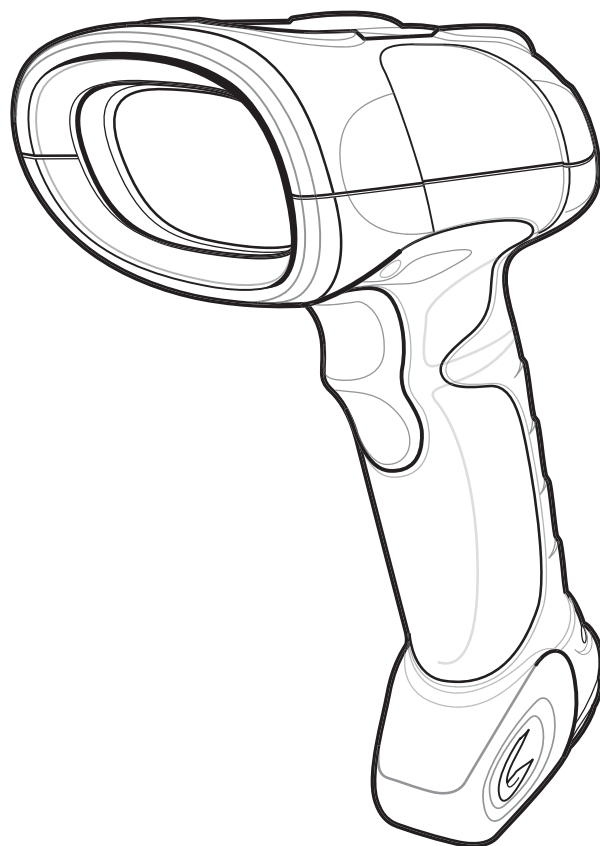


DS3408

Product Reference Guide



DS3408
Product Reference Guide

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Revision A

July 2016

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Revision History

Changes to the original manual are listed below:

Change	Date	Description
-01 Rev. A	8/2004	Initial release.
-02 Rev. A	5/2006	Add Picklist mode and other updates.
-03 Rev. A	2/2007	Update service information; correct Symbol PTC Terminal bar code, add Simple COM Port Emulation bar code in USB chapter.
-04 Rev. A	6/2007	Add DPM version information, including new decode zones and DPM Scanning parameter; add new UPC/EAN Supplemental options, Bookland ISBN format, 4State Postal, Inverse 1D, Data Matrix Inverse, Micro QR, QR Inverse, Aztec, Aztec Inverse parameters.
-05 Rev. A	5/2008	Remove DPM version information, add Fuzzy 1D Processing, Decode Mirror Image, Low Light Enhancement, and Presentation Mode Field of View parameters, remove IBM XT bar code and keyboard from Keyboard Wedge section, add Code 128 Lengths and Post US4 options.
-06 Rev. A	8/2008	Add 2D decode zones, change UCC/EAN-128 code type name to GS1-128.
-07 Rev. A	2/2009	Update power requirement specification, add SSI support, add custom defaults, update postal code names, add new ADF options.
-08 Rev. A	4/2009	Remove SSI support, add ISSN EAN, Matrix 2 of 5, and Chinese 2 of 5 code types, add ISBT concatenation parameters.
-09 Rev. A	8/2010	Add new parameters: suppress power up beeps, USB static CDC, disable all code types, UPC/EAN/JAN supplemental AIM ID format, coupon report, Korean 3 of 5, Australia Post format.
-10 Rev. A	12/2014	Zebra Rebranding
-10 Rev. B	3/2015	Zebra Rebranding
-11 Rev. A	7/2016	Update Advanced Data Formatting chapter.

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Glossary

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Tell Us What You Think...

About This Guide

Introduction

The *DS3408 Product Reference Guide* provides general instructions for setting up, operating, maintaining, and troubleshooting the DS3408 Standard Range and High Density digital scanners.

Configurations

This guide includes the following configurations:

- DS3408-SF - Standard focus
- DS3408-HD - High density scanning

Chapter Descriptions

- [Chapter 1, Getting Started](#) provides a product overview, unpacking instructions, and cable connection information.
- [Chapter 2, Scanning](#) describes parts of the digital scanner, beeper and LED definitions, and how to use the digital scanner in hand-held and presentation (hands-free) modes.
- [Chapter 3, Maintenance and Technical Specifications](#) provides information on how to care for the digital scanner, troubleshooting, and technical specifications.
- [Chapter 4, User Preferences](#) provides programming bar codes for selecting user preference features for the digital scanner.
- [Chapter 5, Decoding Preferences](#) provides programming bar codes for selecting digital scanner preference features.
- [Chapter 6, Keyboard Wedge Interface](#) describes how to set up a Keyboard Wedge interface with the digital scanner.
- [Chapter 7, RS-232 Interface](#) describes how to set up the digital scanner with an RS-232 host, such as point-of-sale devices, host computers, or other devices with an available RS-232 port.

- [Chapter 8, USB Interface](#) describes how to set up the digital scanner with a USB host.
- [Chapter 9, IBM 468X/469X Interface](#) describes how to set up the digital scanner with IBM 468X/469X POS systems.
- [Chapter 10, Wand Emulation Interface](#) describes how to set up the digital scanner with a Wand Emulation host.
- [Chapter 11, Scanner Emulation Interface](#) describes how to set up the digital scanner with an Undecoded Scanner Emulation host.
- [Chapter 12, 123 Scan](#) describes the 123Scan PC-based scanner configuration tool, and provides the bar code to scan to communicate with the 123Scan program.
- [Chapter 13, Symbologies](#) describes all symbology features and provides programming bar codes for selecting these features for the digital scanner.
- [Chapter 14, Miscellaneous Scanner Options](#) includes features frequently used to customize how data transmits to the host device.
- [Chapter 15, Advanced Data Formatting \(ADF\)](#) provides reference to customize scanned data before transmitting to the host.
- [Appendix A, Standard Default Parameters](#) provides a table of all host devices and miscellaneous digital 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 of various code types.
- [Appendix D, Numeric Bar Codes](#) includes the numeric bar codes to scan for parameters requiring specific numeric values.
- [Appendix E, ASCII Character Sets](#) provides ASCII character value tables.

Notational Conventions

The following conventions are used in this document:

- 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 *LS/DS3408 Quick Start Guide*, p/n 72-67131-xx, provides general information for getting started with the digital scanner, and includes basic set up and operation 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 service 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, please contact that business partner for support.

Chapter 1 Getting Started

Introduction

The DS3408 combines superior 1D and 2D omnidirectional bar code scanning and advanced ergonomics to provide the best value in a digital scanner. Whether in hand-held mode or presentation (hands-free) mode in a stand, the digital scanner ensures comfort and ease of use for extended periods of time.

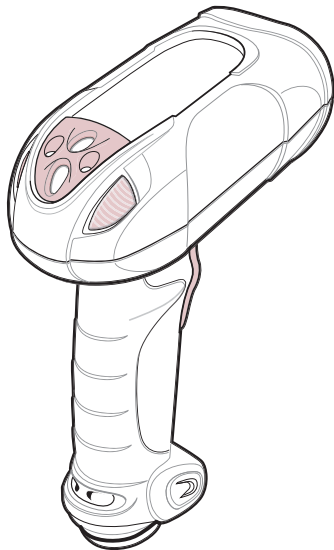


Figure 1-1 *DS3408 Digital Scanner*

The digital scanner supports:

- 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 communication of the digital scanner with the host.

- USB connection to a host. The digital scanner 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 with the IBM terminal.
- Wand Emulation connection to a host. The digital scanner connects 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 digital scanner connects to a portable data terminal / 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 digital scanner autodetects the host.
- Configuration via 123Scan.

Unpacking

Remove the digital scanner from its packing and inspect it for damage. If the digital scanner was damaged in transit, contact Zebra Support. See [page xv](#) for contact information. **KEEP THE PACKING.** It is the approved shipping container; use this to return the equipment for servicing.

Setting Up the Digital Scanner

Installing the Interface Cable

1. Loosen the two screws on the cable clamp at the bottom of the digital scanner and gently pull the clamp away from the bottom of the digital scanner.

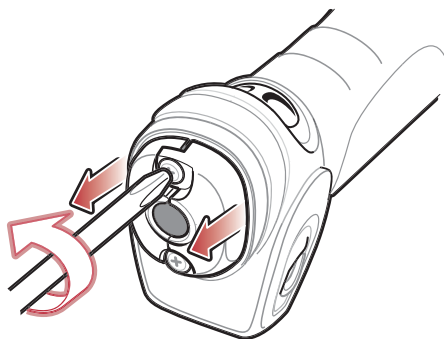


Figure 1-2 *Loosening Screws on Bottom of Digital Scanner*

2. Open the clamp and plug the interface cable modular connector into the cable interface port on the bottom of the digital scanner handle.

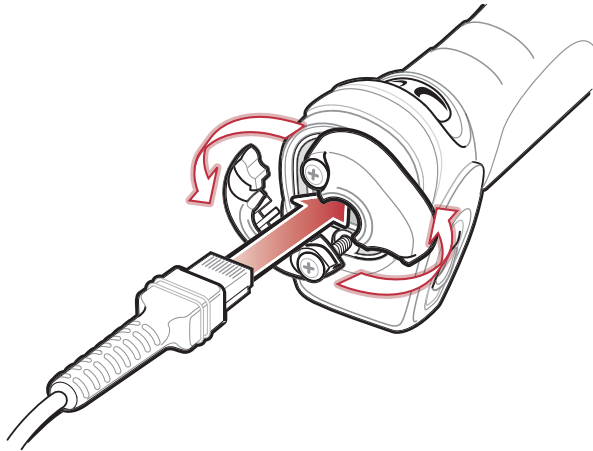


Figure 1-3 Connecting the Interface Cable

3. Gently tug the cable to ensure the connector is properly secured.
4. Close the clamp, push it back into place and tighten the screws on the clamp to secure the cable into the bottom of the digital scanner.

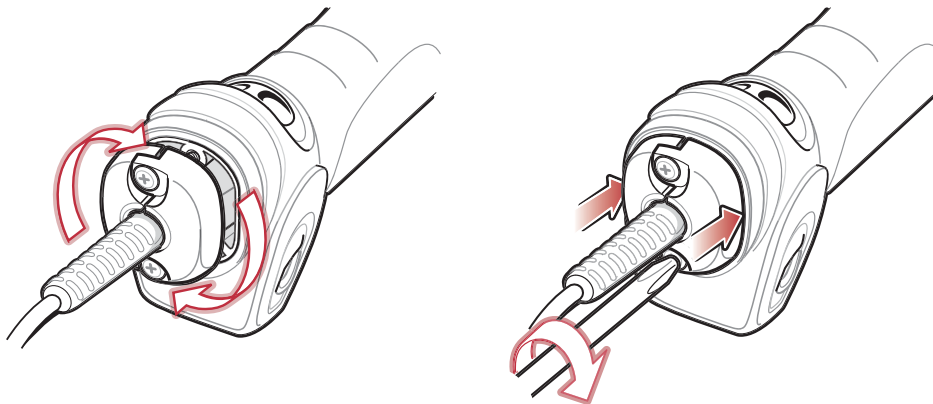


Figure 1-4 Securing the Clamp

5. Connect the other end of the interface cable to the host (see the specific host chapter for information on host connections).

✓ **NOTE** Different hosts require different cables. The connectors illustrated in each host chapter are examples only. The connectors may be different than those illustrated, but the steps to connect the digital scanner are the same.

Removing the Interface Cable

1. Loosen the two screws on the cable clamp at the bottom of the digital scanner and gently pull the clamp away from the bottom of the digital scanner.
2. Open the clamp and unplug the interface cable modular connector from the cable interface port on the bottom of the digital scanner handle. Carefully slide out the cable.
3. Follow the steps for [Installing the Interface Cable on page 1-2](#) to connect a new cable.

Connecting a Synapse Cable Interface

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

Synapse Smart Cables enable interfacing to a variety of hosts. The Synapse cable has built-in intelligence to detect that host.

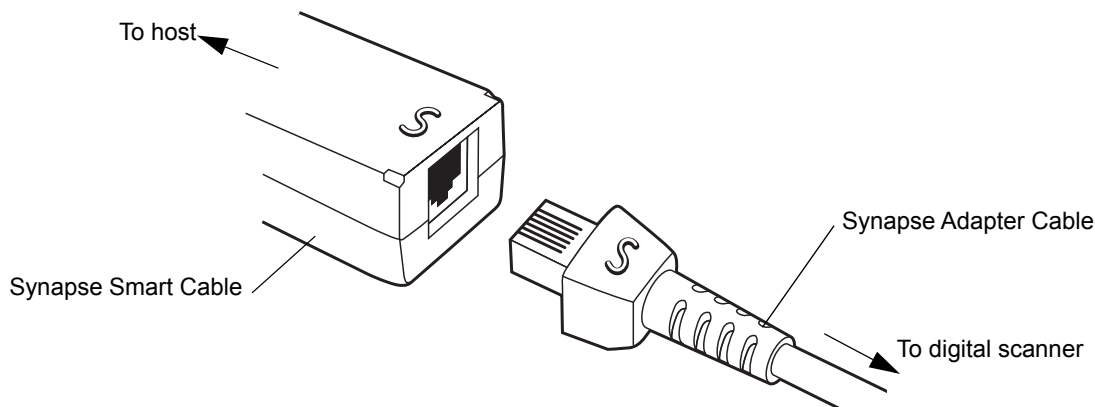


Figure 1-5 Synapse Cable Connection

1. Plug the Synapse adapter cable (p/n 25-32463-xx) into the bottom of the digital scanner, as described in [Installing the Interface Cable on page 1-2](#).
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.

Connecting Power (if required)

If the host does not provide power to the digital scanner, connect an external power supply to the digital scanner:

1. Connect the interface cable to the bottom of the digital scanner, as described in [Installing the Interface Cable on page 1-2](#).
2. Connect the other end of the interface cable to the host (refer to the host manual to locate the correct port).
3. Plug the power supply into the power jack on the interface cable. Plug the other end of the power supply into an AC outlet.

Configuring the Digital Scanner

To configure the digital scanner, use the bar codes included in this manual, or the 123Scan configuration program.

See [Chapter 4, User Preferences](#) for information about programming the digital scanner using bar code menus. Also see each host-specific chapter to set up connection to a specific host type.

See [Chapter 12, 123 Scan](#) to configure the digital scanner using this configuration program. The program includes a help file.

Chapter 2 Scanning

Introduction

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

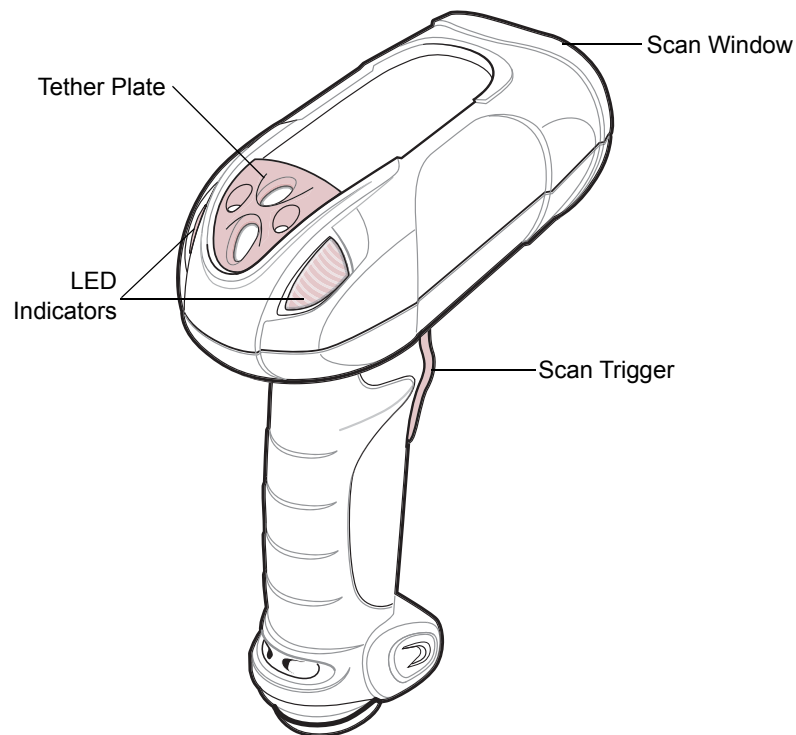


Figure 2-1 *Parts*

Beeper Definitions

The digital 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 digital scanner.

Table 2-1 *Beeper Definitions*

Beeper Sequence	Indication
Standard Use	
Short low/short medium/ short high beep sequence	Power up.
1 short high beep	A bar code symbol was decoded (if decode beeper is enabled).
4 long low beeps	A transmission error occurred when scanning a bar code. The data is ignored. This occurs if the digital scanner is not properly configured. Check option setting.
5 low beeps	Conversion or format error.
Lo/hi/lo beeps	ADF transmit error. See Chapter 15, Advanced Data Formatting .
Short high/short high/short high/long low beep sequence	RS-232 receive error.
Parameter Menu Scanning	
Short high beep	Correct entry scanned or correct menu sequence performed.
Long low/long high beep sequence	Input error; incorrect bar code, programming sequence, or Cancel scanned; digital scanner remains in ADF program mode.
Short high/short low beep sequence	Keyboard parameter selected. Enter value using numeric bar codes.
Short high/short low/short high/short low beep sequence	Successful program exit with change in parameter setting.
Short low/short high/short low/short high beep sequence	Out of host parameter storage space. Scan Set Default Parameter on page 4-4 .
Code 39 Buffering	
Hi/lo beeps	New Code 39 data was entered into the buffer.
3 long high beeps	Code 39 buffer is full.
Lo/hi/lo beeps	The Code 39 buffer was erased or there was an attempt to clear or transmit an empty buffer.
Lo/hi beeps	A successful transmission of buffered data.

Table 2-1 *Beeper Definitions (Continued)*

Beeper Sequence	Indication
Macro PDF	
2 long low beeps	File ID error. A bar code not in the current MPDF sequence was scanned.
3 long low beeps	Out of memory. There is not enough buffer space to store the current MPDF symbol.
4 long low beeps	Bad symbology. Scanned a 1D or 2D bar code in a MPDF sequence, a duplicate MPDF label, a label in an incorrect order, or trying to transmit an empty or illegal MPDF field.
5 long low beeps	Flushing MPDF buffer.
Fast warble beep	Aborting MPDF sequence.
Lo/Hi beeps	Flushing an already empty MPDF buffer.
ADF Programming: Normal Data Entry. Duration of tones are short.	
Hi/Lo beeps	Enter another digit. Add leading zeros to the front if necessary.
Lo/Lo beeps	Enter another alphabetic character or scan the End of Message bar code.
Hi/Hi beeps	Enter another criterion or action, or scan the Save Rule bar code.
Hi/Lo/Hi/Lo beeps	Rule saved. Rule entry mode exited.
Hi/Lo/Lo beeps	All criteria or actions cleared for current rule, continue entering rule.
Low beep	Delete last saved rule. The current rule is left intact.
Lo/Hi/Hi beeps	All rules are deleted.
ADF Programming: Error Indications. Duration of tones are very long.	
Lo/Hi/Lo/Hi beeps	Out of rule memory. Erase some existing rules, then try to save rule again. (It is not necessary to re-enter the current rule.)
Lo/Hi/Lo beeps	Cancel rule entry. Rule entry mode exited because of an error or the user asked to exit rule entry.
Lo/Hi beeps	Entry error, wrong bar code scanned. Re-enter criterion or action. All previously entered criteria and actions are retained. Criteria or action list is too long for a rule.

Table 2-1 *Beeper Definitions (Continued)*

Beeper Sequence	Indication
Host Specific	
USB only	
4 short high beeps	Digital scanner has not completed initialization. Wait several seconds and scan again.
Short low/short medium/short high beep sequence after scanning a USB device type	Communication with the bus must be established before the digital scanner can operate at the highest power level.
Short low/short medium/short high beep sequence occurs more than once	The USB bus can put the digital scanner in a state where power to the digital scanner is cycled on and off more than once. This is normal and usually happens when the PC cold boots.
RS-232 only	
1 short high beep	A <BEL> character is received and Beep on <BEL> is enabled.

LED Definitions

In addition to beep sequences, the digital scanner uses a two-color LED to indicate status. [Table 2-2](#) defines LED colors that display during scanning.

Table 2-2 *Standard LED Definitions*

LED	Indication
Off	No power is applied to the digital scanner, or the digital scanner is on and ready to scan.
Green	A bar code was successfully decoded.
Red	A data transmission error or digital scanner malfunction occurred.

Scanning in Hand-Held Mode

Install and program the digital scanner (see [Setting Up the Digital Scanner on page 1-2](#)). For assistance, contact the local supplier or Zebra Support.

Scanning with the Digital Scanner

1. Ensure all connections are secure (see the appropriate host chapter.)
2. Aim the digital scanner at the bar code.

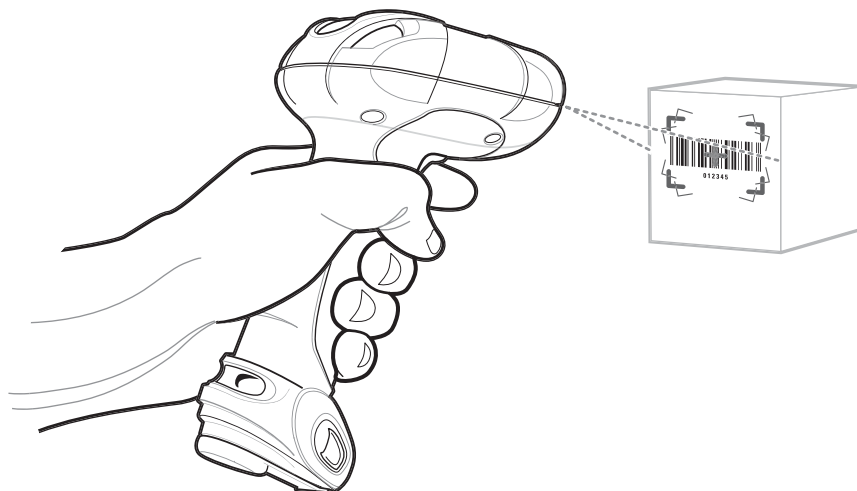


Figure 2-2 Scanning in Hand-Held Mode

3. When the digital scanner senses movement, in its default **Auto Aim** trigger mode, it projects a red laser aiming pattern which allows positioning the bar code or object within the field of view. (To turn off the default **Auto Aim** trigger mode, see [Trigger Mode on page 4-11](#).)

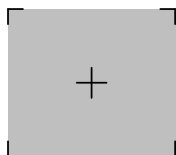


Figure 2-3 Laser Aiming Pattern

If necessary, the digital scanner turns on its red LEDs to illuminate the target bar code.

- Center the symbol in any orientation within the aiming pattern. Be sure the entire symbol is within the rectangular area formed by the brackets in the pattern.

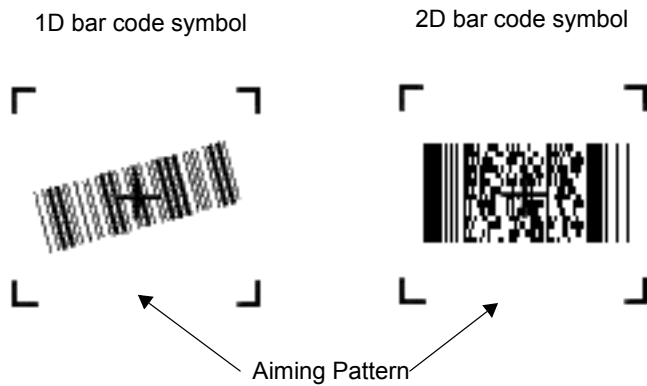


Figure 2-4 Centering Symbol in Aiming Pattern

- Hold the trigger until the digital scanner beeps, indicating the bar code is successfully decoded. For more information on beeper and LED definitions, see [Table 2-1](#) and [Table 2-2](#).

This process usually occurs instantaneously. Steps 2 - 4 are repeated on poor quality or difficult bar codes, until the bar code is decoded, the trigger is released, or the Decode Session Timeout occurs.

Aiming

Hold the digital scanner between two and nine inches (depending on symbol density; see [Decode Zones on page 2-9](#)) from the symbol, centering the aiming pattern cross hairs on the symbol.

The aiming pattern is smaller when the digital 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 digital scanner, and those with larger bars or elements (mil size) farther from the digital scanner.

The digital scanner can also read a bar code presented within the aiming pattern but not centered. The top examples in [Figure 2-5](#) show acceptable aiming options, while the bottom examples can not be decoded.

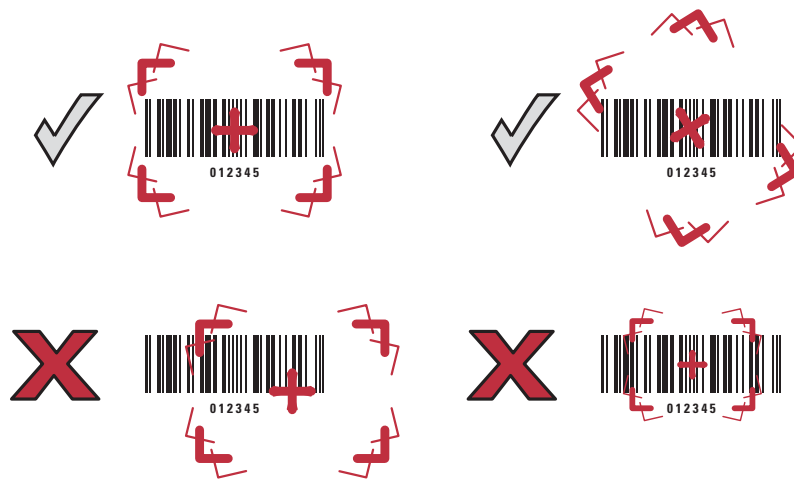


Figure 2-5 *Acceptable and Incorrect Aiming*

Scanning in Presentation Mode

The optional Intellistand adds greater flexibility to scanning operation. When you place the digital scanner in the stand's "cup," the scanner's built-in sensor places the scanner in presentation (hands-free) mode. When you remove the digital scanner from the stand it operates in its normal hand-held mode.

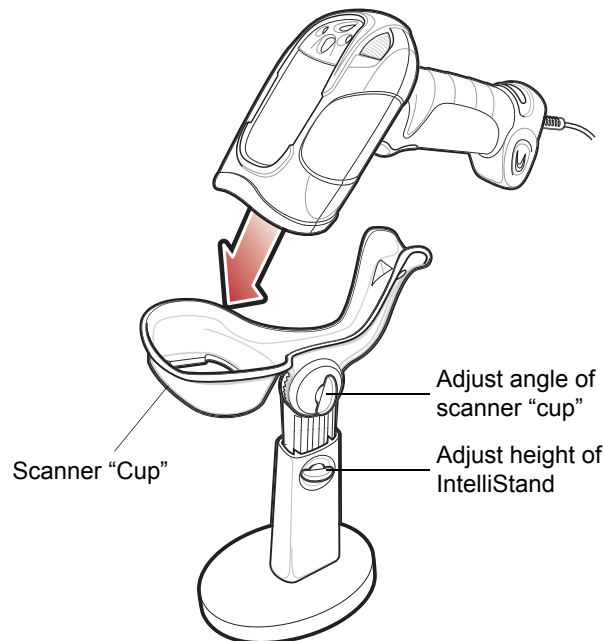


Figure 2-6 Inserting the Digital Scanner in the Intellistand

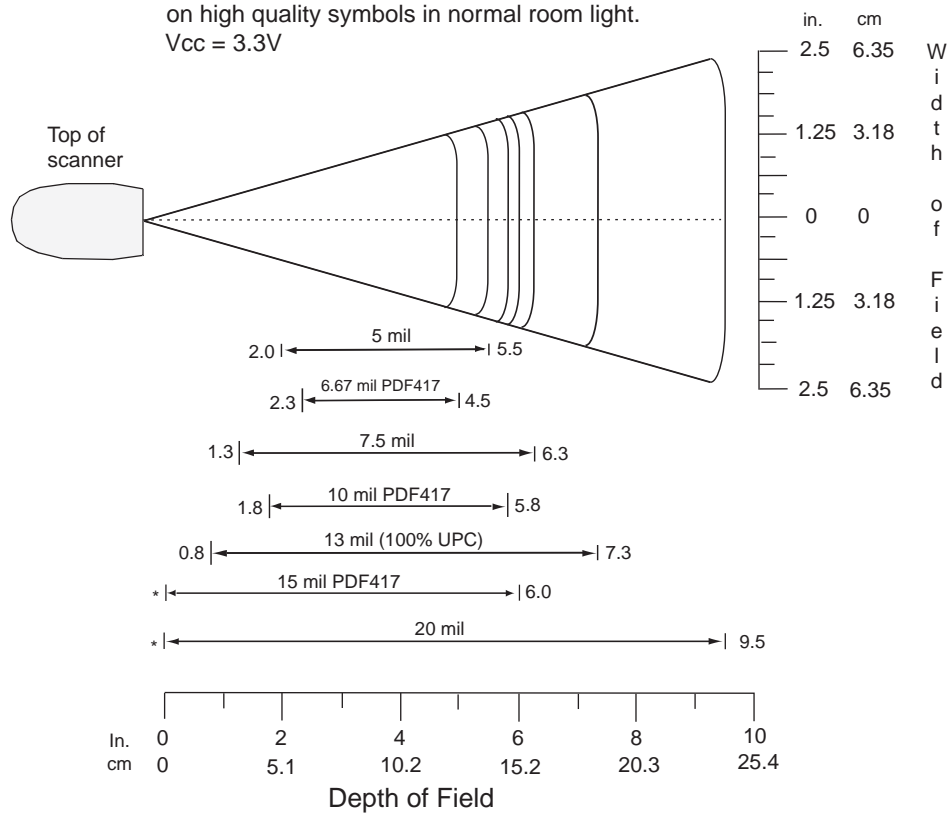
To operate the digital scanner in the Intellistand:

1. Connect the digital scanner to the host (see the appropriate host chapter for information on host connections).
2. Insert the digital scanner in the Intellistand by placing the front of the digital scanner into the stand's "cup" (see [Figure 2-6](#)).
3. Use the Intellistand's adjustment knobs to adjust the height and angle of the digital scanner.
4. Center the symbol in the aiming pattern. The entire symbol must be within the brackets.
5. Upon successful decode, the digital scanner beeps and the LED turns green. For more information on beeper and LED definitions, see [Table 2-1](#) and [Table 2-2](#).

Decode Zones

DS3408-SF Near Focus - 1D and PDF417

Note: Typical performance at 73°F (23°C)
on high quality symbols in normal room light.
Vcc = 3.3V

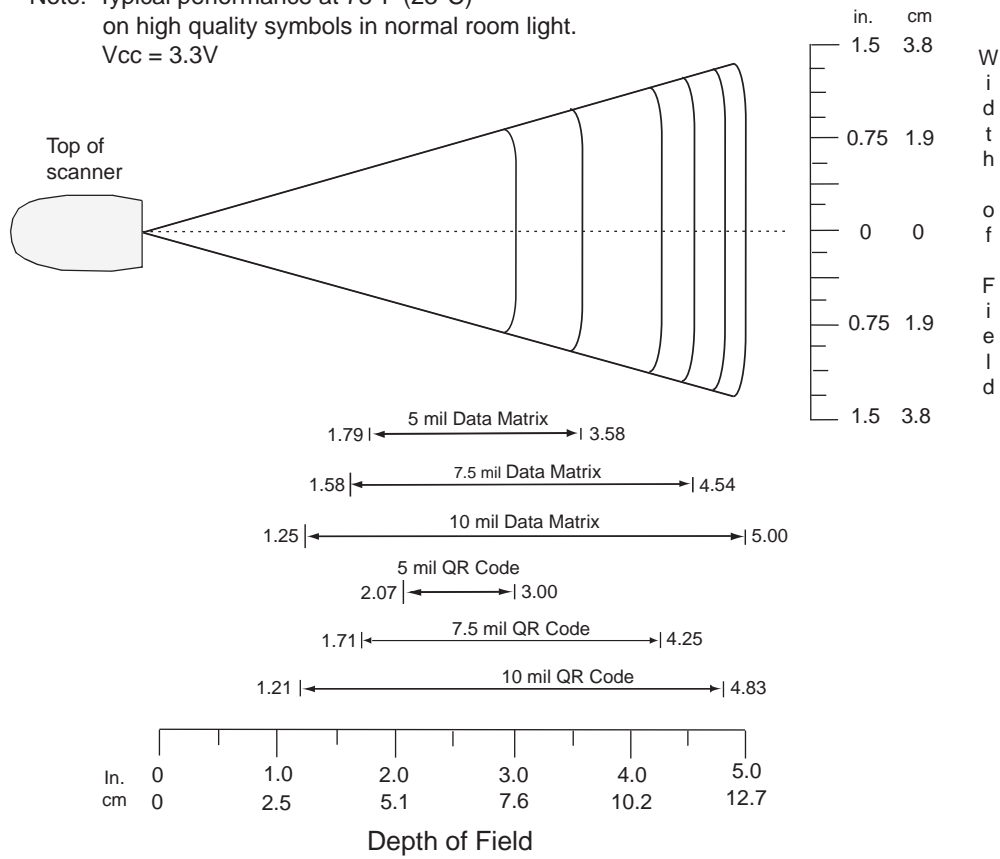


* Minimum distance determined by symbol length and scan angle.

Figure 2-7 DS3408-SF Near Focus Decode Zone - 1D and PDF417

DS3408-SF Near Focus - 2D Codes

Note: Typical performance at 73°F (23°C)
on high quality symbols in normal room light.
Vcc = 3.3V

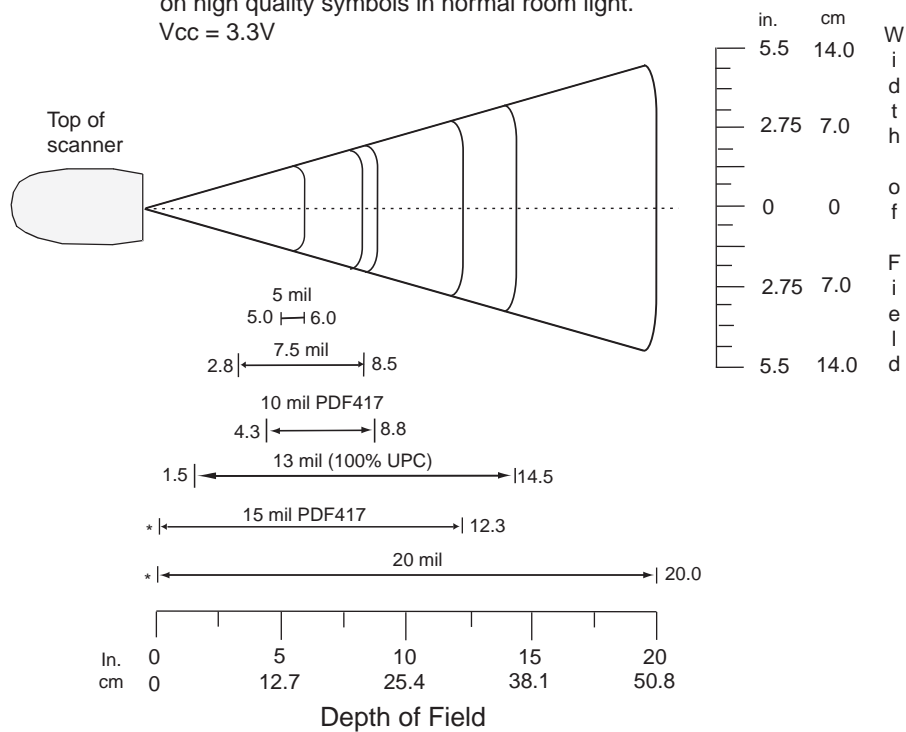


* Minimum distance determined by symbol length and scan angle.

Figure 2-8 DS3408-SF Near Focus Decode Zone - 2D Codes

DS3408-SF Far Focus

Note: Typical performance at 73°F (23°C)
on high quality symbols in normal room light.
Vcc = 3.3V



* Minimum distance determined by symbol length and scan angle.

Figure 2-9 DS3408-SF Far Focus Decode Zone

DS3408-SF Smart Focus

Note: Typical performance at 73°F (23°C)
on high quality symbols in normal room light.
Vcc = 3.3V

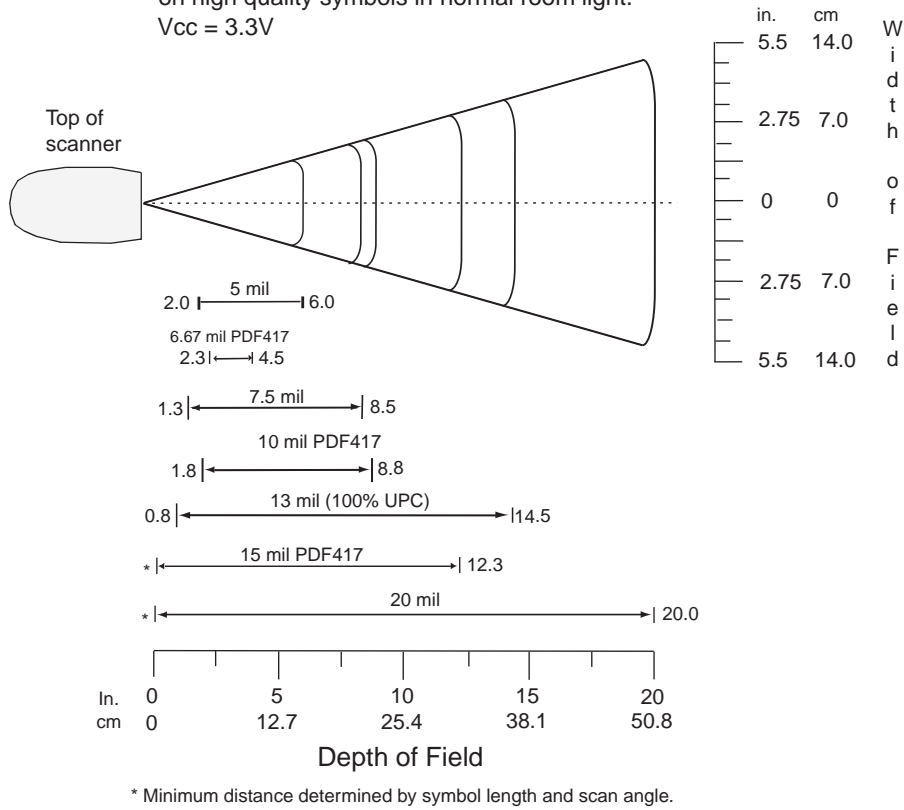
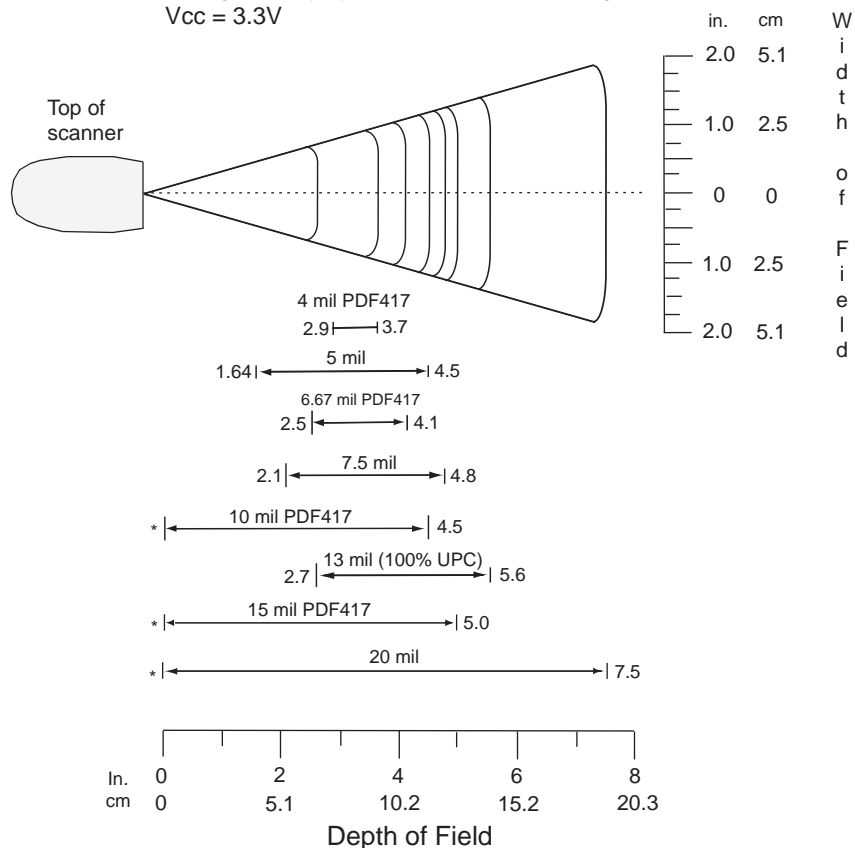


Figure 2-10 DS3408-SF Smart Focus Decode Zone

DS3408-HD Near Focus - 1D and PDF417

Note: Typical performance at 73°F (23°C)
on high quality symbols in normal room light.
Vcc = 3.3V

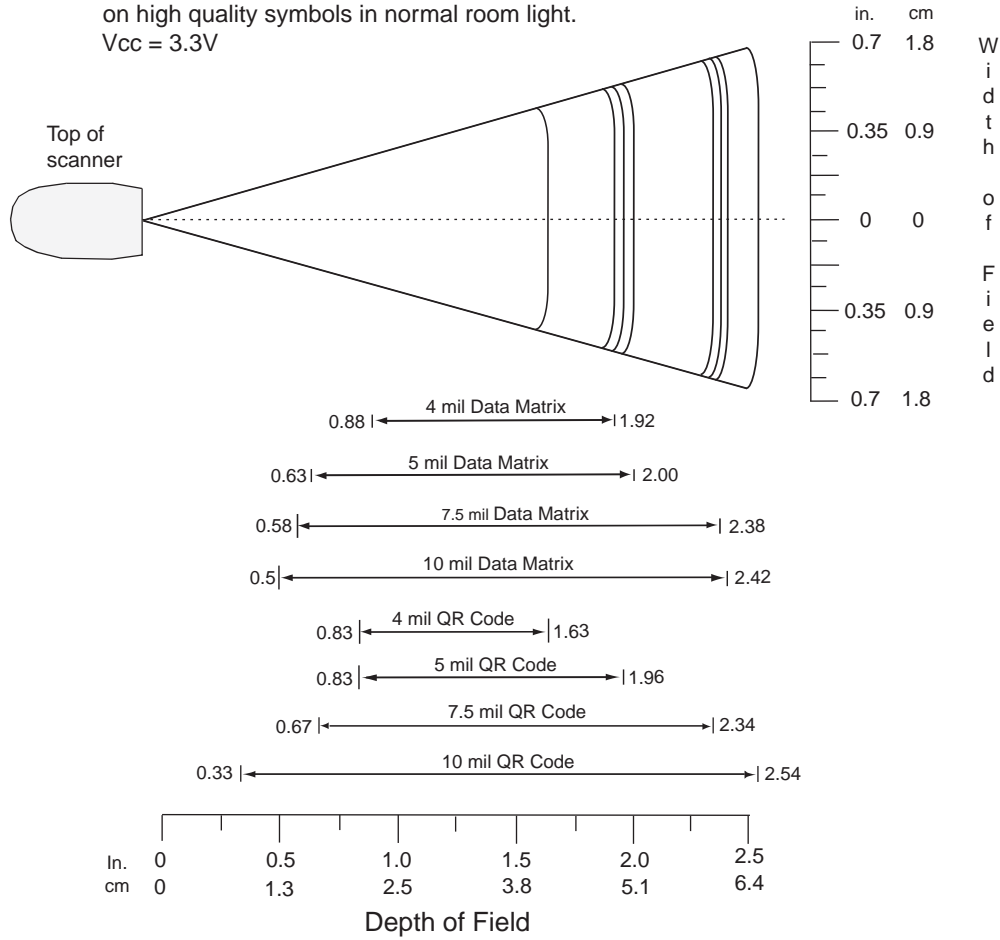


* Minimum distance determined by symbol length and scan angle.

Figure 2-11 DS3408-HD Near Focus Decode Zone - 1D and PDF417

DS3408-HD Near Focus - 2D Codes

Note: Typical performance at 73°F (23°C)
on high quality symbols in normal room light.
Vcc = 3.3V

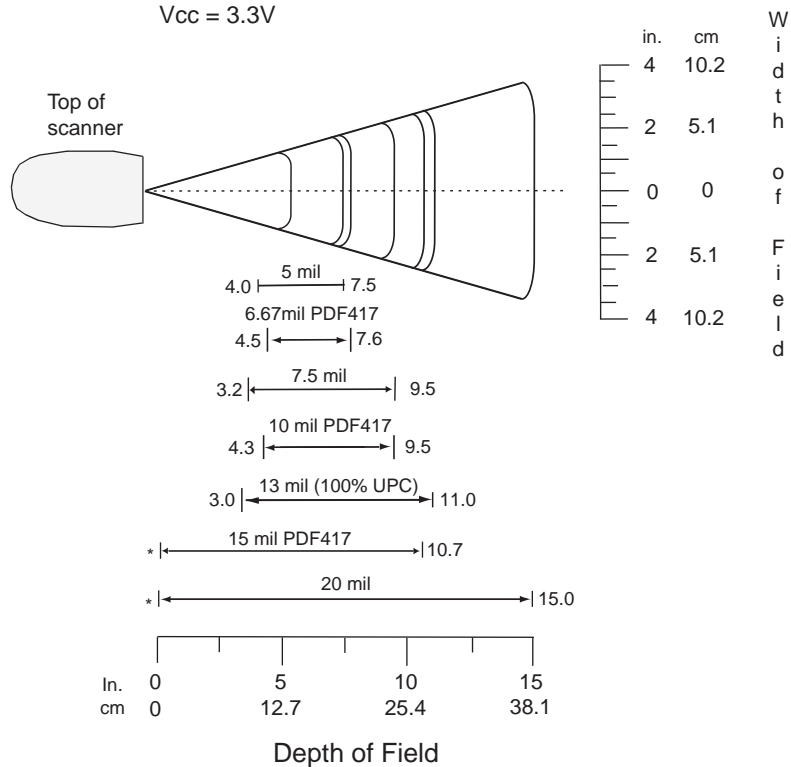


* Minimum distance determined by symbol length and scan angle.

Figure 2-12 DS3408-HD Near Focus Decode Zone - 2D Codes

DS3408-HD Far Focus

Note: Typical performance at 73°F (23°C)
on high quality symbols in normal room light.
Vcc = 3.3V

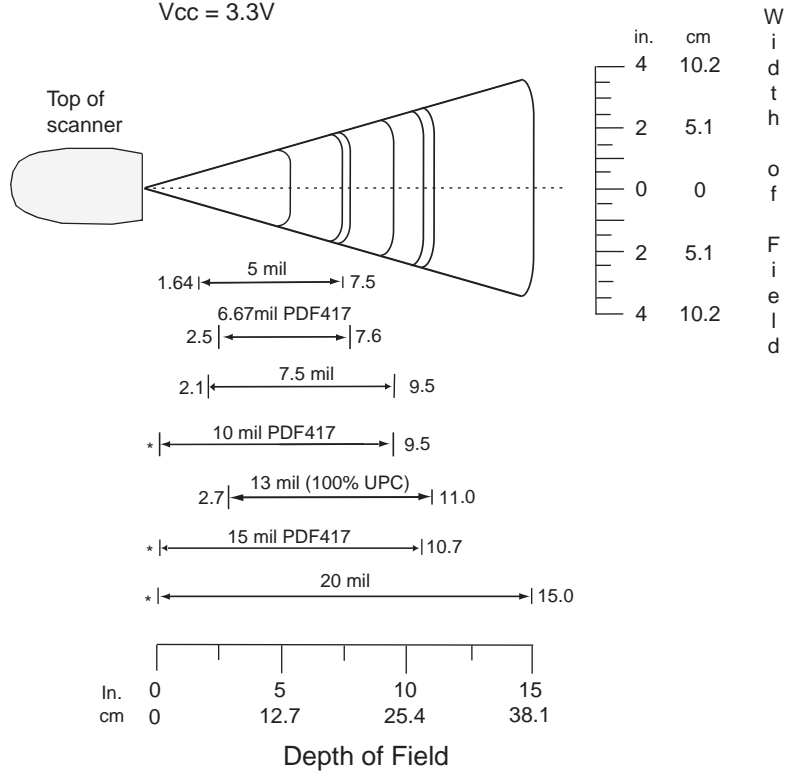


* Minimum distance determined by symbol length and scan angle.

Figure 2-13 DS3408-HD Far Focus Decode Zone

DS3408-HD Smart Focus

Note: Typical performance at 73°F (23°C)
on high quality symbols in normal room light.
Vcc = 3.3V



* Minimum distance determined by symbol length and scan angle.

Figure 2-14 DS3408-HD Smart Focus Decode Zone

Chapter 3 Maintenance and Technical Specifications

Introduction

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

Maintenance

Cleaning the scan window is the only maintenance required. A dirty window can affect scanning accuracy.

- Do not allow 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.

Troubleshooting

Table 3-1 *Troubleshooting*

Problem	Possible Causes	Possible Solutions
The aiming pattern does not appear when pressing the trigger.	No power to the digital scanner.	If the configuration requires a power supply, re-connect the power supply.
	Incorrect host interface cable is used.	Connect the correct host interface cable.
	Interface/power cables are loose.	Re-connect cables.
	Digital scanner is disabled.	For Synapse or IBM 468x mode, enable the digital scanner via the host interface. Otherwise, see the technical person in charge of scanning.
	If using RS-232 Nixdorf B mode, CTS is not asserted.	Assert CTS line.
	Aiming pattern is disabled.	Enable the aiming pattern. See Decode Aiming Pattern on page 5-4 .
Scanner emits short low/short medium/short high beep sequence (power-up beep sequence) more than once.	The USB bus may put the digital scanner in a state where power to the digital scanner is cycled on and off more than once.	Normal during host reset.
Digital scanner emits aiming pattern, but does not decode the bar code.	Digital scanner is not programmed for the correct bar code type.	Program the digital 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.
	The symbol is not completely inside aiming pattern.	Move the symbol completely within the aiming pattern.
Digital scanner emits 4 short high beeps during decode attempt.	Digital scanner has not completed USB initialization.	Wait several seconds and scan again.

Table 3-1 Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
Digital scanner decodes bar code, but does not transmit the data to the host.	Digital 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.	Re-connect the cable.
	If 4 long low beeps are heard, a transmission error occurred.	Set the digital scanner's communication parameters to match the host's setting.
	If 5 low beeps are heard, a conversion or format error occurred.	Configure the digital scanner's conversion parameters properly.
	If low/high/low beeps are heard, an invalid ADF rule is detected.	Program the correct ADF rules.
	If high/low beeps are heard, the digital scanner is buffering Code 39 data.	Normal scanning a Code 39 bar code and the Code 39 Buffering option is enabled.
Host displays scanned data incorrectly.	Digital scanner is not programmed to work with the host.	Scan the appropriate host type programming bar code.
		For RS-232, set the digital scanner's communication parameters to match the host's settings.
		For a Keyboard Wedge configuration, program the system for the correct keyboard type, and turn off the CAPS LOCK key.
		Program the proper editing options (e.g., UPC-E to UPC-A Conversion).
Digital scanner emits high/high/high/low beeps when not in use.	RS-232 receive error.	Normal during host reset. Otherwise, set the digital scanner's RS-232 parity to match the host setting.
Digital scanner emits low/high beeps during programming.	Input error or Cancel bar code was scanned.	Scan the correct numeric bar codes within range for the parameter programmed.
Digital scanner emits low/high/low/high beeps during programming.	Out of ADF parameter storage space.	Erase all rules and re-program with shorter rules.
	Out of Synapse parameter storage space.	Scan Set Synapse Defaults bar code for cables no longer in use and re-program the digital scanner for the current host interface.

Table 3-1 Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
Digital scanner emits low/high/low beeps.	Clearing Code 39 buffer.	Normal when scanning the Code 39 Buffering Clear Buffer bar code or upon attempt to transmit an empty Code 39 buffer.
Digital scanner emits a power-up beep after changing USB host type.	The USB bus re-established power to the digital scanner.	Normal when changing USB host type.
Digital scanner emits one high beep when not in use.	In RS-232 mode, a <BEL> character was received and Beep on <BEL> option is enabled.	Normal when Beep on <BEL> is enabled and the digital scanner is in RS-232 mode.



NOTE If after performing these checks the digital scanner still experiences problems, contact the distributor or Zebra Support. See [page xv](#) for the telephone numbers.

Technical Specifications

Table 3-2 Technical Specifications

Item	Description
Power Requirements	5 VDC + / - 10% @ approximately 240 mA RMS (nominal), 500 mA (max)
Power Source	Depending on host: <ul style="list-style-type: none"> • Host powered • External power supply, 5.2 V nominal
Decode Capability	UPC/EAN, UPC/EAN with supplementals, JAN 8 & 13, Bookland EAN, Coupon Code, Code 128, GS1-128, Code 39, Code 39 Full ASCII, Code 39 Trioptic, Code 32, Code 93, Code 11, Interleaved 2 of 5, Discrete 2 of 5, IATA 2 of 5, Codabar (NW7), MSI, Inverse 1D, US Postnet, US Planet, UK Postal, Japan Postal, Australia Postal, Netherlands KIX Code, USPS 4CB/One Code/Intelligent Mail, UPU FICS Postal, GS1 DataBar, Composite Codes, PDF417, MicroPDF, Maxicode, Data Matrix (ECC 200), Data Matrix Inverse, QR Code, MicroQR, QR Inverse, Aztec, Aztec Inverse.
Beeper Operation	User-selectable: enable, disable
Beeper Volume	User-selectable: three levels
Beeper Tone	User-selectable: three tones
Field of View	30° +/- 2° horizontal 22.5° +/- 2° vertical
Yaw Tolerance	± 50° from normal

Table 3-2 *Technical Specifications (Continued)*

Item	Description
Pitch Tolerance	± 60° from normal
Roll Tolerance	± 180° from normal
Print Contrast Minimum	25% minimum reflectance differential, measured at 650 nm.
Ambient Light Immunity	10,000 Ft Candles (107,600 Lux)
Durability	6.5 ft (2 m) drop to concrete
Operating Temperature	-4° to 122° F (-20° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Humidity	5% to 95% (non-condensing)
Weight (without cable)	11.73 oz. (335 g)
Dimensions:	
Height	7.34 in. (18.65 cm)
Width	4.82 in. (12.25 cm)
Depth	2.93 in. (7.43 cm)
Laser	650nm laser diode
ESD	15 kV area discharge 8 kV contact discharge
Minimum Element Width	5 mil (0.127 mm)
Interfaces Supported	RS-232, Keyboard Wedge, Wand Emulation, Scanner Emulation, IBM 468X/469X, USB, Synapse

Digital Scanner Signal Descriptions

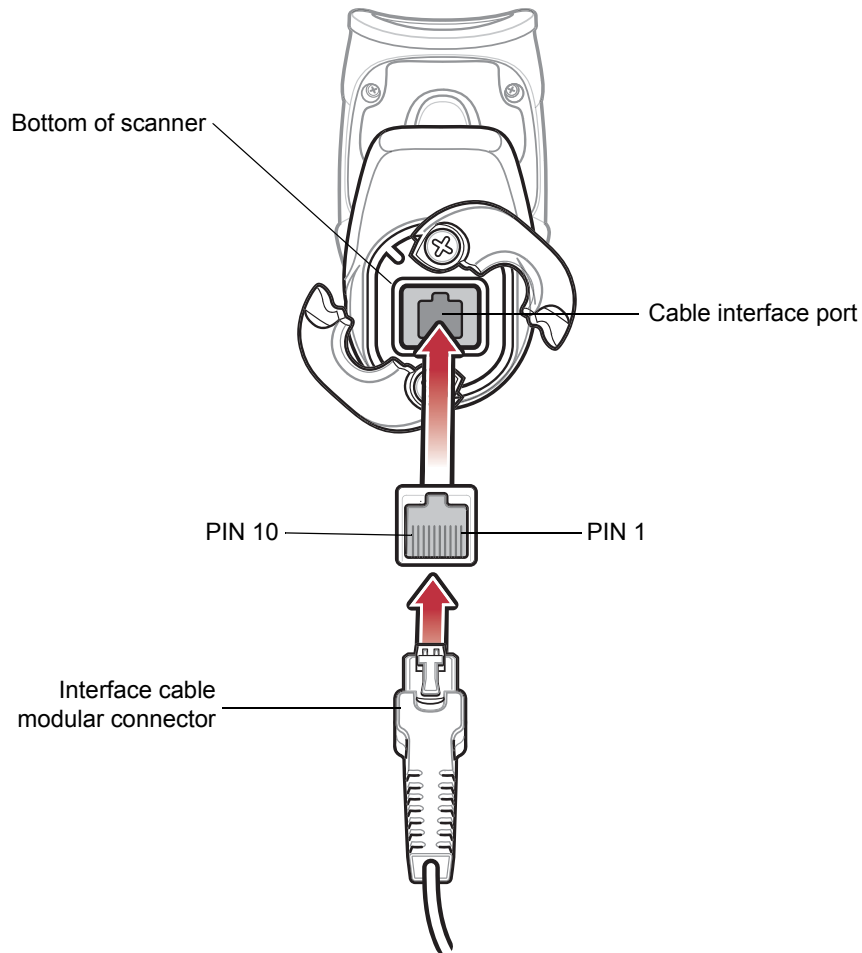


Figure 3-1 *Digital Scanner Cable Pinouts*

Chapter 4 User Preferences

Introduction

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

The digital scanner ships with the settings shown in [Table 4-1 on page 4-2](#) (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 you power down the digital scanner.

- ✓ **NOTE** Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code clearly, and bars and/or spaces are not merging.

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 [Set Default Parameter](#) bar code on [page 4-4](#). Throughout the programming bar code menus, asterisks (*) indicate default values.



* Indicates Default *High Volume 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 4-6](#). The digital 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, to correct an error during a scanning sequence, just re-scan the correct parameter.

User Preferences Parameter Defaults

[Table 4-1](#) lists defaults for user preferences parameters. To change the default values, scan the appropriate bar codes in this guide. These new values replace the standard default values in memory. To recall the default parameter values, scan [*Set Defaults on page 4-4](#).

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

Table 4-1 User Preferences Default Table

Parameter	Parameter Number	Default	Page Number
User Preferences			
Set Default Parameter		Set Defaults	4-4
Parameter Scanning	ECh	Enable	4-5
Beeper Tone	91h	Medium	4-6
Beeper Volume	8Ch	High	4-7
Suppress Power-up Beeps	F1h D1h	Do not suppress	4-7
Power Mode	80h	Continuous On	4-8
Time Delay to Low Power Mode	92h	1 Minute	4-9
Trigger Mode	8Ah	Auto Aim	4-11
Picklist Mode	F0h 92h	Disabled Always	4-12
Decode Session Timeout	88h	9.9 Sec	4-13
Timeout Between Decodes, Same Symbol	89h	0.6 Sec	4-13

Table 4-1 *User Preferences Default Table*

Parameter	Parameter Number	Default	Page Number
Beep After Good Decode	38h	Enable	4-14
Fuzzy 1D Processing	F1h, 02h	Enable	4-14
Decode Mirror Images	F1h, 19h	Never	4-15

User Preferences

Set Default Parameter

Scan this bar code to return all parameters to the default values listed in [Table A-1 on page A-1](#).

You can reset the digital scanner 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 its current settings as custom defaults.

- **Set Defaults** - Scan this bar code to reset all default parameters as follows.
 - If you previously set custom defaults by scanning **Write to Custom Defaults**, scan **Set Defaults** to retrieve and restore the decoder's custom default settings.
 - If you did not set custom defaults, scan **Restore Defaults** to restore the factory default values listed in [Table A-1](#).
- **Set Factory Defaults** - Scan this bar code to restore the factory default values listed in [Table A-1](#). This deletes any custom defaults set.
- **Write to Custom Defaults** - Scan this bar code to set the current decoder settings as custom defaults. Once set, you can recover custom default settings by scanning **Restore Defaults**.



***Set Defaults**



Set Factory Defaults



Write to Custom Defaults

Parameter Scanning

Parameter # ECh

To disable decoding of parameter bar codes, including the **Set Defaults** parameter bar codes, scan the **Disable Parameter Scanning** bar code below. To re-enable decoding of parameter bar codes, scan **Enable Parameter Scanning**.



***Enable Parameter Scanning
(01h)**

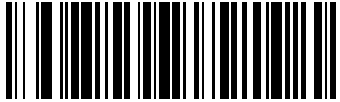


**Disable Parameter Scanning
(00h)**

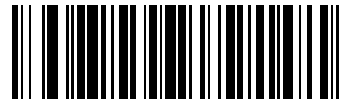
Beeper Tone

Parameter # 91h

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



Low Frequency
(02h)



***Medium Frequency**
(Optimum Setting)
(01h)



High Frequency
(00h)

Beeper Volume

Parameter # 8Ch

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



Low Volume
(02h)



Medium Volume
(01h)



***High Volume**
(00h)

Suppress Power-up Beeps

Parameter # F1h D1h

Select whether or not to suppress the digital scanner's power-up beeps.



*** Do Not Suppress Power-up Beeps**
(00h)



Suppress Power-up Beeps
(01h)

Power Mode

Parameter # 80h

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



***Continuous On
(00h)**



**Reduced Power Mode
(01h)**

Time Delay to Low Power Mode

Parameter # 92h

✓ **NOTE** This parameter only applies in Reduced Power Mode.

This parameter sets the time the digital scanner remains active after decoding. The digital scanner wakes upon trigger pull or when the host attempts to communicate with the digital scanner.



1 Second
(11h)



5 Seconds
(15h)



***1 Minute**
(21h)



5 Minutes
(25h)

Time Delay to Low Power Mode (continued)



15 Minutes
(2Bh)



1 Hour
(31h)

Trigger Mode

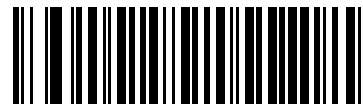
Parameter # 8Ah

Select one of the following trigger modes for the digital scanner:

- **Level** - A trigger pull activates decode processing. Decode processing continues until the bar code is decoded, you release the trigger, or the Decode Session Timeout occurs.
- **Blink** - In presentation (scanstand) mode, the digital scanner activates decode processing when it detects a bar code in its field of view. Decoding range is reduced in this mode.
- **Host** - A host command issues the triggering signal. The digital scanner interprets an actual trigger pull as a Level triggering option.



Level
(00h)



Blink
(07h)



*** Auto Aim**
(09h)

Picklist Mode

Parameter # F0h 92h

Picklist mode enables the digital scanner to decode only bar codes that are aligned under the laser crosshair. Select one of the following picklist modes for the digital scanner:

- **Disabled Always (default)** - Picklist mode is always disabled.
- **Enabled Out of Scanstand** - Picklist mode is enabled when the digital scanner is out of presentation (scanstand) mode and disabled when the digital scanner is in presentation mode.
- **Enabled Always** - Picklist mode is always enabled.



***Disabled Always
(00h)**



**Enabled Out of Scanstand
(01h)**



**Enabled Always
(02h)**

Decode Session Timeout

Parameter # 88h

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

To set a Decode Session Timeout, scan the bar code below. Next, scan two numeric bar codes from [Appendix D, Numeric Bar Codes](#) that correspond to the desired on time. Enter a leading zero for single digit numbers. For example, to set a Decode Session Timeout of 0.5 seconds, scan the bar code below, then scan the **0** and **5** bar codes. To correct an error or change the selection, scan **Cancel** on [page D-3](#).



Decode Session Timeout

Timeout Between Decodes, Same Symbol

Parameter # 89h

Use this option in presentation (scanstand) mode to prevent the beeper from continuously beeping when a symbol is left in the digital scanner's field of view. It is programmable in 0.1 second increments from 0.0 to 9.9 seconds. The default interval is 0.6 seconds.

To select the timeout between decodes for the same symbol, scan the bar code below, then scan two numeric bar codes from [Appendix D, Numeric Bar Codes](#) that correspond to the desired interval, in 0.1 second increments.



Timeout Between Decodes, Same Symbol

Beep After Good Decode

Parameter # 38h

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



***Beep After Good Decode
(Enable)
(01h)**



**Do Not Beep After Good Decode
(Disable)
(00h)**

Fuzzy 1D Processing

Parameter # F1h 02h

This option is enabled by default to optimize decode performance on 1D bar codes, including damaged and poor quality symbols. Disable this only if you experience time delays when decoding 2D bar codes, or in detecting a no decode.



***Enable Fuzzy 1D Processing
(01h)**



**Disable Fuzzy 1D Processing
(00h)**

Decode Mirror Images (Data Matrix Only)

Parameter # F1h 19h

Select an option for decoding mirror image Data Matrix bar codes:

- Always - decode only Data Matrix bar codes that are mirror images
- Never - do not decode Data Matrix bar codes that are mirror images
- Auto - decode both mirrored and unmirrored Data Matrix bar codes.



***Never**
(00h)



Always
(01h)



Auto
(02h)

Chapter 5 Decoding Preferences

Introduction

You can program the digital scanner to perform various functions, or activate different features. This chapter describes digital scanner preference features and provides programming bar codes for selecting these features.

The digital scanner ships with the settings shown in the [Decoding 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 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 you power down the digital scanner.

✓ **NOTE** Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code clearly, and bars and/or spaces are not merging.

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 [Set Default Parameter on page 4-4](#). Throughout the programming bar code menus, asterisks (*) indicate default values.



Scanning Sequence Examples

In most cases scanning one bar code sets the parameter value. For example, to disable the decode aiming pattern, scan the **Disable Decode Aiming Pattern** bar code under [Decode Aiming Pattern on page 5-4](#). The digital scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

Other parameters require scanning several bar codes. See these parameter descriptions for this procedure.

Errors While Scanning

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

Decoding Preferences Parameter Defaults

Table 5-1 lists defaults for digital scanner preferences parameters. To change the default values scan the appropriate bar codes in this guide. These new values replace the standard default values in memory. To recall the default parameter values, scan **Set Defaults on page 4-4*.

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

Table 5-1 *Decoding Preferences Default Table*

Parameter	Parameter Number	Default	Page Number
Decoding Options			
Focus Mode	F0h A6h	Far Focus	5-3
Decoding Illumination	F0h 2Ah	Enable	5-4
Decode Aiming Pattern	F0h 32h	Enable	5-4
Low Light Enhancement	F1h 64h	Disable	5-5
Presentation Mode Field of View	F1h 61h	Default (Reduced)	5-5

Decoding Preferences

The parameters in this chapter control bar code decoding characteristics.

Focus Mode

Parameter # F0h, A6h

Select the Focus Mode to control the working range of the digital scanner. Select **Far Focus** to optimize the digital scanner to read at its far position. Select **Near Focus** to optimize the digital scanner to read at its near position. **Smart Focus** toggles the focus position after every frame.



***Far Focus**
(00h)



Near Focus
(01h)



Smart Focus
(02h)

Decoding Illumination

Parameter # F0h, 2Ah

Selecting **Enable Decoding Illumination** causes the digital scanner to flash illumination to aid decoding. Select **Disable Decoding Illumination** to prevent the digital scanner from using decoding illumination.

Enabling illumination usually results in superior images. The effectiveness of the illumination decreases as the distance to the target increases.



***Enable Decoding Illumination
(01h)**



**Disable Decoding Illumination
(00h)**

Decode Aiming Pattern

Parameter # F0h, 32h

This parameter only applies when in Decode Mode. Select **Enable Decode Aiming Pattern** to project the aiming pattern during bar code capture, or **Disable Decode Aiming Pattern** to turn the aiming pattern off.



NOTE With picklist enabled, the decode aiming pattern flashes even when the Decode Aiming Pattern is disabled.



***Enable Decode Aiming Pattern
(02h)**



**Disable Decode Aiming Pattern
(00h)**

Low Light Enhancement

Parameter # F1h, 64h

In presentation mode, selecting **Enable Low Light Enhancement** causes illumination to remain on at a low level in low lighting conditions. Select **Disable Low Light Enhancement** to prevent illumination from remaining on under these conditions.



**Enable Low Light Enhancement
(01h)**



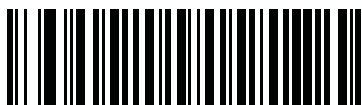
***Disable Low Light Enhancement
(00h)**

Presentation Mode Field of View

Parameter # F1h, 61h

In presentation mode, the scanner searches for a bar code in a smaller region around the aiming pattern's center cross to speed search time.

To use a full field of view, scan **Presentation Mode Full Field of View**. This allows the scanner to search the larger area of the aiming pattern.



***Presentation Mode Default Field of View
(01h)**



**Presentation Mode Full Field of View
(02h)**

Chapter 6 Keyboard Wedge Interface

Introduction

This chapter describes how to set up the digital scanner with a Keyboard Wedge interface. With this interface, the digital scanner is connected between the keyboard and host computer, and translates bar code data into keystrokes. The host computer accepts the keystrokes as if they originated from the keyboard. This mode adds bar code reading functionality to a system designed for manual keyboard input. Keyboard keystrokes are simply passed through.

Throughout the programming bar code menus, asterisks (*) indicate default values.



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



NOTE Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code clearly, and bars and/or spaces are not merging.

Connecting a Keyboard Wedge Interface

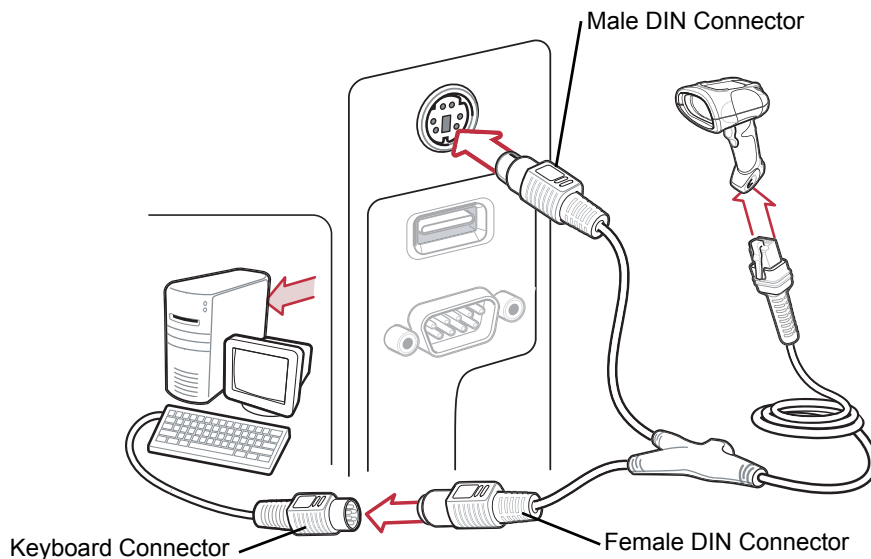


Figure 6-1 Keyboard Wedge Connection with Y-cable

To connect the Keyboard Wedge interface Y-cable:

✓ **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 scanner are the same.

1. Turn off the host and unplug the keyboard connector.
2. Attach the modular connector of the Y-cable to the cable interface port on the digital scanner. See [Installing the Interface Cable on page 1-2](#).
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 Types on page 6-4](#).
9. To modify any other parameter options, scan the appropriate bar codes in this chapter.

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	6-4
Country Types (Country Codes)	North American	6-5
Ignore Unknown Characters	Transmit	6-7
Keystroke Delay	No Delay	6-7
Intra-Keystroke Delay	Disable	6-8
Alternate Numeric Keypad Emulation	Disable	6-8
Caps Lock On	Disable	6-9
Caps Lock Override	Disable	6-9
Convert Wedge Data	No Convert	6-10
Function Key Mapping	Disable	6-10
FN1 Substitution	Disable	6-11
Send and Make Break	Send	6-11

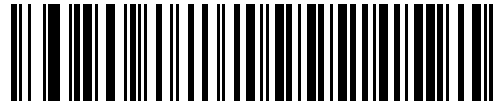
Keyboard Wedge Host Parameters

Keyboard Wedge Host Types

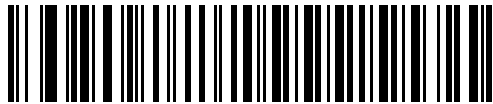
Select the Keyboard Wedge host by scanning one of the bar codes below.



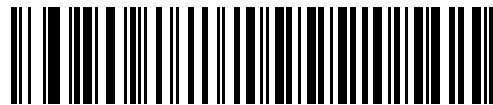
IBM PC/AT & IBM PC Compatibles



IBM PS/2 (Model 30)



IBM AT Notebook



NCR 7052

Keyboard Wedge Country Types (Country Codes)

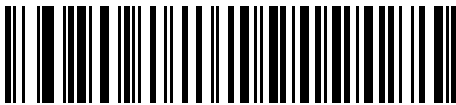
Scan the bar code corresponding to the keyboard type. If your keyboard type does not appear, see [Alternate Numeric Keypad Emulation on page 6-8](#).



***North American**



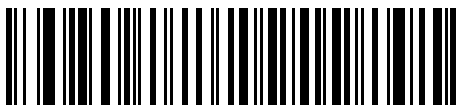
German Windows



French Windows



French Canadian Windows 95/98

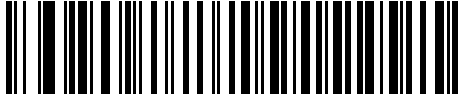


French Canadian Windows XP/2000

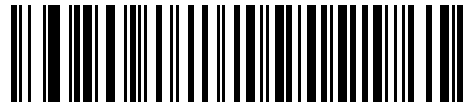


Spanish Windows

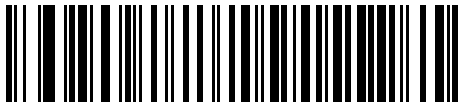
Keyboard Wedge Country Types (continued)



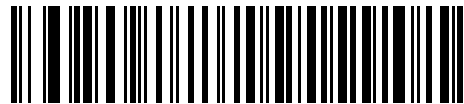
Italian Windows



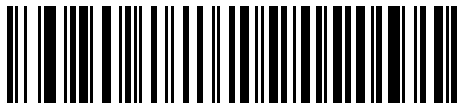
Swedish Windows



UK English Windows



Japanese Windows

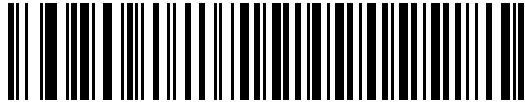


Portuguese-Brazilian Windows

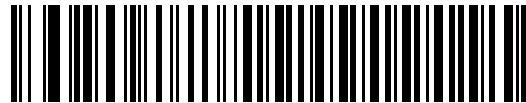
Ignore Unknown Characters

Unknown characters are characters the host does not recognize. Select **Send Bar Codes With Unknown Characters** to send all bar code data except for unknown characters. The digital scanner issues no error beeps.

Select **Do Not Send Bar Codes With Unknown Characters** to send bar code data up to the first unknown character. The digital scanner issues an error beep.



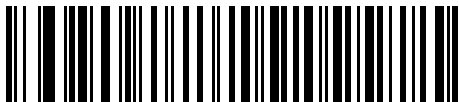
***Send Bar Codes with Unknown Characters
(Transmit)**



Do Not Send Bar Codes with Unknown Characters

Keystroke Delay

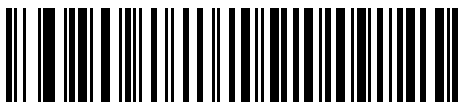
This is the delay in milliseconds between emulated keystrokes. Scan a bar code below to increase the delay when hosts require slower data transmission.



***No Delay**



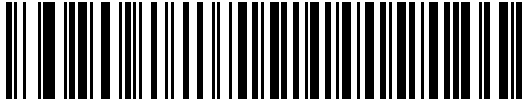
Medium Delay (20 msec)



Long Delay (40 msec)

Intra-Keystroke Delay

Enable this to insert an additional delay between each emulated key depression and release. This sets the Keystroke Delay parameter to a minimum of 5 msec as well.



Enable



***Disable**

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.



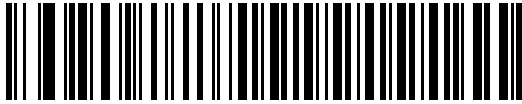
Enable Alternate Numeric Keypad



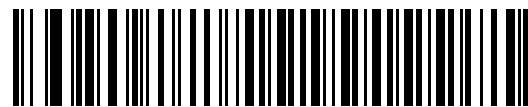
***Disable Alternate Numeric Keypad**

Caps Lock On

Enable this to emulate keystrokes as if the Caps Lock key is always pressed.



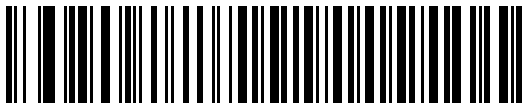
Enable Caps Lock On



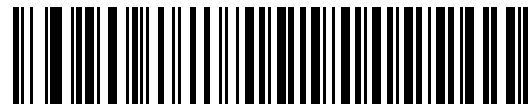
*Disable Caps Lock On

Caps Lock Override

If you enable this, on AT or AT Notebook hosts, the keyboard ignores the state of the Caps Lock key. Therefore, an 'A' in the bar code transmits as an 'A' regardless of the state of the keyboard's Caps Lock key.



Enable Caps Lock Override



*Disable Caps Lock Override



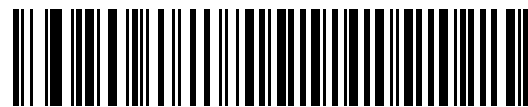
NOTE If both Caps Lock On and Caps Lock Override are enabled, Caps Lock Override takes precedence.

Convert Wedge Data

Enable this to convert 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 6-14](#)). Enable this parameter to send the keys in bold in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not you enable this parameter.



Enable



***Disable**

FN1 Substitution

Enable this to replace FN1 characters in a GS1-128 bar code with a user-selected keystroke (see [FN1 Substitution Values on page 14-7](#)).



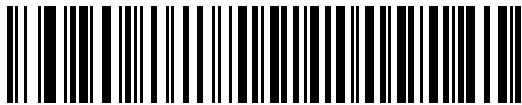
Enable



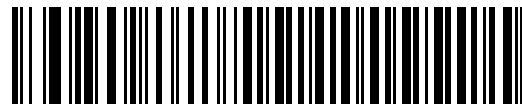
***Disable**

Send Make and Break

Enable this to prevent sending the scan codes for releasing a key.



***Send Make and Break Scan Codes**



Send Make Scan Code Only

Keyboard Maps

Use the following keyboard maps for reference for prefix/suffix keystroke parameters. To program the prefix/suffix values, see the bar codes on [page 14-4](#).

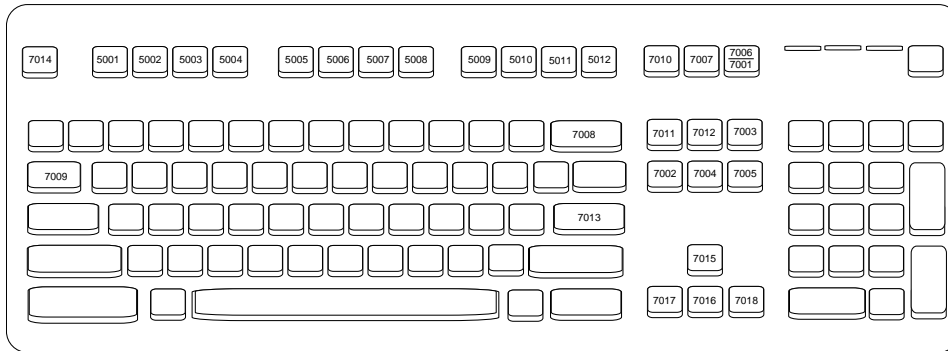


Figure 6-2 IBM PS2 Type Keyboard

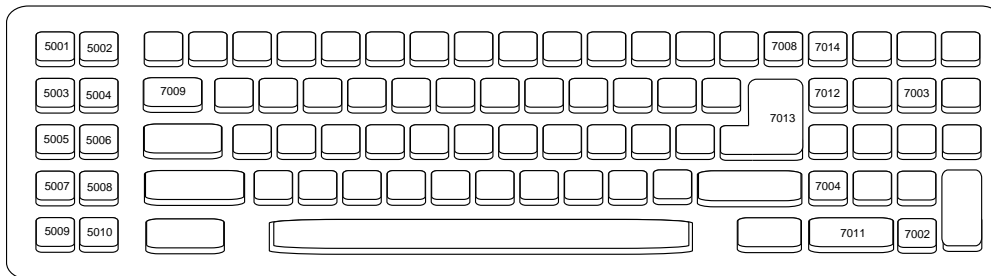


Figure 6-3 IBM PC/AT

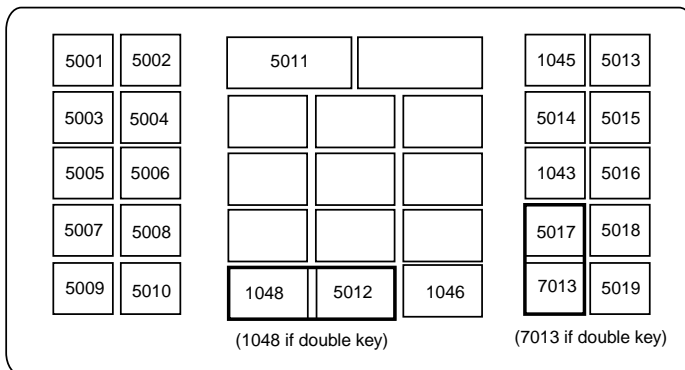


Figure 6-4 NCR 7052 32-KEY

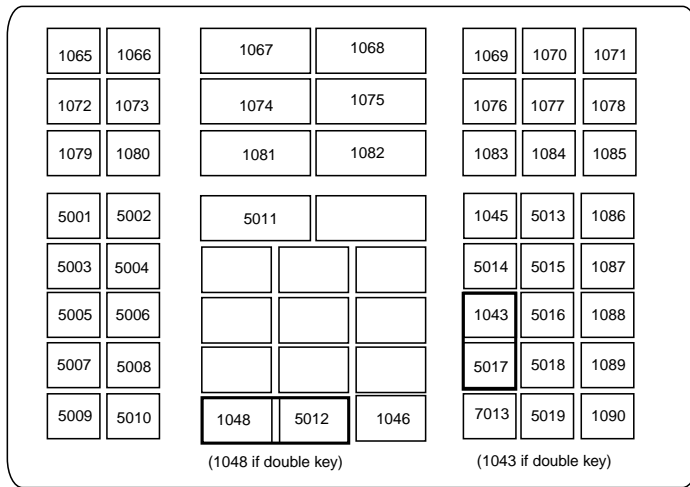


Figure 6-5 NCR 7052 58-KEY

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, if you enable Code 39 Full ASCII and scan **+B**, it transmits 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
1022	\$V	CTRL V

¹The keystroke in bold transmits only if you enabled *Function Key Mapping* on page 6-10. Otherwise, the unbolded keystroke transmits.

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

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
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
1050	2	2

¹The keystroke in bold transmits only if you enabled *Function Key Mapping* on page 6-10. Otherwise, the unbolded keystroke transmits.

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

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
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
1078	N	N

¹The keystroke in bold transmits only if you enabled *Function Key Mapping* on page 6-10. Otherwise, the unbolded keystroke transmits.

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

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
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
1106	+J	j

¹The keystroke in bold transmits only if you enabled *Function Key Mapping* on page 6-10. Otherwise, the unbolded keystroke transmits.

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

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
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 transmits only if you enabled *Function Key Mapping* on page 6-10. Otherwise, the unbolded keystroke transmits.

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
2070	ALT F

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

ALT Keys	Keystroke
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 GUI 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
3054	GUI 6

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

GUI Keys	Keystrokes
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	-

Table 6-6 Keyboard Wedge Numeric Keypad Character Set (Continued)

Numeric Keypad	Keystroke
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

Table 6-7 *Keyboard Wedge Extended Keypad Character Set (Continued)*

Extended Keypad	Keystroke
7015	Up Arrow
7016	Dn Arrow
7017	Left Arrow
7018	Right Arrow

Chapter 7 RS-232 Interface

Introduction

This chapter describes how to set up the digital scanner with an RS-232 host. Use the RS-232 interface to connect the digital scanner to point-of-sale devices, host computers, or other devices with an available RS-232 port (e.g., com port).

If your host does not appear in [Table 7-2](#), refer to the documentation for the host device to set communication parameters to match the host.

- ✓ **NOTE** The digital 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 TTL-to-RS-232C conversion. Contact Zebra Support for more information.

Throughout the programming bar code menus, asterisks (*) indicate default values.



* Indicates Default *Baud Rate 9600 Feature/Option

- ✓ **NOTE** Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code clearly, and bars and/or spaces are not merging.

Connecting an RS-232 Interface

Connect the digital scanner directly to the host computer.

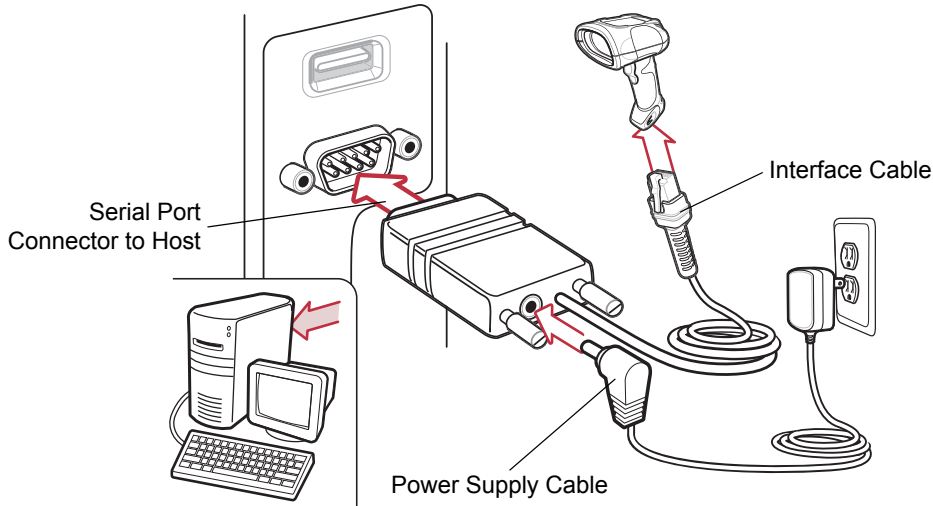


Figure 7-1 RS-232 Direct Connection

✓ **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 scanner are the same.

1. Attach the modular connector of the RS-232 interface cable to the cable interface port on the digital scanner (see [Installing the Interface Cable on page 1-2](#)).
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 [page 7-6](#).
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

RS-232 Parameter Defaults

[Table 7-1](#) lists the defaults for RS-232 host parameters. To change an option, scan the appropriate bar code(s) provided in the RS-232 Host Parameters 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	7-9
Stop Bit Select	1 Stop Bit	7-10
Data Bits	8-Bit	7-10
Check Receive Errors	Enable	7-11
Hardware Handshaking	None	7-12
Software Handshaking	None	7-14
Host Serial Response Time-out	2 Sec	7-16
RTS Line State	Low RTS	7-17
Beep on <BEL>	Disable	7-17
Intercharacter Delay	0 msec	7-18
Nixdorf Beep/LED Options	Normal Operation	7-19
Ignore Unknown Characters	Send Bar Code	7-19

RS-232 Host Parameters

Various RS-232 hosts use their own parameter default settings. Selecting standard, ICL, Fujitsu, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, OPOS/JPOS, Olivetti, or Omron sets the defaults listed in [Table 7-2](#)

Table 7-2 Terminal Specific RS-232

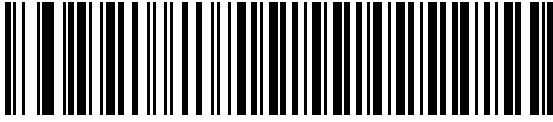
Parameter	Standard (Default)	ICL	Fujitsu	Wincor-Nixdorf Mode A	Wincor-Nixdorf Mode B/OPOS/JPOS	Olivetti	Omron
Transmit Code ID	No	Yes	Yes	Yes	Yes	Yes	Yes
Data Transmission Format	Data as is	Data/Suffix	Data/Suffix	Data/Suffix	Data/Suffix	Prefix/Data/Suffix	Data/Suffix
Suffix	CR/LF (7013)	CR (1013)	CR (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, scanning is enabled.**

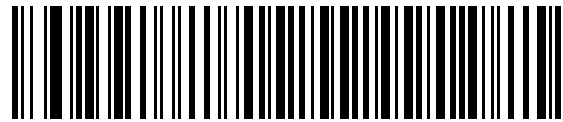
****If you select Nixdorf Mode B without connecting the digital scanner to the proper host, it may appear unable to scan. If this happens, scan a different RS-232 host type within 5 seconds of cycling power to the digital scanner.**

RS-232 Host Types

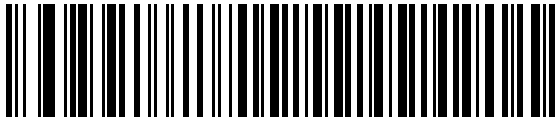
To select an RS-232 host interface, scan one of the following bar codes.



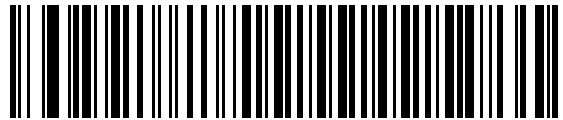
Standard RS-232



ICL RS-232



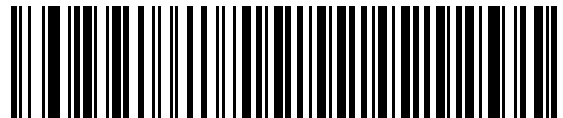
Wincor-Nixdorf RS-232 Mode A



Wincor-Nixdorf RS-232 Mode B

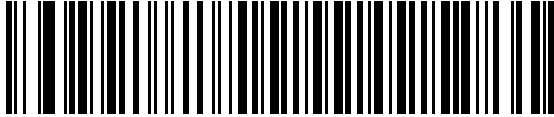


Olivetti ORS4500

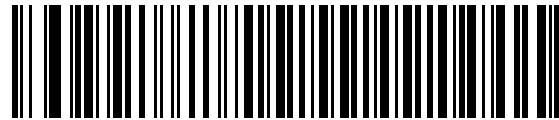


Omron

RS-232 Host Types (continued)



OPOS/JPOS



Fujitsu RS-232

Baud Rate

Baud rate is the number of bits of data transmitted per second. Set the digital 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 (continued)



***Baud Rate 9600**



Baud Rate 19,200



Baud Rate 38,400

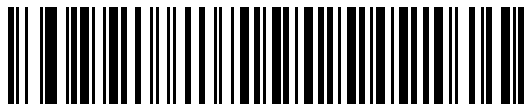


Baud Rate 57,600

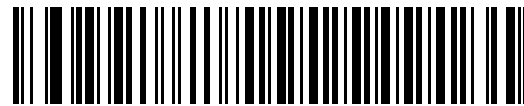
Parity

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

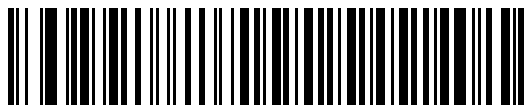
- Select **Odd** parity to set the parity bit value to 0 or 1, based on data, to ensure that the coded character contains an odd number of 1 bits.
- Select **Even** parity to set the parity bit value to 0 or 1, based on data, to ensure that the coded character contains an even number of 1 bits.
- Select **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



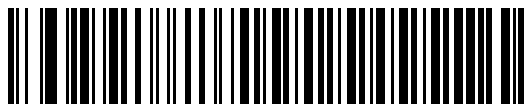
Even



Mark



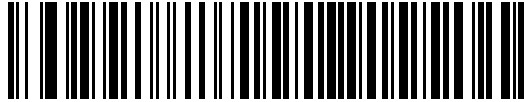
Space



***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. Select the number of stop bits (one or two) to match the number the receiving terminal is programmed to accommodate. Set the number of stop bits to match host device requirements.



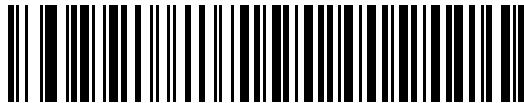
***1 Stop Bit**



2 Stop Bits

Data Bits

This parameter allows the digital 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 to check the parity, framing, and overrun of received characters. The parity value of received characters is verified against the parity parameter selected above.



***Check For Received Errors**



Do Not Check For Received Errors

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).

Disable Standard RTS/CTS handshaking to transmit scan data as it becomes available. Select Standard RTS/CTS handshaking to transmit scan data according to the following sequence:

- The digital scanner reads the CTS line for activity. If CTS is asserted, the digital 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 (default), the CTS line is still asserted, the digital scanner sounds a transmit error, and discards any scanned data.
- When the CTS line is de-asserted, the digital 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 transmits. If, after Host Serial Response Time-out (default), the CTS line is not asserted, the digital scanner sounds a transmit error, and discards the data.
- When data transmission completes, the digital scanner de-asserts RTS 10 msec after sending the last character.
- The host should respond by negating CTS. The digital scanner checks for a de-asserted CTS upon the next transmission of data.

During data transmission, the CTS line should be asserted. If CTS is deasserted for more than 50 ms between characters, the digital scanner aborts transmission, sounds a transmission error, and discards the data.

If this communication sequence fails, the digital 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.

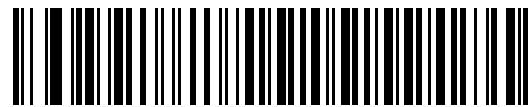
✓ **NOTE** The DTR signal is jumpered to the active state.

- **None:** Scan this bar code to disable hardware handshaking.
- **Standard RTS/CTS:** Scan the bar code below to select Standard RTS/CTS Hardware Handshaking.
- **RTS/CTS Option 1:** If you select RTS/CTS Option 1, the digital scanner asserts RTS before transmitting and ignores the state of CTS. The digital scanner de-asserts RTS when the transmission completes.
- **RTS/CTS Option 2:** If you select Option 2, RTS is always high or low (user-programmed logic level). However, the digital scanner waits for CTS to be asserted before transmitting data. If CTS is not asserted within Host Serial Response Time-out (default), the digital scanner issues an error indication and discards the data.
- **RTS/CTS Option 3:** If you select Option 3, the digital scanner asserts RTS prior to any data transmission, regardless of the state of CTS. The digital scanner waits up to Host Serial Response Time-out (default) for CTS to be asserted. If CTS is not asserted during this time, the digital scanner issues an error indication and discards the data. The digital scanner de-asserts RTS when transmission completes.

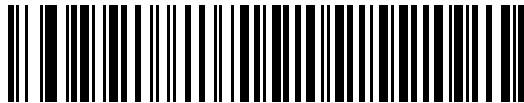
Hardware Handshaking (continued)



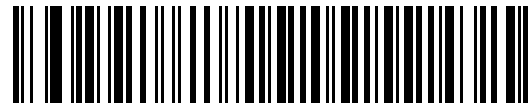
***None**



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.

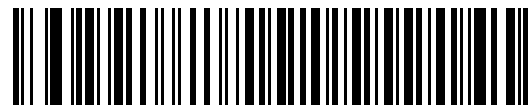
- **None:** Select this option to transmit data immediately. The digital scanner expects no response from the host.
- **ACK/NAK:** If you select this option, after transmitting data, the digital scanner expects either an ACK or NAK response from the host. When the scanner receives a NAK, it transmits the same data again and waits for either an ACK or NAK. After three unsuccessful attempts to send data after receiving NAKs, the digital scanner issues an error indication and discards the data.

The digital scanner waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the digital 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.

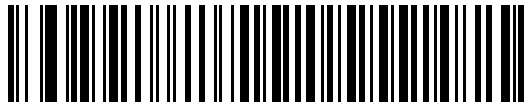
- **ENQ:** If you select this option, the digital scanner waits for an ENQ character from the host before transmitting data. If the scanner does not receive an ENQ within the Host Serial Response Time-out, the scanner issues an error indication and discards the data. The host must transmit an ENQ character 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 digital scanner transmission off until the scanner receives an XON character. There are two situations for XON/XOFF:
 - The scanner receives an XOFF before it has data to send. When the digital scanner has data to send, it waits up to Host Serial Response Time-out for an XON character before transmission. If it does not receive the XON within this time, the digital scanner issues an error indication and discards the data.
 - The scanner receives an XOFF during a transmission. Data transmission then stops after sending the current byte. When the digital scanner receives an XON character, it sends the rest of the data message. The digital scanner waits up to 30 seconds for the XON.

Software Handshaking (continued)

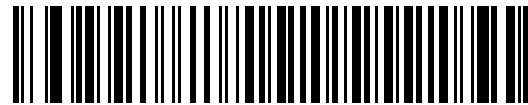
***None**



ACK/NAK



ENQ



ACK/NAK with ENQ



XON/XOFF

Host Serial Response Time-out

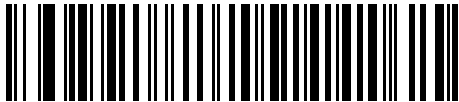
This parameter specifies how long the digital scanner waits for an ACK, NAK, or CTS before determining that a transmission error occurred. This only applies when in one of the ACK/NAK software handshaking modes, or in RTS/CTS hardware handshaking mode.



***Minimum: 2 Sec**



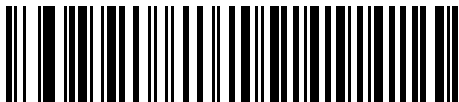
Low: 2.5 Sec



Medium: 5 Sec



High: 7.5 Sec



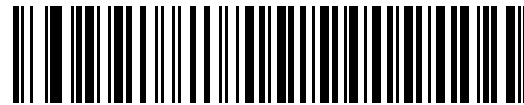
Maximum: 9.9 Sec

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.



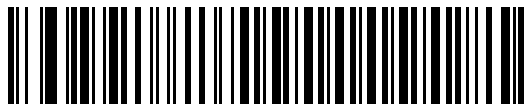
***Host: Low RTS**



Host: High RTS

Beep on <BEL>

If you enable this parameter, the digital scanner issues a beep when it detects a <BEL> character on the RS-232 serial line. <BEL> gains a user's attention to an illegal entry or other important event.



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



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

Intercharacter Delay

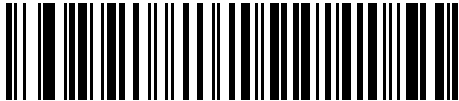
This parameter specifies the intercharacter delay inserted between character transmissions.



***Minimum: 0 msec**



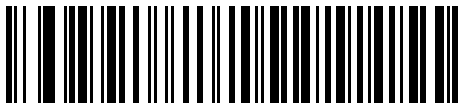
Low: 25 msec



Medium: 50 msec



High: 75 msec



Maximum: 99 msec

Nixdorf Beep/LED Options

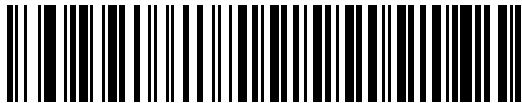
If you selected Nixdorf Mode B, this indicates when the digital scanner beeps and turns on its LED after a decode.



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



Beep/LED After Transmission

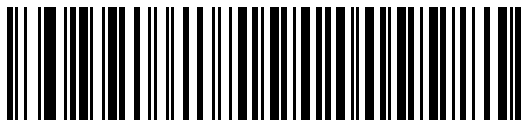


Beep/LED After CTS Pulse

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. Select **Send Bar Codes with Unknown Characters** to send all bar code data except for unknown characters. The digital scanner issues no error beeps.

Select **Do Not Send Bar Codes with Unknown Characters** to send bar code data up to the first unknown character. The digital scanner issues an error beep.



***Send Bar Code with Unknown Characters**



Do Not Send Bar Codes with Unknown Characters

ASCII Character Set for RS-232

You can assign the values in [Table 7-4](#) as prefixes or suffixes for ASCII character data transmission.

Table 7-4 Prefix/Suffix Values

Prefix/Suffix 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 Prefix/Suffix Values (Continued)

Prefix/Suffix 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
1055	7	7
1056	8	8

Table 7-4 Prefix/Suffix Values (Continued)

Prefix/Suffix 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 Prefix/Suffix Values (Continued)

Prefix/Suffix 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 *Prefix/Suffix Values (Continued)*

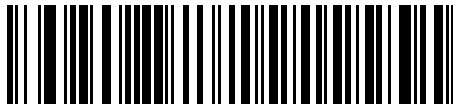
Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	
1125	%R	}
1126	%S	~
1127		Undefined
7013		ENTER

Chapter 8 USB Interface

Introduction

This chapter describes how to set up the digital scanner with a USB host. The digital scanner connects directly to a USB host, or a powered USB hub, which powers it. No additional power supply is required.

Throughout the programming bar code menus, asterisks (*) indicate default values.



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

- ✓ **NOTE** Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code clearly, and bars and/or spaces are not merging.

Connecting a USB Interface

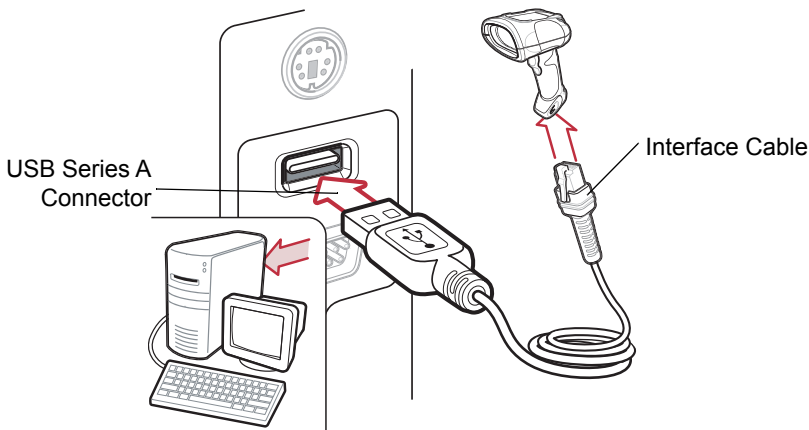


Figure 8-1 USB Connection

The digital scanner 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 digital scanner through USB:

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

The digital scanner also interfaces with other USB hosts which support USB Human Interface Devices (HID). For more information on USB technology, hosts, and peripheral devices, visit <http://www.zebra.com/support>.

To set up the digital scanner:

✓ **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 are the same.

1. Connect the modular connector of the USB interface cable to the cable interface port on the digital scanner (see [Installing the Interface Cable on page 1-2](#)).
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 [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 digital scanner powers up during this installation.
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

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. To change any option, 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	8-6
USB Keystroke Delay	No Delay	8-8
USB CAPS Lock Override	Disable	8-8
USB Ignore Unknown Characters	Enable	8-9
Emulate Keypad	Disable	8-9
Emulate Keypad with Leading Zero	Disable	8-10
USB FN1 Substitution	Disable	8-10
Function Key Mapping	Disable	8-11
Simulated Caps Lock	Disable	8-11
Convert Case	None	8-12
USB Static CDC	Enable	8-12

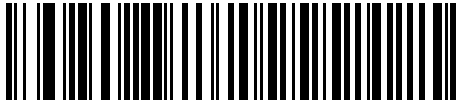
USB Host Parameters

USB Device Type

Select the desired USB device type.

- ✓ **NOTE** When changing USB Device Types, the digital scanner automatically resets and issues the standard startup beep sequences.

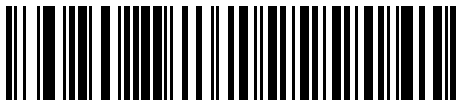
- ✓ **NOTE** Before selecting **CDC COM Port Emulation**, install the CDC INF file on the host to ensure the digital scanner does not stall during power up (due to a failure to enumerate USB). If the digital scanner stalls, to recover it:
 - 1) Install the CDC INF file
 - or
 - 2) After power-up, hold the trigger for 10 seconds, which allows the digital scanner to power up using an alternate USB configuration. Upon power-up, scan another **USB Device Type**.



***HID Keyboard Emulation**



IBM Table Top USB



IBM Hand-Held USB

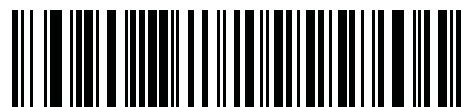


USB OPOS Handheld

USB Device Type (continued)



Simple COM Port Emulation

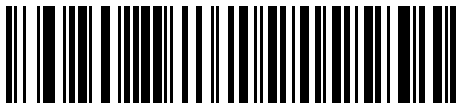


CDC COM Port Emulation

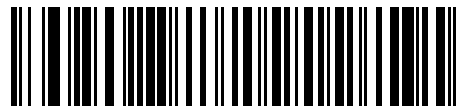
USB Country Keyboard Types (Country Codes)

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

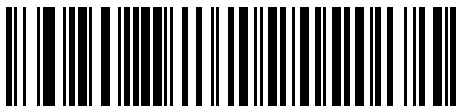
- ✓ **NOTE** When changing USB country keyboard types the digital scanner automatically resets and issues the standard startup beep sequences.



***North American Standard USB Keyboard**



German Windows



French Windows



French Canadian Windows 95/98

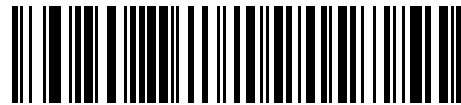


French Canadian Windows 2000/XP

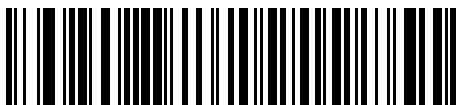
USB Country Keyboard Types (continued)



French Belgian Windows



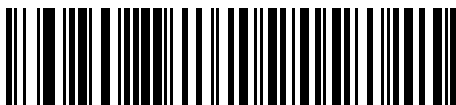
Spanish Windows



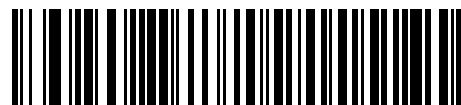
Italian Windows



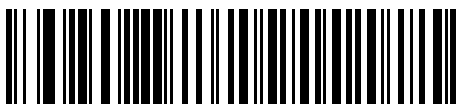
Swedish Windows



UK English Windows



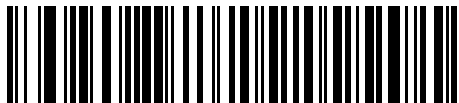
Japanese Windows (ASCII)



Portuguese-Brazilian Windows

USB Keystroke Delay

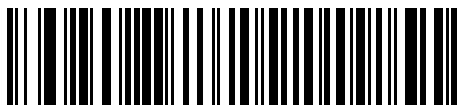
This parameter sets the delay, in milliseconds, between emulated keystrokes. Scan a bar code below to increase the delay when hosts require slower data transmission.



***No Delay**



Medium Delay (20 msec)



Long Delay (40 msec)

USB CAPS Lock Override

This option applies only to the HID Keyboard Emulation device. Enable this to preserve the case of the data 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)**

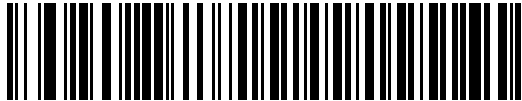


***Do Not Override Caps Lock Key
(Disable)**

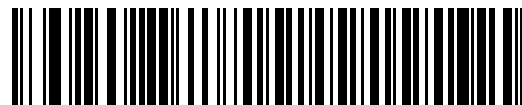
USB Ignore Unknown Characters

This option applies only to the HID Keyboard Emulation device and IBM device. Unknown characters are characters the host does not recognize. Select **Send Bar Codes With Unknown Characters** to send all bar code data except for unknown characters. The digital scanner issues no error beeps.

Select **Do Not Send Bar Codes With Unknown Characters** to prevent sending bar codes containing at least one unknown character to the host. The digital scanner issues an error beep.



***Send Bar Codes with Unknown Characters
(Transmit)**



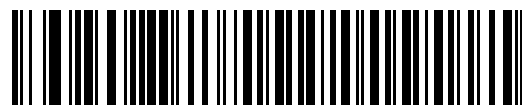
**Do Not Send Bar Codes with Unknown Characters
(Disable)**

Emulate Keypad

Enable this to send all characters as ASCII sequences over the numeric keypad. For example ASCII A transmits as "ALT make" 0 6 5 "ALT Break".



***Disable Keypad Emulation**



Enable Keypad Emulation

Emulate Keypad with Leading Zero

Enable this to send character sequences sent over the numeric keypad as ISO characters which have a leading zero. For example ASCII A transmits as “ALT MAKE” 0 0 6 5 “ALT BREAK”.



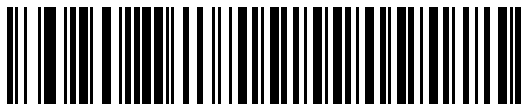
***Disable Keypad Emulation with Leading Zero**



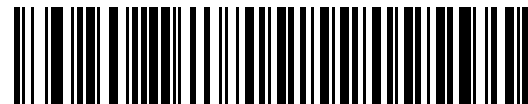
Enable Keypad Emulation with Leading Zero

USB Keyboard FN1 Substitution

This option applies only to the USB HID Keyboard Emulation device. Enable this to replace any FN1 characters in an EAN 128 bar code with a user-selected Key Category and value. See [FN1 Substitution Values on page 14-7](#) to set the Key Category and Key Value.



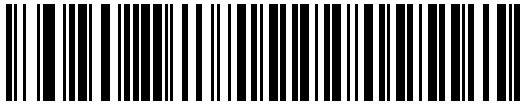
Enable



***Disable**

Function Key Mapping

ASCII values under 32 are normally sent as a control-key sequences (see [Table 8-2 on page 8-13](#)). Enable this parameter to send the keys in bold in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not you enable this parameter.



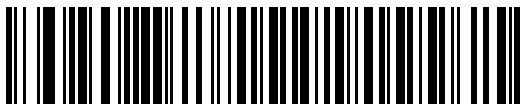
***Disable Function Key Mapping**



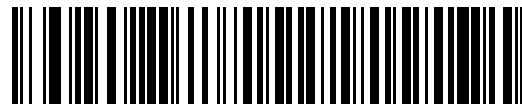
Enable Function Key Mapping

Simulated Caps Lock

Enable this to invert upper and lower case characters on the bar code as if the Caps Lock state is enabled on the keyboard. This inversion occurs regardless of the keyboard's current Caps Lock state.



***Disable Simulated Caps Lock**



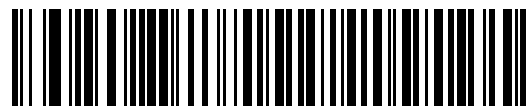
Enable Simulated Caps Lock

Convert Case

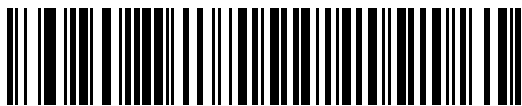
Enable this to convert all bar code data to the selected case.



***No Case Conversion**



Convert All to Upper Case



Convert All to Lower Case

USB Static CDC

When disabled, each device connected consumes another COM port (first device = COM1, second device = COM2, third device = COM3, etc.)

When enabled, each device connects to the same COM port.



***Enable USB Static CDC**



Disable USB Static CDC

ASCII Character Set for USB

Table 8-2 USB Prefix/Suffix Values

Prefix/ Suffix 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 transmits only if you enabled *Function Key Mapping* on page 8-11. Otherwise, the unbolded keystroke transmits.

Table 8-2 USB Prefix/Suffix Values (Continued)

Prefix/ Suffix 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 transmits only if you enabled *Function Key Mapping* on page 8-11. Otherwise, the unbolded keystroke transmits.

Table 8-2 USB Prefix/Suffix Values (Continued)

Prefix/ Suffix 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 transmits only if you enabled *Function Key Mapping* on page 8-11. Otherwise, the unbolded keystroke transmits.

Table 8-2 USB Prefix/Suffix Values (Continued)

Prefix/ Suffix 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 transmits only if you enabled *Function Key Mapping* on page 8-11. Otherwise, the unbolded keystroke transmits.

Table 8-2 USB Prefix/Suffix Values (Continued)

Prefix/ Suffix 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 transmits only if you enabled *Function Key Mapping* on page 8-11. Otherwise, the unbolded keystroke transmits.

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

Table 8-3 USB ALT Key Character Set (Continued)

ALT Keys	Keystroke
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

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
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

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
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
5016	F16
5017	F17
5018	F18
5019	F19
5020	F20
5021	F21

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

F Keys	Keystroke
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

Table 8-7 *USB Extended Keypad Character Set (Continued)*

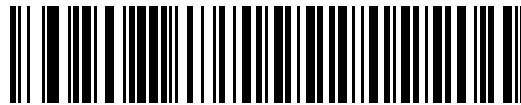
Extended Keypad	Keystroke
7006	Pause
7007	Scroll Lock
7008	Backspace
7009	Tab
7010	Print Screen
7011	Insert
7012	Home
7013	Enter
7014	Escape
7015	Up Arrow
7016	Down Arrow
7017	Left Arrow
7018	Right Arrow

Chapter 9 IBM 468X/469X Interface

Introduction

This chapter describes how to set up the digital scanner with an IBM 468X/469X host.

Throughout the programming bar code menus, asterisks (*) indicate default values.



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



NOTE Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code clearly, and bars and/or spaces are not merging.

Connecting to an IBM 468X/469X Host

Connect the digital scanner directly to the host interface.

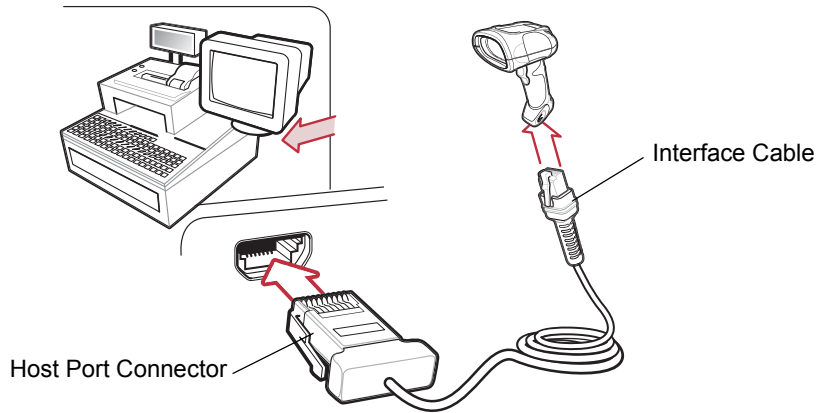


Figure 9-1 IBM Direct Connection

✓ **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 scanner are the same.

1. Attach the modular connector of the IBM 46XX interface cable to the cable interface port on the digital scanner (see [Installing the Interface Cable on page 1-2](#)).
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** The only required configuration is the port address. The IBM system typically controls other digital scanner parameters.

IBM Parameter Defaults

[page 9-3](#) lists the defaults for IBM host parameters. To change an 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*

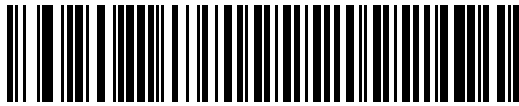
Parameter	Default	Page Number
IBM 468X/469X Host Parameters		
Port Address	None Selected	9-4
Convert Unknown to Code 39	Disable	9-5

IBM 468X/469X Host Parameters

Port Address

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

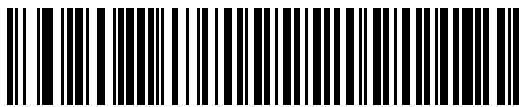
✓ **NOTE** Scanning one of these bar codes enables the RS-485 interface on the digital scanner.



None Selected



Hand-held Scanner Emulation (Port 9B)



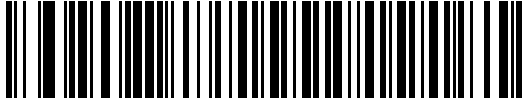
Non-IBM Scanner Emulation (Port 5B)



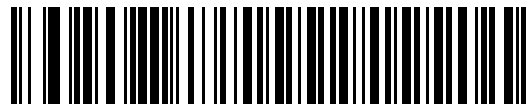
Table Top Scanner Emulation (Port 17)

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**

Chapter 10 Wand Emulation Interface

Introduction

This chapter describes how to set up the digital scanner with a wand emulation host when you need Wand Emulation communication. The digital scanner connects to an external wand decoder or to a decoder integrated in a mobile computer or Point-of-Sale (POS) terminal.

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

Throughout the programming bar code menus, asterisks (*) indicate default values.



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



NOTE Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code clearly, and bars and/or spaces are not merging.

Connecting Using Wand Emulation

To perform Wand Emulation, connect the digital scanner to a mobile computer, or a controller which collects the wand data and interprets it for the host.

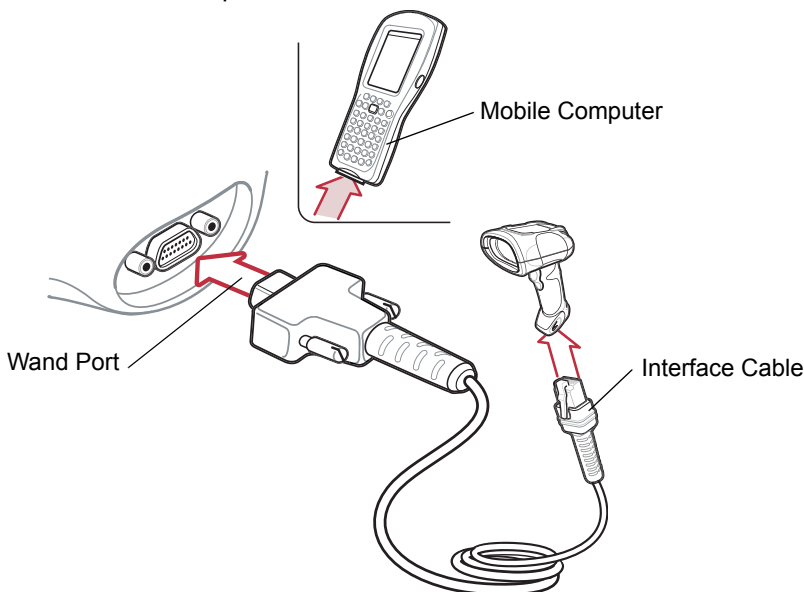


Figure 10-1 Wand Emulation Connection

✓ **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 scanner are the same.

1. Attach the modular connector of the Wand Emulation interface cable to cable interface port on the digital scanner (see [Installing the Interface Cable on page 1-2](#)).
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.



WARNING! Connect the digital scanner to 5 volt decoders only. Connecting the digital scanner to a 12 volt decoder can damage the digital scanner and invalidate the warranty.

Wand Emulation Parameter Defaults

Table 10-1 lists the defaults for Wand Emulation host types. To change an option, scan the appropriate bar code(s) provided in *Wand Emulation Host Parameters 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	10-4
Leading Margin	80 msec	10-5
Polarity	Bar High/Margin Low	10-6
Ignore Unknown Characters	Ignore	10-6
Convert All Bar Codes to Code 39	Disable	10-7
Convert Code 39 to Full ASCII	Disable	10-8

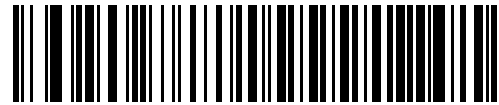
Wand Emulation Host Parameters

Wand Emulation Host Types

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



Symbol OmniLink Interface Controller



Symbol PDT Terminal (MSI)

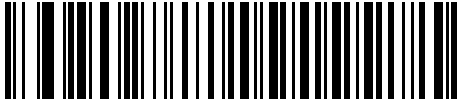


Symbol PTC Terminal (Telxon)

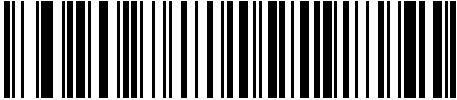
Leading Margin (Quiet Zone)

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.

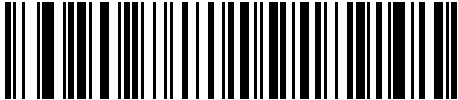
✓ **NOTE** 250 msec is the maximum value that this parameter can attain, however, 200 msec is sufficient.



*80 msec



140 msec

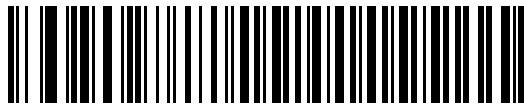


200 msec

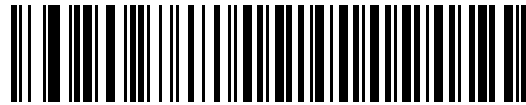
Polarity

Polarity determines how the digital scanner'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 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.

Scan the appropriate bar code to select the polarity required by the decoder.



***Bar High/Margin Low**



Bar Low/Margin High

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. Select **Send Bar Codes With Unknown Characters** to send all bar code data except for unknown characters. The digital scanner issues no error beeps.

Select **Do Not Send Bar Codes With Unknown Characters** to prevent sending bar codes containing at least one unknown character to the host. The digital scanner issues an error beep.



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



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

Convert All Bar Codes to Code 39

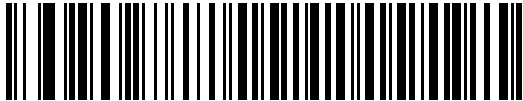
By default, the Wand Emulation interface sends data to the attached host in the symbology decoded. This can be a problem for users with older systems that do not recognize newer symbologies (for example, GS1 DataBar).

Enabling this parameter ignores the decoded symbology, and outputs the data as a Code 39 bar code. Lowercase characters in the original data stream transmit as uppercase characters. This also allows ADF formatting.

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

If you disabled **Ignore Unknown Characters**, if the digital scanner encounters characters that do not have a corresponding Code 39 character, it emits an error beep and transmits no data.

✓ **NOTE** ADF Note: By default, the Wand Emulation interface does not allow ADF rules to process scanned data. Enabling this parameter allows ADF rules to process the scanned data. See [Chapter 15, Advanced Data Formatting](#).



Enable Convert to Code 39 for Wand Host



*Disable Convert to Code 39 for Wand Host

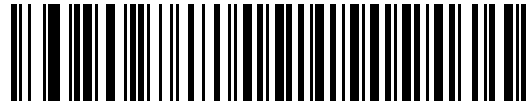
Convert Code 39 to Full ASCII

By default, any characters that do not have a corresponding character in the Code 39 symbology set are replaced by a space. Enable this parameter to encode data sent to the wand Interface 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 Code 39 Full ASCII Conversion**



Enable Code 39 Full ASCII Conversion



NOTE Wand Emulation emits an error beep when there is an attempt to send composite data. No data is sent.

Chapter 11 Scanner Emulation Interface

Introduction

This chapter describes how to set up the digital scanner with a Scanner Emulation host. Use this mode when you need Scanner Emulation communication. In this mode, the digital scanner connects to an external decoder or to a decoder integrated in a mobile computer or Point-of-Sale (POS) terminal.

Throughout the programming bar code menus, asterisks (*) indicate default values.



NOTE Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code clearly, and bars and/or spaces are not merging.

Connecting Using Scanner Emulation

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

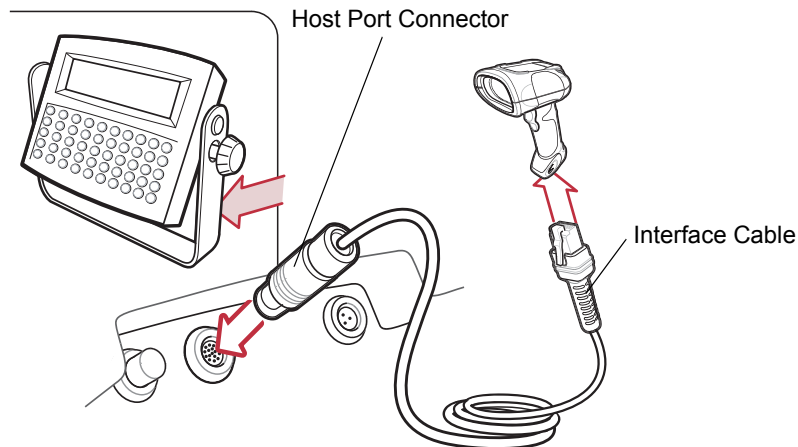


Figure 11-1 Scanner Emulation Connection

✓ **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 scanner are the same.

1. Connect the modular connector of the Scanner Emulation interface cable to the cable interface port on the digital scanner (see [Installing the Interface Cable on page 1-2](#)).
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 11-4](#) to enable the Scanner Emulation host interface.
4. To modify any other parameter options, scan the appropriate bar codes in this chapter.



WARNING! Connect the digital scanner to 5 volt decoders only. Connecting the digital scanner to a 12 volt decoder can damage the digital 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 11-5](#).

✓ **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	11-5
Parameter Pass-Through	Parameter Process and Pass Through	11-6
Convert Newer Code Types	Convert Newer Code Types	11-7
Module Width	20 μ s	11-8
Convert All Bar Codes to Code 39	Do Not Convert to Bar Codes to Code 39	11-8
Code 39 Full ASCII Conversion	Disable	11-9
Transmission Timeout	3 seconds	11-10
Ignore Unknown Characters	Ignore Unknown Characters	11-11
Leading Margin	2 ms	11-12
Check for Decode LED	Check for Decode LED	11-13

Scanner Emulation Host

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



Scanner Emulation Host

Scanner Emulation Host Parameters

Beep Style

The Scanner Emulation host supports three beep styles.

- **Beep On Successful Transmit:** The digital scanner beeps when the attached decoder issues the decode signal to the digital scanner, so the digital scanner and the attached decoder beep at the same time.
- **Beep At Decode Time:** The digital scanner beeps upon decode. This results in a double beep sequence from most decoders, since the digital 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.

In all cases, if an error occurs, the digital scanner issues error beeps.



***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 Zebra 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 digital scanner and the attached decoder both process the parameter.



***Parameter Process and Pass-Through**



Parameter Process Only

Convert Newer Code Types

The digital scanner supports a variety of code types that are not decodable by attached decoder systems. To allow compatibility in these environments, the digital 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
GS1 DataBar (14, Limited, and Expanded), Coupon Code, PDF, MicroPDF, MaxiCode, Data Matrix, QR Code, Postal Codes, Composite Codes	Code 128

When decoding these code types with this parameter disabled, the digital scanner issues Convert Error beeps and transmits no data. The amount of data in the scanned newer bar code type should not exceed that of the conversion code type.



***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 a 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, this option replaces any characters that do not have a corresponding character in the Code 39 symbology set with a space. Enable this parameter to encode the data sent to the Scanner Emulation host 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



NOTE Scanner Emulation emits an error beep and does not send any data if the scanned data exceeds the maximum length for Code 39.

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 did not receive the bar code data), the digital scanner issues transmit error beeps.

Scan the appropriate 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. Select **Ignore Unknown Characters** to send all bar code data except for unknown characters. The digital scanner issues no error beeps.

Select **Convert Error on Unknown Characters** to prevent sending bar codes containing at least one unknown character to the decoder. The digital scanner issues a convert error beep.



***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



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 digital scanner emits transmit error beeps to indicate that the bar code did not transmit. Scan the **Ignore Decode LED** bar code to disable the Transmit Error beeps.



***Check For Decode LED**



Ignore Decode LED

Chapter 12 123 Scan

Introduction

123Scan is a Windows[®]-based utility that programs the digital scanner with all parameters including Advanced Data Formatting (ADF) rules. An ADF rule modifies bar code data before it transmits to the host to ensure compatibility between bar coded data and the host application. You can program the digital scanner via PC download or by scanning a sheet of bar codes generated by the 123Scan utility. Digital scanner programming is saved in a file for electronic distribution. The 123Scan program includes a help file.

Communication with 123Scan

To communicate with the 123Scan program which runs on a host computer running a Windows operating system, use an RS-232 cable to connect the digital scanner to the host computer (see [Connecting a Keyboard Wedge Interface on page 6-2](#)).

123Scan requirements:

- Host computer with Windows 98, Windows NT, Windows 2000, or Windows XP
- Digital scanner
- RS-232 cable.

123Scan Parameter

To communicate with the 123Scan program, load 123Scan, included in the documentation CD-ROM, onto the host computer, and scan the bar code below. Refer to 123Scan instructions for programming the digital scanner.

Scan the bar code below to enable the 123Scan interface on the digital scanner.



123Scan Configuration

Chapter 13 Symbologies

Introduction

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

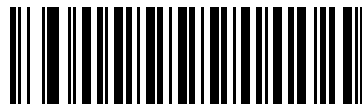
The digital scanner ships with the settings shown in the [Symbology Default Table on page 13-2](#) (also see [Appendix A, Standard Default Parameters](#) for all host device and miscellaneous defaults). If the default values suit requirements, programming is not necessary.

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 you power down the digital scanner.

✓ **NOTE** Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code, and bars and/or spaces are not merging.

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 [*Set Defaults on page 4-4](#). Throughout the programming bar code menus, asterisks (*) indicate default values.



* 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 13-16](#). The digital 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

Table 13-1 lists the defaults for all symbologies parameters. To change the default values, scan the appropriate bar codes in this guide. These new values replace the standard default values in memory. To recall the default parameter values, scan the **Set Defaults* bar code on *page 4-4*.

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

Table 13-1 *Symbology Default Table*

Parameter	Parameter Number	Default	Page Number
Disable All Code Types			13-7
UPC/EAN			
UPC-A	01h	Enable	13-8
UPC-E	02h	Enable	13-8
UPC-E1	0Ch	Disable	13-9
EAN-8/JAN 8	04h	Enable	13-9
EAN-13/JAN 13	03h	Enable	13-10
Bookland EAN	53h	Disable	13-10
Decode UPC/EAN/JAN Supplementals (2 and 5 digits)	10h	Ignore	13-11
User-Programmable Supplementals Supplemental 1: Supplemental 2:	F1h 43h F1h 44h		13-14
UPC/EAN/JAN Supplemental Redundancy	50h	10	13-14
UPC/EAN/JAN Supplemental AIM ID Format	F1h A0h	Combined	13-15
Transmit UPC-A Check Digit	28h	Enable	13-16
Transmit UPC-E Check Digit	29h	Enable	13-16
Transmit UPC-E1 Check Digit	2Ah	Enable	13-17
UPC-A Preamble	22h	System Character	13-18
UPC-E Preamble	23h	System Character	13-19

Table 13-1 Symbology Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
UPC-E1 Preamble	24h	System Character	13-20
Convert UPC-E to A	25h	Disable	13-21
Convert UPC-E1 to A	26h	Disable	13-22
EAN-8/JAN-8 Extend	27h	Disable	13-22
Bookland ISBN Format	F1h 40h	ISBN-10	13-23
UCC Coupon Extended Code	55h	Disable	13-24
Coupon Report	F1h DAh	Old Coupon Format	13-25
ISSN EAN	F1h 69h	Disable	13-26
Code 128			
Code 128	08h	Enable	13-26
Set Length(s) for Code 128	D1h D2h	Any Length	13-27
GS1-128 (formerly UCC/EAN-128)	0Eh	Enable	13-29
ISBT 128	54h	Enable	13-29
ISBT Concatenation	F1h 41h	Disable	13-30
Check ISBT Table	F1h 42h	Enable	13-31
ISBT Concatenation Redundancy	DFh	10	13-31
Code 39			
Code 39	00h	Enable	13-32
Trioptic Code 39	0Dh	Disable	13-32
Convert Code 39 to Code 32 (Italian Pharmacy Code)	56h	Disable	13-33
Code 32 Prefix	E7h	Disable	13-33
Set Length(s) for Code 39	12h 13h	2 to 55	13-34
Code 39 Check Digit Verification	30h	Disable	13-35
Transmit Code 39 Check Digit	2Bh	Disable	13-36
Code 39 Full ASCII Conversion	11h	Disable	13-37
Buffer Code 39	71h	Disable	13-38
Code 93			
Code 93	09h	Disable	13-40
Set Length(s) for Code 93	1Ah 1Bh	4 to 55	13-34

Table 13-1 Symbology Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Code 11			
Code 11	0Ah	Disable	13-43
Set Lengths for Code 11	1Ch 1Dh	4 to 55	13-44
Code 11 Check Digit Verification	34h	Disable	13-46
Transmit Code 11 Check Digit(s)	2Fh	Disable	13-47
Interleaved 2 of 5 (ITF)			
Interleaved 2 of 5 (ITF)	06h	Enable	13-47
Set Lengths for I 2 of 5	16h 17h	14	13-48
I 2 of 5 Check Digit Verification	31h	Disable	13-49
Transmit I 2 of 5 Check Digit	2Ch	Disable	13-50
Convert I 2 of 5 to EAN 13	52h	Disable	13-50
Discrete 2 of 5 (DTF)			
Discrete 2 of 5	05h	Disable	13-51
Set Length(s) for D 2 of 5	14h 15h	12	13-52
Codabar (NW - 7)			
Codabar	07h	Disable	13-54
Set Lengths for Codabar	18h 19h	5 to 55	13-55
CLSI Editing	36h	Disable	13-57
NOTIS Editing	37h	Disable	13-57
MSI			
MSI	0Bh	Disable	13-58
Set Length(s) for MSI	1Eh 1Fh	4 to 55	13-58
MSI Check Digits	32h	One	13-60
Transmit MSI Check Digit	2Eh	Disable	13-61
MSI Check Digit Algorithm	33h	Mod 10/Mod 10	13-61
Chinese 2 of 5			
Chinese 2 of 5	F0h 98h	Disable	13-62

Table 13-1 Symbology Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Matrix 2 of 5			
Matrix 2 of 5	F1h 6Ah	Disable	13-62
Matrix 2 of 5 Lengths	F1h 6Bh F1h 6Ch	1 Length - 14	13-63
Matrix 2 of 5 Check Digit	F1h 6Eh	Disable	13-64
Transmit Matrix 2 of 5 Check Digit	F1h 6Fh	Disable	13-64
Korean 3 of 5			
Korean 3 of 5	F1h 45h	Disable	13-65
Inverse 1D	F1h 4Ah	Regular	13-66
Postal Codes			
US Postnet	59h	Enable	13-67
US Planet	5Ah	Enable	13-67
Transmit US Postal Check Digit	5Fh	Enable	13-68
UK Postal	5Bh	Enable	13-68
Transmit UK Postal Check Digit	60h	Enable	13-69
Japan Postal	F0h 22h	Enable	13-69
Australia Post	F0h 23h	Enable	13-70
Australia Post Format	F1h CEh	Autodiscriminate	13-71
Netherlands KIX Code	F0h 46h	Enable	13-72
USPS 4CB/One Code/Intelligent Mail	F1h 50h	Disable	13-72
UPU FICS Postal	F1h 63h	Disable	13-73
GS1 DataBar			
GS1 DataBar-14	F0h 52h	Enable	13-74
GS1 DataBar Limited	F0h 53h	Disable	13-74
GS1 DataBar Expanded	F0h 54h	Enable	13-75
Convert GS1 DataBar to UPC/EAN	F0h 8Dh	Disable	13-75
Composite			
Composite CC-C	F0h 55h	Disable	13-76
Composite CC-A/B	F0h 56h	Disable	13-76
Composite TLC-39	F0h 73h	Disable	13-77

Table 13-1 Symbology Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
UPC Composite Mode	F0h 58h	Always Linked	13-78
Composite Beep Mode	F0h 8Eh	Beep As Each Code Type is Decoded	13-79
GS1-128 Emulation Mode for UCC/EAN Composite Codes	F0h ABh	Disable	13-79
2D Symbologies			
PDF417	0Fh	Enable	13-80
MicroPDF417	E3h	Disable	13-80
Code 128 Emulation	7Bh	Disable	13-81
Data Matrix	F0h 24h	Enable	13-82
Data Matrix Inverse	F1h 4Ch	Regular	13-83
Maxicode	F0h 26h	Enable	13-83
QR Code	F0h 25h	Enable	13-84
QR Inverse	F1h 4Bh	Regular	13-85
MicroQR	F1h 3Dh	Enable	13-85
Aztec	F1h 3Eh	Enable	13-86
Aztec Inverse	F1h 4Dh	Regular	13-86
Symbology-Specific Security Levels			
Redundancy Level	4Eh	1	13-87
Security Level	4Dh	1	13-89
Intercharacter Gap Size	F0h 7Dh	Normal	13-90
Report Version			13-90
Macro PDF			
Flush Macro PDF Buffer			13-91
Abort Macro PDF Entry			13-91

Disable All Code Types

To disable all symbologies, scan the bar code below. This is useful when enabling only a few code types.



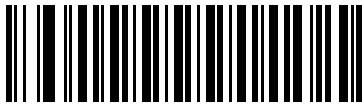
Disable All Code Types

UPC/EAN

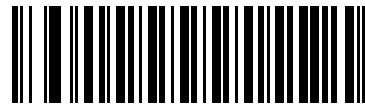
Enable/Disable UPC-A

Parameter # 01h

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



***Enable UPC-A
(01h)**

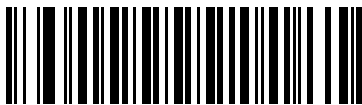


**Disable UPC-A
(00h)**

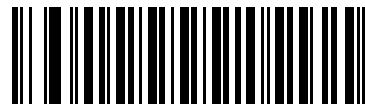
Enable/Disable UPC-E

Parameter # 02h

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



***Enable UPC-E
(01h)**



**Disable UPC-E
(00h)**

Enable/Disable UPC-E1

Parameter # 0Ch

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
(01h)**

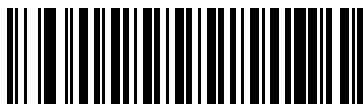


***Disable UPC-E1
(00h)**

Enable/Disable EAN-8/JAN-8

Parameter # 04h

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



***Enable EAN-8/JAN-8
(01h)**

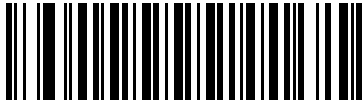


**Disable EAN-8/JAN-8
(00h)**

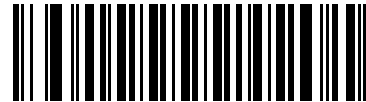
Enable/Disable EAN-13/JAN-13

Parameter # 03h

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



***Enable EAN-13/JAN-13
(01h)**

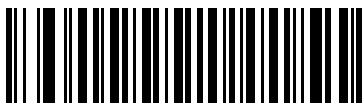


**Disable EAN-13/JAN-13
(00h)**

Enable/Disable Bookland EAN

Parameter # 53h

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



**Enable Bookland EAN
(01h)**



***Disable Bookland EAN
(00h)**



NOTE If you enable Bookland EAN, select a [Bookland ISBN Format on page 13-23](#). 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 13-11](#).

Decode UPC/EAN/JAN Supplementals

Parameter # 10h

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 13-14](#) 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 13-14](#) 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 13-10](#) to enable Bookland EAN, and select a format using [Bookland ISBN Format on page 13-23](#).

- **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. Set this 3-digit prefix using [User-Programmable Supplementals on page 13-14](#).
- **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 13-14](#).
- **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 13-14](#).
- **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 13-14](#).



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

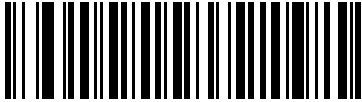
Decode UPC/EAN/JAN Supplementals (continued)



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

Supplemental 1: Parameter # F1h 43h

Supplemental 2: Parameter # F1h 44h

If you selected a Supplemental User-Programmable option from [Decode UPC/EAN/JAN Supplementals on page 13-11](#), 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

Parameter # 50h

If you selected **Autodiscriminate UPC/EAN/JAN Supplementals**, this option adjusts the number of times to decode a symbol without supplementals before transmission. The range is from two to thirty times. Five or above is recommended when decoding a mix of UPC/EAN/JAN symbols with and without supplementals. The default is 10.

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



UPC/EAN/JAN Supplemental Redundancy

UPC/EAN/JAN Supplemental AIM ID Format

Parameter # F1h A0h

Select an output format when reporting UPC/EAN/JAN bar codes with supplementals with *Transmit Code ID Character on page 14-3* set to **AIM Code ID Character**:

- **Separate** - transmit UPC/EAN with supplementals with separate AIM IDs but one transmission, i.e.:
]E<0 or 4><data>]E<1 or 2>[supplemental data]
- **Combined** – transmit UPC/EAN with supplementals with one AIM ID and one transmission, i.e.:
]E3<data+supplemental data>
- **Separate Transmissions** - transmit UPC/EAN with supplementals with separate AIM IDs and separate transmissions, i.e.:
]E<0 or 4><data>
]E<1 or 2>[supplemental data]



Separate
(00h)



*Combined
(01h)

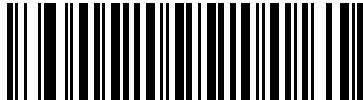


Separate Transmissions
(02h)

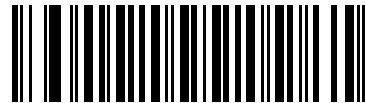
Transmit UPC-A Check Digit

Parameter # 28h

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
(01h)**

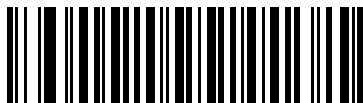


**Do Not Transmit UPC-A Check Digit
(00h)**

Transmit UPC-E Check Digit

Parameter # 29h

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
(01h)**

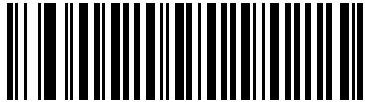


**Do Not Transmit UPC-E Check Digit
(00h)**

Transmit UPC-E1 Check Digit

Parameter # 2Ah

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
(01h)**

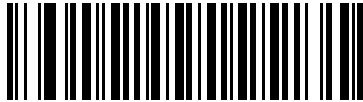


**Do Not Transmit UPC-E1 Check Digit
(00h)**

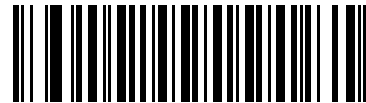
UPC-A Preamble

Parameter # 22h

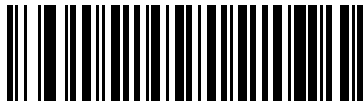
Preamble characters are part of the UPC symbol, and include Country Code and System Character. There are three options for transmitting a UPC-A preamble to the host device: transmit System Character only, transmit System Character and Country Code ("0" for USA), and transmit no preamble. Select the appropriate option to match the host system.



No Preamble (<DATA>)
(00h)



***System Character (<SYSTEM CHARACTER> <DATA>)**
(01h)

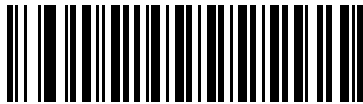


System Character & Country Code (< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)
(02h)

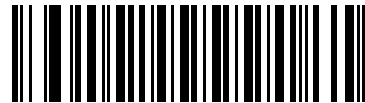
UPC-E Preamble

Parameter # 23h

Preamble characters are part of the UPC symbol, and include Country Code and System Character. There are three options for transmitting a UPC-E preamble to the host device: transmit System Character only, transmit System Character and Country Code ("0" for USA), and transmit no preamble. Select the appropriate option to match the host system.



No Preamble (<DATA>)
(00h)



***System Character (<SYSTEM CHARACTER>)**
<DATA>
(01h)

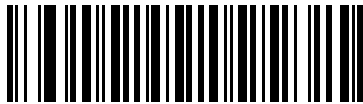


System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER>
<DATA>
(02h)

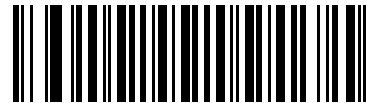
UPC-E1 Preamble

Parameter # 24h

Preamble characters are part of the UPC symbol, and include Country Code and System Character. There are three options for transmitting a UPC-E1 preamble to the host device: transmit System Character only, transmit System Character and Country Code ("0" for USA), and transmit no preamble. Select the appropriate option to match the host system.



No Preamble (<DATA>)
(00h)



***System Character (<SYSTEM CHARACTER>)**
<DATA>
(01h)



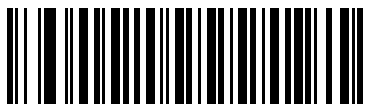
System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER>
<DATA>
(02h)

Convert UPC-E to UPC-A

Parameter # 25h

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).

Disable this to transmit UPC-E decoded data as UPC-E data, without conversion.



Convert UPC-E to UPC-A (Enable)
(01h)



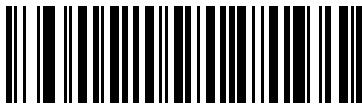
***Do Not Convert UPC-E to UPC-A (Disable)**
(00h)

Convert UPC-E1 to UPC-A

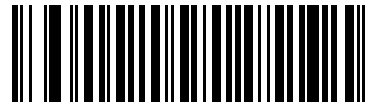
Parameter # 26h

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).

Disable this to transmit UPC-E1 decoded data as UPC-E1 data, without conversion.



Convert UPC-E1 to UPC-A (Enable)
(01h)



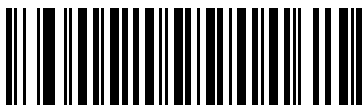
***Do Not Convert UPC-E1 to UPC-A (Disable)**
(00h)

EAN-8/JAN-8 Extend

Parameter # 27h

Enable this parameter to add five leading zeros to decoded EAN-8 symbols to make them compatible in format to EAN-13 symbols.

Disable this to transmit EAN-8 symbols as is.



Enable EAN/JAN Zero Extend
(01h)



***Disable EAN/JAN Zero Extend**
(00h)

Bookland ISBN Format

Parameter # F1h 40h

If you enabled Bookland EAN using [Enable/Disable Bookland EAN on page 13-10](#), 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)

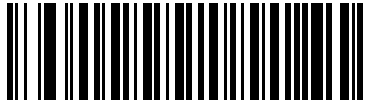


NOTE For Bookland EAN to function properly, first enable Bookland EAN using [Enable/Disable Bookland EAN on page 13-10](#), then select either Decode UPC/EAN Supplementals, Autodiscriminate UPC/EAN Supplementals, or Enable 978/979 Supplemental Mode in [Decode UPC/EAN/JAN Supplementals on page 13-11](#).

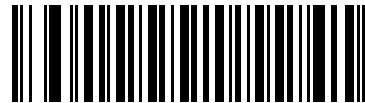
UCC Coupon Extended Code

Parameter # 55h

Enable this to decode UPC-A bar codes starting with digit '5', EAN-13 bar codes starting with digit '99', and UPC-A/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
(01h)



*Disable UCC Coupon Extended Code
(00h)



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

Coupon Report

Parameter # F1h DAh

Traditional coupon symbols (old coupon symbols) are composed of two bar codes: UPC/EAN and Code128. A new coupon symbol is composed of a single Databar Expanded bar code. The new coupon format offers more options for purchase values (up to \$999.99) and supports complex discount offers such as a second purchase requirement.

An interim coupon symbol also exists that contains both types of bar codes: UPC/EAN and Databar Expanded. This format accommodates both retailers that do not recognize or use the additional information included in the new coupon symbol, as well as those who can process new coupon symbols.

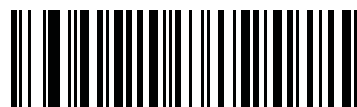
Scan a bar code below to select one of the following options for decoding coupon symbols:

- **Old Coupon Format** - Scanning an old coupon symbol reports both the UPC and Code 128 portion of the symbol if both are present in the field of view. The scanner may report either the UPC or the Code 128 if only one is within the field of view or is readable. [UPC/EAN/JAN Supplemental Redundancy on page 13-14](#) controls the number of times the scanner attempts to decode the entire symbol before transmission. Additionally, scanning an interim coupon symbol reports UPC, and scanning a new coupon symbol reports nothing (no decode).
- **New Coupon Format** - Scanning an old coupon symbol reports either UPC or Code 128, and scanning an interim coupon symbol or a new coupon symbol reports Databar Expanded.
- **Both Coupon Formats** - Scanning an old coupon symbol reports both the UPC and Code 128 portion of the symbol if both are present in the field of view. The scanner may report either the UPC or the Code 128 if only one is within the field of view or is readable. [UPC/EAN/JAN Supplemental Redundancy on page 13-14](#) controls the number of times the scanner attempts to decode the entire symbol before transmission. Additionally, scanning an interim coupon symbol or a new coupon symbol reports Databar Expanded.

✓ **NOTE** For Coupon Report to function properly, first enable [UCC Coupon Extended Code on page 13-24](#).



*Old Coupon Format
(00h)



New Coupon Format
(01h)

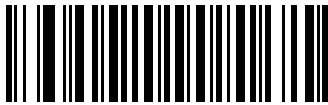


Both Coupon Formats
(02h)

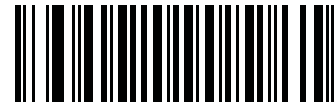
ISSN EAN

Parameter # F1h 69h

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



Enable ISSN EAN
(01h)



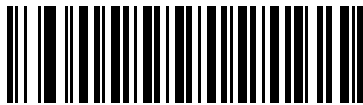
*Disable ISSN EAN
(00h)

Code 128

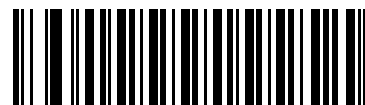
Enable/Disable Code 128

Parameter # 08h

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



*Enable Code 128
(01h)



Disable Code 128
(00h)

Set Lengths for Code 128

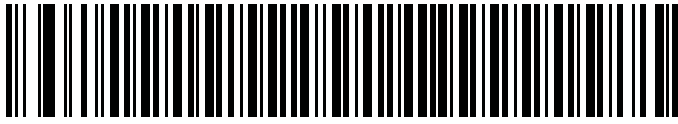
Parameter # L1 = D1h, L2 = D2h

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 128 to any length, one or two discrete lengths, or lengths within a specific range.

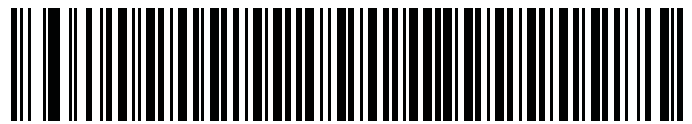
✓ **NOTE** When setting lengths, enter a leading zero for single digit numbers.

- **One Discrete Length** - Select this option to decode only Code 128 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 128 symbols with 14 characters, scan **Code 128 - 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 128 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 Code 128 symbols containing either 2 or 14 characters, select **Code 128 - 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 128 symbol with a specific length range. Select lengths using numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Code 128 symbols containing between 4 and 12 characters, first scan **Code 128 - Length Within Range**. Then scan **0, 4, 1**, and **2** (enter a leading zero for single digit numbers). To correct an error or change the selection, scan [Cancel on page D-3](#).
- **Any Length** - Select this option to decode Code 128 symbols containing any number of characters within the digital scanner capability.

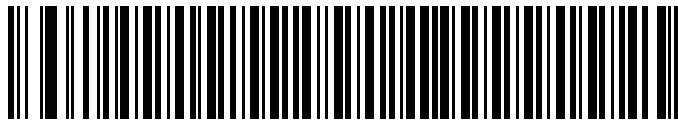
Set Lengths for Code 128 (continued)



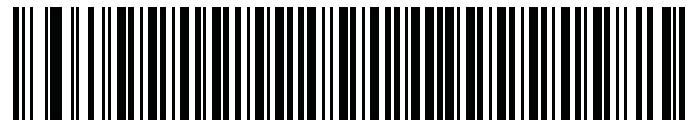
Code 128 - One Discrete Length



Code 128 - Two Discrete Lengths



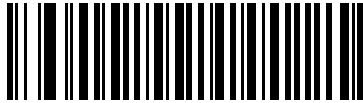
Code 128 - Length Within Range



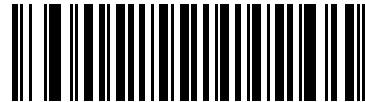
*Code 128 - Any Length

Enable/Disable GS1-128 (formerly UCC/EAN-128)**Parameter # 0Eh**

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



***Enable GS1-128
(01h)**



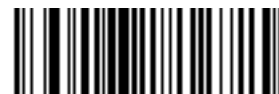
**Disable GS1-128
(00h)**

Enable/Disable ISBT 128**Parameter # 54h**

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



***Enable ISBT 128
(01h)**



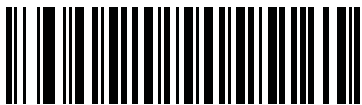
**Disable ISBT 128
(00h)**

ISBT Concatenation

Parameter # F1h 41h

Select an option for concatenating pairs of ISBT code types:

- If you select **Disable ISBT Concatenation**, the digital scanner does not concatenate pairs of ISBT codes it encounters.
- If you select **Enable ISBT Concatenation**, there must be two ISBT codes in order for the digital scanner to decode and perform concatenation. The digital scanner does not decode single ISBT symbols.
- If you select **Autodiscriminate ISBT Concatenation**, the digital scanner decodes and concatenates pairs of ISBT codes immediately. If only a single ISBT symbol is present, the digital scanner must decode the symbol the number of times set via [ISBT Concatenation Redundancy on page 13-31](#) before transmitting its data to confirm that there is no additional ISBT symbol.



*Disable ISBT Concatenation
(00h)



Enable ISBT Concatenation
(01h)



Autodiscriminate ISBT Concatenation
(02h)

Check ISBT Table

Parameter # F1h 42h

The ISBT specification includes a table that lists several types of ISBT bar codes that are commonly used in pairs. If you set **ISBT Concatenation** to **Enable**, enable **Check ISBT Table** to concatenate only those pairs found in this table. Other types of ISBT codes are not concatenated.



*Enable Check ISBT Table
(01h)



Disable Check ISBT Table
(00h)

ISBT Concatenation Redundancy

Parameter # DFh

If you set **ISBT Concatenation** to **Autodiscriminate**, use this parameter to set the number of times the digital scanner must decode an ISBT symbol before determining that there is no additional symbol.

Scan the bar code below, then scan two numeric bar codes in [Appendix D, Numeric Bar Codes](#) to set a value between 2 and 20. Enter a leading zero for single digit numbers. To correct an error or change a selection, scan [Cancel on page D-3](#). The default is 10.



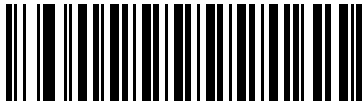
ISBT Concatenation Redundancy

Code 39

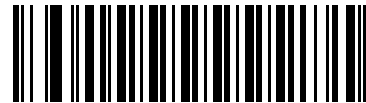
Enable/Disable Code 39

Parameter # 00h

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



***Enable Code 39
(01h)**

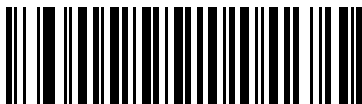


**Disable Code 39
(00h)**

Enable/Disable Trioptic Code 39

Parameter # 0Dh

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
(01h)**



***Disable Trioptic Code 39
(00h)**



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

Convert Code 39 to Code 32

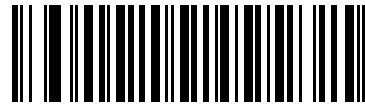
Parameter # 56h

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
(01h)



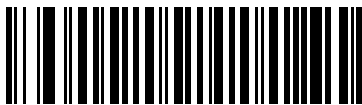
*Disable Convert Code 39 to Code 32
(00h)

Code 32 Prefix

Parameter # E7h

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
(01h)



*Disable Code 32 Prefix
(00h)

Set Lengths for Code 39

Parameter # L1 = 12h, L2 = 13h

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, enter a leading zero for single digit numbers.

- **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 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** (enter a leading zero for single digit numbers). 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 digital scanner capability.



Code 39 - One Discrete Length



Code 39 - Two Discrete Lengths

Set Lengths for Code 39 (continued)



Code 39 - Length Within Range

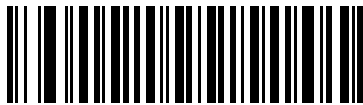


Code 39 - Any Length

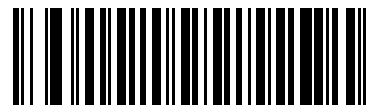
Code 39 Check Digit Verification

Parameter # 30h

Enable this feature to check 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, so enable this only if the Code 39 symbols contain a Modulo 43 check digit.



Enable Code 39 Check Digit
(01h)

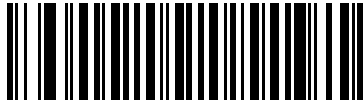


*Disable Code 39 Check Digit
(00h)

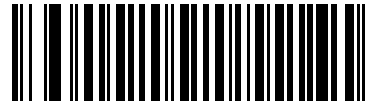
Transmit Code 39 Check Digit

Parameter # 2Bh

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



Transmit Code 39 Check Digit (Enable)
(01h)



*Do Not Transmit Code 39 Check Digit (Disable)
(00h)

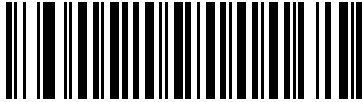


NOTE Code 39 Check Digit Verification must be enabled for this parameter to function.

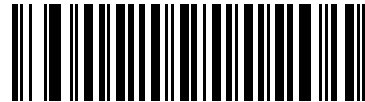
Code 39 Full ASCII Conversion

Parameter # 11h

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
(01h)**



***Disable Code 39 Full ASCII
(00h)**



NOTE You cannot enable Trioptic Code 39 and Code 39 Full ASCII simultaneously.

Code 39 Full ASCII to Full ASCII Correlation is host-dependent. See the [ASCII Character Set for Keyboard Wedge on page 6-14](#), the [ASCII Character Set for RS-232 on page 7-20](#), or the [ASCII Character Set for USB on page 8-13](#) for more information.

Code 39 Buffering (Scan & Store)

Parameter # 71h

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

Select the Scan and Store option (**Buffer Code 39**) to temporarily buffer all Code 39 symbols with a leading space as a first character for later transmission. This does not buffer the leading space.

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

Select the **Do Not Buffer Code 39** option to transmit all decoded Code 39 symbols immediately without storing them in the buffer.

This feature affects Code 39 only. If selecting **Buffer Code 39**, Zebra recommends configuring the digital scanner to decode Code 39 symbology only.



Buffer Code 39 (Enable)
(01h)



***Do Not Buffer Code 39 (Disable)**
(00h)

While there is data in the transmission buffer, you cannot select **Do Not Buffer Code 39**. 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 13-39](#)) or clear the buffer.

Buffer Data

To buffer data, enable Code 39 buffering and decode a Code 39 symbol with a space immediately following the start pattern.

- Unless the data overflows the transmission buffer, the digital scanner issues a low/high beep to indicate successful decode and buffering. For overflow conditions, see [Overfilling Transmission Buffer on page 13-40](#).
- The digital 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 digital scanner issues a short high/low/high beep.
- The digital scanner erases the transmission buffer.
- No transmission occurs.



Clear Buffer



NOTE The Clear Buffer contains only the dash (minus) character. To scan this command, set Code 39 lengths to include length 1.

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 digital scanner transmits and clears the buffer.
 - The digital scanner issues a low/high beep.



Transmit Buffer

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



NOTE The Transmit Buffer contains only a plus (+) character. To scan this command, set Code 39 lengths to include length 1.

Overfilling Transmission Buffer

The Code 39 buffer holds 200 characters. If the scanner decodes a symbol that overflows the transmission buffer:

- The digital scanner indicates that it rejected the symbol by issuing three long, high beeps.
- No transmission occurs. This does not affect data in the buffer.

Attempt to Transmit an Empty Buffer

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

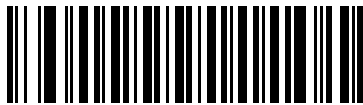
- A short low/high/low beep signals that the buffer is empty.
- No transmission occurs.
- The buffer remains empty.

Code 93

Enable/Disable Code 93

Parameter # 09h

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



Enable Code 93
(01h)



*Disable Code 93
(00h)

Set Lengths for Code 93

Parameter # L1 = 1Ah, L2 = 1Bh

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 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** (enter a leading zero for single digit numbers). 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 digital scanner's capability.

Set Lengths for Code 93 (continued)



Code 93 - One Discrete Length



Code 93 - Two Discrete Lengths



Code 93 - Length Within Range



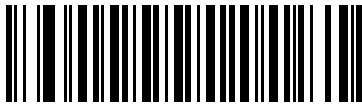
Code 93 - Any Length

Code 11

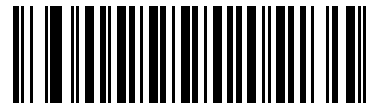
Code 11

Parameter # 0Ah

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



**Enable Code 11
(01h)**



***Disable Code 11
(00h)**

Set Lengths for Code 11

Parameter # L1 = 1Ch, L2 = 1Dh

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 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** (enter a leading zero for single digit numbers). 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 digital scanner capability.

Set Lengths for Code 11 (continued)



Code 11 - One Discrete Length



Code 11 - Two Discrete Lengths



Code 11 - Length Within Range



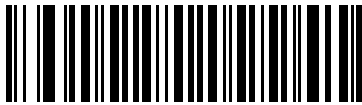
Code 11 - Any Length

Code 11 Check Digit Verification

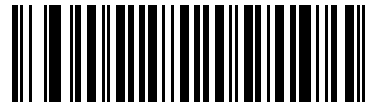
Parameter # 34h

This feature checks 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.

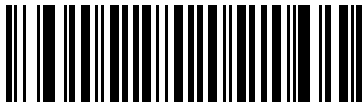
To enable this feature, scan the bar code below corresponding to the number of check digits encoded in the Code 11 symbols.



***Disable
(00h)**



**One Check Digit
(01h)**

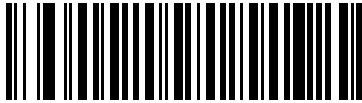


**Two Check Digits
(02h)**

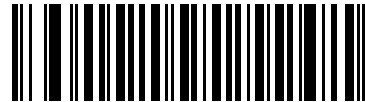
Transmit Code 11 Check Digits

Parameter # 2Fh

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



Transmit Code 11 Check Digit(s) (Enable)
(01h)



*Do Not Transmit Code 11 Check Digit(s) (Disable)
(00h)



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

Parameter # 06h

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
(01h)



Disable Interleaved 2 of 5
(00h)

Set Lengths for Interleaved 2 of 5

Parameter # L1 = 16h, L2 = 17h

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 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** (enter a leading zero for single digit numbers). 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 digital 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 transmit 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.



I 2 of 5 - One Discrete Length



I 2 of 5 - Two Discrete Lengths

Set Lengths for Interleaved 2 of 5 (continued)



I 2 of 5 - Length Within Range



I 2 of 5 - Any Length

I 2 of 5 Check Digit Verification

Parameter # 31h

Enable this feature to check 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
(00h)



USS Check Digit
(01h)

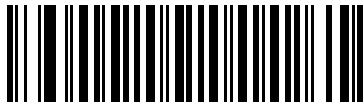


OPCC Check Digit
(02h)

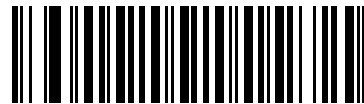
Transmit I 2 of 5 Check Digit

Parameter # 2Ch

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)
(01h)

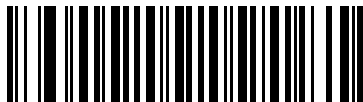


***Do Not Transmit I 2 of 5 Check Digit (Disable)**
(00h)

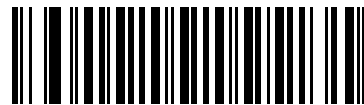
Convert I 2 of 5 to EAN-13

Parameter # 52h

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)
(01h)



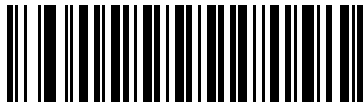
***Do Not Convert I 2 of 5 to EAN-13 (Disable)**
(00h)

Discrete 2 of 5 (DTF)

Enable/Disable Discrete 2 of 5

Parameter # 05h

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



Enable Discrete 2 of 5
(01h)



*Disable Discrete 2 of 5
(00h)

Set Lengths for Discrete 2 of 5

Parameter # L1 = 14h, L2 = 15h

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 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** (enter a leading zero for single digit numbers). 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 digital 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 transmit 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



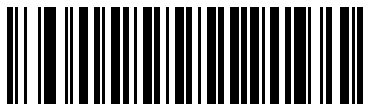
D 2 of 5 - Any Length

Codabar (NW - 7)

Enable/Disable Codabar

Parameter # 07h

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



**Enable Codabar
(01h)**



***Disable Codabar
(00h)**

Set Lengths for Codabar

Parameter # L1 = 18h, L2 = 19h

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** (enter a leading zero for single digit numbers). 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 digital scanner capability.

Set Lengths for Codabar (continued)



Codabar - One Discrete Length



Codabar - Two Discrete Lengths



Codabar - Length Within Range



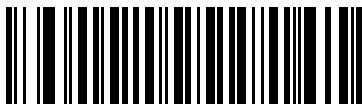
Codabar - Any Length

CLSI Editing

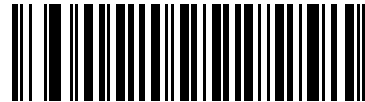
Parameter # 36h

Enable this to strip the start and stop characters and insert a space after the first, fifth, and tenth characters of a 14-character Codabar symbol. Enable this feature if the host system requires this data format.

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



Enable CLSI Editing
(01h)



*Disable CLSI Editing
(00h)

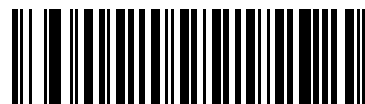
NOTIS Editing

Parameter # 37h

Enable this to strip the start and stop characters from a decoded Codabar symbol. Enable this feature if the host system requires this data format.



Enable NOTIS Editing
(01h)



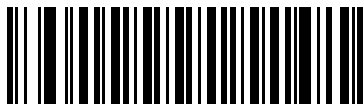
*Disable NOTIS Editing
(00h)

MSI

Enable/Disable MSI

Parameter # 0Bh

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



Enable MSI
(01h)



*Disable MSI
(00h)

Set Lengths for MSI

Parameter # L1 = 1Eh, L2 = 1Fh

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** (enter a leading zero for single digit numbers). 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 digital 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 transmit 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

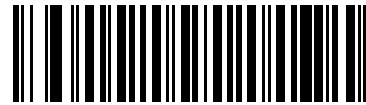
Parameter # 32h

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 13-61](#) for the selection of second digit algorithms.



***One MSI Check Digit
(00h)**

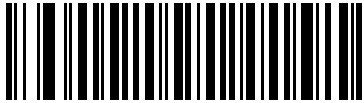


**Two MSI Check Digits
(01h)**

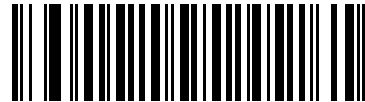
Transmit MSI Check Digit(s)

Parameter # 2Eh

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



Transmit MSI Check Digit(s) (Enable)
(01h)

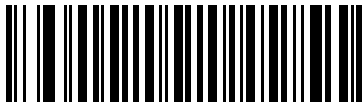


*Do Not Transmit MSI Check Digit(s) (Disable)
(00h)

MSI Check Digit Algorithm

Parameter # 33h

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 the check digit.



MOD 10/MOD 11
(00h)



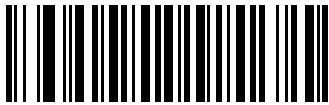
*MOD 10/MOD 10
(01h)

Chinese 2 of 5

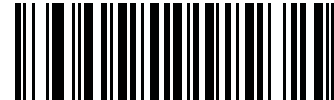
Enable/Disable Chinese 2 of 5

Parameter # F0h 98h

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



Enable Chinese 2 of 5
(01h)



*Disable Chinese 2 of 5
(00h)

Matrix 2 of 5

Enable/Disable Matrix 2 of 5

Parameter # F1h 6Ah

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



Enable Matrix 2 of 5
(01h)



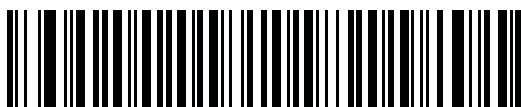
*Disable Matrix 2 of 5
(00h)

Set Lengths for Matrix 2 of 5

Parameter # L1 = F1h 6Bh, L2 = F1h 6Ch

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 Matrix 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 Matrix 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 Matrix 2 of 5 symbols with 14 characters, scan **Matrix 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 Matrix 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 Matrix 2 of 5 symbols containing either 2 or 14 characters, select **Matrix 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 Matrix 2 of 5 symbol with a specific length range. Select lengths using the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Matrix 2 of 5 symbols containing between 4 and 12 characters, first scan **Matrix 2 of 5 - Length Within Range**. Then scan **0, 4, 1**, and **2** (enter a leading zero for single digit numbers). To correct an error or change the selection, scan [Cancel on page D-3](#).
- **Any Length** - Scan this option to decode Matrix 2 of 5 symbols containing any number of characters within the digital scanner's capability.



*Matrix 2 of 5 - One Discrete Length



Matrix 2 of 5 - Two Discrete Lengths



Matrix 2 of 5 - Length Within Range



Matrix 2 of 5 - Any Length

Matrix 2 of 5 Check Digit

Parameter # F1h 6Eh

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 Matrix 2 of 5 check digit.



Enable Matrix 2 of 5 Check Digit
(01h)



*Disable Matrix 2 of 5 Check Digit
(00h)

Transmit Matrix 2 of 5 Check Digit

Parameter # F1h 6Fh

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



Transmit Matrix 2 of 5 Check Digit
(01h)



*Do Not Transmit Matrix 2 of 5 Check Digit
(00h)

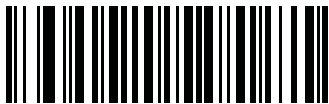
Korean 3 of 5

Enable/Disable Korean 3 of 5

Parameter # F1h 45h

To enable or disable Korean 3 of 5, scan the appropriate bar code below.

✓ **NOTE** The length for Korean 3 of 5 is fixed at 6.



Enable Korean 3 of 5
(01h)



*Disable Korean 3 of 5
(00h)

Inverse 1D

Parameter # F1h 4Ah

This parameter sets the 1D inverse decoder setting. Options are:

- **Regular Only** - the scanner decodes regular 1D bar codes only.
- **Inverse Only** - the scanner decodes inverse 1D bar codes only.
- **Inverse Autodetect** - the scanner decodes both regular and inverse 1D bar codes.



***Regular
(00h)**



**Inverse Only
(01h)**



**Inverse Autodetect
(02h)**

Postal Codes

US Postnet

Parameter # 59h

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



***Enable US Postnet
(01h)**



**Disable US Postnet
(00h)**

US Planet

Parameter # 5Ah

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



***Enable US Planet
(01h)**

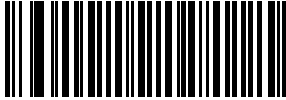


**Disable US Planet
(00h)**

Transmit US Postal Check Digit

Parameter # 5Fh

Select whether to transmit US Postal data, which includes both US Postnet and US Planet, with or without the check digit.



***Transmit US Postal Check Digit
(01h)**



**Do Not Transmit US Postal Check Digit
(00h)**

UK Postal

Parameter # 5Bh

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



***Enable UK Postal
(01h)**



**Disable UK Postal
(00h)**

Transmit UK Postal Check Digit

Parameter # 60h

Select whether to transmit UK Postal data with or without the check digit.



***Transmit UK Postal
Check Digit
(01h)**



**Do Not Transmit UK Postal Check Digit
(00h)**

Japan Postal

Parameter # F0h, 22h

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



***Enable Japan Postal
(01h)**



**Disable Japan Postal
(00h)**

Australia Post

Parameter # F0h, 23h

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



***Enable Australia Post
(01h)**



**Disable Australia Post
(00h)**

Australia Post Format

Parameter # F1h, CEh

To select one of the following formats for Australia Post, scan the appropriate bar code below:

- **Autodiscriminate** (or Smart mode) - Attempt to decode the Customer Information Field using the N and C Encoding Tables.

✓ **NOTE** This option increases the risk of misdecodes because the encoded data format does not specify the Encoding Table used for encoding.

- **Raw Format** - Output raw bar patterns as a series of numbers 0 through 3.
- **Alphanumeric Encoding** - Decode the Customer Information Field using the C Encoding Table.
- **Numeric Encoding** - Decode the Customer Information Field using the N Encoding Table.

For more information on Australia Post Encoding Tables, refer to the *Australia Post Customer Barcoding Technical Specifications* available at <http://www.auspost.com.au>.



*Autodiscriminate
(00h)



Raw Format
(01h)



Alphanumeric Encoding
(02h)



Numeric Encoding
(03h)

Netherlands KIX Code

Parameter # F0h, 46h

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



***Enable Netherlands KIX Code
(01h)**



**Disable Netherlands KIX Code
(00h)**

USPS 4CB/One Code/Intelligent Mail

Parameter # F1h 50h

To enable or disable USPS 4CB/One Code/Intelligent Mail, scan the appropriate bar code below.



**Enable USPS 4CB/One Code/Intelligent Mail
(01h)**



***Disable USPS 4CB/One Code/Intelligent Mail
(00h)**

UPU FICS Postal

Parameter # F1h 63h

To enable or disable UPU FICS postal, scan the appropriate bar code below.



**Enable UPU FICS Postal
(01h)**



***Disable UPU FICS Postal
(00h)**

GS1 DataBar (formerly RSS - Reduced Space Symbology)

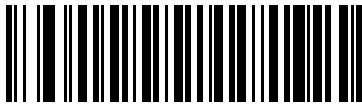
Scan the appropriate bar code(s) below to enable or disable GS1 DataBar code types.



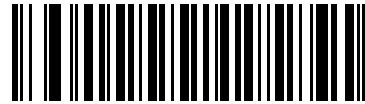
NOTE For increased decoding security, scanners with later firmware versions do not support decoding inverse video GS1 DataBar bar codes.

GS1 DataBar-14

Parameter # F0h 52h.



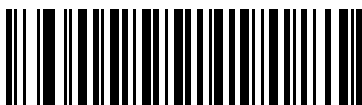
*Enable GS1 DataBar-14
(01h)



Disable GS1 DataBar-14
(00h)

GS1 DataBar Limited

Parameter # F0h 53h.



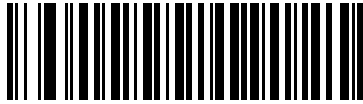
Enable GS1 DataBar Limited
(01h)



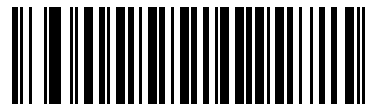
*Disable GS1 DataBar Limited
(00h)

GS1 DataBar Expanded

Parameter # F0h 54h.



***Enable GS1 DataBar Expanded
(01h)**



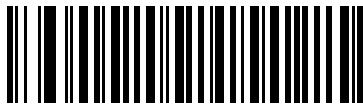
**Disable GS1 DataBar Expanded
(00h)**

Convert GS1 DataBar to UPC/EAN

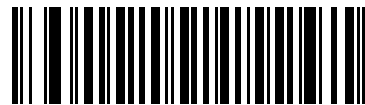
Parameter # F0h, 8Dh

This parameter only applies to GS1 DataBar-14 and GS1 DataBar Limited symbols not decoded as part of a Composite symbol. Enable this to strip the leading '010' from GS1 DataBar-14 and GS1 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
(01h)**



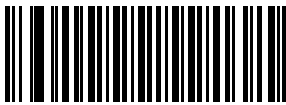
***Disable Convert GS1 DataBar to UPC/EAN
(00h)**

Composite

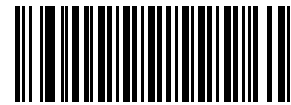
Composite CC-C

Parameter # F0h 55h

Scan a bar code below to enable or disable Composite bar codes of type CC-C.



Enable CC-C
(01h)

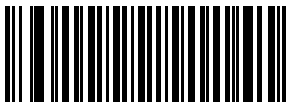


*Disable CC-C
(00h)

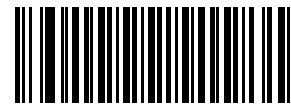
Composite CC-A/B

Parameter # F0h 56h

Scan a bar code below to enable or disable Composite bar codes of type CC-A/B.



Enable CC-A/B
(01h)

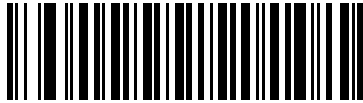


*Disable CC-A/B
(00h)

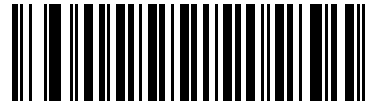
Composite TLC-39

Parameter # F0h 73h

Scan a bar code below to enable or disable Composite bar codes of type TLC-39.



Enable TLC39
(01h)



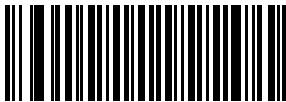
***Disable TLC39**
(00h)

UPC Composite Mode

Parameter # F0h 58h

Select one of the following options for linking UPC symbols with a 2D symbol during transmission as if they were one symbol:

- Select **UPC Never Linked** to transmit UPC bar codes regardless of whether a 2D symbol is detected.
- Select **UPC Always Linked** to transmit UPC bar codes and the 2D portion. If 2D is not present, the UPC bar code does not transmit.
- If you select **Autodiscriminate UPC Composites**, the scanner determines if there is a 2D portion, then transmits the UPC, as well as the 2D portion if present.



UPC Never Linked
(00h)



***UPC Always Linked**
(01h)

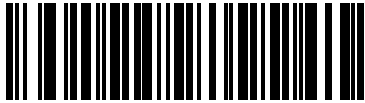


Autodiscriminate UPC Composites
(02h)

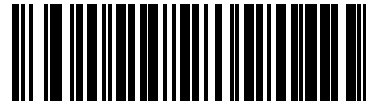
Composite Beep Mode

Parameter # F0h, 8Eh

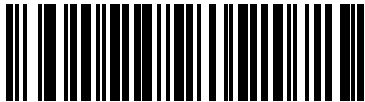
To select the number of decode beeps when a composite bar code is decoded, scan the appropriate bar code.



Single Beep after both are decoded
(00h)



*Beep as each code type is decoded
(01h)



Double Beep after both are decoded
(02h)

GS1-128 Emulation Mode for UCC/EAN Composite Codes

Parameter # F0h, ABh

Select whether to enable or disable this mode.



Enable GS1-128 Emulation Mode for
UCC/EAN Composite Codes
(01h)



*Disable GS1-128 Emulation Mode for
UCC/EAN Composite Codes
(00h)

2D Symbologies

Enable/Disable PDF417

Parameter # 0Fh

To enable or disable PDF417, scan the appropriate bar code below.



***Enable PDF417
(01h)**



**Disable PDF417
(00h)**

Enable/Disable MicroPDF417

Parameter # E3h

To enable or disable MicroPDF417, scan the appropriate bar code below.



**Enable MicroPDF417
(01h)**



***Disable MicroPDF417
(00h)**

Code 128 Emulation

Parameter # 7Bh

Enable this parameter to transmit data from certain MicroPDF417 symbols as if it was encoded in Code 128 symbols. Transmit *AIM Code ID Character (01h) on page 14-3* must be enabled for this parameter to work.

Enable Code 128 Emulation to transmit these MicroPDF417 symbols with one of the following prefixes:

-]C1 if the first codeword is 903-905
-]C2 if the first codeword is 908 or 909
-]C0 if the first codeword is 910 or 911

Disable this to transmit these MicroPDF417 symbols with one of the following prefixes:

-]L3 if the first codeword is 903-905
-]L4 if the first codeword is 908 or 909
-]L5 if the first codeword is 910 or 911

Scan a bar code below to enable or disable Code 128 Emulation.



NOTE Linked MicroPDF codewords 906, 907, 912, 914, and 915 are not supported. Use GS1 Composites instead.



**Enable Code 128 Emulation
(01h)**



***Disable Code 128 Emulation
(00h)**

Data Matrix

Parameter # F0h, 24h

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



***Enable Data Matrix
(01h)**



**Disable Data Matrix
(00h)**

Data Matrix Inverse

Parameter # F1h 4Ch

This parameter sets the Data Matrix inverse decoder setting. Options are:

- **Regular Only** - the scanner decodes regular Data Matrix bar codes only.
- **Inverse Only** - the scanner decodes inverse Data Matrix bar codes only.
- **Inverse Autodetect** - the scanner decodes both regular and inverse Data Matrix bar codes.



***Regular**
(00h)



Inverse Only
(01h)



Inverse Autodetect
(02h)

Maxicode

Parameter # F0h, 26h

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



***Enable Maxicode**
(01h)



Disable Maxicode
(00h)

QR Code

Parameter # F0h,25h

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



***Enable QR Code
(01h)**



**Disable QR Code
(00h)**

QR Inverse

Parameter # F1h 4Bh

This parameter sets the QR inverse decoder setting. Options are:

- **Regular Only** - the scanner decodes regular QR bar codes only.
- **Inverse Only** - the scanner decodes inverse QR bar codes only.
- **Inverse Autodetect** - the scanner decodes both regular and inverse QR bar codes.



*Regular
(00h)



Inverse Only
(01h)



Inverse Autodetect
(02h)

MicroQR

Parameter # F1h 3Dh

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



*Enable MicroQR
(01h)



Disable MicroQR
(00h)

Aztec

Parameter # F1h 3Eh

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



*Enable Aztec
(01h)



Disable Aztec
(00h)

Aztec Inverse

Parameter # F1h 4Dh

This parameter sets the Aztec inverse decoder setting. Options are:

- **Regular Only** - the scanner decodes regular Aztec bar codes only.
- **Inverse Only** - the scanner decodes inverse Aztec bar codes only.
- **Inverse Autodetect** - the scanner decodes both regular and inverse Aztec bar codes.



*Regular
(00h)



Inverse Only
(01h)



Inverse Autodetect
(02h)

Redundancy Level

Parameter # 4Eh

The digital scanner offers four levels of decode redundancy. Select higher redundancy levels for decreasing levels of bar code quality. As redundancy levels increase, the digital 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 Plessey	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

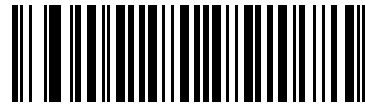
The following code types must be successfully read three times before being decoded:

Code Type	Code Length
All	All

Redundancy Level (continued)



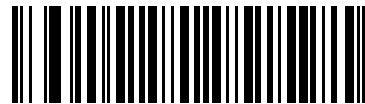
***Redundancy Level 1
(01h)**



**Redundancy Level 2
(02h)**



**Redundancy Level 3
(03h)**



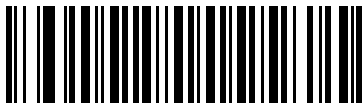
**Redundancy Level 4
(04h)**

Security Level

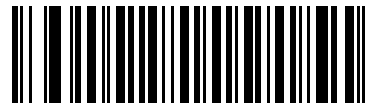
Parameter # 4Dh

The digital 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 digital scanner aggressiveness, so choose only that level of security necessary for any given application.

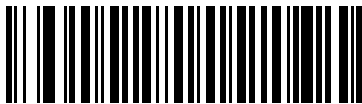
- **Security Level 0:** Select this option to allow the digital scanner to operate in its most aggressive state, while providing sufficient security in decoding most “in-spec” bar codes.
- **Security Level 1:** This default setting eliminates most misdecodes. Select this option if misdecodes occur.
- **Security Level 2:** Select this option if Security level 1 fails to eliminate misdecodes.
- **Security Level 3:** If you selected Security Level 2 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 digital scanner. If you need this level of security, try to improve the quality of the bar codes.



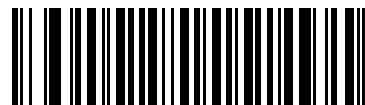
Security Level 0
(00h)



*Security Level 1
(01h)



Security Level 2
(02h)



Security Level 3
(03h)

Intercharacter Gap Size

Parameter # F0h, 7Dh

The Code 39 and Codabar symbologies have an intercharacter gap that is typically quite small. Due to various bar code-printing technologies, this gap can grow larger than the maximum size allowed, preventing the digital scanner from decoding the symbol. If this problem occurs, scan the **Large Intercharacter Gaps** parameter to tolerate these out-of-specification bar codes.



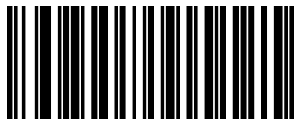
***Normal Intercharacter Gaps
(06h)**



**Large Intercharacter Gaps
(0Ah)**

Report Version

Scan the bar code below to report the version of software currently installed in the digital scanner.



Report Software Version

Macro PDF Features

Macro PDF is a special feature for concatenating multiple PDF symbols into one file. The digital scanner can decode symbols that are encoded with this feature, and can store more than 64 kb of decoded data stored in up to 50 MacroPDF symbols.



CAUTION When printing, keep each Macro PDF sequence separate, as each sequence has unique identifiers. Do not mix bar codes from several Macro PDF sequences, even if they encode the same data. When scanning Macro PDF sequences, scan the entire Macro PDF sequence without interruption. If, when scanning a mixed sequence, the digital scanner emits two long low beeps (Low Low) this indicates an inconsistent file ID or inconsistent symbology error.

Flush Macro Buffer

This flushes the buffer of all decoded Macro PDF data stored to that point, transmits it to the host device, and aborts from Macro PDF mode.



Flush Macro PDF Buffer

Abort Macro PDF Entry

This clears all currently-stored Macro PDF data in the buffer without transmission and aborts from Macro PDF mode.



Abort Macro PDF Entry

Chapter 14 Miscellaneous Scanner Options

Introduction

This chapter includes features frequently used to customize how data transmits to the host device. See [Chapter 15, Advanced Data Formatting](#) for further customization options.

The digital scanner ships with the settings shown in the [Miscellaneous Scanner Options Default Table on page 14-2](#) (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 you power down the digital scanner.

✓ **NOTE** Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where you can see the bar code, and bars and/or spaces are not merging.

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 [*Set Defaults on page 4-4](#). Throughout the programming bar code menus, asterisks (*) indicate default values.



Scanning Sequence Examples

In most cases, scan one bar code to set a specific parameter value. Other parameters, such as **Prefix Value**, require scanning several bar codes. See each parameter for descriptions of this procedure.

Errors While Scanning

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

Miscellaneous Scanner Parameter Defaults

[Table 14-1](#) lists the defaults for miscellaneous scanner options parameters. To change the default values scan the appropriate bar codes in this guide. These new values replace the standard default values in memory. To recall the default parameter values, scan the **Set Defaults* bar code on [page 4-4](#).

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

Table 14-1 *Miscellaneous Scanner Options Default Table*

Parameter	Parameter Number	Default	Page Number
Transmit Code ID Character	2Dh	None	14-3
Prefix Value	63h, 69h	7013 <CR><LF>	14-4
Suffix 1 Value Suffix 2 Value	62h, 68h 64h, 6Ah	7013 <CR><LF>	14-4
Scan Data Transmission Format	EBh	Data as is	14-5
FN1 Substitution Values	67h, 6Dh	Set	14-7
Transmit "No Read" Message	5Eh	Disable	14-8
Synapse Interface	F0h ACh	Standard	14-9

Miscellaneous Scanner Parameters

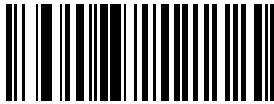
Transmit Code ID Character

Parameter # 2Dh

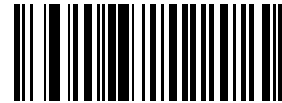
A Code ID character identifies the code type of a scanned bar code, useful when decoding more than one code type. In addition to any single character prefix already selected, the Code ID character is inserted between the prefix and the decoded symbol.

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-3](#).

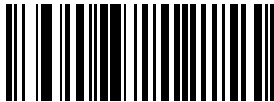
✓ **NOTE** If you enable Symbol Code ID Character or AIM Code ID Character, and enable [Transmit "No Read" Message on page 14-8](#), the scanner appends the code ID for Code 39 to the NR message.



Symbol Code ID Character
(02h)



AIM Code ID Character
(01h)



*None
(00h)

Prefix/Suffix Values

Key Category Parameter # P = 63h, S1 = 62h, S2 = 64h

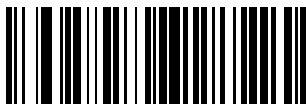
Decimal Value Parameter # P = 69h, S1 = 68h, S2 = 6Ah

You can append a prefix and/or one or two suffixes to scan data for use in data editing. To set a value for a prefix or suffix, scan a four-digit number (i.e., four bar codes from [Appendix D, Numeric Bar Codes](#)) that corresponds to that value. See [Table E-1 on page E-1](#) for the four-digit codes.

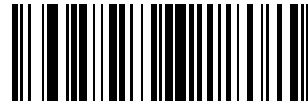
When using host commands to set the prefix or suffix, set the key category parameter to 1, then set the 3-digit decimal value. See [Table E-1 on page E-1](#) for the four-digit codes.

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

✓ **NOTE** To use Prefix/Suffix values, first set the [Scan Data Transmission Format on page 14-5](#).



**Scan Prefix
(07h)**



**Scan Suffix 1
(06h)**



**Scan Suffix 2
(08h)**



Data Format Cancel

Scan Data Transmission Format

Parameter # EBh

To change the scan data format, scan one of the following eight bar codes corresponding to the desired format.

✓ **NOTE** If using this parameter do not use ADF rules to set the prefix/suffix.

To set values for the prefix and/or suffix, see [Prefix/Suffix Values on page 14-4](#).



***Data As Is**
(00h)



<DATA> <SUFFIX 1>
(01h)



<DATA> <SUFFIX 2>
(02h)



<DATA> <SUFFIX 1> <SUFFIX 2>
(03h)



<PREFIX> <DATA >
(04h)

Scan Data Transmission Format (continued)



<PREFIX> <DATA> <SUFFIX 1>
(05h)



<PREFIX> <DATA> <SUFFIX 2>
(06h)



<PREFIX> <DATA> <SUFFIX 1> <SUFFIX 2>
(07h)

FN1 Substitution Values

Key Category Parameter # 67h

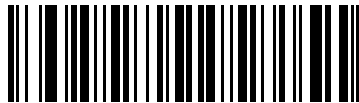
Decimal Value Parameter # 6Dh

The Wedge and USB HID Keyboard hosts support a FN1 Substitution feature. Enabling this substitutes any FN1 character (0x1b) in a GS1-128 bar code with a value. This value defaults to 7013 (Enter Key).

When using host commands to set the FN1 substitution value, set the key category parameter to 1, then set the 3-digit keystroke value. See the ASCII Character Set table for the current host interface for the desired value.

To select a FN1 substitution value via bar code menus:

1. Scan the bar code below.



Set FN1 Substitution Value

2. Locate the keystroke for FN1 Substitution in the ASCII Character Set table for the current host interface. Enter the 4-digit ASCII 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 6-11](#).

To enable FN1 substitution for USB HID keyboard, scan the **Enable FN1 Substitution** bar code on [page 8-10](#).

Transmit “No Read” Message

Parameter # 5Eh

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 14-3](#), the scanner appends the code ID for Code 39 to the NR message.



**Enable No Read
(01h)**



***Disable No Read
(00h)**

Synapse Interface

Parameter # F0h, ACh

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

To disconnect and reconnect the digital 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
(01h)**



**Auxiliary Synapse Port Connection
(32h)**



**"Plug and Play" Synapse Connection
(0Ah)**

Chapter 15 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	Parameter Number	Default	Page Number
User Preferences			
Set Default Parameter		All Defaults	4-4
Parameter Scanning	ECh	Enable	4-5
Beeper Tone	91h	Medium	4-6
Beeper Volume	8Ch	High	4-7
Suppress Power-up Beeps	F1h D1h	Do not suppress	4-7
Power Mode	80h	Continuous On	4-8
Time Delay to Low Power Mode	92h	1 Minute	4-9
Trigger Mode	8Ah	Auto Aim	4-11
Picklist Mode	F0h 92h	Disabled Always	4-12
Decode Session Timeout	88h	9.9 Sec	4-13
Timeout Between Decodes, Same Symbol	89h	0.6 Sec	4-13
Beep After Good Decode	38h	Enable	4-14
Fuzzy 1D Processing	F1h, 02h	Enable	4-14
Decode Mirror Images	F1h, 19h	Never	4-15

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

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
Decoding Preferences			
Focus Mode	F0h A6h	Far Focus	5-3
Decoding Illumination	F0h 2Ah	Enable	5-4
Decode Aiming Pattern	F0h 32h	Enable	5-4
Low Light Enhancement	F1h 64h	Disable	5-5
Presentation Mode Field of View	F1h 61h	Default (Reduced)	5-5
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		Transmit	6-7
Keystroke Delay		No Delay	6-7
Intra-Keystroke Delay		Disable	6-8
Alternate Numeric Keypad Emulation		Disable	6-8
Caps Lock On		Disable	6-9
Caps Lock Override		Disable	6-9
Convert Wedge Data		No Convert	6-10
Function Key Mapping		Disable	6-10
FN1 Substitution		Disable	6-11
Send and Make Break		Send	6-11
RS-232 Host Parameters			
RS-232 Host Types		Standard ¹	7-6
Baud Rate		9600	7-7
Parity Type		None	7-9
Stop Bit Select		1 Stop Bit	7-10
Data Bits		8-Bit	7-10
Check Receive Errors		Enable	7-11
Hardware Handshaking		None	7-12

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

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
Software Handshaking		None	7-14
Host Serial Response Time-out		2 Sec	7-16
RTS Line State		Low RTS	7-17
Beep on <BEL>		Disable	7-17
Intercharacter Delay		0 msec	7-18
Nixdorf Beep/LED Options		Normal Operation	7-19
Ignore Unknown Characters		Send Bar Code	7-19
USB Host Parameters			
USB Device Type		HID Keyboard Emulation	8-4
USB Country Keyboard Types (Country Codes)		North American	8-6
USB Keystroke Delay		No Delay	8-8
USB CAPS Lock Override		Disable	8-8
USB Ignore Unknown Characters		Enable	8-9
Emulate Keypad		Disable	8-9
Emulate Keypad with Leading Zero		Disable	8-10
USB Keyboard FN1 Substitution		Disable	8-10
Function Key Mapping		Disable	8-11
Simulated Caps Lock		Disable	8-11
Convert Case		No Case Conversion	8-12
USB Static CDC		Enable	8-12
IBM 468X/469X Host Parameters			
Port Address		None Selected	9-4
Convert Unknown to Code 39		Disable	9-5
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
¹User selection is required to configure this interface and this is the most common selection.			

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
Ignore Unknown Characters		Ignore	10-6
Convert All Bar Codes to Code 39		Disable	10-7
Convert Code 39 to Full ASCII		Disable	10-8
Undecoded Scanner Emulation			
Beep Style		Beep on Successful Transmit	11-5
Parameter Pass-Through		Parameter Process and Pass Through	11-6
Convert Newer Code Types		Convert Newer Code Types	11-7
Module Width		20 μ s	11-8
Convert All Bar Codes to Code 39		Do Not Convert to Code 39	11-8
Code 39 Full ASCII Conversion		Disable	11-9
Transmission Timeout		3 seconds	11-10
Ignore Unknown Characters		Ignore Unknown Characters	11-11
Leading Margin		2 ms	11-12
Check for Decode LED		Check for Decode LED	11-13
123Scan Configuration Tool			
123Scan Configuration		None ¹	12-1
Disable All Code Types			13-7
UPC/EAN			
UPC-A	01h	Enable	13-8
UPC-E	02h	Enable	13-8
UPC-E1	0Ch	Disable	13-9
EAN-8/JAN 8	04h	Enable	13-9
EAN-13/JAN 13	03h	Enable	13-10
Bookland EAN	53h	Disable	13-10
Decode UPC/EAN/JAN Supplementals (2 and 5 digits)	10h	Ignore	13-11

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

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
User-Programmable Supplementals Supplemental 1: Supplemental 2:	F1h 43h F1h 44h		13-14
UPC/EAN/JAN Supplemental Redundancy	50h	10	13-14
UPC/EAN/JAN Supplemental AIM ID Format	F1h A0h	Combined	13-15
Transmit UPC-A Check Digit	28h	Enable	13-16
Transmit UPC-E Check Digit	29h	Enable	13-16
Transmit UPC-E1 Check Digit	2Ah	Enable	13-17
UPC-A Preamble	22h	System Character	13-18
UPC-E Preamble	23h	System Character	13-19
UPC-E1 Preamble	24h	System Character	13-20
Convert UPC-E to A	25h	Disable	13-21
Convert UPC-E1 to A	26h	Disable	13-22
EAN-8/JAN-8 Extend	27h	Disable	13-22
Bookland ISBN Format	F1h 40h	ISBN-10	13-23
UCC Coupon Extended Code	55h	Disable	13-24
Coupon Report	F1h DAh	Old Coupon Format	13-25
ISSN EAN	F1h 69h	Disable	13-26
Code 128			
Code 128	08h	Enable	13-26
Set Length(s) for Code 128	D1h D2h	Any Length	13-27
GS1-128 (formerly UCC/EAN-128)	0Eh	Enable	13-29
ISBT 128	54h	Enable	13-29
ISBT Concatenation	F1h 41h	Disable	13-30
Check ISBT Table	F1h 42h	Enable	13-31
ISBT Concatenation Redundancy	DFh	10	13-31

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

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
Code 39			
Code 39	00h	Enable	13-32
Trioptic Code 39	0Dh	Disable	13-32
Convert Code 39 to Code 32 (Italian Pharmacy Code)	56h	Disable	13-33
Code 32 Prefix	E7h	Disable	13-33
Set Length(s) for Code 39	12h 13h	2 to 55	13-34
Code 39 Check Digit Verification	30h	Disable	13-35
Transmit Code 39 Check Digit	2Bh	Disable	13-36
Code 39 Full ASCII Conversion	11h	Disable	13-37
Buffer Code 39	71h	Disable	13-38
Code 93			
Code 93	09h	Disable	13-40
Set Length(s) for Code 93	1Ah 1Bh	4 to 55	13-41
Code 11			
Code 11	0Ah	Disable	13-43
Set Lengths for Code 11	1Ch 1Dh	4 to 55	13-44
Code 11 Check Digit Verification	34h	Disable	13-46
Transmit Code 11 Check Digit(s)	2Fh	Disable	13-47
Interleaved 2 of 5 (ITF)			
Interleaved 2 of 5 (ITF)	06h	Enable	13-47
Set Lengths for I 2 of 5	16h 17h	14	13-48
I 2 of 5 Check Digit Verification	31h	Disable	13-49
Transmit I 2 of 5 Check Digit	2Ch	Disable	13-50
Convert I 2 of 5 to EAN 13	52h	Disable	13-50
Discrete 2 of 5 (DTF)			
Discrete 2 of 5	05h	Disable	13-51
Set Length(s) for D 2 of 5	14h 15h	12	13-52

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

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
Codabar (NW - 7)			
Codabar	07h	Disable	13-54
Set Lengths for Codabar	18h 19h	5 to 55	13-55
CLSI Editing	36h	Disable	13-57
NOTIS Editing	37h	Disable	13-57
MSI			
MSI	0Bh	Disable	13-58
Set Length(s) for MSI	1Eh 1Fh	4 to 55	13-58
MSI Check Digits	32h	One	13-60
Transmit MSI Check Digit	2Eh	Disable	13-61
MSI Check Digit Algorithm	33h	Mod 10/Mod 10	13-61
Chinese 2 of 5			
Chinese 2 of 5	F0h 98h	Disable	13-62
Matrix 2 of 5			
Matrix 2 of 5	F1h 6Ah	Disable	13-62
Matrix 2 of 5 Lengths	F1h 6Bh F1h 6Ch	1 Length - 14	13-63
Matrix 2 of 5 Check Digit	F1h 6Eh	Disable	13-64
Transmit Matrix 2 of 5 Check Digit	F1h 6Fh	Disable	13-64
Korean 3 of 5			
Korean 3 of 5	F1h 45h	Disable	13-65
Inverse 1D	F1h 4Ah	Regular	13-66
Postal Codes			
US Postnet	59h	Enable	13-67
US Planet	5Ah	Enable	13-67
Transmit US Postal Check Digit	5Fh	Enable	13-68
UK Postal	5Bh	Enable	13-68
Transmit UK Postal Check Digit	60h	Enable	13-69

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

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
Japan Postal	F0h 22h	Enable	13-69
Australia Post	F0h 23h	Enable	13-70
Australia Post Format	F1h CEh	Autodiscriminate	13-71
Netherlands KIX Code	F0h 46h	Enable	13-72
USPS 4CB/One Code/Intelligent Mail	F1h 50h	Disable	13-72
UPU FICS Postal	F1h 63h	Disable	13-73
GS1 DataBar			
GS1 DataBar-14	F0h 52h	Enable	13-74
GS1 DataBar Limited	F0h 53h	Disable	13-74
GS1 DataBar Expanded	F0h 54h	Enable	13-75
Convert GS1 DataBar to UPC/EAN	F0h 8Dh	Disable	13-75
Composite			
Composite CC-C	F0h 55h	Disable	13-76
Composite CC-A/B	F0h 56h	Disable	13-76
Composite TLC-39	F0h 73h	Disable	13-77
UPC Composite Mode	F0h 58h	Always Linked	13-78
Composite Beep Mode	F0h 8Eh	Beep As Each Code Type is Decoded	13-79
GS1-128 Emulation Mode for UCC/EAN Composite Codes	F0h ABh	Disable	13-79
2D Symbolologies			
PDF417	0Fh	Enable	13-80
MicroPDF417	E3h	Disable	13-80
Code 128 Emulation	7Bh	Disable	13-81
Data Matrix	F0h 24h	Enable	13-82
Data Matrix Inverse	F1h 4Ch	Regular	13-83
Maxicode	F0h 26h	Enable	13-83
QR Code	F0h 25h	Enable	13-84
QR Inverse	F1h 4Bh	Regular	13-85

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

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Parameter Number	Default	Page Number
MicroQR	F1h 3Dh	Enable	13-85
Aztec	F1h 3Eh	Enable	13-86
Aztec Inverse	F1h 4Dh	Regular	13-86
Symbology-Specific Security Levels			
Redundancy Level	4Eh	1	13-87
Security Level	4Dh	1	13-89
Intercharacter Gap Size	F0h 7Dh	Normal	13-90
Report Version			13-90
Macro PDF			
Flush Macro PDF Buffer			13-91
Abort Macro PDF Entry			13-91
Miscellaneous Scanner Options			
Transmit Code ID Character	2Dh	None	14-3
Prefix Value	63h, 69h	7013 <CR><LF>	14-4
Suffix 1 Value Suffix 2 Value	62h, 68h 64h, 6Ah	7013 <CR><LF>	14-4
Scan Data Transmission Format	EBh	Data as is	14-5
FN1 Substitution Values	67h, 6Dh	Set	14-7
Transmit "No Read" Message	5Eh	Disable	14-8
Synapse Interface	F0h ACh	Standard	14-9

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-A, UPC-E, UPC-E1, EAN-8, EAN-13
B	Code 39, Code 32
C	Codabar
D	Code 128, ISBT 128, ISBT 128 Concatenated
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
S	Matrix 2 of 5
T	UCC Composite, TLC 39
U	Chinese 2 of 5

Table B-1 *Symbol Code Characters (Continued)*

Code Character	Code Type
V	Korean 3 of 5
X	ISSN EAN, PDF417, Macro PDF417, Micro PDF417
z	Aztec, Aztec Rune
P00	Data Matrix
P01	QR Code, MicroQR
P02	Maxicode
P03	US Postnet
P04	US Planet
P05	Japan Postal
P06	UK Postal
P08	Netherlands KIX Code
P09	Australia Post
P0A	USPS 4CB/One Code/Intelligent Mail
P0B	UPU FICS Postal

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, ISBT 128, ISBT 128 Concatenated, GS1-128, Coupon (Code 128 portion)
d	Data Matrix
E	UPC/EAN, Coupon (UPC portion)
e	GS1 DataBar Family
F	Codabar
G	Code 93
H	Code 11
I	Interleaved 2 of 5
L	PDF417, Macro PDF417, Micro PDF417
L2	TLC 39
M	MSI
Q	QR Code, MicroQR
S	Discrete 2 of 5, IATA 2 of 5
U	Maxicode
z	Aztec, Aztec Rune
X	Bookland EAN, ISSN EAN, Trioptic Code 39, Chinese 2 of 5, Matrix 2 of 5, Korean 3 of 5, US Postnet, US Planet, UK Postal, Japan Postal, Australia Post, Netherlands KIX Code, USPS 4CB/One Code/ Intelligent Mail, UPU FICS Postal

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 J A7AIMID 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 J X0412356	
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 J C1AIMID		
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 J I04123		
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 J F04123		
Code 93	0	No options specified at this time. Always transmit 0.
	Example: A Code 93 bar code 012345678905 is transmitted as J G0012345678905	

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 and UPC-E (not including supplemental data).
	1	Two-digit supplement data only.
	2	Five-digit supplement data only.
	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	
ISSN EAN	0	No options specified at this time. Always transmit 0.
	Example: An ISSN 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. GS1 DataBar-14 and GS1 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 GS1DataBar-14 bar code 0110012345678902 is transmitted as Je00110012345678902 .	

Table B-3 *Modifier Characters (Continued)*

Code Type	Option Value	Option
EAN.UCC Composites (GS1 DataBar, GS1-128, 2D portion of UPC composite)		Native mode transmission. Note: UPC portion of composite is transmitted using UPC rules.
	0	Standard data packet.
	1	Data packet containing the data following an encoded symbol separator character.
	2	Data packet containing the data following an escape mechanism character. The data packet does not support the ECI protocol.
	3	Data packet containing the data following an escape mechanism character. The data packet supports the ECI protocol.
		GS1-128 emulation Note: UPC portion of composite is transmitted using UPC rules.
	1	Data packet is a GS1-128 symbol (i.e., data is preceded with]C1).
PDF417, Micro PDF417	0	Reader set to conform to protocol defined in 1994 PDF417 symbology specifications. Note: When this option is transmitted, the receiver cannot reliably determine whether ECIs have been invoked or whether data byte 92 _{DEC} has been doubled in transmission.
	1	Reader set to follow the ECI protocol (Extended Channel Interpretation). All data characters 92 _{DEC} are doubled.
	2	Reader set for Basic Channel operation (no escape character transmission protocol). Data characters 92 _{DEC} are not doubled. Note: When decoders are set to this mode, unbuffered Macro symbols and symbols requiring the decoder to convey ECI escape sequences cannot be transmitted.
	3	The bar code contains a GS1-128 symbol, and the first codeword is 903-907, 912, 914, 915.
	4	The bar code contains a GS1-128 symbol, and the first codeword is in the range 908-909.
	5	The bar code contains a GS1-128 symbol, and the first codeword is in the range 910-911.
Example: A PDF417 bar code ABCD, with no transmission protocol enabled, is transmitted as]L2ABCD.		

Table B-3 *Modifier Characters (Continued)*

Code Type	Option Value	Option
Data Matrix	0	ECC 000-140, not supported.
	1	ECC 200.
	2	ECC 200, FNC1 in first or fifth position.
	3	ECC 200, FNC1 in second or sixth position.
	4	ECC 200, ECI protocol implemented.
	5	ECC 200, FNC1 in first or fifth position, ECI protocol implemented.
	6	ECC 200, FNC1 in second or sixth position, ECI protocol implemented.
MaxiCode	0	Symbol in Mode 4 or 5.
	1	Symbol in Mode 2 or 3.
	2	Symbol in Mode 4 or 5, ECI protocol implemented.
	3	Symbol in Mode 2 or 3, ECI protocol implemented in secondary message.
QR Code	0	Model 1 symbol.
	1	Model 2 / MicroQR symbol, ECI protocol not implemented.
	2	Model 2 symbol, ECI protocol implemented.
	3	Model 2 symbol, ECI protocol not implemented, FNC1 implied in first position.
	4	Model 2 symbol, ECI protocol implemented, FNC1 implied in first position.
	5	Model 2 symbol, ECI protocol not implemented, FNC1 implied in second position.
	6	Model 2 symbol, ECI protocol implemented, FNC1 implied in second position.
Aztec	0	Aztec symbol.
	C	Aztec Rune symbol.

Appendix C Sample Bar Codes

Code 39



UPC/EAN

UPC-A, 100 %



EAN-13, 100 %



Code 128



Interleaved 2 of 5



GS1 DataBar-14

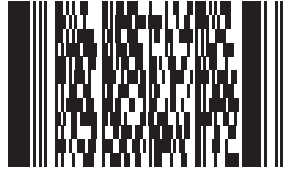


NOTE GS1 DataBar-14 must be enabled to read the bar code below (see [GS1 DataBar-14 on page 13-74](#)).



7612341562341

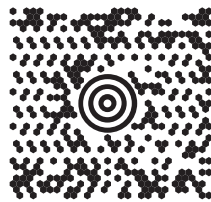
PDF417



Data Matrix



Maxicode



QR Code



US Postnet



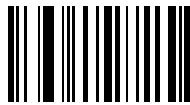
UK Postal



Appendix D Numeric Bar Codes

Numeric Bar Codes

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



0



1



2



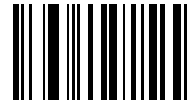
3

Numeric Bar Codes

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



4



5



6



7



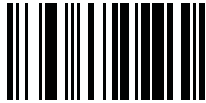
8



9

Cancel

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



Cancel

Appendix E ASCII Character Sets

Table E-1 *ASCII Value Table*

ASCII Value	Full ASCII Code 39 Encode Char	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 unbold keystroke is sent.

Table E-1 ASCII Value Table (Continued)

ASCII Value	Full ASCII Code 39 Encode Char	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 unbold keystroke is sent.

Table E-1 ASCII Value Table (Continued)

ASCII Value	Full ASCII Code 39 Encode Char	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 unbold keystroke is sent.

Table E-1 ASCII Value Table (Continued)

ASCII Value	Full ASCII Code 39 Encode Char	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 unbold keystroke is sent.

Table E-1 ASCII Value Table (Continued)

ASCII Value	Full ASCII Code 39 Encode Char	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 unbold keystroke is sent.

Table E-2 *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 E-3 *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 E-3 *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 E-4 *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 E-5 *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
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 E-6 *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
6053	5
6054	6
6055	7
6056	8
6057	9
6058	Enter
6059	Num Lock

Table E-7 *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.

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

Application Programming Interface. See **API**.

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.

BIOS. Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.

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

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

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.

BOOTP. A protocol for remote booting of diskless devices. Assigns an IP address to a machine and may specify a boot file. The client sends a bootp request as a broadcast to the bootp server port (67) and the bootp server responds using the bootp client port (68). The bootp server must have a table of all devices, associated MAC addresses and IP addresses.

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 the mobile computer and erases all user stored records and entries.

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

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

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

D

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

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

Decode Algorithm. A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.

Decryption. Decryption is the decoding and unscrambling of received encrypted data. Also see, **Encryption** and **Key**.

Depth of Field. The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.

Discrete 2 of 5. A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.

Discrete Code. A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

DRAM. Dynamic random access memory.

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

F

Flash Disk. An additional megabyte of non-volatile memory for storing application and configuration files.

Flash Memory. Flash memory is responsible for storing the system firmware and is non-volatile. If the system power is interrupted the data is not be lost.

FTP. See **File Transfer Protocol**.

H

Hard Reset. See **Cold Boot**.

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

IDE. Intelligent drive electronics. Refers to the solid-state hard drive type.

IEC. International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.

IEC (825) Class 1. This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 second window and an automatic laser shutdown if the scanner's oscillating mirror fails.

Input/Output Ports. I/O ports are primarily dedicated to passing information into or out of the device's memory, such as serial and USB ports.

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.

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.

IOCTL. Input/Output Control.

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

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

IPX/SPX. Internet Package Exchange/Sequential Packet Exchange. A communications protocol for Novell. IPX is Novell's Layer 3 protocol, similar to XNS and IP, and used in NetWare networks. SPX is Novell's version of the Xerox SPP protocol.

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.

LCD. See **Liquid Crystal Display**.

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

Light Emitting Diode. See **LED**.

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

M

MDN. Mobile Directory Number. The directory listing telephone number that is dialed (generally using POTS) to reach a mobile unit. The MDN is usually associated with a MIN in a cellular telephone -- in the US and Canada, the MDN and

MIN are the same value for voice cellular users. International roaming considerations often result in the MDN being different from the MIN.

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.

N

Nominal. The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.

Nominal Size. Standard size for a bar code symbol. Most UPC/EAN codes are used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).

NVM. Non-Volatile Memory.

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.

PC Card. A plug-in expansion card for laptop computers and other devices, also called a PCMCIA card. PC Cards are 85.6mm long x 54 mm wide, and have a 68 pin connector. There are several different kinds:

- Type I; 3.3 mm high; use - RAM or Flash RAM
- Type II; 5 mm high; use - modems, LAN adaptors
- Type III; 10.5 high; use - Hard Disks

PCMCIA. Personal Computer Memory Card Interface Association. See **PC Card**.

Percent Decode. The average probability that a single scan of a bar code would result in a successful decode. In a well-designed bar code scanning system, that probability should approach near 100%.

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

Print Contrast Signal (PCS). Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. $PCS = (RL - RD) / RL$, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.

Programming Mode. The state in which a scanner is configured for parameter values. See **Scanning Mode**.

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

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

Reflectance. Amount of light returned from an illuminated surface.

Resolution. The narrowest element dimension which is distinguished by a particular reading device or printed with a particular device or method.

RF. Radio Frequency.

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

Router. A device that connects networks and supports the required protocols for packet filtering. Routers are typically used to extend the range of cabling and to organize the topology of a network into subnets. See **Subnet**.

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.

SDK. Software Development Kit

Self-Checking Code. A symbology that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.

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

SHIP. Symbol Host Interface Program.

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

Soft Reset. See **Warm Boot.**

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

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

Start/Stop Character. A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.

STEP. Symbol Terminal Enabler Program.

Subnet. A subset of nodes on a network that are serviced by the same router. See **Router.**

Subnet Mask. A 32-bit number used to separate the network and host sections of an IP address. A custom subnet mask subdivides an IP network into smaller subsections. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets. Default is often 255.255.255.0.

Substrate. A foundation material on which a substance or image is placed.

SVTP. Symbol Virtual Terminal Program.

Symbol. A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters and check characters.

Symbol Aspect Ratio. The ratio of symbol height to symbol width.

Symbol Height. The distance between the outside edges of the quiet zones of the first row and the last row.

Symbol Length. Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.

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

T

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

Telnet. A terminal emulation protocol commonly used on the Internet and TCP/IP-based networks. It allows a user at a terminal or computer to log onto a remote device and run a program.

Terminal Emulation. A “terminal emulation” emulates a character-based mainframe session on a remote non-mainframe terminal, including all display features, commands and function keys. The VC5000 Series supports Terminal Emulations in 3270, 5250 and VT220.

Terminate and Stay Resident (TSR). A program under DOS that ends its foreground execution to remain resident in memory to service hardware/software interrupts, providing background operation. It remains in memory and may provide services on behalf of other DOS programs.

TFTP. (Trivial File Transfer Protocol) A version of the TCP/IP FTP (File Transfer Protocol) protocol that has no directory or password capability. It is the protocol used for upgrading firmware, downloading software and remote booting of diskless devices.

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

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

Trivial File Transfer Protocol. See **TFTP**.

TSR. See **Terminate and Stay Resident**.

U

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

UPC. Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbology for retail food packages in the United States.

V

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

W

Warm Boot. A warm boot restarts the mobile computer by closing all running programs. All data that is not saved to flash memory is lost.

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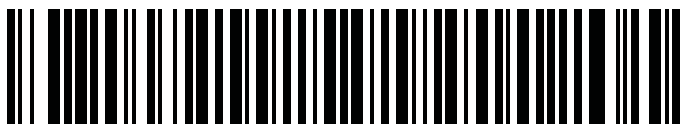
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