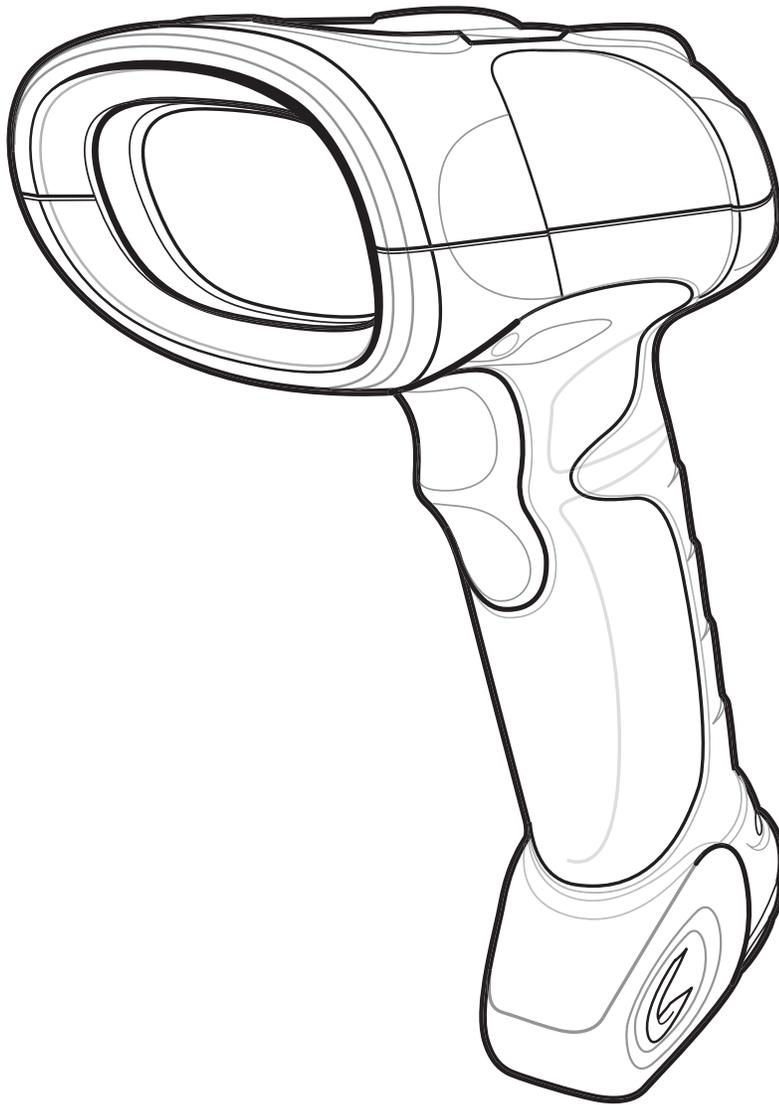


LS3400

Product Reference Guide



LS3400 Product Reference Guide

72E-86094-01

Revision A

July 2006

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Patents

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Revision History

Changes to the original manual are listed below:

Change	Date	Description
Rev A	7/2006	Initial release

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Overview

The *LS3400 Product Reference Guide* provides general instructions for setting up, operating, maintaining, and troubleshooting the LS3400 scanner. The LS 3400 includes the following variations of the scanner:

- LS3400-FZ20005: 1-D scanning
- LS3400-ER20005: extended range 1-D scanning.

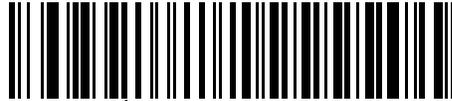
Chapter Descriptions

- [Chapter 1, Getting Started](#) provides a product overview, unpacking instructions, and cable connection information.
- [Chapter 2, Scanning](#) describes parts of the scanner, beeper and LED definitions, and how to use the scanner.
- [Chapter 3, Maintenance, Troubleshooting, & Specifications](#) provides information on how to care for the scanner, troubleshooting, and technical specifications.
- [Chapter 4, User Preferences](#) provides programming bar codes for selecting user preference features for the scanner.
- [Chapter 5, Scanner Emulation Interface](#) provides information for setting up the scanner for Scanner Emulation operation.
- [Chapter 6, Symbologies](#) describes all symbology features and provides the programming bar codes necessary for selecting these features for the scanner.
- [Chapter 7, Miscellaneous Scanner Options](#) includes commonly used bar codes to customize how the data is transmitted to the host device.
- [Appendix A, Standard Defaults](#) provides a table of all host devices and miscellaneous scanner defaults.
- [Appendix B, Programming Reference](#) provides a table of AIM code identifiers, ASCII character conversions, and keyboard maps.
- [Appendix C, Sample Bar Codes](#) includes sample bar codes.
- [Appendix D, Numeric Bar Codes](#) includes the numeric bar codes to scan for parameters requiring specific numeric values.

Notational Conventions

The following conventions are used in this document:

- *Italics* are used to highlight the following:
 - Chapters and sections in this and related documents
- 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

Related Documents

The *LS3400 Quick Reference Guide* (p/n 72-86093-xx) provides general information to help the user get started with the scanner. It includes basic operation instructions and start up bar codes.

For the latest versions of the *LS3400 Quick Reference Guide* and the *LS3400 Product Reference Guide* go to: <http://www.symbol.com/manuals>.

Service Information

If you have a problem with your equipment, contact the Symbol Global Customer Interaction Center for your region (see below for contact information). Before calling, have the model number, serial number, and several of your bar code symbols at hand.

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

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

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

For service information, warranty information or technical assistance contact or call the Symbol Global Customer Interaction Center. For contact information, go to: www.symbol.com/contactsupport.

If you purchased your Symbol product from a Symbol Business Partner, contact that Business Partner for service.

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

Introduction

The scanner combines excellent scanning performance and advanced ergonomics to provide the best value in a lightweight laser scanner, and ensures comfort and ease of use for extended periods of time.

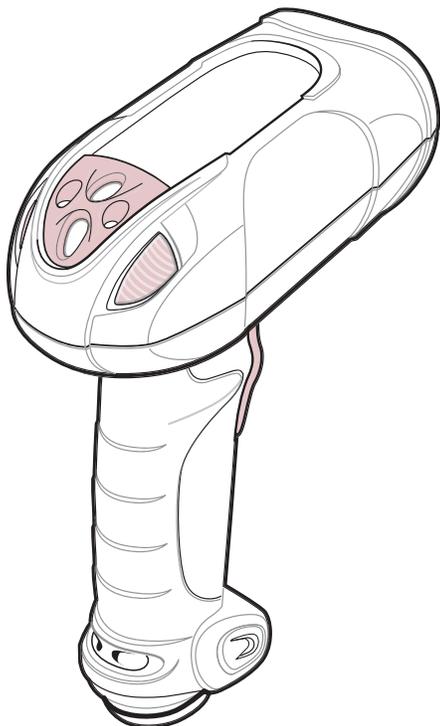


Figure 1-1 *LS 3400 Scanner*

This scanner supports Scanner Emulation connection to a mobile computer or a controller which collects the data and interprets it for the host.

Unpacking the Scanner

Remove the scanner from its packing and inspect it for damage. If the scanner was damaged in transit, call the Symbol Global Customer Interaction Center. See page xi for contact information. **KEEP THE PACKING.** It is the approved shipping container and should be used if the equipment ever needs to be returned for servicing.

Setting Up the Scanner

Installing the Interface Cable

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

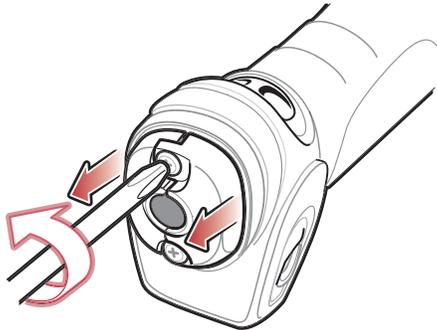


Figure 1-2 *Loosening the Screws on the Cable Clamp*

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

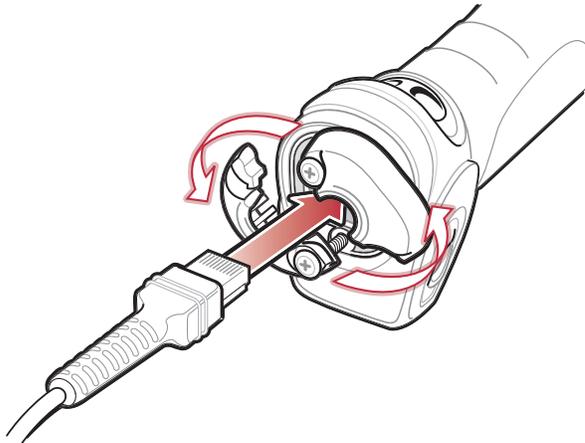


Figure 1-3 *Inserting the Cable*

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 scanner.

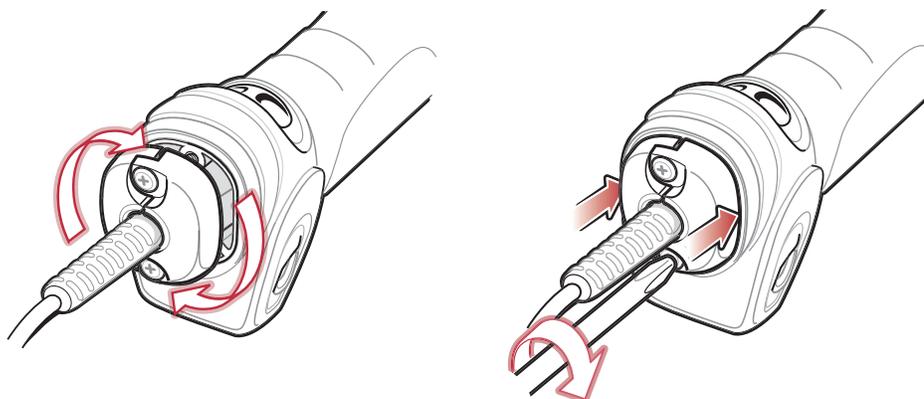


Figure 1-4 Closing the Clamp

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

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

Removing the Interface Cable

1. Loosen the two screws on the cable clamp at the bottom of the scanner and gently pull the clamp away from the bottom of the scanner.
2. Open the clamp and unplug the interface cable modular connector from the cable interface port on the bottom of the 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.

Configuring the Scanner

Use the bar codes included in this manual to configure the scanner.

Introduction

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

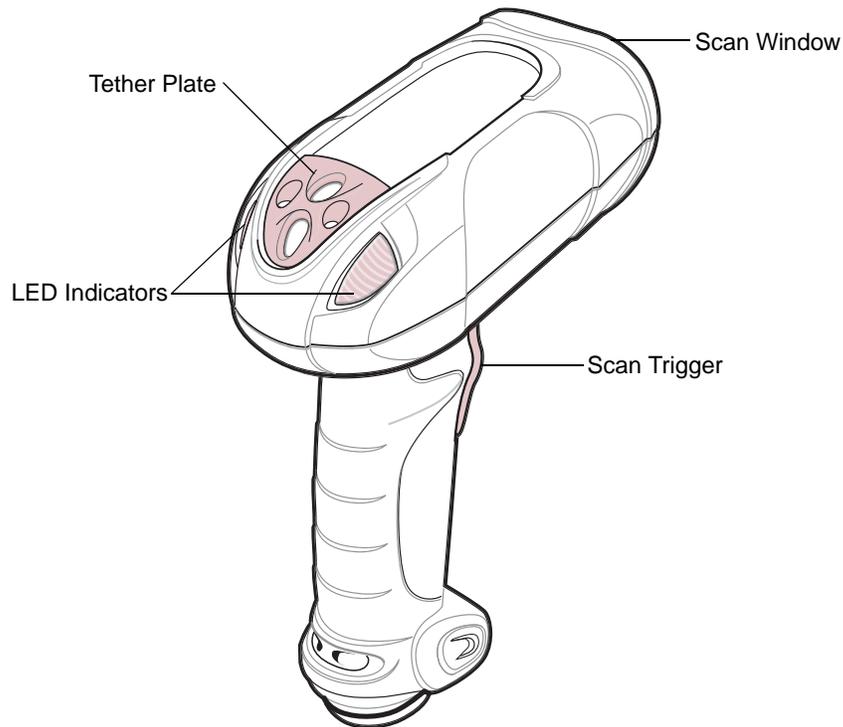


Figure 2-1 Parts

Beeper Definitions

The scanner emits different beeper sequences and patterns to indicate its status. [Table 2-1](#) defines beep sequences that occur during both normal scanning and while programming the scanner.

Table 2-1 *Standard Beeper Definitions*

Beeper Sequence	Indication
Standard Use	
1 short high beep	A bar code symbol was decoded (if decode beeper is enabled).
Parameter Menu Scanning	
Long low/long high beep sequence	Incorrect programming sequence or 'Cancel' bar code scanned. Scanner remains in program mode.
Short high/short low beep sequence	Keyboard parameter selected. Enter value using bar code keypad.
Short high/short low/short high/short low beep sequence	Successful program exit with change in the parameter setting.
Short low/short high/short low/short high beep sequence	Out of host parameter storage space. Scan Set Default Parameter on page 4-3 .

LED Definitions

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

Table 2-2 *Standard LED Definitions*

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

Scanning in Hand-Held Mode

Install and program the scanner (see [Setting Up the Scanner on page 1-2](#)). For assistance, contact the local supplier or the Symbol Global Customer Interaction Center.

1. Ensure the scanner is properly connected to the host (see the appropriate host chapter).
2. Aim the scanner at the bar code.

3. Press the scan trigger.

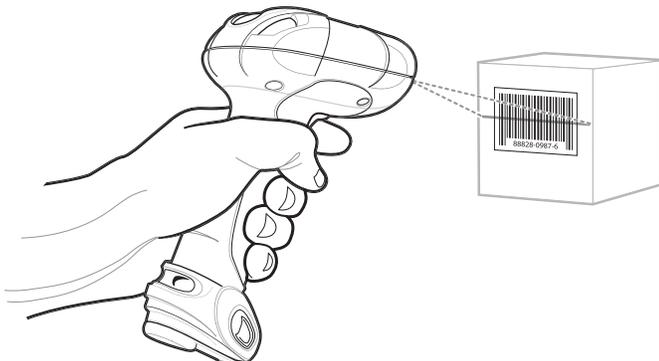
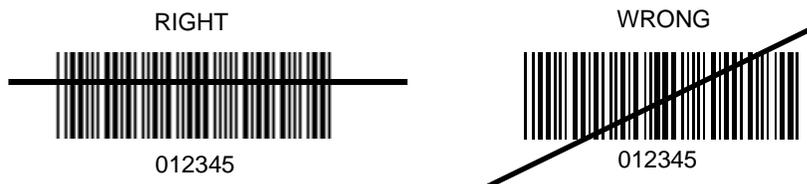


Figure 2-2 Scanning in Hand-Held Mode

4. Ensure the scan line crosses every bar and space of the symbol.



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

Aiming

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

The scanner can be tilted up to 65° forward or back and achieve a successful decode ([Figure 2-3](#)). Simple practice quickly shows what tolerances to work within.

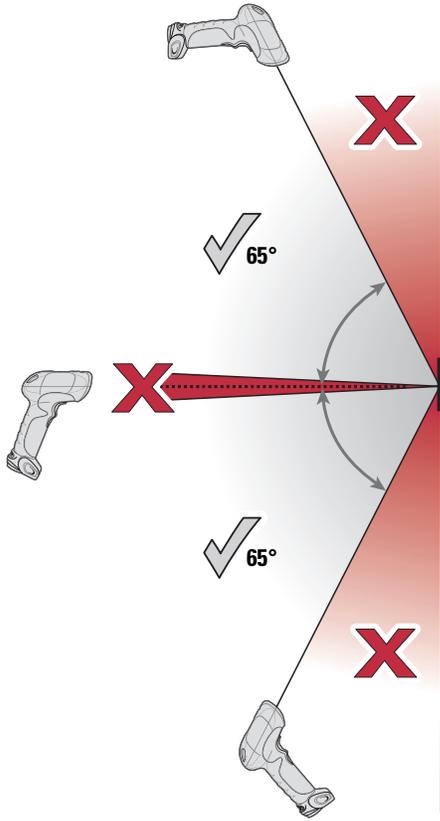
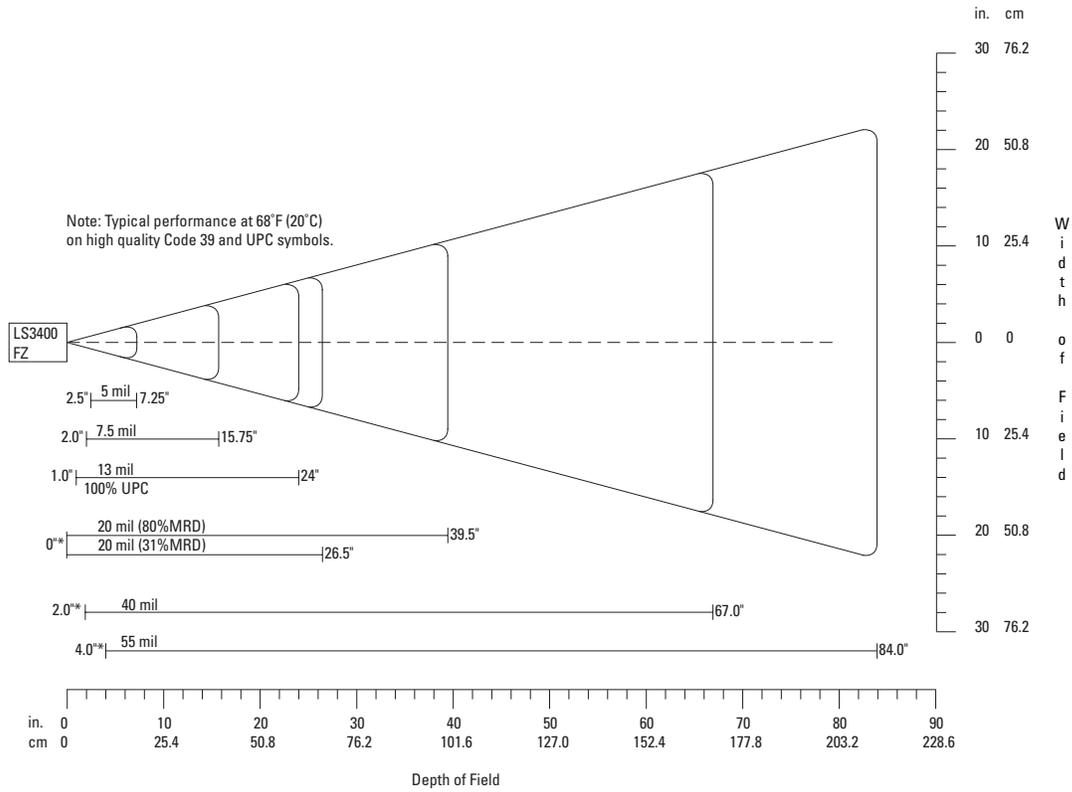


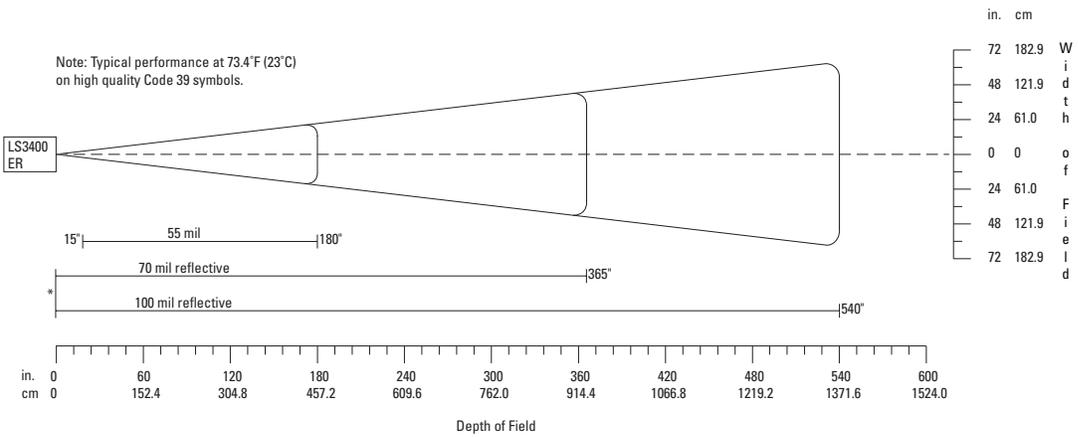
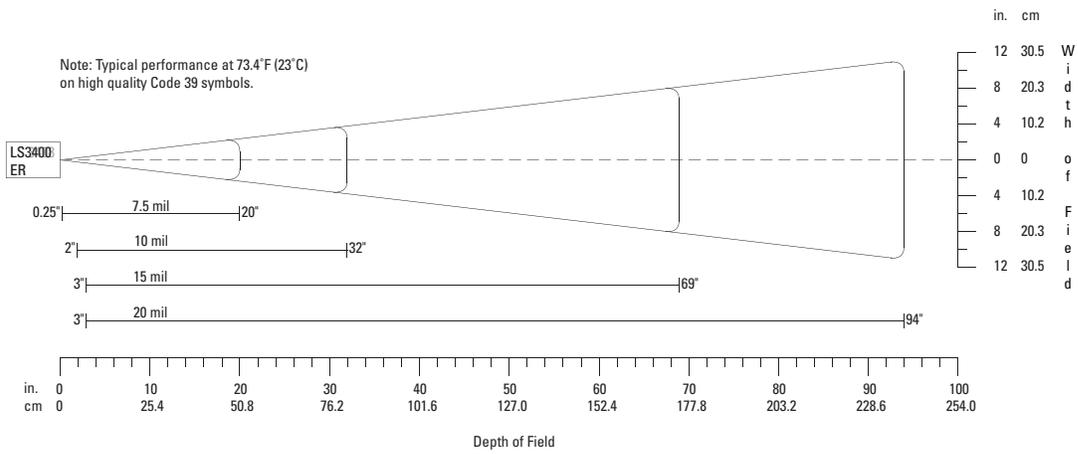
Figure 2-3 *Optimum Scan Angles*

Decode Zone



*Minimum distance determined by symbol length and scan angle

Figure 2-4 LS 3400-FZ Decode Zone



*Near range determined by degree of reflectivity and width of bar code.

Figure 2-5 LS 3400-ER Decode Zone

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 may affect scanning accuracy.

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

Troubleshooting

Table 3-1 *Troubleshooting*

Problem	Possible Causes	Possible Solutions
Scanner emits short low/short medium/short high beep sequence.	Scanner is powering up.	Normal when scanner is plugged in.
Nothing happens when scan trigger is pressed.	No power to the scanner.	Check the system power. Ensure the power supply is connected if the configuration requires a power supply.
		Power supply is not plugged in.
	Interface/power cables are loose.	Ensure all cable connections are secure.
Laser comes on, but scanner does not decode the bar code.	Scanner is not programmed for the correct bar code type.	Ensure the scanner is programmed to read the type of bar code being scanned.
	Bar code symbol is unreadable.	Check the symbol to ensure it is not defaced. Try scanning test bar codes of the same bar code type. See Appendix C, Sample Bar Codes for test bar codes.
	Bar code is out of range from the scanner.	Move scanner closer to or further from bar code.
Bar code is decoded, but data is not transmitted to the host.	Interface cable is loose.	Ensure all cable connections are secure.
	Attached decoder is not programmed for that bar code type.	Enable the bar code type for the decoder.
Scanned data is incorrectly displayed on the host.	Scanner is not programmed to work with the host.	Ensure editing options (e.g., UPC-E to UPC-A conversion) are properly programmed.
Scanner emits long low/long high beep sequence while it is being programming.	'Cancel' bar code is scanned.	Normal behavior.

✓ **NOTE** If after performing these checks the symbol still does not decode, contact the distributor or call the local Symbol Global Customer Interaction Center. See page xi for the telephone numbers.

Technical Specifications

Table 3-2 *Technical Specifications*

Item	Description	
	LS3400-FZ	LS3400-ER
Power Requirements	4.5 - 14VDC	
Operating Current	180mA @ 5.2V	240mA @ 5.2V
Stand-By Current	50mA (max)	
Power Source	Depending on host: host powered external power supply	
Decode Capability	UPC/EAN, Bookland EAN, UPC/EAN with supplementals, Code 128, UCC/EAN 128, ISBT 128, Code 39, Trioptic Code 39, Code 93, Code 11, Interleaved 2 of 5, Discrete 2 of 5, Codabar (NW-7), MSI, RSS.	
Beeper Operation	User-selectable: Enable, Disable	
Beeper Volume	User-selectable: Three levels	
Beeper Tone	User-selectable: Three tones	
Scan Repetition Rate	36 scans/second	
Yaw Tolerance	± 50° from nominal	± 60° from nominal
Pitch Tolerance	± 65° from nominal	± 65° from nominal
Roll Tolerance	± 20° from nominal	± 10° from nominal
Print Contrast Minimum	25% minimum reflectance differential, measured at 650 nm.	
Ambient Light Immunity Indoor: Outdoor:	450 Ft Candles (4,842 Lux) 8,000 Ft Candles (86,080 Lux)	450 Ft Candles (4,842 Lux) 4,000 Ft Candles (43,040 Lux)
Durability	6.5 ft (2.0 m) drops to concrete	
Operating Temperature	-22° to 122° F (-30° to 50° C)	
Storage Temperature	-40° to 158° F (-40° to 70° C)	
Humidity	5% to 95% (non-condensing)	
Weight (without cable)	12.35 oz. (350 g)	12.56 oz. (356 g)
Dimensions: Height Width Depth	7.34 in. (18.65 cm) 4.82 in. (12.25 cm) 2.93 in. (7.43 cm)	

Table 3-2 *Technical Specifications (Continued)*

Item	Description	
	LS3400-FZ	LS3400-ER
Laser	650nm laser diode	
Laser Classifications	IEC 825-1 Class 2	
ESD	20 kV area discharge 8 kV contact discharge	
Minimum Element Width	5 mil (0.127 mm)	7.5 mil (0.191 mm)
Interfaces Supported	Scanner Emulation	
Electrical Safety	Certified Pending to UL1950, CSA C22.2 No.950. EN60950/IC950	
Input Transient Protection	IEC 1000-4-(2,3,4,5,6,11)	
EMI	FCC Part 15 Class B, ICES-003 Class B European Union EMC Directive, Australian SMA, Taiwan EMC, Japan VCCI/MITI/Dentori	

Scanner Signal Descriptions

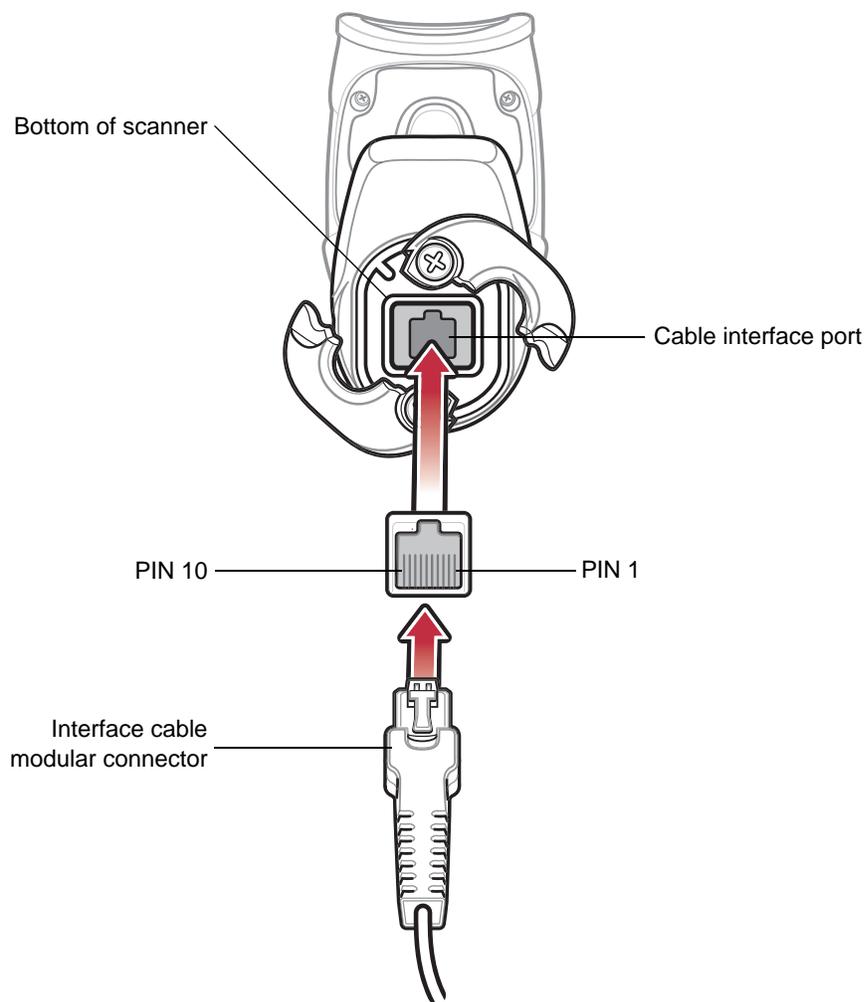


Figure 3-1 Scanner Cable Pinouts

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

Table 3-3 *Scanner Signal Pin-outs*

Pin	Description
1	DBP
2	Power
3	Ground
4	SOS
5	Decode
6	Trigger
7	Enable
8	Reserved
9	Reserved
10	Reserved

Introduction

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

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

Feature values are set by scanning single bar codes or short bar code sequences. The settings are stored in non-volatile memory and are preserved even when the scanner is powered down.

To return all features to their default values, scan the [Set All Defaults on page 4-3](#). Throughout the programming bar code menus, default values are indicated with asterisks (*).



* Indicates Default —*High Frequency — Feature/Option

Scanning Sequence Examples

In most cases, only one bar code needs to be scanned to set a specific parameter value. For example, to set the beeper tone to high, simply scan the **High Frequency** (beeper tone) bar code listed under [Beeper Tone on page 4-3](#). The scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

Other parameters, such as specifying **Laser On Time**, require scanning several bar codes. See [Laser On Time on page 4-5](#) for a description of this procedure.

Errors While Scanning

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

User Preferences Default Parameters

Table 4-1 lists the defaults for user preferences parameters. To change any option, scan the appropriate bar code(s) provided in [User Preferences on page 4-3](#).

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

Table 4-1 *User Preferences Default Table*

Parameter	Default	Page Number
User Preferences		
Set Default Parameter	All Defaults	4-3
Beeper Tone	High	4-3
Beeper Volume	High	4-4
Power Mode	Reduced Power	4-4
Laser On Time	3.0 sec	4-5
Beep After Good Decode	Disable	4-6
Trigger Mode	Level	4-6
Aim Duration	0.0 sec	4-7

User Preferences

Set Default Parameter

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



Set All Defaults

Beeper Tone

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



Low Frequency



Medium Frequency



***High Frequency**

Beeper Volume

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



Low Volume



Medium Volume



***High Volume**

Power Mode

This parameter determines whether or not the scanner enters reduced power mode after a decode attempt. When in reduced power mode, the scanner draws less current from its power source.



Continuous On



***Reduced Power Mode**

Laser On Time

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

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

- ✓ **NOTE** To optimize decode performance, you must set a longer Laser On Time for the attached decoder than the Laser On Time of the LS3400.



Laser On Time

Beep After Good Decode

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



**Beep After Good Decode
(Enable)**



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

Trigger Mode

The scanner has three trigger modes that can be used to scan bar codes. The desired trigger mode can be set by using the bar codes below.

Level Trigger

When the trigger is pulled, an aiming dot appears for a programmable duration of time. After this time, the aiming dot automatically turns into a standard laser scanning beam for a full decode session. The laser scanning beam stays on until the laser-on timeout occurs, a decode occurs, or the trigger is released. If the trigger is released before the aiming duration expires, the laser shuts off and no decode occurs.

- ✓ **NOTE** To optimize decode performance, you must set a longer Laser On Time for the attached decoder than the sum of the Aim Duration and the Laser On Time of the LS3400.



***Level**

Trigger Mode (continued)

Two Stage - Option 1

When the trigger is pulled, an aiming dot appears. This aiming dot remains while the trigger is pulled. When the trigger is released, the aiming dot automatically turns into a standard laser scanning beam for a full decode session. The laser scanning beam stays on until the laser-on timeout occurs or a decode occurs. If the trigger is pulled again while in a decode session, the scanner beam returns to an aiming dot.



Two Stage - Option 1

Two Stage - Option 2

When the trigger is pulled, an aiming dot appears. When the trigger is released, the aiming dot turns off. Pulling the trigger twice in rapid succession turns on the standard laser scanning beam for a full decode session. The laser scanning beam, stays on until the laser-on timeout occurs, a decode occurs, or the trigger is released.



Two Stage - Option 2

Aim Duration

When the scanner is in Level trigger mode (default mode), Aim Duration sets the amount of time the aiming dot is seen before turning into a scanning beam. This parameter has no affect when the scanner is in either of the Two Stage trigger modes. See [Trigger Mode on page 4-6](#) for a description of each of the trigger modes.

The aim duration is programmable in 0.1 second increments, from 0.0 to 9.9 seconds. The default Aim Duration is 0.0 seconds. When set to 0.0 seconds, no aiming pattern appears before a decode session.

To set an aim duration, scan the bar code below. Then scan two numeric bar codes, available in [Appendix D, Numeric Bar Codes](#), that correspond to the desired aim duration. Durations less than 1.0 seconds must have a leading zero. For example, to set an aim duration of 0.5 seconds, scan the bar code below, followed by the '0' and the '5' bar codes. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Aim Duration

Introduction

This chapter provides Scanner Emulation host information for setting up the scanner. This mode is used whenever Scanner Emulation communication is needed. When Scanner Emulation is used, the scanner attaches either to an external decoder or to a decoder integrated in a portable terminal or Point-of-Sale (POS) terminal.

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



Connecting Using Scanner Emulation

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

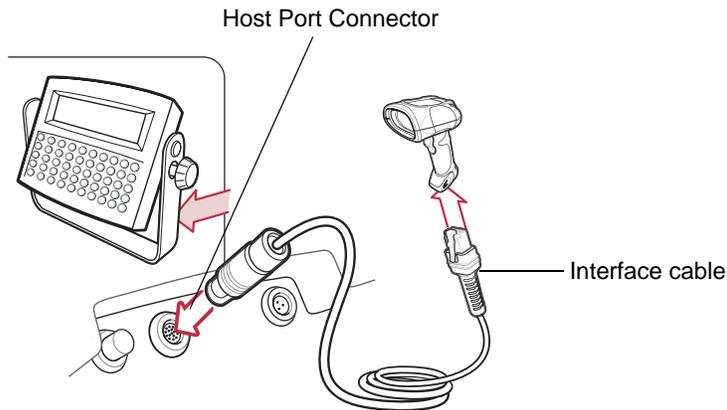


Figure 5-1 *Scanner Emulation Connection*

✓ **NOTE** Interface cables vary depending on configuration. The connectors illustrated in [Figure 5-1](#) are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner remain the same.

1. Attach the modular connector of the Scanner Emulation interface cable to the cable interface port on the 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. Ensure that all connections are secure.
4. To modify any parameter options, scan the appropriate bar codes in this chapter.

Scanner Emulation Default Parameters

Table 5-1 lists the defaults for the Scanner Emulation Host. To change any option, scan the appropriate bar code(s) provided in [Scanner Emulation Host Parameters on page 5-4](#).

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

Table 5-1 *Scanner Emulation Default Table*

Parameter	Default	Page Number
Scanner Emulation Host Parameters		
Convert Newer Code Types	Convert Newer Code Types	5-4
Module Width	50 μ s Module Width	5-4
Convert All Bar Codes to Code 39	Disable	5-5
Code 39 Full ASCII Conversion	Disable	5-5
Transmission Timeout	3 seconds	5-6
Transmit With Unknown Characters	Transmit With Unknown Characters	5-7
Leading Margin	2 ms	5-8

Scanner Emulation Host Parameters

Convert Newer Code Types

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

Scan this code type:	Transmitted as:
Code 11	Code 39
RSS (14, Limited, and Expanded)	Code 128

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



***Convert Newer Code Types**



Reject Newer Code Types

Module Width

The default module width is 50 μ s. If desired, reduce this module width to 20 μ s by scanning the corresponding bar code below.



20 μ s Module Width



***50 μ s Module Width**

Convert All Bar Codes to Code 39

Scan the appropriate 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
(Disable)**



**Convert All To Code 39
(Enable)**

Code 39 Full ASCII Conversion

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

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



***Do Not Convert Code 39 To Full ASCII
(Disable)**



**Convert Code 39 To Full ASCII
(Enable)**

Transmission Timeout

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

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

Transmit With Unknown Characters

Unknown characters are characters that the decoder does not recognize. When "Transmit With Unknown Characters" is selected, all bar code data is sent except for unknown characters. When "Do Not Transmit With Unknown Characters" is selected, bar codes containing at least one unknown character are not sent to the decoder.



***Transmit With Unknown Characters**



Do Not Transmit With 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

Introduction

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

The scanner is shipped with the settings shown in the [Symbology Default Table on page 6-2](#) (also see [Appendix A, Standard Defaults](#) for all host device and miscellaneous scanner defaults). If the default values suit the requirements, programming may not be necessary. Features values are set by scanning single bar codes or short bar code sequences.

To return all features to their default values, scan [Set All Defaults on page 4-3](#).

Scanning Sequence Examples

In most cases, only one bar code needs to be scanned to set a specific parameter value. For example, to transmit bar code data without the UPC-A check digit, scan the **Do Not Transmit UPC-A Check Digit** bar code listed under [Transmit UPC-A/UPC-E/UPC-E1 Check Digit on page 6-10](#). The scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

Other parameters, such as **Set Length(s) for D 2 of 5** require that several bar codes be scanned in the proper sequence. See the individual parameter, like **Set Length(s) for D 2 of 5**, for this procedure.

Errors While Scanning

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

Symbology Default Parameters

[Table 6-1](#) lists the defaults for all symbologies parameters. To change any option, scan the appropriate bar code(s) provided in this chapter.

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

Table 6-1 *Symbology Default Table*

Parameter	Default	Page Number
UPC/EAN		
UPC-A	Enable	6-5
UPC-E	Enable	6-5
UPC-E1	Disable	6-6
EAN-13/JAN 13	Enable	6-6
EAN-8/JAN 8	Enable	6-7
Bookland EAN	Disable	6-7
Decode UPC/EAN/JAN Supplementals (2 and 5 digits)	Ignore Supplementals	6-9
UPC/EAN/JAN Supplemental Redundancy	14	6-10
Transmit UPC-A Check Digit	Enable	6-10
Transmit UPC-E Check Digit	Enable	6-11
Transmit UPC-E1 Check Digit	Enable	6-11
UPC-A Preamble	System Character	6-12
UPC-E Preamble	System Character	6-13
UPC-E1 Preamble	System Character	6-14
Convert UPC-E to A	Disable	6-15
Convert UPC-E1 to A	Disable	-16
EAN-8/JAN-8 Extend	Disable	6-17
Code 128		
Code 128	Enable	6-17
UCC/EAN-128	Enable	6-18
ISBT 128	Enable	6-18

Table 6-1 Symbology Default Table (Continued)

Parameter	Default	Page Number
Code 39		
Code 39	Enable	6-19
Trioptic Code 39	Disable	6-19
Convert Code 39 to Code 32	Disable	6-20
Code 32 Prefix	Disable	6-21
Set Length(s) for Code 39	2 to 55	6-22
Code 39 Check Digit Verification	Disable	6-23
Transmit Code 39 Check Digit	Disable	6-24
Code 39 Full ASCII Conversion	Disable	6-25
Code 93		
Code 93	Disable	6-26
Set Lengths for Code 93	4 to 55	6-26
Code 11		
Code 11	Disable	6-28
Set Lengths for Code 11	4 to 41	6-28
Code 11 Check Digit Verification	One Check Digit	6-30
Transmit Code 11 Check Digits	Disable	6-31
Interleaved 2 of 5 (I 2 of 5)		
Interleaved 2 of 5 (I 2 of 5)	Enable	6-32
Set Lengths for Interleaved 2 of 5	14	6-32
I 2 of 5 Check Digit Verification	Disable	6-34
Transmit I 2 of 5 Check Digit	Disable	6-35
Convert I 2 of 5 to EAN-13	Disable	6-35
Discrete 2 of 5 (D 2 of 5)		
Discrete 2 of 5	Disable	6-36
Set Lengths for D 2 of 5	12	6-36
Codabar (NW - 7)		
Codabar	Disable	6-38
Set Lengths for Codabar	5 to 55	6-38
CLSI Editing	Disable	6-40

Table 6-1 *Symbology Default Table (Continued)*

Parameter	Default	Page Number
NOTIS Editing	Disable	6-40
MSI		
MSI	Disable	6-41
Set Lengths for MSI	6 to 55	6-41
MSI Check Digits	One	6-43
Transmit MSI Check Digit(s)	Disable	6-43
MSI Check Digit Algorithm	Mod 10/Mod 10	6-44
RSS (Reduced Space Symbology)		
RSS 14	Disable	6-45
RSS Limited	Disable	6-45
RSS Expanded	Disable	6-46
Convert RSS to UPC/EAN	Disable	6-46
Symbology - Specific Security Levels		
Redundancy Level	1	6-47
Security Levels	0	6-49
Bi-directional Redundancy	Disable	6-50
Report Software Version		6-50

UPC/EAN

Enable/Disable UPC-A

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



***Enable UPC-A**



Disable UPC-A

Enable/Disable UPC-E

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



***Enable UPC-E**



Disable UPC-E

Enable/Disable UPC-E1

UPC-E1 is disabled by default.

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

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



Enable UPC-E1



*Disable UPC-E1

Enable/Disable EAN-13

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



*Enable EAN-13/JAN-13



Disable EAN-13/JAN-13

Enable/Disable EAN-8

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



*Enable EAN-8/JAN-8



Disable EAN-8/JAN-8

Enable/Disable Bookland EAN

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



Enable Bookland EAN



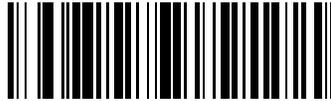
*Disable Bookland EAN

Decode UPC/EAN/JAN Supplementals

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

- If **Decode UPC/EAN Only With Supplementals** is selected, UPC/EAN symbols without supplementals are not decoded.
- If **Ignore Supplementals** is selected, and the scanner is presented with a UPC/EAN with a supplemental, the UPC/EAN is decoded and the supplemental bar code is ignored.
- An **Autodiscriminate Option** is also available. If this option is selected, choose an appropriate *“UPC/EAN/JAN Supplemental Redundancy,”* value from the next page. A value of 14 or more is recommended.
- **Enable 378/379 Supplemental Mode** to enable only EAN13 bar codes starting with a ‘378’ or ‘379’ prefix to be delayed by the supplemental search process. All other UPC/EAN bar codes are exempted from the search and are reported instantly upon their decode.
- Select **Enable 978 Supplemental Mode** to enable only EAN13 bar codes starting with a ‘978’ prefix to be delayed by the supplemental search process. All other UPC/EAN bar codes are exempted from the search and are reported instantly upon their decode.
- Select **Enable Smart Supplemental Mode** to enable only EAN13 bar codes starting with a ‘378’, ‘379’, or ‘978’ prefix to be delayed by the supplemental search process. All other UPC/EAN bar codes are exempted from the search and are reported instantly upon their decode.

✓ **NOTE** In order to minimize the risk of invalid data transmission, it is recommended to select either to decode or ignore supplemental characters.



Decode UPC/EAN/JAN Only With Supplementals

Decode UPC/EAN/JAN Supplementals (continued)



***Ignore Supplementals**



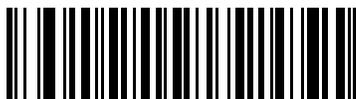
Autodiscriminate UPC/EAN/JAN Supplementals



Enable 378/379 Supplemental Mode



Enable 978 Supplemental Mode



Enable Smart Supplemental Mode

UPC/EAN/JAN Supplemental Redundancy

With **Autodiscriminate UPC/EAN/JAN Supplementals** selected, this option adjusts the number of times a symbol without supplementals is decoded before transmission. The range is from two to thirty times. 14 or above is recommended when decoding a mix of UPC/EAN symbols with and without supplementals, and the autodiscriminate option is selected. The default is set at 14.

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



UPC/EAN/JAN Supplemental Redundancy

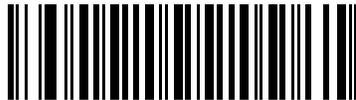
Transmit UPC-A/UPC-E/UPC-E1 Check Digit

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

UPC-A Check Digit



*Transmit UPC-A Check Digit



Do Not Transmit UPC-A Check Digit

UPC-E Check Digit



***Transmit UPC-E Check Digit**



Do Not Transmit UPC-E Check Digit

UPC-E1 Check Digit



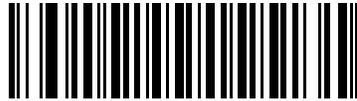
***Transmit UPC-E1 Check Digit**



Do Not Transmit UPC-E1 Check Digit

UPC-A Preamble

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



No Preamble
(<DATA>)



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



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

UPC-E Preamble

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



No Preamble
(<DATA>)



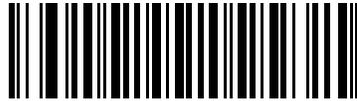
***System Character**
(<SYSTEM CHARACTER> <DATA>)



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

UPC-E1 Preamble

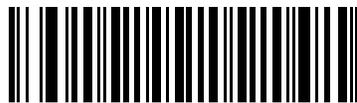
Preamble characters are part of the UPC symbol consisting of Country Code and System Character. Three options are given for transmitting UPC-E1 preamble to the host device: transmit System Character only, transmit System Character and Country Code ("0" for USA), and no preamble transmitted. Select the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



No Preamble
(<DATA>)



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



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

Convert UPC-E to UPC-A

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

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



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

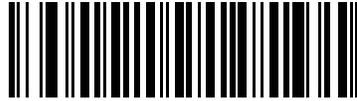


***Do Not Convert UPC-E to UPC-A
(Disable)**

Convert UPC-E1 to UPC-A

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

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



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

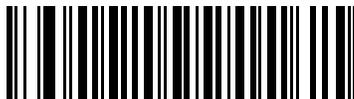


***Do Not Convert UPC-E1 to UPC-A
(Disable)**

EAN-8/JAN-8 Extend

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

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



Enable EAN/JAN Zero Extend



*Disable EAN/JAN Zero Extend

Code 128

Enable/Disable Code 128

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



*Enable Code 128



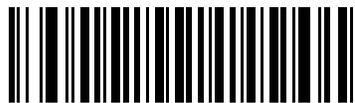
Disable Code 128

Enable/Disable UCC/EAN-128

To enable or disable UCC/EAN-128, scan the appropriate bar code below.



***Enable UCC/EAN-128**



Disable UCC/EAN-128

Enable/Disable ISBT 128

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



***Enable ISBT 128**



Disable ISBT 128

Code 39

Enable/Disable Code 39

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



*Enable Code 39



Disable Code 39

Enable/Disable Trioptic Code 39

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



Enable Trioptic Code 39



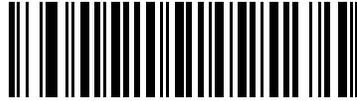
*Disable Trioptic Code 39

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

Convert Code 39 to Code 32

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

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



**Convert Code 39 to Code 32
(Enable)**



***Do Not Convert Code 39 to Code 32
(Disable)**

Code 32 Prefix

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

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



Enable Code 32 Prefix



*Disable Code 32 Prefix

Set Lengths for Code 39

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

- ✓ **NOTE** When setting lengths for different bar code types by scanning single digit numbers, single digit numbers must always be preceded by a leading zero.

One Discrete Length - This option allows the scanner to decode only those Code 39 symbols containing a selected length. Lengths are selected from 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**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Code 39 - One Discrete Length

Two Discrete Lengths - This option allows the scanner to decode only those Code 39 symbols containing either of two selected lengths. Lengths are selected from the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select **Code 39 - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Code 39 - Two Discrete Lengths

Length Within Range - This option allows the scanner to decode a Code 39 symbol with a specific length range. The length range is selected from numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan **Code 39 - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Code 39 - Length Within Range

Any Length - This option allows the scanner to decode Code 39 symbols containing any number of characters within the scanner capability.



Code 39 - Any Length

Code 39 Check Digit Verification

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



Enable Code 39 Check Digit



***Disable Code 39 Check Digit**

Transmit Code 39 Check Digit

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



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



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

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

Code 39 Full ASCII Conversion

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



Enable Code 39 Full ASCII



***Disable Code 39 Full ASCII**

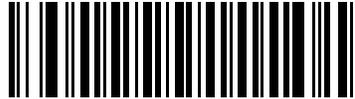
- ✓ **NOTE** Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously.

- ✓ **NOTE** Code 39 Full ASCII to Full ASCII Correlation is host-dependent, and is therefore described in the "ASCII Character Set" Table for the appropriate interface.

Code 93

Enable/Disable Code 93

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



Enable Code 93



*Disable Code 93

Set Lengths for Code 93

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

One Discrete Length - This option allows scanner to decode only those Code 93 symbols containing a selected length. Lengths are selected from 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**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Code 93 - One Discrete Length

Set Lengths for Code 93 (continued)

Two Discrete Lengths - This option allows the scanner to decode only those Code 93 symbols containing either of two selected lengths. Lengths are selected from the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those Code 93 symbols containing either 2 or 14 characters, select **Code 93 - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Code 93 - Two Discrete Lengths

Length Within Range - This option allows the scanner to decode a Code 93 symbol with a specific length range. The length range is selected from numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Code 93 symbols containing between 4 and 12 characters, first scan **Code 93 - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Code 93 - Length Within Range

Any Length - This option allows the scanner to decode Code 93 symbols containing any number of characters within the scanner's capability.



Code 93 - Any Length

Code 11

✓ **NOTE** If you need to scan Code 11 bar codes, first enable either [Convert Newer Code Types on page 5-4](#) or [Convert All Bar Codes to Code 39 on page 5-5](#) to allow data to transmit to the attached device.

Code 11

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



Enable Code 11



*Disable Code 11

Set Lengths for Code 11

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

One Discrete Length - This option allows the scanner to decode only those Code 11 symbols containing a selected length. Lengths are selected from 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**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Code 11 - One Discrete Length

Set Lengths for Code 11 (continued)

Two Discrete Lengths - This option allows the scanner to decode only those Code 11 symbols containing either of two selected lengths. Lengths are selected from the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those Code 11 symbols containing either 2 or 14 characters, select **Code 11 - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Code 11 - Two Discrete Lengths

Length Within Range - This option allows the scanner to decode a Code 11 symbol with a specific length range. The length range is selected from numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Code 11 symbols containing between 4 and 12 characters, first scan **Code 11 - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Code 11 - Length Within Range

Any Length - This option allows the scanner to decode Code 11 symbols containing any number of characters within the scanner capability.



Code 11 - Any Length

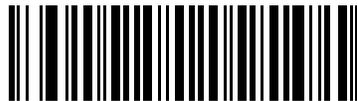
Code 11 Check Digit Verification

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

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



Disable



***One Check Digit**



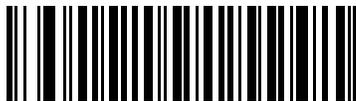
Two Check Digits

Transmit Code 11 Check Digits

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



Transmit Code 11 Check Digit(s)
(Enable)



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

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

Interleaved 2 of 5 (I 2 of 5)

Enable/Disable Interleaved 2 of 5

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



*Enable Interleaved 2 of 5



Disable Interleaved 2 of 5

Set Lengths for Interleaved 2 of 5

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

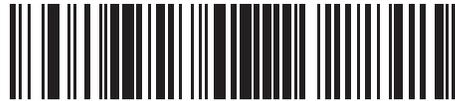
One Discrete Length - This option allows the scanner to decode only those I 2 of 5 symbols containing a selected length. Lengths are selected from the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only I 2 of 5 symbols with 14 characters, scan **I 2 of 5 - One Discrete Length**, then scan **1** followed by **4**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



I 2 of 5 - One Discrete Length

Set Lengths for Interleaved 2 of 5 (continued)

Two Discrete Lengths - This option allows the scanner to decode only those I 2 of 5 symbols containing either of two selected lengths. Lengths are selected from the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those I 2 of 5 symbols containing either 2 or 14 characters, select **I 2 of 5 - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



I 2 of 5 - Two Discrete Lengths

Length Within Range - This option allows the scanner to decode an I 2 of 5 symbol with a specific length range. The length range is selected from numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode I 2 of 5 symbols containing between 4 and 12 characters, first scan **I 2 of 5 - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). In case of an error, or to change the selection, scan [Cancel on page D-3](#).



I 2 of 5 - Length Within Range

Set Lengths for Interleaved 2 of 5 (continued)

Any Length - This option allows the scanner to decode I 2 of 5 symbols containing any number of characters within the scanner capability.

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



I 2 of 5 - Any Length

I 2 of 5 Check Digit Verification

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



*Disable



USS Check Digit



OPCC Check Digit

Transmit I 2 of 5 Check Digit

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



Transmit I 2 of 5 Check Digit
(Enable)



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

Convert I 2 of 5 to EAN-13

This parameter converts a 14 character I 2 of 5 code into EAN-13, and transmits to the host as EAN-13. In order 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.

Scanning a single bar code below, **Convert I 2 of 5 to EAN-13 (Enable)**, accomplishes this function.



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



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

Discrete 2 of 5 (D 2 of 5)

Enable/Disable Discrete 2 of 5

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



Enable Discrete 2 of 5



*Disable Discrete 2 of 5

Set Lengths for Discrete 2 of 5

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

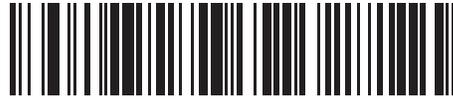
One Discrete Length - This option allows the scanner to decode only those D 2 of 5 symbols containing a selected length. Lengths are selected from the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only D 2 of 5 symbols with 14 characters, scan **D 2 of 5 - One Discrete Length**, then scan **1** followed by **4**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



D 2 of 5 - One Discrete Length

Set Lengths for Discrete 2 of 5 (continued)

Two Discrete Lengths - This option allows the scanner to decode only those D 2 of 5 symbols containing either of two selected lengths. Lengths are selected from the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those D 2 of 5 symbols containing either 2 or 14 characters, select **D 2 of 5 - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



D 2 of 5 - Two Discrete Lengths

Length Within Range - This option allows the scanner to decode an D 2 of 5 symbol with a specific length range. The length range is selected from numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode D 2 of 5 symbols containing between 4 and 12 characters, first scan **D 2 of 5 - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). In case of an error, or to change the selection, scan [Cancel on page D-3](#).



D 2 of 5 - Length Within Range

Any Length - This option allows the scanner to decode D 2 of 5 symbols containing any number of characters within the scanner capability.

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



D 2 of 5 - Any Length

Codabar (NW - 7)

Enable/Disable Codabar

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



Enable Codabar



*Disable Codabar

Set Lengths for Codabar

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

One Discrete Length - This option allows the scanner to decode only those Codabar symbols containing a selected length. Lengths are selected from 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**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Codabar - One Discrete Length

Two Discrete Lengths - This option allows the scanner to decode only those Codabar symbols containing either of two selected lengths. Lengths are selected from the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those Codabar symbols containing either 2 or 14 characters, select **Codabar - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Codabar - Two Discrete Lengths

Set Lengths for Codabar (continued)

Length Within Range - This option allows the scanner to decode a Codabar symbol with a specific length range. The length range is selected from numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode Codabar symbols containing between 4 and 12 characters, first scan **Codabar - Length Within Range**. Then scan **0, 4, 1, and 2** (single digit numbers must always be preceded by a leading zero). In case of an error, or to change the selection, scan [Cancel on page D-3](#).



Codabar - Length Within Range

Any Length - This option allows the scanner to decode Codabar symbols containing any number of characters within the scanner capability.

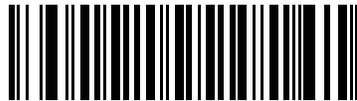


Codabar - Any Length

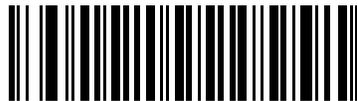
CLSI Editing

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

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



Enable CLSI Editing



*Disable CLSI Editing

NOTIS Editing

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



Enable NOTIS Editing



*Disable NOTIS Editing

MSI

Enable/Disable MSI

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



Enable MSI



*Disable MSI

Set Lengths for MSI

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

One Discrete Length - This option allows the scanner to decode only those MSI symbols containing a selected length. Lengths are selected from 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**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



MSI - One Discrete Length

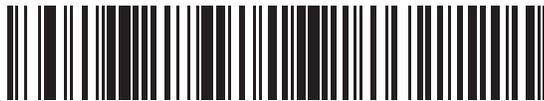
Set Lengths for MSI (continued)

Two Discrete Lengths - This option allows the scanner to decode only those MSI symbols containing either of two selected lengths. Lengths are selected from the numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode only those MSI symbols containing either 2 or 14 characters, select **MSI - Two Discrete Lengths**, then scan **0, 2, 1**, and then **4**. In case of an error, or to change the selection, scan [Cancel on page D-3](#).



MSI - Two Discrete Lengths

Length Within Range - This option allows the scanner to decode an MSI symbol with a specific length range. The length range is selected from numeric bar codes in [Appendix D, Numeric Bar Codes](#). For example, to decode MSI symbols containing between 4 and 12 characters, first scan **MSI - Length Within Range**. Then scan **0, 4, 1**, and **2** (single digit numbers must always be preceded by a leading zero). In case of an error, or to change the selection, scan [Cancel on page D-3](#).



MSI - Length Within Range

Any Length - This option allows the scanner to decode MSI symbols containing any number of characters within the scanner capability.

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



MSI - Any Length

MSI Check Digits

With MSI symbols, one check digit is mandatory and always verified by the reader. The second check digit is optional. If the MSI codes include two check digits, enable the verification of the second check digit by scanning the bar code below.

See [MSI Check Digit Algorithm on page 6-44](#) for the selection of second digit algorithms.



***One MSI Check Digit**



Two MSI Check Digits

Transmit MSI Check Digit(s)

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



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



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

MSI Check Digit Algorithm

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



MOD 10/MOD 11



***MOD 10/MOD 10**

RSS (Reduced Space Symbology)

✓ **NOTE** If you need to scan RSS bar codes, first enable either [Convert Newer Code Types on page 5-4](#) or [Convert All Bar Codes to Code 39 on page 5-5](#) to allow data to transmit to the attached device.

RSS

The variants of RSS are RSS 14, RSS Expanded, and RSS Limited. The limited and expanded versions have stacked variants. Scan the appropriate bar code below to enable or disable each variant of RSS.

RSS 14



Enable RSS 14



*Disable RSS 14

RSS Limited

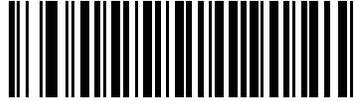


Enable RSS Limited



*Disable RSS Limited

RSS Expanded



Enable RSS Expanded



*Disable RSS Expanded

Convert RSS to UPC/EAN

This parameter only applies to RSS-14 and RSS Limited symbols not decoded as part of a Composite symbol. When this conversion is enabled, RSS-14 and RSS Limited symbols encoding a single zero as the first digit have the leading '010' stripped and the bar code reported as EAN-13.

Bar codes beginning with two or more zeros but not six zeros have the leading '0100' stripped and the bar code reported as UPC-A. The UPC-A Preamble parameter to transmit 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 RSS to UPC/EAN



*Disable Convert RSS to UPC/EAN

Redundancy Level

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

Select the redundancy level appropriate for the bar code quality.

Redundancy Level 1

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

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



*Redundancy Level 1

Redundancy Level 2

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

Code Type	Code Length
All	All



Redundancy Level 2

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 3

Redundancy Level 4

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

Code Type	Code Length
All	All



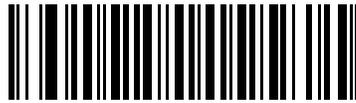
Redundancy Level 4

Security Level

The scanner offers four levels of decode security for UPC/EAN bar codes. Increasing levels of security are provided for decreasing levels of bar code quality. There is an inverse relationship between security and scanner decode speed, so be sure to choose only that level of security necessary for any given application.

Security Level 0

This is the default setting which allows the scanner to operate fastest, while providing sufficient security in decoding "in-spec" UPC/EAN bar codes.



*Security Level 0

Security Level 1

As bar code quality levels diminish, certain characters become prone to misdecodes before others (i.e., 1, 2, 7, 8). If the scanner is misdecoding poorly printed bar codes, and the misdecodes are limited to these characters, select this security level.



Security Level 1

Security Level 2

If the scanner is misdecoding poorly printed bar codes, and the misdecodes are not limited to characters 1, 2, 7, and 8, select this security level.



Security Level 2

Security Level 3

If Security Level 2 has been tried, and the scanner is still misdecoding, select this security level. Be advised, selecting this option is an extreme measure against misdecoding severely out of spec bar codes. Selection of this level of security may significantly impair the decoding ability of the scanner. If this level of security is necessary, try to improve the quality of the bar codes.



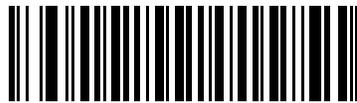
Security Level 3

Bi-directional Redundancy

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



Enable Bi-directional Redundancy



***Disable Bi-directional Redundancy**

Report Version

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



Introduction

This chapter includes commonly used bar codes to customize how the data is transmitted to the host device. In addition to these bar codes for data formatting, see each host chapter for the appropriate host connections and host device features for the scanner. See [Chapter 6, Symbologies](#) for customizing data for transmission to the host device.

Before programming, follow the instructions in [Chapter 1, Getting Started](#).

The scanner is shipped with the settings shown in the [Miscellaneous Scanner Options Default Table on page 7-2](#) (also see [Appendix A, Standard Defaults](#) for all host device and miscellaneous scanner defaults). If the default values suit the requirements, programming may not be necessary. Features values are set by scanning single bar codes or short bar code sequences.

Scanning Sequence Examples

In most cases, only one bar code needs to be scanned to set a specific parameter value.

Parameters, such as **Prefix Value**, require that several bar codes be scanned in the proper sequence. See each individual parameter for descriptions of this procedure.

Errors While Scanning

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

Miscellaneous Default Parameters

Table 7-1 lists the defaults for miscellaneous scanner options parameters. To change any option, scan the appropriate bar code(s) provided in the Miscellaneous Scanner Parameters section beginning on [page 7-3](#).

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

Table 7-1 *Miscellaneous Scanner Options Default Table*

Parameter	Default	Page Number
Miscellaneous Scanner Options		
Transmit Code ID Character	None	7-3
Scan Angle	Normal Angle	7-4

Miscellaneous Scanner Parameters

Transmit Code ID Character

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

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

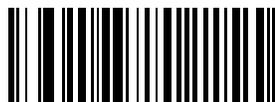
✓ **NOTE** This parameter only functions if you enable [Convert All Bar Codes to Code 39 on page 5-5](#).



Symbol Code ID Character



AIM Code ID Character



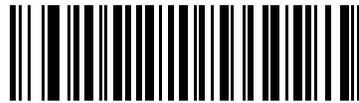
*None

Scan Angle

The scanner supports two scan angles. This parameter provides two options for the length of the laser scanning beam. Use the bar codes below to change scan angles.



***Normal Angle**



Alternate Angle

Table A-1 Standard Default Parameters Table

Parameter	Default	Page Number
User Preferences		
Set Default Parameter	All Defaults	4-3
Beeper Tone	High	4-3
Beeper Volume	High	4-4
Power Mode	Reduced Power	4-4
Laser On Time	3.0 sec	4-5
Beep After Good Decode	Disable	4-6
Trigger Mode	Level	4-6
Aim Duration	0.0 sec	4-7
Scanner Emulation Host Parameters		
Convert Newer Code Types	Convert Newer Code Types	5-4
Module Width	50 μ s Module Width	5-4
Convert All Bar Codes to Code 39	Disable	5-5
Code 39 Full ASCII Conversion	Disable	5-5
Transmission Timeout	3 seconds	5-6
Ignore Unknown Characters	Ignore Unknown Characters	5-7
Leading Margin	2 ms	5-8
UPC/EAN		
UPC-A	Enable	6-5

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

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Default	Page Number
UPC-E	Enable	6-5
UPC-E1	Disable	6-6
EAN-13/JAN 13	Enable	6-6
EAN-8/JAN 8	Enable	6-7
Bookland EAN	Disable	6-7
Decode UPC/EAN/JAN Supplementals (2 and 5 digits)	Ignore Supplementals	6-8
UPC/EAN/JAN Supplemental Redundancy	14	6-10
Transmit UPC-A Check Digit	Enable	6-10
Transmit UPC-E Check Digit	Enable	6-10
Transmit UPC-E1 Check Digit	Enable	6-10
UPC-A Preamble	System Character	6-12
UPC-E Preamble	System Character	6-13
UPC-E1 Preamble	System Character	6-14
Convert UPC-E to A	Disable	6-15
Convert UPC-E1 to A	Disable	6-16
EAN-8/JAN-8 Extend	Disable	6-17
Code 128		
Code 128	Enable	6-17
UCC/EAN-128	Enable	6-18
ISBT 128	Enable	6-18
Code 39		
Code 39	Enable	6-19
Trioptic Code 39	Disable	6-19
Convert Code 39 to Code 32	Disable	6-20
Code 32 Prefix	Disable	6-21
Set Length(s) for Code 39	2 to 55	6-22
Code 39 Check Digit Verification	Disable	6-23
Transmit Code 39 Check Digit	Disable	6-24

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

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Default	Page Number
Code 39 Full ASCII Conversion	Disable	6-25
Code 93		
Code 93	Disable	6-26
Set Lengths for Code 93	4 to 55	6-26
Code 11		
Code 11	Disable	6-28
Set Lengths for Code 11	4 to 41	6-28
Code 11 Check Digit Verification	One Check Digit	6-30
Transmit Code 11 Check Digits	Disable	6-31
Interleaved 2 of 5 (I 2 of 5)		
Interleaved 2 of 5 (I 2 of 5)	Enable	6-32
Set Lengths for Interleaved 2 of 5	14	6-32
I 2 of 5 Check Digit Verification	Disable	6-34
Transmit I 2 of 5 Check Digit	Disable	6-35
Convert I 2 of 5 to EAN-13	Disable	6-35
Discrete 2 of 5 (D 2 of 5)		
Discrete 2 of 5	Disable	6-36
Set Lengths for D 2 of 5	12	6-36
Codabar (NW - 7)		
Codabar	Disable	6-38
Set Lengths for Codabar	5 to 55	6-38
CLSI Editing	Disable	6-40
NOTIS Editing	Disable	6-40
MSI		
MSI	Disable	6-41
Set Lengths for MSI	6 to 55	6-41
MSI Check Digits	One	6-43
Transmit MSI Check Digit(s)	Disable	6-43
MSI Check Digit Algorithm	Mod 10/Mod 10	6-44
¹ User selection is required to configure this interface and this is the most common selection.		

Table A-1 Standard Default Parameters Table (Continued)

Parameter	Default	Page Number
RSS (Reduced Space Symbology)		
RSS 14	Disable	6-45
RSS Limited	Disable	6-45
RSS Expanded	Disable	6-46
Convert RSS to UPC/EAN	Disable	6-46
Symbology - Specific Security Levels		
Redundancy Level	1	6-47
Security Levels	0	6-49
Bi-directional Redundancy	Disable	6-50
Report Version		6-50
Miscellaneous Scanner Options		
Transmit Code ID Character	None	7-3
Scan Angle	Normal Angle	7-4
¹ User selection is required to configure this interface and this is the most common selection.		

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
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	UCC/EAN-128
L	Bookland EAN
M	Trioptic Code 39
R	RSS Family

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
E	UPC/EAN
e	RSS Family
F	Codabar
G	Code 93
H	Code 11
I	Interleaved 2 of 5
M	MSI
S	Discrete 2 of 5, IATA 2 of 5
X	Code 39 Trioptic
X	Bookland EAN

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 JA7AIMID 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 JX0412356	
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 JC1AIMID	
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 JIO4123	
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 JF04123	
Code 93	0	No options specified at this time. Always transmit 0.
	Example: A Code 93 bar code 012345678905 is transmitted as JG0012345678905	

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 JM1 4123	
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 JS0 4123	
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 JE000 12345678905	
Bookland EAN	0	No options specified at this time. Always transmit 0.
	Example: A Bookland EAN bar code 123456789X is transmitted as JX0 123456789X	
Code 11	0	Single check digit
	1	Two check digits
	3	Check characters validated but not transmitted.

UPC-A



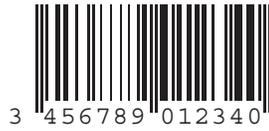
UPC-E



UPC-E1



EAN-13



EAN-8



Code 39



Trioptic Code 39



Code 93



Code 11



Codabar



MSI



Interleaved 2 of 5



0, 1, 2

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



0



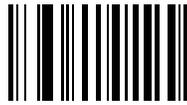
1



2

3, 4, 5, 6

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



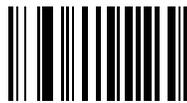
3



4



5



6

7, 8, 9

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



7



8



9

Cancel

In case of an error or to change the selection, scan the bar code below.



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