codabar | Disable | 13-42 |
| Set Lengths for Codabar | 5 to 55 | 13-42 |
| CLSI Editing | Disable | 13-44 |
| NOTIS Editing | Disable | 13-44 |
| MSI | | |
| MSI | Disable | 13-45 |
| Set Length(s) for MSI | 1 to 55 | 13-45 |
| MSI Check Digits | One | 13-46 |
| Transmit MSI Check Digit | Disable | 13-47 |
| MSI Check Digit Algorithm | Mod 10/Mod 10 | 13-47 |
| GS1 DataBar | | |
| GS1 DataBar-14 | Disable | 13-48 |
| GS1 DataBar Limited | Disable | 13-48 |
| GS1 DataBar Expanded | Disable | 13-48 |
| Convert GS1 DataBar to UPC/EAN | Disable | 13-49 |
| Symbology - Specific Security Levels | | |
| Redundancy Level | 1 | 13-50 |
| Security Levels | 0 | 13-52 |
| Bi-directional Redundancy | Disable | 13-53 |

¹User selection is required to configure this interface and this is the most common selection.

Appendix B Programming Reference

Symbol Code Identifiers

Table B-1 *Symbol Code Characters*

| Code Character | Code Type |
|----------------|--|
| A | UPC/EAN |
| B | Code 39, Code 39 Full ASCII, Code 32 |
| C | Codabar |
| D | Code 128, ISBT 128 |
| E | Code 93 |
| F | Interleaved 2 of 5 |
| G | Discrete 2 of 5, or Discrete 2 of 5 IATA |
| H | Code 11 |
| J | MSI |
| K | GS1-128 |
| L | Bookland EAN |
| M | Trioptic Code 39 |
| N | Coupon Code |
| R | GS1 DataBar Family |
| U | Chinese 2 of 5 |

AIM Code Identifiers

Each AIM Code Identifier contains the three-character string **Jcm** where:

- J = Flag Character (ASCII 93)
- c = Code Character (see [Table B-2](#))
- m = Modifier Character (see [Table B-3](#))

Table B-2 *Aim Code Characters*

| Code Character | Code Type |
|----------------|--|
| A | Code 39, Code 39 Full ASCII, Code 32 |
| C | Code 128 (all variants), Coupon (Code 128 portion) |
| E | UPC/EAN, Coupon (UPC portion) |
| e | GS1 DataBar Family |
| F | Codabar |
| G | Code 93 |
| H | Code 11 |
| I | Interleaved 2 of 5 |
| M | MSI |
| S | D2 of 5, IATA 2 of 5 |
| X | Bookland EAN, Code 39 Trioptic, Chinese 2 of 5 |

The modifier character is the sum of the applicable option values based on [Table B-3](#).

Table B-3 *Modifier Characters*

| Code Type | Option Value | Option |
|---|--|--|
| Code 39 | 0 | No check character or Full ASCII processing. |
| | 1 | Reader has checked one check character. |
| | 3 | Reader has checked and stripped check character. |
| | 4 | Reader has performed Full ASCII character conversion. |
| | 5 | Reader has performed Full ASCII character conversion and checked one check character. |
| | 7 | Reader has performed Full ASCII character conversion and checked and stripped check character. |
| Example: A Full ASCII bar code with check character W, A+I+MI+DW , is transmitted as JA7 AimId where 7 = (3+4). | | |
| Trioptic Code 39 | 0 | No option specified at this time. Always transmit 0. |
| | Example: A Trioptic bar code 412356 is transmitted as JX0 356412 | |
| Chinese 2 of 5 | 0 | No option specified at this time. Always transmit 0. |
| | Example: A Chinese 2 of 5 bar code 01234567890 is transmitted as JX000 1234567890 | |
| Code 128 | 0 | Standard data packet, no Function code 1 in first symbol position. |
| | 1 | Function code 1 in first symbol character position. |
| | 2 | Function code 1 in second symbol character position. |
| | Example: A Code (EAN) 128 bar code with Function 1 character FNC1 in the first position, AIMID is transmitted as JC1 AIMID | |
| I 2 of 5 | 0 | No check digit processing. |
| | 1 | Reader has validated check digit. |
| | 3 | Reader has validated and stripped check digit. |
| | Example: An I 2 of 5 bar code without check digit, 4123, is transmitted as J10 4123 | |
| Codabar | 0 | No check digit processing. |
| | 1 | Reader has checked check digit. |
| | 3 | Reader has stripped check digit before transmission. |
| | Example: A Codabar bar code without check digit, 4123, is transmitted as JF0 4123 | |
| Code 93 | 0 | No options specified at this time. Always transmit 0. |
| | Example: A Code 93 bar code 012345678905 is transmitted as JG00 12345678905 | |

Table B-3 *Modifier Characters (Continued)*

| Code Type | Option Value | Option |
|--------------------|--|---|
| MSI | 0 | Check digits are sent. |
| | 1 | No check digit is sent. |
| | Example: An MSI bar code 4123, with a single check digit checked, is transmitted as JM14123 | |
| D 2 of 5 | 0 | No options specified at this time. Always transmit 0. |
| | Example: A D 2 of 5 bar code 4123, is transmitted as JS04123 | |
| UPC/EAN | 0 | Standard packet in full EAN country code format, which is 13 digits for UPC-A, UPC-E, and EAN-13 (not including supplemental data). |
| | 1 | Two-digit supplement data only. |
| | 2 | Five-digit supplement data only. |
| | 3 | Combined data packet comprising 13 digits from a UPC-A, UPC-E, or EAN-13 symbol and 2 or 5 digits from a supplemental symbol. |
| | 4 | EAN-8 data packet. |
| | Example: A UPC-A bar code 012345678905 is transmitted as JE00012345678905 | |
| Bookland EAN | 0 | No options specified at this time. Always transmit 0. |
| | Example: A Bookland EAN bar code 123456789X is transmitted as JX0123456789X | |
| Code 11 | 0 | Single check digit |
| | 1 | Two check digits |
| | 3 | Check characters validated but not transmitted. |
| GS1 DataBar Family | | No option specified at this time. Always transmit 0. DataBar-14 and DataBar Limited transmit with an Application Identifier "01". Note: In GS1-128 emulation mode, GS1 DataBar is transmitted using Code 128 rules (i.e., JC1). |
| | Example: A DataBar-14 bar code 100123456788902 is transmitted as Je001100123456788902 . | |

Appendix C Sample Bar Codes

Code 39



UPC/EAN

UPC-A, 100%



EAN-13, 100%



Code 128



Interleaved 2 of 5



12345678901231

GS1 DataBar



NOTE GS1 DataBar variants must be enabled to read the bar codes below (see [GS1 DataBar on page 13-48](#)).



10293847560192837465019283746029478450366523
(GS1 DataBar Expanded Stacked)



1234890hjio9900mnb
(GS1 DataBar Expanded)



08672345650916
(GS1 DataBar Limited)

GS1 DataBar-14



55432198673467
(GS1 DataBar-14 Truncated)



90876523412674
(GS1 DataBar-14 Stacked)



78123465709811
(GS1 DataBar-14 Stacked Omni-Directional)

Appendix D Numeric Bar Codes

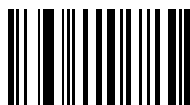
For parameters requiring specific numeric values, scan the appropriately numbered bar code(s).



0



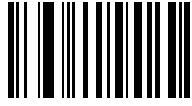
1



2



3



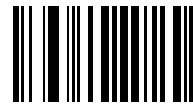
4



5



6



7



8



9

Cancel

To correct an error or change a selection, scan the bar code below.



Cancel

Appendix E Alphanumeric Bar Codes

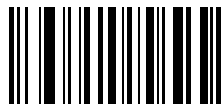
Alphanumeric Keyboard



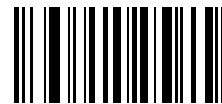
Space



#



\$



%

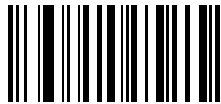
Alphanumeric Keyboard (continued)



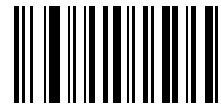
*



+



-



.



/

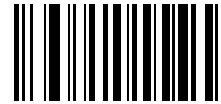


!

Alphanumeric Keyboard (continued)



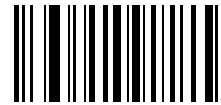
“



&



’



(



)

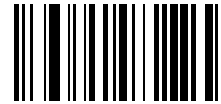


:

Alphanumeric Keyboard (continued)



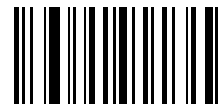
;



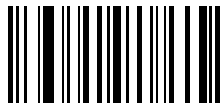
<



=



>



?

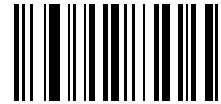


@

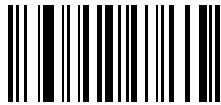
Alphanumeric Keyboard (continued)



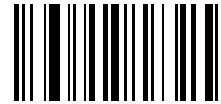
[



\



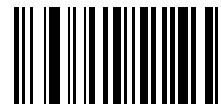
]



^



-



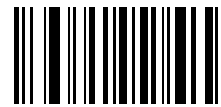
~

Alphanumeric Keyboard (continued)

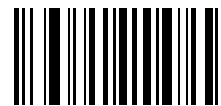
✓ **NOTE** The bar codes that follow should not be confused with those on the numeric keypad.



1



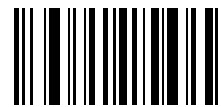
0



2



3



4

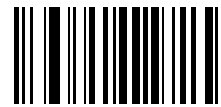


5

Alphanumeric Keyboard (continued)



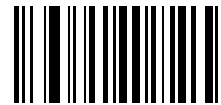
6



7



8



9



End of Message

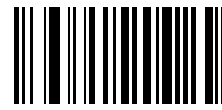


Cancel

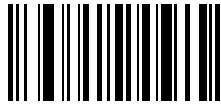
Alphanumeric Keyboard (continued)



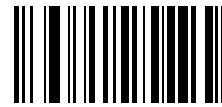
A



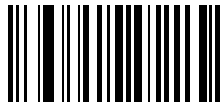
B



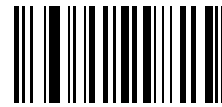
C



D



E

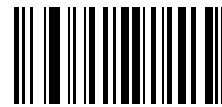


F

Alphanumeric Keyboard (continued)



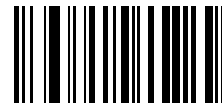
G



H



I



J



K



L

Alphanumeric Keyboard (continued)



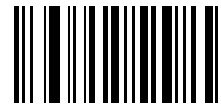
M



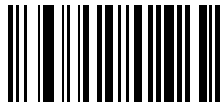
N



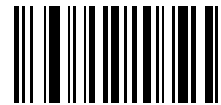
O



P



Q

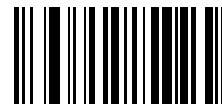


R

Alphanumeric Keyboard (continued)



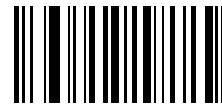
S



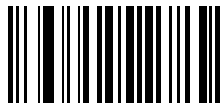
T



U



V



W

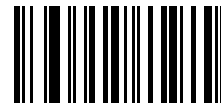


X

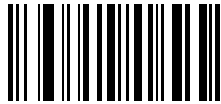
Alphanumeric Keyboard (continued)



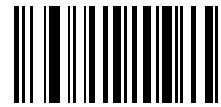
Y



Z



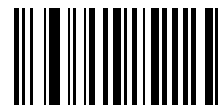
a



b



c



d

Alphanumeric Keyboard (continued)



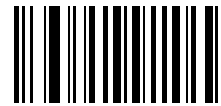
e



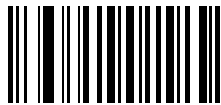
f



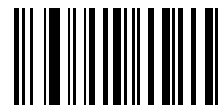
g



h



i

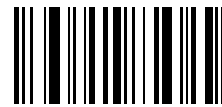


j

Alphanumeric Keyboard (continued)



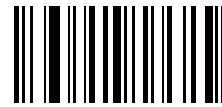
k



l



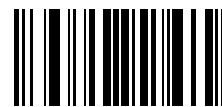
m



n

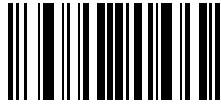


o

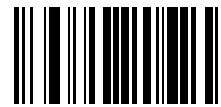


p

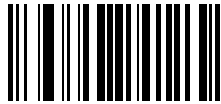
Alphanumeric Keyboard (continued)



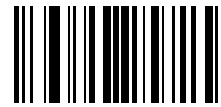
q



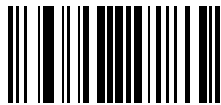
r



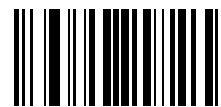
s



t

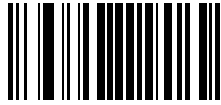


u

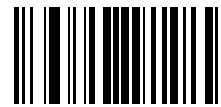


v

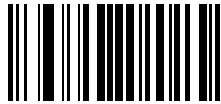
Alphanumeric Keyboard (continued)



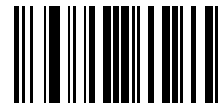
w



x



y



z

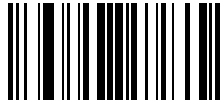


{

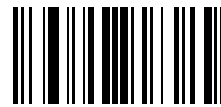


|

Alphanumeric Keyboard (continued)



}



~

Appendix F ASCII Character Sets

Table F-1 ASCII Value Standard Default Parameters Table

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|--|
| 1000 | %U | CTRL 2 |
| 1001 | \$A | CTRL A |
| 1002 | \$B | CTRL B |
| 1003 | \$C | CTRL C |
| 1004 | \$D | CTRL D |
| 1005 | \$E | CTRL E |
| 1006 | \$F | CTRL F |
| 1007 | \$G | CTRL G |
| 1008 | \$H | CTRL H/ BACKSPACE ¹ |
| 1009 | \$I | CTRL I/ HORIZONTAL TAB ¹ |
| 1010 | \$J | CTRL J |
| 1011 | \$K | CTRL K |
| 1012 | \$L | CTRL L |
| 1013 | \$M | CTRL M/ ENTER ¹ |
| 1014 | \$N | CTRL N |
| 1015 | \$O | CTRL O |

The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table F-1 ASCII Value Standard Default Parameters Table (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1016 | \$P | CTRL P |
| 1017 | \$Q | CTRL Q |
| 1018 | \$R | CTRL R |
| 1019 | \$S | CTRL S |
| 1020 | \$T | CTRL T |
| 1021 | \$U | CTRL U |
| 1022 | \$V | CTRL V |
| 1023 | \$W | CTRL W |
| 1024 | \$X | CTRL X |
| 1025 | \$Y | CTRL Y |
| 1026 | \$Z | CTRL Z |
| 1027 | %A | CTRL [|
| 1028 | %B | CTRL \ |
| 1029 | %C | CTRL] |
| 1030 | %D | CTRL 6 |
| 1031 | %E | CTRL - |
| 1032 | Space | Space |
| 1033 | /A | ! |
| 1034 | /B | " |
| 1035 | /C | # |
| 1036 | /D | ? |
| 1037 | /E | % |
| 1038 | /F | & |
| 1039 | /G | ' |
| 1040 | /H | (|
| 1041 | /I |) |
| 1042 | /J | * |
| 1043 | /K | + |

The keystroke in bold is sent only if the "Function Key Mapping" is enabled. Otherwise, the unbolded keystroke is sent.

Table F-1 ASCII Value Standard Default Parameters Table (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1044 | /L | , |
| 1045 | - | - |
| 1046 | . | . |
| 1047 | /o | / |
| 1048 | 0 | 0 |
| 1049 | 1 | 1 |
| 1050 | 2 | 2 |
| 1051 | 3 | 3 |
| 1052 | 4 | 4 |
| 1053 | 5 | 5 |
| 1054 | 6 | 6 |
| 1055 | 7 | 7 |
| 1056 | 8 | 8 |
| 1057 | 9 | 9 |
| 1058 | /Z | : |
| 1059 | %F | ; |
| 1060 | %G | < |
| 1061 | %H | = |
| 1062 | %I | > |
| 1063 | %J | ? |
| 1064 | %V | @ |
| 1065 | A | A |
| 1066 | B | B |
| 1067 | C | C |
| 1068 | D | D |
| 1069 | E | E |
| 1070 | F | F |
| 1071 | G | G |

The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table F-1 ASCII Value Standard Default Parameters Table (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1072 | H | H |
| 1073 | I | I |
| 1074 | J | J |
| 1075 | K | K |
| 1076 | L | L |
| 1077 | M | M |
| 1078 | N | N |
| 1079 | O | O |
| 1080 | P | P |
| 1081 | Q | Q |
| 1082 | R | R |
| 1083 | S | S |
| 1084 | T | T |
| 1085 | U | U |
| 1086 | V | V |
| 1087 | W | W |
| 1088 | X | X |
| 1089 | Y | Y |
| 1090 | Z | Z |
| 1091 | %K | [|
| 1092 | %L | \ |
| 1093 | %M |] |
| 1094 | %N | ^ |
| 1095 | %O | _ |
| 1096 | %W | ' |
| 1097 | +A | a |
| 1098 | +B | b |
| 1099 | +C | c |

The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table F-1 ASCII Value Standard Default Parameters Table (Continued)

| ASCII Value | Full ASCII Code 39 Encode Character | Keystroke |
|-------------|-------------------------------------|-----------|
| 1100 | +D | d |
| 1101 | +E | e |
| 1102 | +F | f |
| 1103 | +G | g |
| 1104 | +H | h |
| 1105 | +I | i |
| 1106 | +J | j |
| 1107 | +K | k |
| 1108 | +L | l |
| 1109 | +M | m |
| 1110 | +N | n |
| 1111 | +O | o |
| 1112 | +P | p |
| 1113 | +Q | q |
| 1114 | +R | r |
| 1115 | +S | s |
| 1116 | +T | t |
| 1117 | +U | u |
| 1118 | +V | v |
| 1119 | +W | w |
| 1120 | +X | x |
| 1121 | +Y | y |
| 1122 | +Z | z |
| 1123 | %P | { |
| 1124 | %Q | |
| 1125 | %R | } |
| 1126 | %S | ~ |

The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.

Table F-2 *ALT Key Standard Default Tables*

| ALT Keys | Keystroke |
|-----------------|------------------|
| 2064 | ALT 2 |
| 2065 | ALT A |
| 2066 | ALT B |
| 2067 | ALT C |
| 2068 | ALT D |
| 2069 | ALT E |
| 2070 | ALT F |
| 2071 | ALT G |
| 2072 | ALT H |
| 2073 | ALT I |
| 2074 | ALT J |
| 2075 | ALT K |
| 2076 | ALT L |
| 2077 | ALT M |
| 2078 | ALT N |
| 2079 | ALT O |
| 2080 | ALT P |
| 2081 | ALT Q |
| 2082 | ALT R |
| 2083 | ALT S |
| 2084 | ALT T |
| 2085 | ALT U |
| 2086 | ALT V |
| 2087 | ALT W |
| 2088 | ALT X |
| 2089 | ALT Y |
| 2090 | ALT Z |

Table F-3 *Misc. Key Standard Default Table*

| Misc. Key | Keystroke |
|-----------|-----------|
| 3001 | PA 1 |
| 3002 | PA 2 |
| 3003 | CMD 1 |
| 3004 | CMD 2 |
| 3005 | CMD 3 |
| 3006 | CMD 4 |
| 3007 | CMD 5 |
| 3008 | CMD 6 |
| 3009 | CMD 7 |
| 3010 | CMD 8 |
| 3011 | CMD 9 |
| 3012 | CMD 10 |
| 3013 | CMD 11 |
| 3014 | CMD 12 |
| 3015 | CMD 13 |
| 3016 | CMD 14 |

Table F-4 *GUI Shift Keys*

| Other Value | Keystroke |
|-------------|-----------|
| 3048 | GUI 0 |
| 3049 | GUI 1 |
| 3050 | GUI 2 |
| 3051 | GUI 3 |
| 3052 | GUI 4 |
| 3053 | GUI 5 |
| 3054 | GUI 6 |
| 3055 | GUI 7 |
| 3056 | GUI 8 |

The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.

Table F-4 GUI Shift Keys (Continued)

| Other Value | Keystroke |
|-------------|-----------|
| 3057 | GUI 9 |
| 3065 | GUI A |
| 3066 | GUI B |
| 3067 | GUI C |
| 3068 | GUI D |
| 3069 | GUI E |
| 3070 | GUI F |
| 3071 | GUI G |
| 3072 | GUI H |
| 3073 | GUI I |
| 3074 | GUI J |
| 3075 | GUI K |
| 3076 | GUI L |
| 3077 | GUI M |
| 3078 | GUI N |
| 3079 | GUI O |
| 3080 | GUI P |
| 3081 | GUI Q |
| 3082 | GUI R |
| 3083 | GUI S |
| 3084 | GUI T |
| 3085 | GUI U |
| 3086 | GUI V |
| 3087 | GUI W |
| 3088 | GUI X |
| 3089 | GUI Y |
| 3090 | GUI Z |

The Apple™ iMac keyboard has an apple key on either side of the space bar. Windows-based systems have a GUI key to the left of the left ALT key, and to the right of the right ALT key.

Table F-5 *PF Key Standard Default Table*

| PF Keys | Keystroke |
|---------|-----------|
| 4001 | PF 1 |
| 4002 | PF 2 |
| 4003 | PF 3 |
| 4004 | PF 4 |
| 4005 | PF 5 |
| 4006 | PF 6 |
| 4007 | PF 7 |
| 4008 | PF 8 |
| 4009 | PF 9 |
| 4010 | PF 10 |
| 4011 | PF 11 |
| 4012 | PF 12 |
| 4013 | PF 13 |
| 4014 | PF 14 |
| 4015 | PF 15 |
| 4016 | PF 16 |

Table F-6 *F key Standard Default Table*

| F Keys | Keystroke |
|--------|-----------|
| 5001 | F 1 |
| 5002 | F 2 |
| 5003 | F 3 |
| 5004 | F 4 |
| 5005 | F 5 |
| 5006 | F 6 |
| 5007 | F 7 |
| 5008 | F 8 |
| 5009 | F 9 |

Table F-6 *F key Standard Default Table (Continued)*

| F Keys | Keystroke |
|---------------|------------------|
| 5010 | F 10 |
| 5011 | F 11 |
| 5012 | F 12 |
| 5013 | F 13 |
| 5014 | F 14 |
| 5015 | F 15 |
| 5016 | F 16 |
| 5017 | F 17 |
| 5018 | F 18 |
| 5019 | F 19 |
| 5020 | F 20 |
| 5021 | F 21 |
| 5022 | F 22 |
| 5023 | F 23 |
| 5024 | F 24 |

Table F-7 *Numeric Key Standard Default Table*

| Numeric Keypad | Keystroke |
|-----------------------|------------------|
| 6042 | * |
| 6043 | + |
| 6044 | Undefined |
| 6045 | - |
| 6046 | . |
| 6047 | / |
| 6048 | 0 |
| 6049 | 1 |
| 6050 | 2 |
| 6051 | 3 |
| 6052 | 4 |

Table F-7 *Numeric Key Standard Default Table (Continued)*

| Numeric Keypad | Keystroke |
|-----------------------|------------------|
| 6053 | 5 |
| 6054 | 6 |
| 6055 | 7 |
| 6056 | 8 |
| 6057 | 9 |
| 6058 | Enter |
| 6059 | Num Lock |

Table F-8 *Extended Keypad Standard Default Table*

| Extended Keypad | Keystroke |
|------------------------|------------------|
| 7001 | Break |
| 7002 | Delete |
| 7003 | Pg Up |
| 7004 | End |
| 7005 | Pg Dn |
| 7006 | Pause |
| 7007 | Scroll Lock |
| 7008 | Backspace |
| 7009 | Tab |
| 7010 | Print Screen |
| 7011 | Insert |
| 7012 | Home |
| 7013 | Enter |
| 7014 | Escape |
| 7015 | Up Arrow |
| 7016 | Dn Arrow |
| 7017 | Left Arrow |
| 7018 | Right Arrow |

Glossary

A

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

ASCII. American Standard Code for Information Interchange. A 7 bit-plus-parity code representing 128 letters, numerals, punctuation marks and control

characters. It is a standard data transmission code in the U.S.

Autodiscrimination. The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content is decoded.

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).

Bar Height. The dimension of a bar measured perpendicular to the bar width.

Bar Width. Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.

Bit. Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

Bits per Second (bps). Bits transmitted or received.

Bluetooth. A technology that provides a way to connect and exchange information between devices such as scanners, mobile phones, laptops, PCs, and printers over a secure, globally unlicensed short-range radio frequency.

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

CDRH. Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.

CDRH Class 1. This is the lowest power CDRH laser classification. This class is considered intrinsically safe, even if all laser output were directed into the eye's pupil. There are no special operating procedures for this class.

CDRH Class 2. No additional software mechanisms are needed to conform to this limit. Laser operation in this class poses no danger for unintentional direct human exposure.

Character. A pattern of bars and spaces which either directly represents data or indicates a control function, such as a number, letter, punctuation mark, or communications control contained in a message.

Character Set. Those characters available for encoding in a particular bar code symbology.

Check Digit. A digit used to verify a correct symbol decode. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbologies. Using check digits decreases the chance of substitution errors when a symbol is decoded.

Codabar. A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (- \$: / , +).

Code 128. A high density symbology which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.

Code 3 of 9 (Code 39). A versatile and widely used alphanumeric bar code symbology with a set of 43 character types, including all uppercase letters, numerals from 0 to 9 and 7 special characters (- . / + % \$ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.

Code 93. An industrial symbology compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.

Code Length. Number of data characters in a bar code between the start and stop characters, not including those characters.

Cold Boot. A cold boot restarts a computer and closes all running programs.

COM Port. Communication port; ports are identified by number, e.g., COM1, COM2.

Continuous Code. A bar code or symbol in which all spaces within the symbol are parts of characters. There are no intercharacter gaps in a continuous code. The absence of gaps allows for greater information density.

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

D

Dead Zone. An area within a scanner's field of view, in which specular reflection may prevent a successful decode.

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

Decode Algorithm. A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.

Decryption. Decryption is the decoding and unscrambling of received encrypted data. Also see, **Encryption** and **Key**.

Depth of Field. The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.

Discrete Code. A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

Discrete 2 of 5. A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.

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.

Element. Generic term for a bar or space.

Encoded Area. Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.

ENQ (RS-232). ENQ software handshaking is also supported for the data sent to the host.

ESD. Electro-Static Discharge

H

HID. Human Interface Device. A Bluetooth host type.

Host Computer. A computer that serves other terminals in a network, providing such services as computation,

database access, supervisory programs and network control.

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

I

IEC. International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.

IEC (825) Class 1. This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 second window and an automatic laser shutdown if the scanner's oscillating mirror fails.

Intercharacter Gap. The space between two adjacent bar code characters in a discrete code.

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.

Interleaved Bar Code. A bar code in which characters are paired together, using bars to represent the first

character and the intervening spaces to represent the second.

Input/Output Ports. I/O ports are primarily dedicated to passing information into or out of the terminal's memory. Series 9000 mobile computers include Serial and USB ports.

I/O Ports. interface The connection between two devices, defined by common physical characteristics, signal characteristics, and signal meanings. Types of interfaces include RS-232 and PCMCIA.

K

Key. A key is the specific code used by the algorithm to encrypt or decrypt the data. Also see, **Encryption** and **Decrypting**.

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 Diode. A gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.

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

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

Light Emitting Diode. See **LED**.

M

MIL. 1 mil = 1 thousandth of an inch.

MIN. Mobile Identification Number. The unique account number associated with a cellular device. It is broadcast by the cellular device when accessing the cellular system.

Misread (Misdecode). A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.

MRD. Minimum reflective difference. A measurement of print contrast.

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).

O

ODI. See **Open Data-Link Interface**.

Open Data-Link Interface (ODI). Novell's driver specification for an interface between network hardware and higher-level protocols. It supports multiple protocols on a single NIC (Network Interface Controller). It is capable of understanding and

translating any network information or request sent by any other ODI-compatible protocol into something a NetWare client can understand and process.

Open System Authentication. Open System authentication is a null authentication algorithm.

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.

Percent Decode. The average probability that a single scan of a bar code would result in a successful

decode. In a well-designed bar code scanning system, that probability should approach near 100%.

Print Contrast Signal (PCS). Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. $PCS = (RL - RD) / RL$, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.

Programming Mode. The state in which a scanner is configured for parameter values. See **Scanning Mode**.

Q

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

QWERTY. A standard keyboard commonly used on North American and some European PC keyboards. "QWERTY" refers to the arrangement of keys on the left side of the third row of keys.

R

Reflectance. Amount of light returned from an illuminated surface.

Resolution. The narrowest element dimension which is distinguished by a particular reading device or printed with a particular device or method.

RF. Radio Frequency.

RS-232. An Electronic Industries Association (EIA) standard that defines the connector, connector pins, and signals used to transfer data serially from one device to another.

S

Scan Area. Area intended to contain a symbol.

Scanner. An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are: 1) Light source (laser or photoelectric cell) - illuminates a bar code;; 2) Photodetector - registers the difference in reflected light (more light reflected from spaces); 3) Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.

Scanning Mode. The scanner is energized, programmed and ready to read a bar code.

Scanning Sequence. A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.

Self-Checking Code. A symbology that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.

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

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

SPP. Serial Port Profile.

Start/Stop Character. A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.

Substrate. A foundation material on which a substance or image is placed.

Symbol. A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters and check characters.

Symbol Aspect Ratio. The ratio of symbol height to symbol width.

Symbol Height. The distance between the outside edges of the quiet zones of the first row and the last row.

Symbol Length. Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.

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

T

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

U

UPC. Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbology for retail food packages in the United States.

V

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

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