PRODUCT REFERENCE GUIDE

Wasp DuraLine Industrial Scanner

WASP WLS 8400 ER/FZ SERIES

Wasp TECHNOLOGIES

www.waspbarcode.com

WLS 8400
Product Reference Guide

February 2005

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Introduction

The *WLS 8400 Product Reference Guide* provides general instructions for setting up, operating, maintaining, and troubleshooting the scanner. The WLS 8400 includes the following variations of the scanner:

- WLS8400FZ: 1-D scanning
- WLS8400ER: extended range 1-D scanning.

Chapter Descriptions

- *Chapter 1, Getting Started* provides a product overview and unpacking instructions.
- *Chapter 2, Scanning* describes parts of the scanner, beeper and LED definitions, and how to use the scanner in hand-held and hands-free modes.
- *Chapter 3, Maintenance and Technical Specifications* provides information on how to care for the scanner, troubleshooting, and technical specifications.
- *Chapter 4, User Preferences* provides the programming bar codes necessary for selecting user preference features for the scanner.
- *Chapter 5, Keyboard Wedge Interface* provides information for setting up the scanner for Keyboard Wedge operation.
- *Chapter 6, RS-232 Interface* provides information for setting up the scanner for RS-232 operation.
- *Chapter 7, USB Interface* provides information for setting up the scanner for USB operation.
- *Chapter 8, Symbologies* describes all symbology features and provides the programming bar codes necessary for selecting these features for the scanner.
- *Chapter 9, Miscellaneous Scanner Options* includes commonly used bar codes to customize how the data is transmitted to the host device.
- *Chapter 10, Advanced Data Formatting* (ADF) describes how to customize scanned data before transmitting to the host.
- *Appendix A, Standard Default Parameters* provides a table of all host devices and miscellaneous scanner defaults.
- *Appendix B, Programming Reference* provides a table of AIM code identifiers, ASCII character conversions, and keyboard maps.
- *Appendix C, Sample Bar Codes* includes sample bar codes.

- *Appendix D, Numeric Bar Codes* includes the numeric bar codes to scan for parameters requiring specific numeric values.

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

Related Publications

The *WLS 8400 Quick Start Guide* provides general information to help the user get started with the scanner. It includes basic set-up and operation instructions.

For the latest versions of the *WLS 8400 Quick Start Guide* and *the WLS 8400 Product Reference Guide* go to: http://www.waspbarcode.com.

Service Information

If there is a problem with the equipment, contact the local *Wasp Support*. See page xvii for contact information. Before calling, have the model number, serial number, and several of the bar code symbols at hand.

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

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

Note

Wasp 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 Wasp Technologies to request another container.

Wasp Support

For service information, warranty information or technical assistance contact or call Wasp Support at:

1400 10th Street
Plano, TX 75074
214-547-4100

1

Getting Started

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Introduction

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

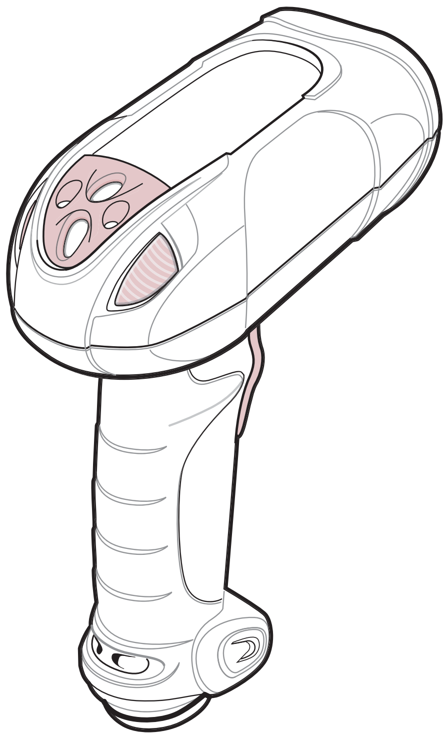


Figure 1-1. WLS 8400 Scanner

This scanner supports:

- Standard RS-232 connection to a host.
- Keyboard Wedge connection to a host, where scanned data is interpreted keystrokes. The following international keyboards are supported (for Windows™ environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Japanese, and Brazilian-Portuguese.

- USB connection to a host. The scanner autodetects a USB host and defaults to the HID keyboard interface type. Other USB interface types may be selected by scanning programming bar codes. The following international keyboards are supported (for Windows™ environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Japanese, and Brazilian-Portuguese.

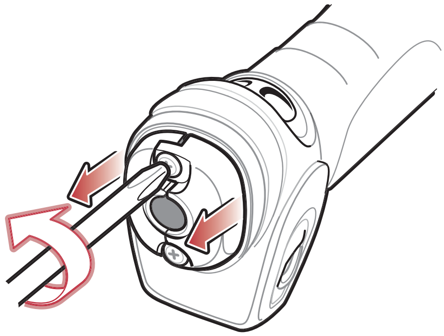
Unpacking the Scanner

Remove the scanner from its packing and inspect it for damage. If the scanner was damaged in transit, call *Wasp Support* at one of the telephone numbers listed on page xvii. **KEEP THE PACKING**. It is the approved shipping container and should be used if the equipment ever needs to be returned for servicing.

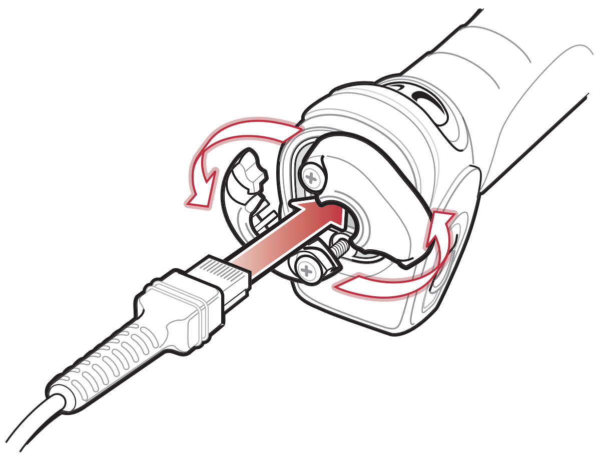
Setting Up the Scanner

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.

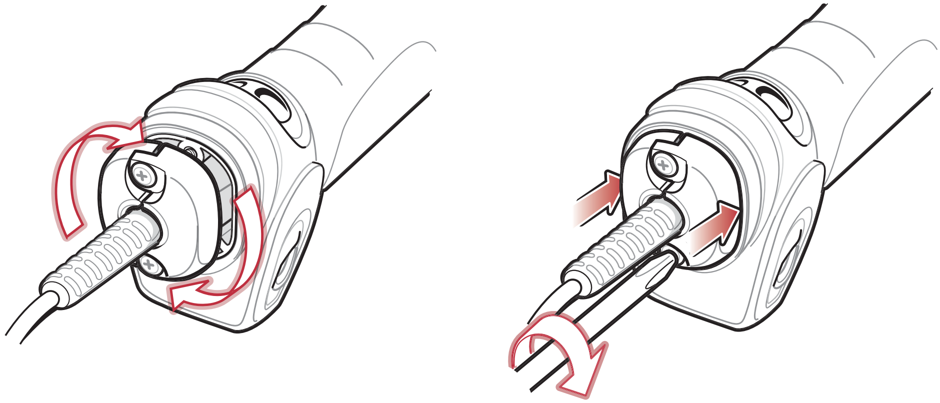


2. Open the clamp and plug the interface cable modular connector into the cable interface port on the bottom of the scanner handle.



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.



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.

Connecting Power (if required)

If the host does not provide power to the scanner, an external power connection is required to power the scanner. To connect power:

1. Connect the interface cable to the bottom of the scanner, as described in *Installing the Interface Cable on page 1-5*.
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.

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 1-5* to connect a new cable.

Configuring the Scanner

Use the bar codes included in this manual to configure the scanner. See *Chapter 4, User Preferences* and each host chapter for information about programming the scanner using bar code menus.

2

Scanning

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Introduction

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

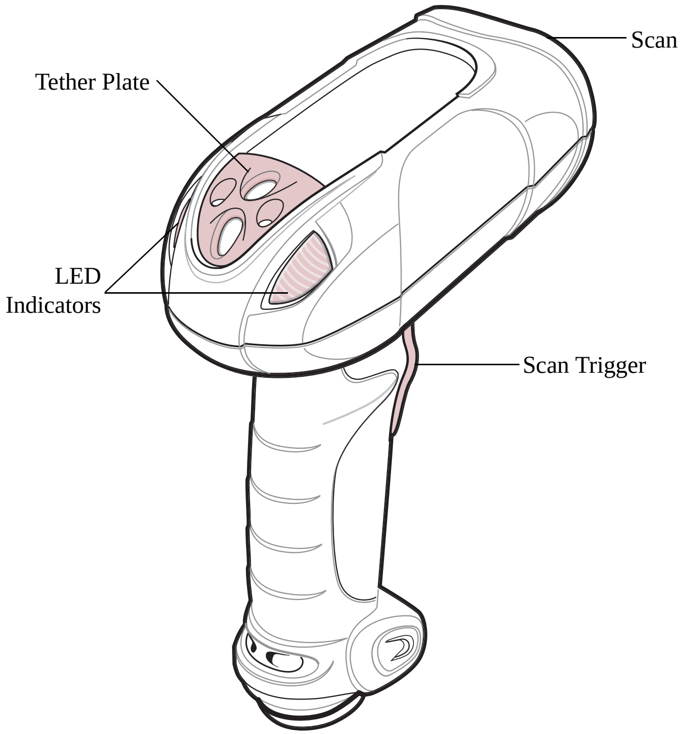


Figure 2-1. Parts

Beeper Definitions

The 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	
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 was detected in a scanned symbol. The data is ignored.
5 long low beeps	Conversion or format error.
Short high/short high/short high/long low beep sequence	RS-232 receive error.
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 4-5*.
USB only	
4 short high beeps	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 scanner can operate at the highest power level.
Short low/short medium/short high beep sequence occurs more than once.	The USB bus may put the scanner in a state where power to the scanner is cycled on and off more than once. This is normal and usually happens when the PC cold boots.

Table 2-1. Standard Beeper Definitions (Continued)

Beeper Sequence	Indication
RS-232 only	
1 short high beep	A <BEL> character is received and Beep on <BEL> is enabled.

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 1-5*). For assistance, contact the local supplier or *Wasp Support*.

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.

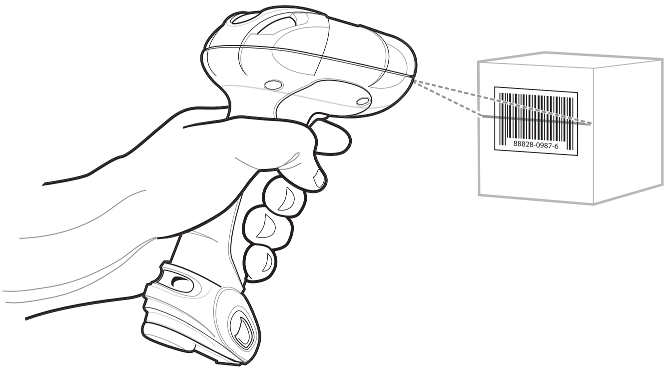
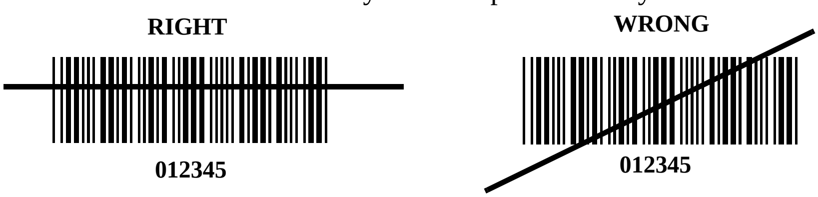


Figure 2-2. Scanning in Hand-Held Mode

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.

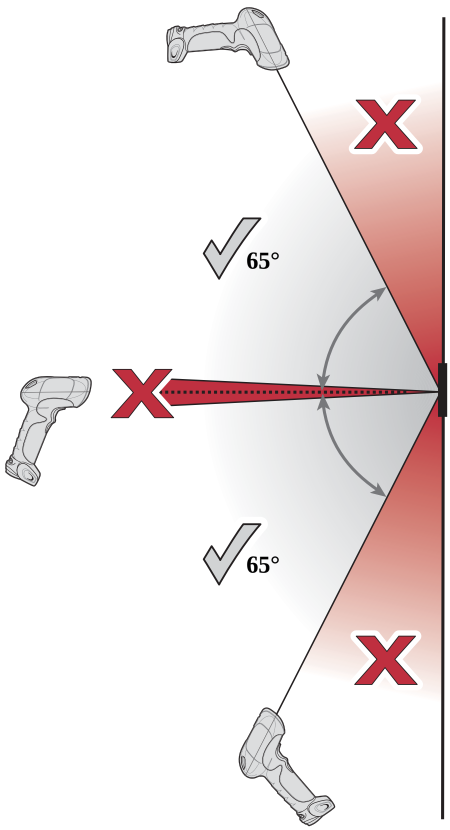


Figure 2-3. Optimum Scan Angles

Scanning in Hands-Free Mode

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

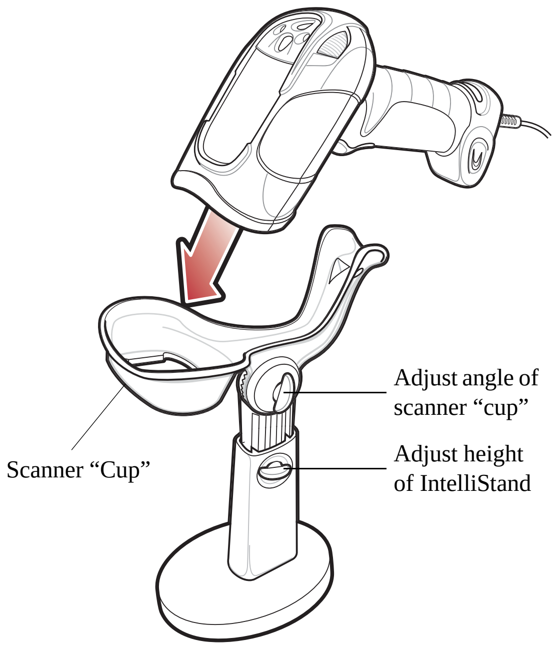


Figure 2-4. Inserting the Scanner in the IntelliStand

To operate the scanner in the IntelliStand:

1. Ensure the scanner is properly connected to the host (see the appropriate host chapter for information on host connections).
2. Insert the scanner into the IntelliStand by placing the front of the scanner into the stand's "cup" (see Figure 2-4).
3. To scan a bar code, present the bar code and ensure the scan line crosses every bar and space of the symbol.
4. 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.

Decode Zone

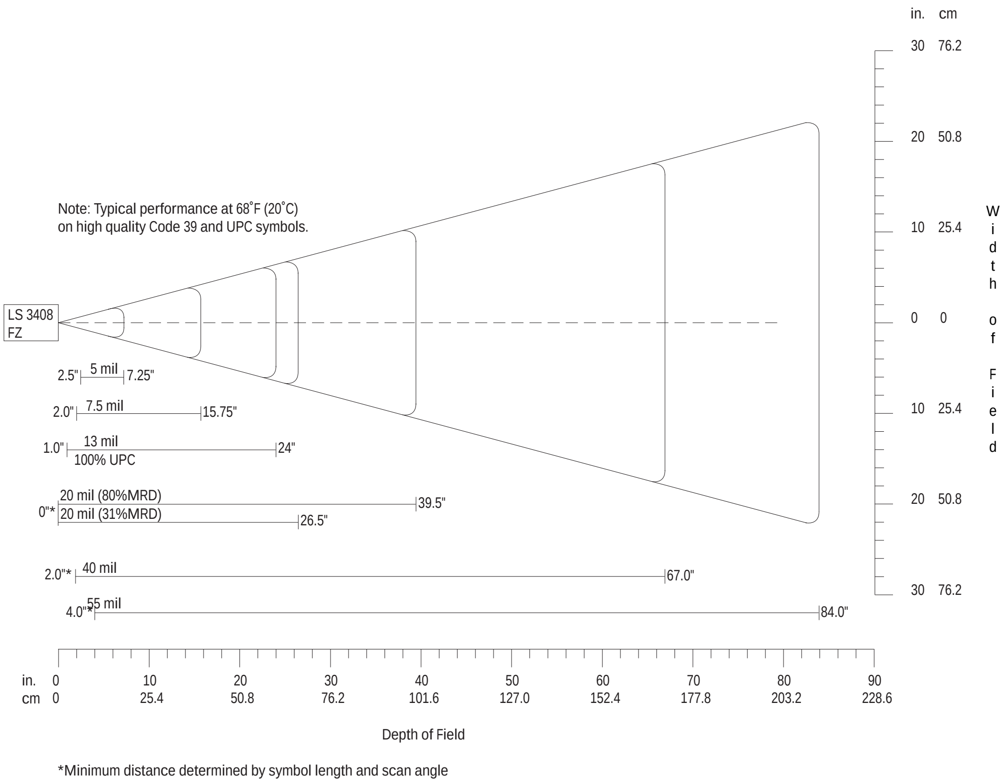
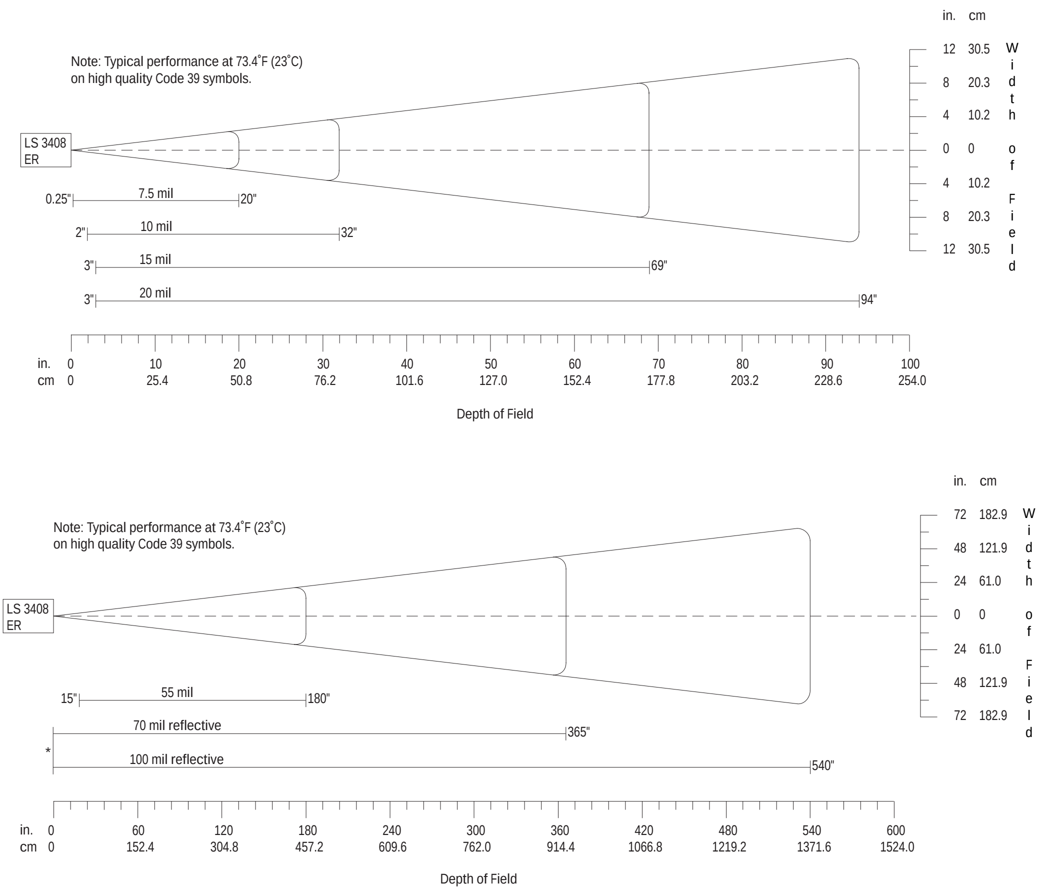


Figure 2-5. WLS 8400FZ Decode Zone



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

Figure 2-6. WLS 8400ER Decode Zone

3

Maintenance and Technical Specifications

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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.
	Incorrect host interface cable is used.	Ensure that correct host interface cable is used.
	Interface/power cables are loose.	Ensure all cable connections are secure.
	Scanner is disabled.	For Simple Serial Interface (SSI), enable the 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.
Scanner emits short low/short medium/short high beep sequence more than once.	The USB bus may put the scanner in a state where power to the scanner is cycled on and off more than once.	Normal during host reset.
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.

Table 3-1. Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
Scanner emits 4 short high beeps while attempting to scan.	Scanner has not completed USB initialization.	Wait several seconds and scan again.
Bar code is decoded, but data is not transmitted to the host.	Scanner is not programmed for the correct host type.	Scan the appropriate host parameter bar codes.
	Interface cable is loose.	Ensure all cable connections are secure.
	If 4 long low beeps are heard, a transmission error was detected.	Ensure the scanner's communication parameters match the host's setting.
	If 5 long low beeps are heard, a conversion or format error was detected.	Ensure the scanner's conversion parameters are properly configured.
Scanned data is incorrectly displayed on the host.	Scanner is not programmed to work with the host.	Ensure proper host is selected.
		For RS-232, ensure the scanner's communication parameters match the host's settings.
		For a Keyboard Wedge configuration, ensure the system is programmed for the correct keyboard type, and the CAPS LOCK key is off.
		Ensure editing options (e.g., UPC-E to UPC-A conversion) are properly programmed.
Scanner emits short high/short high/short high/long low beep sequence when it is not in use.	RS-232 receive error.	Normal during host reset. Otherwise, ensure the scanner's RS-232 parity setting matches the host setting.
Scanner emits long low/long high beep sequence while it is being programming.	Input error or ’Cancel’ bar code is scanned.	Ensure the correct numeric bar codes, that are within range for the parameter that is being programmed, are being scanned.
Scanner emits short low/short high/short low/short high beep sequence while it is being programming.	Out of ADF parameter storage space.	Erase all rules and re-program with shorter rules.

Table 3-1. Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
Scanner emits a short low/short medium/short high beep sequence after changing USB host type.	The USB bus re-establishes power to the scanner.	Normal when the USB host type is changed.
Scanner emits 1 short high beep when it is not in use.	In RS-232 mode, a <BEL> character is received and Beep on <BEL> option is enabled.	Normal when Beep on <BEL> is enabled and the scanner is in RS-232 mode.

If after performing these checks the symbol still does not decode, contact the distributor or call Wasp Support. See page xvii for the telephone number.

Technical Specifications

Table 3-2. Technical Specifications

Item	Description	
	WLS 8400FZ	**WLS 8400ER**
Power Requirements	4.5 - 14VDC	
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)

Table 3-2. Technical Specifications (Continued)

Item	Description	
	WLS 8400FZ	**WLS 8400ER**
Dimensions: Height Width Depth	 7.34 in. (18.65 cm) 4.82 in. (12.25 cm) 2.93 in. (7.43 cm)	
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	Keyboard Wedge, RS-232, USB	
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

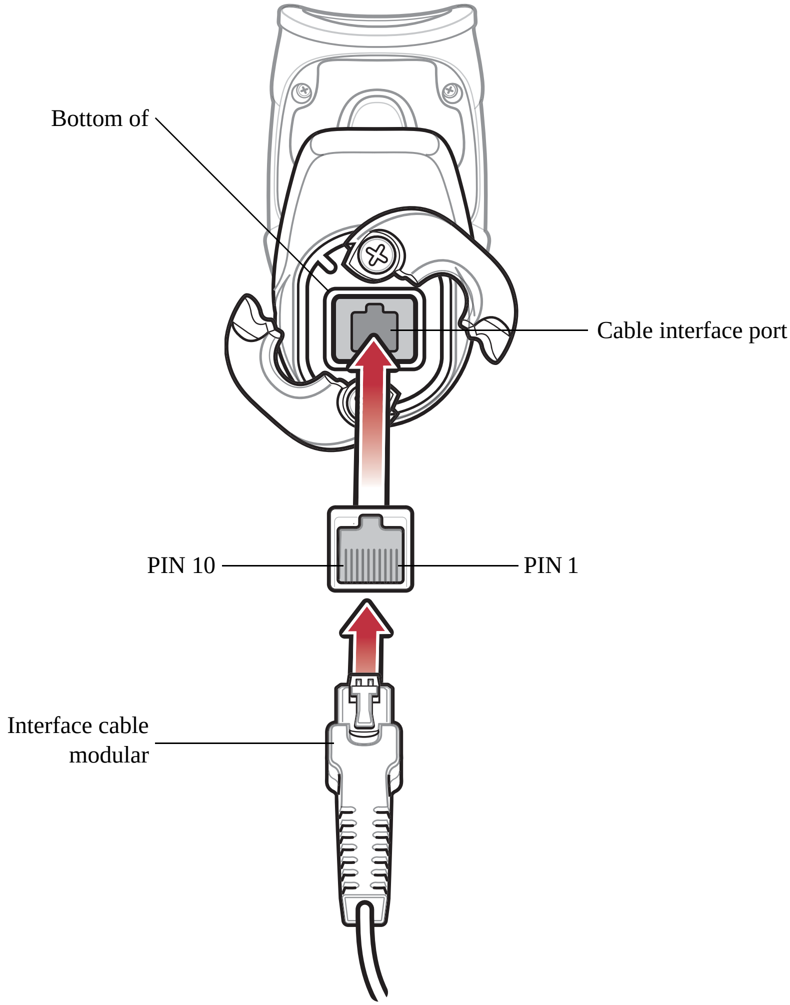

Figure 3-1. Scanner Cable Pinouts

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	RS-232	Keyboard Wedge	USB
1	Reserved	Reserved	Jump to Pin 6
2	Power	Power	Power
3	Ground	Ground	Ground
4	TxD	KeyClock	Reserved
5	RxD	TermData	D +
6	RTS	KeyData	Jump to Pin 1
7	CTS	TermClock	D -
8	Reserved	Reserved	Reserved
9	Reserved	Reserved	Reserved
10	Reserved	Reserved	Reserved

4

User Preferences

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Introduction

The scanner can be programed 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 4-4* (also see *Chapter A, Standard Default Parameters* 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.

If the USB cable is not being used, select a host type (see each host chapter for specific host information). After hearing the power-up beeps, select a host type. This only needs to be done once, upon the first power-up when connected to a new host.

To return all features to their default values, scan the *Set All Defaults* bar code on page 4-5. 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 4-5*. 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** or setting **Data Transmission Formats**, require that several bar codes be scanned. See *Laser On Time* on page 4-7 and *Scan Data Transmission Format on page 9-7* for descriptions 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 the User Preferences section beginning on page 4-5.

Note: See *Chapter A, Standard Default Parameters* 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	4-5
Beeper Tone	High	4-5
Beeper Volume	High	4-6
Power Mode	Continuous On	4-7
Laser On Time	3.0 sec	4-7
Beep After Good Decode	Enable	4-8
Trigger Mode	Level	4-8
Aim Duration	0.0 sec	4-10

User Preferences

Set Default Parameter

Scanning this bar code returns all parameters to the default values listed in *Table A-1 on page A-3*.

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 beginning on page D-1 in *Chapter 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-7.

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.

***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 4-8* 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 the ‘Cancel’ bar code on *page D-7*.

Aim Duration

5

Keyboard Wedge Interface

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Introduction

This chapter provides Keyboard Wedge interface information for setting up the scanner. This interface type is used to attach the scanner between the keyboard and host computer. The scanner translates the bar code data into keystrokes. The host computer accepts the keystrokes as if they originate from the keyboard.

This mode of operation allows adding bar code reading functionality to a system designed for manual keyboard input. In this mode, the keyboard keystrokes are simply passed through.

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

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

Connecting a Keyboard Wedge Interface

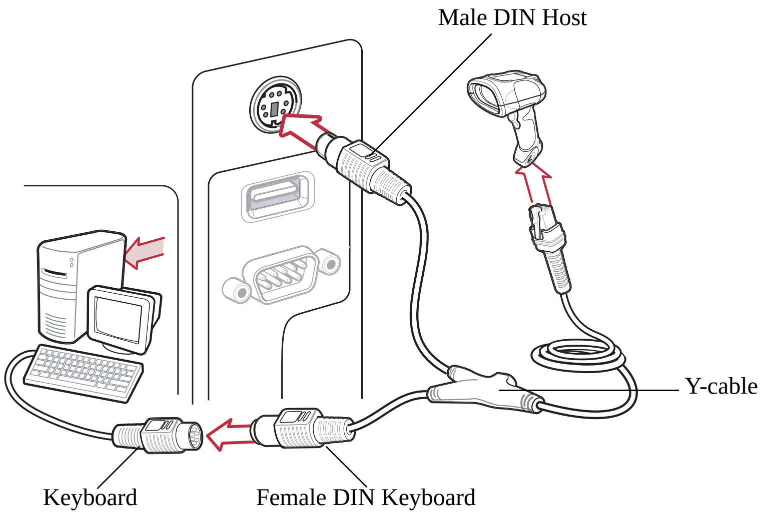

Figure 5-1. Keyboard Wedge Interface Connection with Y-cable

To connect the keyboard wedge interface Y-cable:

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. 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 scanner. (See *Installing the Interface Cable on page 1-5*.)
3. Connect the round male DIN host connector of the Y-cable to the keyboard port on the host.
4. Connect the round female DIN keyboard connector of the Y-cable to the keyboard connector.
5. If required, 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 the *Keyboard Wedge Host Types* section on *page 5-7*.
9. To modify any other parameter options, scan the appropriate bar codes in this chapter.

Keyboard Wedge Default Parameters

Table 5-1 lists the defaults for Keyboard Wedge host parameters. To change any option, scan the appropriate bar code(s) provided in the Keyboard Wedge Host Parameters section beginning on page 5-7.

Note

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

Table 5-1. Keyboard Wedge Host Default Table

Parameter	Default	Page Number
Keyboard Wedge Host Parameters		
Keyboard Wedge Host Type	IBM PC/AT& IBM PC Compatibles	5-7
Keyboard Wedge Country Types (Country Codes)	North American	5-8
Ignore Unknown Characters	Enable	5-10
Keystroke Delay	0 msec (No Delay)	5-10
Intra-Keystroke Delay	Disable	5-11
Alternate Numeric Keypad Emulation	Disable	5-12
Caps Lock On	Disable	5-12
Caps Lock Override	Disable	5-13
Convert Wedge Data	Do Not Convert Wedge Data	5-14
Function Key Mapping	Disable	5-15

Table 5-1. Keyboard Wedge Host Default Table (Continued)

Parameter	Default	Page Number
FN1 Substitution	Disable	5-15
Send Make and Break	Send Make and Break Scan Codes	5-15

Keyboard Wedge Host Types

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

IBM XT

NCR 7052

Keyboard Wedge Country Types (Country Codes)

Scan the bar code corresponding to the keyboard type. If the particular keyboard type is not listed, see *Alternate Numeric Keypad Emulation on page 5-12*.

***North American**

German Windows

French Windows

French Canadian Windows 95/98

French Canadian Windows XP/2000

Keyboard Wedge Country Types (Country Codes) (continued)

Spanish Windows

Italian Windows

Swedish Windows

UK English Windows

Japanese Windows

Brazilian-Portuguese Windows

Ignore Unknown Characters

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

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

Do Not Send Bar Codes with Unknown Characters
(Disable)

Keystroke Delay

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

***0 msec (No Delay)**

20 msec (Medium Delay)

Keystroke Delay (continued)

40 msec (Long Delay)

Intra-Keystroke Delay

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

Enable Intra-Keystroke Delay

***Disable Intra-Keystroke Delay**

Alternate Numeric Keypad Emulation

This allows emulation of most other country keyboard types not listed in *Keyboard Wedge Country Types (Country Codes) on page 5-8* in a Microsoft® operating system environment.

Enable Alternate Numeric Keypad

***Disable Alternate Numeric Keypad**

Caps Lock On

When enabled, the scanner emulates keystrokes as if the Caps Lock key is always pressed.

Enable Caps Lock On

***Disable Caps Lock On**

Caps Lock Override

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

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

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

Convert Wedge Data to Upper Case

Convert Wedge Data to Lower Case

***Do Not Convert Wedge Data**

Function Key Mapping

ASCII values under 32 are normally sent as control key sequences (see *Table 5-2 on page 5-19*). When this parameter is enabled, the keys in bold are sent in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.

Enable Function Key Mapping

***Disable Function Key Mapping**

FN1 Substitution

When enabled, this parameter allows replacement of any FN1 characters in an EAN128 bar code with a keystroke chosen by the user. (see *FN1 Substitution Values on page 9-9*).

Enable FN1 Substitution

***Disable FN1 Substitution**

Send Make and Break

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

***Send Make and Break Scan Codes**

Send Make Scan Code Only

Keyboard Maps

The following keyboard maps are provided for prefix/suffix keystroke parameters. To program the prefix/suffix values, see the bar codes on page 9-6.

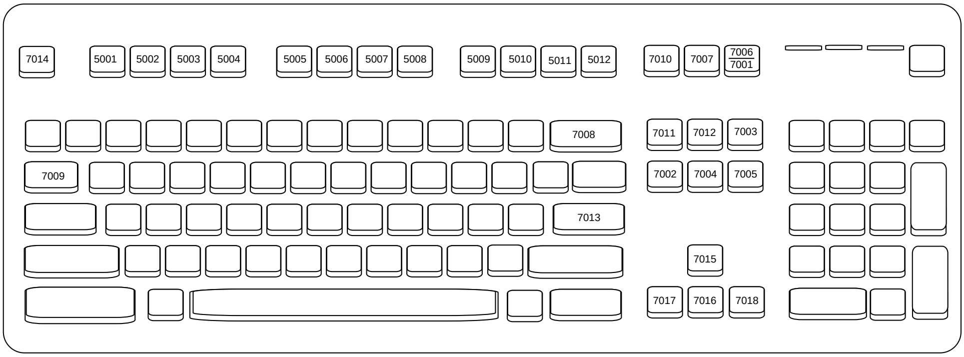

Figure 5-2. IBM PS2 Type Keyboard

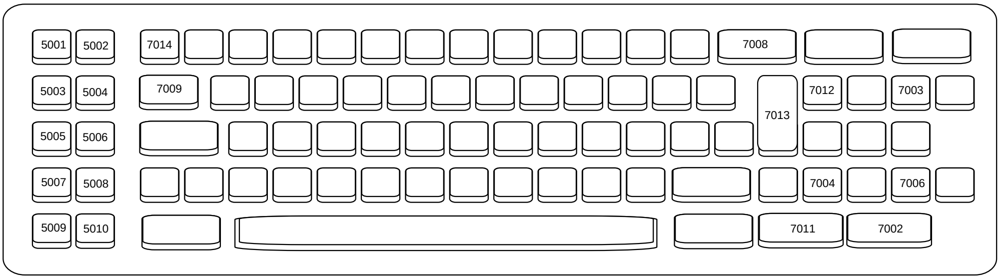

Figure 5-3. IBM PC/XT

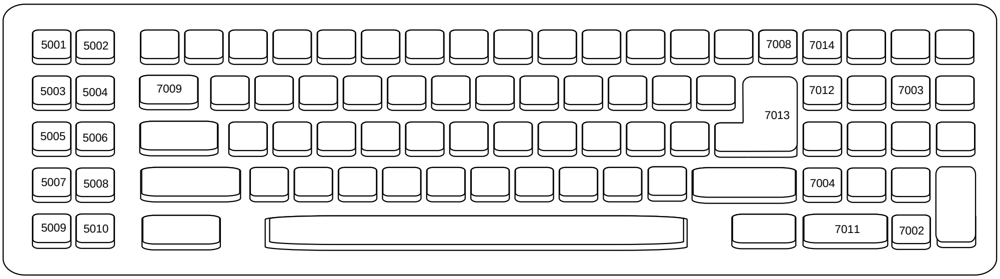

Figure 5-4. IBM PC/AT

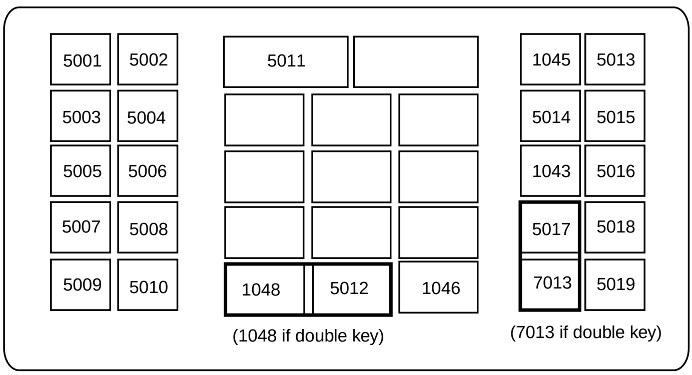

Figure 5-5. NCR 7052 32-KEY

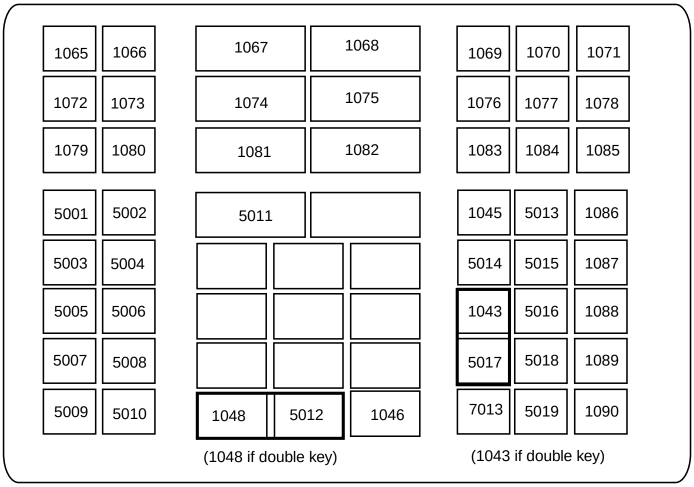

Figure 5-6. NCR 7052 58-KEY

ASCII Character Set

Note

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

Table 5-2. 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

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

Table 5-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
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 [/**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	)

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

Table 5-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
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
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A

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

Table 5-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
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
1087	W	W
1088	X	X
1089	Y	Y

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

Table 5-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
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

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

Table 5-2. Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
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	~

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

Table 5-3. 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
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 5-4. 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
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

Table 5-4. Keyboard Wedge GUI Key Character Set (Continued)

GUI Keys	Keystrokes
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 5-5. 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

Table 5-5. Keyboard Wedge F Key Character Set (Continued)

F Keys	Keystroke
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 5-6. Keyboard Wedge Numeric Keypad Character Set

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

Table 5-6. Keyboard Wedge Numeric Keypad Character Set (Continued)

Numeric Keypad	Keystroke
6052	4
6053	5
6054	6
6055	7
6056	8
6057	9
6058	Enter
6059	Num Lock

Table 5-7. 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 5-7. Keyboard Wedge Extended Keypad Character Set (Continued)

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

6

RS-232 Interface

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Introduction

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

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

Note: This scanner utilizes TTL RS-232 signal levels, which interfaces with most system architectures. Please contact Wasp Support for more information.

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

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

Connecting an RS-232 Interface

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

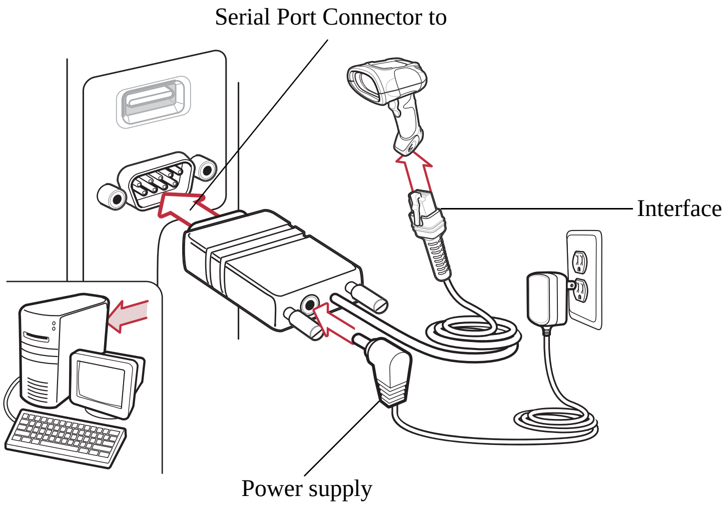

Figure 6-1. RS-232 Direct Connection

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 remain the same.

1. Attach the modular connector of the RS-232 interface cable to the cable interface port on the scanner. (See *Installing the Interface Cable on page 1-5*.)
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 to an appropriate outlet.
4. Ensure that all connections are secure.
5. Select the RS-232 host type by scanning the appropriate bar code from the *RS-232 Host Types* section on *page 6-9*.
6. To modify any other parameter options, scan the appropriate bar codes in this chapter.

RS-232 Default Parameters

Table 6-1 lists the defaults for RS-232 host parameters. To change any option, scan the appropriate bar code(s) provided in the Parameter Descriptions section beginning on page 6-6.

Note

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

Table 6-1. RS-232 Host Default Table

Parameter	Default	Page Number
RS-232 Host Parameters		
RS-232 Host Types	Standard RS-232	6-9
Baud Rate	9600	6-11
Parity	None	6-13
Check Receive Errors	Enable	6-13
Stop Bit Select	1 Stop Bit	6-14
Data Bits	8-Bit	6-14
Hardware Handshaking	None	6-16
Software Handshaking	None	6-18
Host Serial Response Time-out	Minimum: 2 sec	6-20
RTS Line State	Host: Low RTS	6-21
Beep on <BEL>	Disable	6-22
Intercharacter Delay	Minimum: 0 msec	6-23
Nixdorf Beep/LED Options	Normal Operation	6-24
Ignore Unknown Characters	Send Bar Code	6-25

RS-232 Host Parameters

Various RS-232 host types are set up with their own parameter default settings. Selecting the host type sets the parameter defaults as listed in Table 6-2.

Table 6-2. Terminal Specific RS-232

Parameter	Standard RS-232 (Default)	ICL	Wincor-Nixdorf Mode A	Wincor-Nixdorf Mode B	Olivetti	Omron	OPOS/ JPOS	Fujitsu
Transmit Code ID	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data Transmission Format	Data as is	Data/ Suffix	Data/ Suffix	Data/ Suffix	Prefix/ Data/ Suffix	Data/ Suffix	Data/ Suffix	Data/ Suffix
Suffix	CR/LF (7013)	CR (1013)	CR (1013)	CR (1013)	ETX (1002)	CR (1013)	CR (1013)	CR (1013)
Baud Rate	9600	9600	9600	9600	9600	9600	9600	9600
Parity	None	Even	Odd	Odd	Even	None	Odd	None
Hardware Hand-shaking	None	RTS/CTS Option 3	RTS/CTS Option 3	RTS/CTS Option 3	None	None	RTS/CTS Option 3	None
Software Hand-shaking	None	None	None	None	Ack/Nak	None	None	None
Serial Response Time-out	2 Sec.	9.9 Sec.	30.0 Sec.	30.0 Sec.	9.9 Sec.	9.9 Sec.	30.0 Sec.	2 Sec.
Stop Bit Select	One	One	One	One	One	One	One	One
ASCII Format	8-Bit	8-Bit	8-Bit	8-Bit	7-Bit	8-Bit	8-Bit	8-Bit
Beep On <BEL>	Disable	Disable	Disable	Disable	Disable	Disable	Disable	Disable
RTS Line State	Low	High	Low	Low = No data to send	Low	High	Low = No data to send	Low
Prefix	None	None	None	None	STX (1003)	None	None	None

Table 6-2. Terminal Specific RS-232

Parameter	Standard RS-232 (Default)	ICL	Wincor-Nixdorf Mode A	Wincor-Nixdorf Mode B	Olivetti	Omron	OPOS/ JPOS	Fujitsu
*In the Nixdorf Mode B or OPOS/JPOS, if CTS is Low, scanning is disabled. When CTS is High, the user can scan bar codes.								
**If Nixdorf Mode B or OPOS/JPOS is scanned without the scanner connected 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 scanner.								

RS-232 Host Parameters (continued)

Selecting the ICL, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, Olivetti, Omron, OPOS/JPOS or Fujitsu host type enables the transmission of code ID characters listed in Table 6-3 below. These code ID characters are not programmable and are separate from the Transmit Code ID feature. The Transmit Code ID feature should not be enabled for these terminals.

Table 6-3. Terminal Specific Code ID Characters

	ICL	Wincor-Nixdorf Mode A	Wincor-Nixdorf Mode B	Olivetti	Omron	OPOS/ JPOS	Fujitsu
UPC-A	A	A	A	A	A	A	A
UPC-E	E	C	C	C	E	C	E
EAN-8/JAN-8	FF	B	B	B	FF	B	FF
EAN-13/JAN-13	F	A	A	A	F	A	F
Code 39	C <len>	M	M	M <len>	C <len>	M	None
Codabar	N <len>	N	N	N <len>	N <len>	N	None
Code 128	L <len>	K	K	K <len>	L <len>	K	None
I 2 of 5	I <len>	I	I	I <len>	I <len>	I	None
Code 93	None	L	L	L <len>	None	L	None
D 2 of 5	H <len>	H	H	H <len>	H <len>	H	None
UCC/EAN 128	L <len>	P	P	P <len>	L <len>	P	None
MSI	None	O	O	O <len>	None	O	None
Bookland EAN	F	A	A	A	F	A	F
Trioptic	None	None	None	None	None	None	None
Code 11	None	None	None	None	None	None	None
IATA	H<len>	H	H	None	None	H	None
Code 32	None	None	None	None	None	None	None

RS-232 Host Types

To select an RS-232 host type, 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. The scanner's baud rate setting should match the baud rate setting of the host device. If not, 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 (continued)

Baud Rate 4800

***Baud Rate 9600**

Baud Rate 19,200

Baud Rate 38,400

Parity

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

Select **Odd** parity with the parity bit value set to 0 or 1, based on data, to ensure that an odd number of 1 bits are contained in the coded character.

Odd

Select **Even** parity with the parity bit value set to 0 or 1, based on data, to ensure that an even number of 1 bits are contained in the coded character.

Even

Select **Mark** parity and the parity bit is always 1.

Mark

Parity (continued)

Select **Space** parity and the parity bit is always 0.

Space

Select **None** when no parity bit is required.

***None**

Check Receive Errors

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

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

Do Not Check For Received Errors (Disable)

Stop Bit Select

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

***1 Stop Bit**

2 Stop Bits

Data Bits

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

7-Bit

***8-Bit**

Hardware Handshaking

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

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

- The scanner reads the CTS line for activity. If CTS is de-asserted, the scanner waits up to the 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 scanner sounds a transmit error, and any scanned data is lost.
- When the CTS line is de-asserted, the scanner asserts the RTS line and waits up to the Host Serial Response Time-out for the host to assert CTS. When the host asserts CTS, data is transmitted. If, after Host Serial Response Time-out (default), the CTS line is still de-asserted, the scanner sounds a transmit error, and discards the data.
- When data transmission is complete, the scanner de-asserts RTS 10 msec after sending the last character.
- The host should respond by de-asserting CTS. The scanner checks for a de-asserted CTS upon the next transmission of data.

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

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

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

Note

The DTR signal is jumped to the active state.

Hardware Handshaking (continued)

None

Scan the bar code below if no Hardware Handshaking is desired.

***None**

Standard RTS/CTS

Scan the bar code below to select Standard RTS/CTS Hardware Handshaking.

Standard RTS/CTS

RTS/CTS Option 1

When RTS/CTS Option 1 is selected, the scanner asserts RTS before transmitting and ignores the state of CTS. The scanner de-asserts RTS when the transmission is complete.

RTS/CTS Option 1

Hardware Handshaking (continued)

RTS/CTS Option 2

When Option 2 is selected, RTS is always high or low (user-programmed logic level). However, the scanner waits for CTS to be asserted before transmitting data. If CTS is not asserted within Host Serial Response Time-out (default), the scanner issues an error indication and discards the data.

RTS/CTS Option 2

RTS/CTS Option 3

When Option 3 is selected, the scanner asserts RTS prior to any data transmission, regardless of the state of CTS. The scanner waits up to Host Serial Response Time-out (default) for CTS to be asserted. If CTS is not asserted during this time, the scanner issues an error indication and discards the data. The scanner de-asserts RTS when transmission is complete.

RTS/CTS Option 3

Software Handshaking

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

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

None

When this option is selected, data is transmitted immediately. No response is expected from host.

***None**

ACK/NAK

When this option is selected, after transmitting data, the scanner expects either an ACK or NAK response from the host. When a NAK is received, the scanner transmits the same data again and waits for either an ACK or NAK. After three unsuccessful attempts to send data when NAKs are received, the scanner issues an error indication and discards the data.

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

ACK/NAK

Software Handshaking (continued)

ENQ

When this option is selected, the scanner waits for an ENQ character from the host before transmitting data. If an ENQ is not received within the Host Serial Response Time-out, the scanner issues an error indication and discards the data. The host must transmit an ENQ character at least every Host Serial Response Time-out to prevent transmission errors.

ENQ

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.

ACK/NAK with ENQ

XON/XOFF

An XOFF character turns the scanner transmission off until the scanner receives an XON character. There are two situations for XON/XOFF:

- XOFF is received before the scanner has data to send. When the scanner has data to send, it waits up to Host Serial Response Time-out for an XON character before transmission. If the XON is not received within this time, the scanner issues an error indication and discards the data.
- XOFF is received during a transmission. Data transmission then stops after sending the current byte. When the scanner receives an XON character, it sends the rest of the data message. The scanner waits up to 30 seconds for the XON.

XON/XOFF

Host Serial Response Time-out

This parameter specifies how long the scanner waits for an ACK, NAK, or CTS before determining that a transmission error has occurred. This only applies when in one of the ACK/NAK Software Handshaking modes, or RTS/CTS Hardware Handshaking option.

Note: This parameter does not apply to the Wincor-Nixdorf RS-232 Mode A/B and the OPOS/JPOS host types.

***Minimum: 2 sec**

Low: 2.5 Sec

Medium: 5 Sec

Host Serial Response Time-out (continued)

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>

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

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 Mode A/B and OPOS/JPOS Beep/LED Options

When Nixdorf Mode A, Nixdorf Mode B or OPOS/JPOS is selected, this parameter indicates when the scanner should beep and turn on its LED after a decode.

Note

The **Beep/LED After CTS Pulse** option is not valid when Nixdorf Mode A is selected.

***Normal Operation**
(Beep/LED Immediately After Decode)

Beep/LED After Transmission

Beep/LED After CTS Pulse

Ignore Unknown Characters

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

***Send Bar Code**
(with unknown characters)

Do Not Send Bar Codes
(with unknown characters)

ASCII / Character Set

The values in Table 6-4 can be assigned as prefixes or suffixes for ASCII character data transmission.

Table 6-4. RS-232 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

Table 6-4. RS-232 Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1024	$X	CAN
1025	$Y	EM
1026	$Z	SUB
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

Table 6-4. RS-232 Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1057	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

Table 6-4. RS-232 Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	`
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h

Table 6-4. RS-232 Prefix/Suffix Values (Continued)

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
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	~
1127		Undefined
7013		ENTER

7

USB Interface

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Introduction

This chapter provides the connection and setup of the scanner to a USB host. The scanner attaches directly to a USB host, or a powered USB hub, and is powered by it. No additional power supply is required.

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

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

Connecting a USB Interface

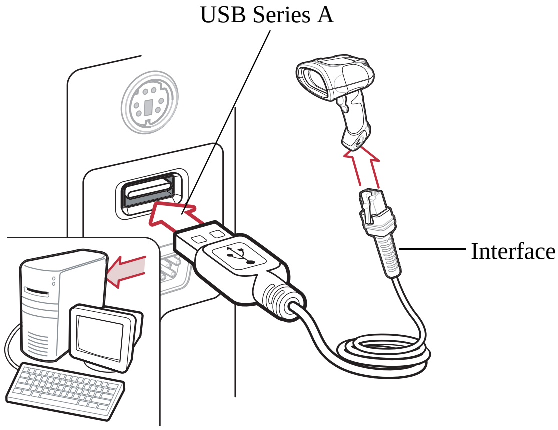

Figure 7-1. USB Connection

The scanner connects with USB capable hosts including:

- Desktop PCs and notebooks
- Apple™ iMacs, Power Mac G4s and G5s, iBooks (North America only), PowerBooks
- IBM SurePOS terminals
- Sun, IBM, and other network computers that support more than one keyboard.

The following operating systems support the scanner through USB:

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

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

To set up the scanner:

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 remain the same.

1. Attach the modular connector of the USB interface cable to the cable interface port on the scanner. (See *Installing the Interface Cable on page 1-5*.)
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. Ensure that all connections are secure.
4. Select the USB device type by scanning the appropriate bar code from the *USB Device Type* section on *page 7-7*.
5. On first installation when using Windows, the software displays a prompt to select or install the "Human Interface Device" driver. To install the "Human Interface Device" driver provided by Windows click "Next" through all the choices and click "Finished" on the last choice. The scanner powers up during this installation.
6. To modify any other parameter options, scan the appropriate bar codes in this chapter.

If there are any problems with the system, see *Troubleshooting on page 3-4*.

USB Default Parameters

Table 7-1 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 7-7.

Note: See *Chapter A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 7-1. USB Host Default Table

Parameter	Default	Page Number
USB Host Parameters		
USB Device Type	HID Keyboard Emulation	7-7
USB Country Keyboard Types (Country Codes)	North American	7-8
USB Keystroke Delay	No Delay (0 msec)	7-10
USB CAPS Lock Override	Disable	7-11
USB Ignore Unknown Characters	Enable	7-12
Emulate Keypad	Disable	7-13
USB Keyboard FN1 Substitution	Disable	7-14
Function Key Mapping	Disable	7-14
Simulated Caps Lock	Disable	7-15
Convert Case	No Case Conversion	7-15

USB Host Parameters

USB Device Type

Select the desired USB device type.

Note: When changing USB Device Types, the scanner automatically resets. The scanner issues the standard startup beep sequences.

***HID Keyboard Emulation**

IBM Table Top USB

IBM Hand-Held USB

USB Country Keyboard Types (Country Codes)

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

Note: When changing USB Country Keyboard Types, the scanner automatically resets. The scanner issues the standard startup beep sequences.

***North American Standard USB Keyboard**

German Windows

French Windows

French Canadian Windows 95/98

USB Country Keyboard Types (Country Codes) (continued)

French Canadian Windows 2000/XP

Spanish Windows

Italian Windows

Swedish Windows

UK English Windows

USB Country Keyboard Types (Country Codes) (continued)

Japanese Windows (ASCII)

Brazilian-Portuguese Windows

USB Keystroke Delay

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

***No Delay (0 msec)**

Medium Delay (20 msec)

Long Delay (40 msec)

USB CAPS Lock Override

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

Override Caps Lock Key
(Enable)

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

USB Ignore Unknown Characters

This option applies only to the HID Keyboard Emulation device and IBM device. Unknown characters are characters the host does not recognize. When “Send Bar Codes With Unknown Characters” is selected, all bar code data is sent except for unknown characters, and no error beeps sound. When “Do Not Send Bar Codes With Unknown Characters” is selected, bar codes containing at least one unknown character are not sent to the host, and an error beep sounds.

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

Do Not Send Bar Codes with Unknown Characters
(Disable)

Emulate Keypad

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

***Disable Keypad Emulation**

Enable Keypad Emulation

USB Keyboard FN 1 Substitution

This option applies only to the USB HID Keyboard Emulation device. When enabled, this allows replacement of any FN 1 characters in an EAN 128 bar code with a Key Category and value chosen by the user. See *FN1 Substitution Values on page 9-9* to set the Key Category and Key Value.

Enable USB Keyboard FN 1 Substitution

***Disable USB Keyboard FN 1 Substitution**

Function Key Mapping

ASCII values under 32 are normally sent as a control-key sequences (see Table 7-2 on page 7-16). When this parameter is enabled, the keys in bold are sent in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.

***Disable Function Key Mapping**

Enable Function Key Mapping

Simulated Caps Lock

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

***Disable Simulated Caps Lock**

Enable Simulated Caps Lock

Convert Case

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

***No Case Conversion**

Convert All to Upper Case

Convert All to Lower Case

ASCII Character Set

Table 7-2. USB Prefix/Suffix Values

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	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

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

Table 7-2. USB Prefix/Suffix Values (Continued)

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
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 [/**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	,

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

Table 7-2. USB Prefix/Suffix Values (Continued)

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
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

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

Table 7-2. USB Prefix/Suffix Values (Continued)

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
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
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\

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

Table 7-2. USB Prefix/Suffix Values (Continued)

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
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

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

Table 7-2. USB Prefix/Suffix Values (Continued)

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
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	~
[1]The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.		

Table 7-3. USB ALT Key Character Set

ALT Keys	Keystroke
2064	ALT 2
2065	ALT A
2066	ALT B
2067	ALT C
2068	ALT D
2069	ALT E
2070	ALT F
2071	ALT G
2072	ALT H

Table 7-3. USB ALT Key Character Set (Continued)

ALT Keys	Keystroke
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 7-4. USB GUI Key Character Set

GUI Key	Keystroke
3000	Right Control Key
3048	GUI 0
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 7-4. USB GUI Key Character Set (Continued)

GUI Key	Keystroke
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
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 7-4. USB GUI Key Character Set (Continued)

GUI Key	Keystroke
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
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 7-5. 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

Table 7-5. USB F Key Character Set (Continued)

F Keys	Keystroke
5010	F10
5011	F11
5012	F 12
5013	F 13
5014	F 14
5015	F 15
5016	F16
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 7-6. USB Numeric Keypad Character Set

Numeric Keypad	Keystroke
6042	*
6043	+
6044	undefined
6045	-
6046	.
6047	/
6048	0

Table 7-6. USB Numeric Keypad Character Set (Continued)

Numeric Keypad	Keystroke
6049	1
6050	2
6051	3
6052	4
6053	5
6054	6
6055	7
6056	8
6057	9
6058	Enter
6059	Num Lock

Table 7-7. USB Extended Keypad Character Set

Extended Keypad	Keystroke
7001	Break
7002	Delete
7003	PgUp
7004	End
7005	Pg Dn
7006	Pause
7007	Scroll Lock
7008	Backspace
7009	Tab
7010	Print Screen
7011	Insert

Table 7-7. USB Extended Keypad Character Set (Continued)

Extended Keypad	Keystroke
7012	Home
7013	Enter
7014	Escape
7015	Up Arrow
7016	Down Arrow
7017	Left Arrow
7018	Right Arrow

8

Symbologies

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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 8-6* (also see *Chapter A, Standard Default Parameters* 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 the *Set All Defaults* bar code on page 4-5.

If the USB cable is not being used, a host type must be selected. See each host chapter for specific host information.

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 8-15*. 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 8-1 lists the defaults for all symbologies parameters. To change any option, scan the appropriate bar code(s) provided in the Symbologies Parameters section beginning on 8-10.

Note: See *Chapter A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 8-1. Symbology Default Table

Parameter	Default	Page Number
UPC/EAN		
UPC-A	Enable	8-10
UPC-E	Enable	8-10
UPC-E1	Disable	8-11
EAN-13/JAN 13	Enable	8-11
EAN-8/JAN 8	Enable	8-12
Bookland EAN	Disable	8-12
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Transmit UPC-A Check Digit	Enable	8-15
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Transmit UPC-E1 Check Digit	Enable	8-16
UPC-A Preamble	System Character	8-17
UPC-E Preamble	System Character	8-18
UPC-E1 Preamble	System Character	8-19
Convert UPC-E to A	Disable	8-20

Table 8-1. Symbology Default Table (Continued)

Parameter	Default	Page Number
Convert UPC-E1 to A	Disable	8-21
EAN-8/JAN-8 Extend	Disable	8-22
Code 128		
Code 128	Enable	8-22
UCC/EAN-128	Enable	8-23
ISBT 128	Enable	8-23
Code 39		
Code 39	Enable	8-24
Trioptic Code 39	Disable	8-24
Convert Code 39 to Code 32	Disable	8-25
Code 32 Prefix	Disable	8-26
Set Length(s) for Code 39	2 to 55	8-27
Code 39 Check Digit Verification	Disable	8-29
Transmit Code 39 Check Digit	Disable	8-30
Code 39 Full ASCII Conversion	Disable	8-31
Code 93		
Code 93	Disable	8-32
Set Lengths for Code 93	4 to 55	8-32
Code 11		
Code 11	Disable	8-34
Set Lengths for Code 11	4 to 41	8-34

Table 8-1. Symbology Default Table (Continued)

Parameter	Default	Page Number
Code 11 Check Digit Verification	One Check Digit	8-36
Transmit Code 11 Check Digits	Disable	8-37
Interleaved 2 of 5 (I 2 of 5)		
Interleaved 2 of 5 (I 2 of 5)	Enable	8-38
Set Lengths for Interleaved 2 of 5	14	8-38
I 2 of 5 Check Digit Verification	Disable	8-41
Transmit I 2 of 5 Check Digit	Disable	8-42
Convert I 2 of 5 to EAN-13	Disable	8-43
Discrete 2 of 5 (D 2 of 5)		
Discrete 2 of 5	Disable	8-44
Set Lengths for D 2 of 5	12	8-44
Codabar (NW - 7)		
Codabar	Disable	8-46
Set Lengths for Codabar	5 to 55	8-47
CLSI Editing	Disable	8-49
NOTIS Editing	Disable	8-49
MSI		
MSI	Disable	8-50
Set Lengths for MSI	6 to 55	8-50
MSI Check Digits	One	8-52
Transmit MSI Check Digit(s)	Disable	8-53

Table 8-1. Symbology Default Table (Continued)

Parameter	Default	Page Number
MSI Check Digit Algorithm	Mod 10/Mod 10	8-53
RSS (Reduced Space Symbology)		
RSS 14	Disable	8-54
RSS Limited	Disable	8-54
RSS Expanded	Disable	8-55
Convert RSS to UPC/EAN	Disable	8-55
Symbology - Specific Security Levels		
Redundancy Level	1	8-56
Security Levels	0	8-58
Bi-directional Redundancy	Disable	8-60

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 beginning on page D-3 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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.

See *Table 5-2 on page 5-19* and for the mapping of Code 39 characters to ASCII values.

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. The Wedge Host conversion table can be found on 5-5, USB Host conversion table can be found on 7-6, and RS-232 Host conversion table can be found on 6-5.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

D 2 of 5 - Length Within Range

Set Lengths for Discrete 2 of 5 (continued)

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

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 beginning on page D-1 in *Chapter 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-7.

MSI - Length Within Range

Set Lengths for MSI (continued)

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 8-53* 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)

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**

9

Miscellaneous Scanner Options

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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 8, Symbologies* and *Chapter 10, Advanced Data Formatting* 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 9-4* (also see *Chapter A, Standard Default Parameters* 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 9-1 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 9-5.

Note: See *Chapter A, Standard Default Parameters* for all user preferences, hosts, symbologies, and miscellaneous default parameters.

Table 9-1. Miscellaneous Scanner Options Default Table

Parameter	Default	Page Number
Miscellaneous Scanner Options		
Transmit Code ID Character	None	9-5
Scan Angle	Normal Angle	9-6
Prefix Value	7013 <CR><LF>	9-6
Suffix Value	7013 <CR><LF>	9-6
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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.

The user may 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-3* and *AIM Code Identifiers on page B-4*.

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

Prefix/Suffix Values

A prefix/suffix may be appended to scan data for use in data editing. These values are set by scanning a four-digit number (i.e., four bar codes) that corresponds to key codes for various terminals. For conversion information, see the ASCII Character Set tables in the appropriate host chapter. Numeric bar codes begin on page D-1 in *Chapter D, Numeric Bar Codes*. In case of an error, or to change the selection, scan **Cancel** on page D-7.

Scan Prefix

Scan Suffix

Scan Data Transmission Format

To change the Scan Data Transmission Format, scan the **Scan Options** bar code below. Then select one of four options:

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

When a selection is made, scan the **Enter** bar code on page 9-8. In case of a mistake, scan the **Data Format Cancel** bar code on page 9-8.

To program a carriage return/enter after each bar code scanned, scan the following bar codes in order:

1. <SCAN OPTIONS>
2. <DATA> <SUFFIX>
3. Enter (on page 9-8)

Scan Options

***Data As Is**

<DATA> <SUFFIX>

Scan Data Transmission Format (continued)

<PREFIX> <DATA>

<PREFIX> <DATA> <SUFFIX>

Enter

Data Format Cancel

FN1 Substitution Values

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

1. To select a FN1 Substitution Value, scan the bar code below.

Set FN1 Substitution Value

2. Look up the keystroke desired for FN1 Substitution in the ASCII Character Set table for the currently installed host interface. Enter the 4-digit "ASCII Value" by scanning each digit in the *Numeric Bar Codes on page D-1*.
3. To correct an error or change the selection, scan CANCEL.

To enable FN1 Substitution for Wedge, scan the **Enable Keyboard Wedge** FN1 Substitution bar code on page 5-15.

To enable FN1 Substitution for USB HID Keyboard, scan the **Enable USB Keyboard** FN1 Substitution bar code on page 7-14.

Transmit "No Read" Message

Scan a bar code below to select whether or not a "No Read" message is transmitted. When enabled, the characters NR are transmitted when a bar code is not decoded. When disabled, if a symbol does not decode, nothing is sent to the host.

Enable No Read

***Disable No Read**

10

Advanced Data Formatting

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Introduction

Advanced Data Formatting (ADF) is a means of customizing data before transmission to the host device. Scan data can be edited to suit the particular requirements.

ADF can be implemented through scanning a related series of bar codes, which begin on page 10-9 which allows the scanner to be setup and programmed with Advanced Data Formatting (ADF) Rules.

Rules: Criteria Linked to Actions

In ADF, data is customized through **rules**. These rules perform detailed actions when the data meets certain criteria. One rule may consist of single or multiple criteria applied to single or multiple actions.

For instance, a data formatting rule could be the following:

> **Criteria***:When scan data is Code 39, length 12, and data at the start position is the string "129",*
>
> **Actions***:pad all sends with zeros to length 8,*
> *send all data up to X,*
> *send a space.*

If a Code 39 bar code of 1299X1559828 is scanned, the following is transmitted: 00001299<space>. If a Code 39 bar code of 1299X15598 is scanned, this rule is ignored because the length criteria has not been met.

The rule specifies the editing conditions and requirements before data transmission occurs.

Using ADF Bar Codes

When a rule is programed, make sure the rule is logically correct. Plan ahead before starting to scan.

To program each data formatting rule:

- **Start the Rule**. Scan the **Begin New Rule bar code on page 10-9**.
- **Criteria**. Scan the bar codes for all pertinent criteria. Criteria can include code type (e.g., Code 128), code length, or data that contains a specific character string (e.g., the digits "129"). These options are described in *Criteria on page 10-12*.
- **Actions**. Scan all actions related to, or affecting, these criteria. The actions of a rule specify how to format the data for transmission. These options are described in *ADF Bar Code Menu Example on page 10-4*.

- **Save the Rule**. Scan the **Save Rule** bar code on page 10-9. This places the rule in the “top” position in the rule buffer.
- In case of errors made during this process, some special-purpose bar codes may be useful: **Erase Criteria and Start Again**, **Erase Actions and Start Again**, **Erase Previously Saved Rule**, etc.

Criteria, actions, and entire rules may be erased by scanning the appropriate bar code (see page 10-10).

Use the *Beeper Definitions on page 2-4* as a guide for the programming steps.

ADF Bar Code Menu Example

This section provides an example of how ADF rules are entered and used for scan data.

An auto parts distribution center wants to encode manufacturer ID, part number, and destination code into their own Code 128 bar codes. The distribution center also has products that carry UPC bar codes, placed there by the manufacturer. The Code 128 bar codes have the following format:

MMMMMPPPPPDD

Where:

M = Manufacturer ID

P = Part Number

D = Destination Code

The distribution center uses a PC with dedicated control characters for manufacturer ID <CTRL M>, part number <CTRL P>, and destination code <CTRL D>. At this center the UPC data is treated as manufacturer ID code.

The following rules need to be entered:

When scanning data of code type Code 128, send the next 5 characters, send the manufacturer ID key <CTRL M>, send the next 5 characters, send the part number key <CTRL P>, send the next 2 characters, send the destination code key <CTRL D>.

When scanning data of code type UPC/EAN, send all data, send the manufacturer ID key <CTRL M>.

To enter these rules, follow the steps below:

Rule 1: The Code 128 Scanning Rule

Step	Bar Code	On Page	Beep Indication
1	Begin New Rule	10-9	High High
2	Code 128	10-13	High High
3	Send next 5 characters	10-29	High High
4	Send <CTRL M>	10-56	High High
5	Send next 5 characters	10-29	High High
6	Send <CTRL P>	10-57	High High
7	Send next 2 characters	10-28	High High
8	Send <CTRL D>	10-55	High High
9	Save Rule	10-9	High Low High Low

Rule 2: The UPC Scanning Rule

Step	**Bar Code**	**On Page**	**Beep Indication**
1	Begin New Rule	10-9	High High
2	UPC/EAN	10-15	High High
3	Send all remaining data	10-28	High High
4	Send <CTRL M>	10-56	High High
5	Save Rule	10-9	High Low High Low

In case of errors while entering this rule, scan the **Quit Entering Rules** bar code on page 10-10. If the rule is already saved, scan the **Erase Previously Saved Rule** bar code on page 10-10.

Alternate Rule Sets

ADF rules may be grouped into one of four alternate sets which can be turned on and off when needed. This is useful to format the same message in different ways. For example, a Code 128 bar code contains the following information:

Class (2 digits), Stock Number (8) digits, Price (5 digits)

This bar code might look like this:

245671243701500

where:

Class = 24

Stock Number = 56712437

Price = 01500

Ordinarily, data is sent as follows:

24 (class key)

56712437 (stock key)

01500 (enter key)

But, when there is a sale, send only the following:

24 (class key)

56712437 (stock key)

and the cashier keys the price manually.

To implement this, first enter an ADF rule that applies to the normal situation. This rule may look like this:

When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, send the data that remains, send the Enter key.

The "sale" rule may look like this:

When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key.

To switch between the two sets of rules, a "switching rule" must be programmed. This rule specifies what type of bar code must be scanned to switch between the rule sets. For example, in the case of the "sale" rule above, the rule programmer wants the cashier to scan the bar code "M" before a sale. To do this, a rule can be entered as follows:

When scanning a bar code of length 1 that begins with "M", select rule set number 1.

Another rule could be programmed to switch back.

When scanning a bar code of length 1 that begins with "N", turn off rule set number 1.

The switching back to normal rules can also be done in the “sale” rule. For example, the rule may look like this:

When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, turn off rule set 1.

It is recommended that the **Disable All Rule Sets** bar code on page 10-11 be scanned after programming a rule belonging to an alternate rule set.

In addition to enabling and disabling rule sets within the rules, it is possible to enable or disable them by scanning the appropriate bar codes on 10-11.

Rules Hierarchy (in Bar Codes)

The order of programming individual rules is important.The most general rule should be programmed last.

All programmed rules are stored in a buffer. As they are programmed, they are stored at the “top” of a rules list. If three rules have been created, the list would be configured as follows:

Third Rule

Second Rule

First Rule

When data is scanned, the rules list is checked from top to bottom to determine if the criteria matches (and therefore, if the actions should occur). Input is modified into the data format specified by the first matching set of criteria it finds. Be sure that the most general rule is the last one programmed.

For example, if the THIRD rule states:

When scanning a bar code of any length, send all data, then send the ENTER key.

And the SECOND rule states:

When scanning a Code 128 bar code of length 12, send the first four characters, then send the ENTER key, then send all remaining data.

If a Code 128 bar code of length 12 were scanned, the THIRD rule would be in effect. The SECOND rule would appear to not function.

Note also that ADF rules are actually created when the standard data editing functions are used. Scan options are entered as ADF rules, and the hierarchy mentioned above also applies to them. For the scanner, this applies to prefix/suffix programming in the parameter *Scan Data Transmission Format*.

These rules reside in the same “rule list” as ADF Rules, so the order of their creation is also important.

Default Rules

Every unit has a default rule to send all scan data. Units with custom software may have one or more default rules burned in. The rules hierarchy checks user programmable rules first, then the default rules. Default rules can be disabled by entering the following general rule in the user programmable buffer:

> When receiving scan data, send all data.

Since this rule always applies, ADF never goes into the default rules.

Special Commands

Pause Duration

This parameter along with the Send Pause parameter on page 10-33 allows a pause to be inserted in the data transmission. Pauses are set by scanning a two-digit number (i.e., two bar codes), and are measured in 0.1 second intervals. For example, scanning bar codes “0” and “1” inserts a 0.1 second pause; “0” and “5” gives a 0.5 second delay. Numeric bar codes begin on page D-1 in *Chapter D, Numeric Bar Codes*. In case of an error, or to change the selection, scan **Numeric Cancel** on page D-6.

Pause Duration

Begin New Rule

Scan this bar code to start entering a new rule

.

Begin New Rule

Save Rule

Scan this bar code to save the entered rule.

Save Rule

Erase

Use these bar codes to erase criteria, actions, or rules.

Erase Criteria And Start Again

Erase Actions And Start Again

Erase Previously Saved Rule

Erase All Rules

Quit Entering Rules

Scan this bar code to quit entering rules.

Quit Entering Rules

Disable Rule Set

Use these bar codes to disable rule sets.

Disable Rule Set 1

Disable Rule Set 2

Disable Rule Set 3

Disable Rule Set 4

Disable All Rule Sets

Criteria

Code Types

Select any number of code types to be affected. All selected codes must be scanned in succession, prior to selecting other criteria. *If a code type is not selected, all code types are affected.*

Scan the bar codes for all code types desired before selecting other criteria.

Code 39

Codabar

RSS 14

RSS Limited

RSS Expanded

Code 128

Code Types (continued)

D 2 OF 5

IATA 2 OF 5

I 2 OF 5

Code 93

UPC-A

UPC-E

Code Types (continued)

EAN-8

EAN-13

MSI

UCC/EAN 128

UPC-E1

Bookland EAN

Code Types (continued)

Trioptic Code 39

Code 11

EAN 128

Code Lengths

Define the number of characters the selected code type must contain. *If a code length is not selected, selected code types of any length are affected*.

Scan these bar codes to define the number of characters the selected code types must contain. Select one length per rule only.

1 Character

2 Characters

3 Characters

4 Characters

Code Lengths (continued)

5 Characters

6 Characters

7 Characters

8 Characters

9 Characters

10 Characters

Code Lengths (continued)

11 Characters

12 Characters

13 Characters

14 Characters

15 Characters

16 Characters

Code Lengths (continued)

17 Characters

18 Characters

19 Characters

20 Characters

21 Characters

22 Characters

Code Lengths (continued)

23 Characters

24 Characters

25 Characters

26 Characters

27 Characters

28 Characters

Code Lengths (continued)

29 Characters

30 Characters

Message Containing A Specific Data String

Use this feature to select whether the formatting affects data that begins with a specific character or data string, or contains a specific character or data string.

There are 4 features:

- Specific String at Start
- Specific String, Any Location
- Any Message OK
- Rule Belongs to Set

Specific String at Start

Scan this bar code, then scan the bar codes representing the desired character or characters (up to a total of 8) in the *Alphanumeric Keyboard on page 10-107*.

After scanning the following bar code:

1. Enter a string using the *Alphanumeric Keyboard* beginning on page 10-107.
2. Scan **End of Message** on page 10-118.

Specific String At Start

Specific String, Any Location

Scan this bar code, then, using the *Numeric Keypad on page 10-25*, scan a two-digit number representing the ***position*** (use a leading “zero” if necessary). Then scan the desired character or characters (up to a total of 8) on the *Alphanumeric Keyboard on page 10-107*, followed by the **End of Message** bar code on page 10-118.

After scanning the following bar code:

1. Enter a location using the “Numeric Keypad” on page 25.
2. Enter a string using the *Alphanumeric Keyboard* beginning on page 10-107.
3. Scan **End of Message** on page 10-118.

Specific String Any Location

Any Message OK

By not scanning any bar code, all selected code types are formatted, regardless of information contained.

Numeric Keypad

Bar codes on this page should not be confused with those on the alphanumeric keyboard.

0

1

2

3

4

5

Numeric Keypad (continued)

6

7

8

9

Cancel

Rule Belongs To Set

Select the set a rule belongs to. (There are four possible rule sets.) See *Alternate Rule Sets on page 10-5* for more information about rule sets.

Scan a bar code below to select which set a rule belongs to.

Rule Belongs To Set 1

Rule Belongs To Set 2

Rule Belongs To Set 3

Rule Belongs To Set 4

Actions

Select how to format the data for transmission.

Send Data

Send all data that remains, send all data up to a specific character selected from the *Alphanumeric Keyboard on page 10-107*, or send the next N characters. N = any number from 1 to 254, selected from the *Alphanumeric Keyboard*. Use these bar codes to send data.

Send Data Up To Character

Send All Data That Remains

Send Next Character

Send Next 2 Characters

Send Next 3 Characters

Send Data (continued)

Send Next 4 Characters

Send Next 5 Characters

Send Next 6 Characters

Send Next 7 Characters

Send Next 8 Characters

Send Next 9 Characters

Send Data (continued)

Send Next 10 Characters

Send Next 11 Characters

Send Next 12 Characters

Send Next 13 Characters

Send Next 14 Characters

Send Next 15 Characters

Send Data (continued)

Send Next 16 Characters

Send Next 17 Characters

Send Next 18 Characters

Send Next 19 Characters

Send Next 20 Characters

Setup Field(s)

Table 10-1. Setup Field(s) Definitions

Parameter	Description	Page
Move Cursor		
Move Cursor To a Character	Scan the **Move Cursor To Character** bar code on page 10-33, then any printable ASCII character from the *Alphanumeric Keyboard*. When this is used, the cursor moves to the position after the matching character. If the character is not there, the rule fails and ADF tries the next rule.	10-33
Move Cursor to Start of Data	Scan this bar code to move cursor to the beginning of the data.	10-33
Move Cursor Past a Character	This parameter moves the cursor past all sequential occurrences of a selected character. For example, if the selected character is ‘A’, then the cursor moves past ‘A’, ‘AA’, ‘AAA’, etc. Scan the **Move Cursor Past Character** bar code on page 10-33, then select a character from the *Alphanumeric Keyboard*. If the character is not there, the cursor does not move (i.e., has no effect).	10-33
Skip Ahead “N” Characters	Scan one of these bar codes to select the desired number of positions to move the cursor ahead.	10-34
Skip Back “N” Characters	Scan one of these bar codes to select the desired number of positions to move the cursor back.	10-36
Send Preset Value	Send prefix and/or suffix value by scanning the appropriate bar code. These values must be set using the Scan Prefix and Scan Suffix bar codes on *page 9-6*.	10-38

Move Cursor

Scan a bar code below to move the cursor in relation to a specified character. Then enter a character by scanning a bar code from the *Alphanumeric Keyboard* beginning on page 10-107.

Note

If there is no match when the rule is interpreted and the rule fails, the next rule is checked.

Move Cursor To Character

Move Cursor To Start

Move Cursor Past Character

Send Pause

Scan the bar code below to insert a pause in the transmission of data. The length of this pause is controlled by the value of the Pause Duration parameter.

Send Pause

Skip Ahead

Use the following bar codes to skip ahead characters.

Skip Ahead 1 Character

Skip Ahead 2 Characters

Skip Ahead 3 Characters

Skip Ahead 4 Characters

Skip Ahead 5 Characters

Skip Ahead 6 Characters

Skip Ahead (continued)

Skip Ahead 7 Characters

Skip Ahead 8 Characters

Skip Ahead 9 Characters

Skip Ahead 10 Characters

Skip Back

Use the following bar codes to skip back characters.

Skip Back 1 Character

Skip Back 2 Characters

Skip Back 3 Characters

Skip Back 4 Characters

Skip Back 5 Characters

Skip Back 6 Characters

Skip Back (continued)

Skip Back 7 Characters

Skip Back 8 Characters

Skip Back 9 Characters

Skip Back 10 Characters

Send Preset Value

Use these bar codes to send preset values. These values must be set using the Scan Prefix and Scan Suffix bar codes on page 9-6.

Send Prefix

Send Suffix

Modify Data

Modify data in the ways listed. The following actions work for all send commands that follow it within a rule. If *pad zeros to length 6, send next 3 characters, stop padding, send next 5 characters* is programmed, three zeros are added to the first send, and the next send is unaffected by the padding. These options do not apply to the **Send Keystroke** or **Send Preset Value** options.

Remove All Spaces

To remove all spaces in the send commands that follow, scan this bar code.

Remove All Spaces

Crunch All Spaces

To leave one space between words, scan this bar code. This also removes all leading and trailing spaces.

Crunch All Spaces

Stop Space Removal

Scan this bar code to disable space removal.

Stop Space Removal

Modify Data (Continued)

Remove Leading Zeros

Scan this bar code to remove all leading zeros.

Remove Leading Zeros

Stop Zero Removal

Scan this bar code to disable the removal of zeros.

Stop Zero Removal

Pad Data with Spaces

To pad data to the left, scan the bar code containing the desired number of spaces. This parameter is activated by Send commands.

Pad Spaces To Length 1

Pad Spaces To Length 2

Pad Spaces To Length 3

Pad Spaces To Length 4

Pad Data with Spaces (continued)

Pad Spaces To Length 5

Pad Spaces To Length 6

Pad Spaces To Length 7

Pad Spaces To Length 8

Pad Spaces To Length 9

Pad Spaces To Length 10

Pad Data with Spaces (continued)

Pad Spaces To Length 11

Pad Spaces To Length 12

Pad Spaces To Length 13

Pad Spaces To Length 14

Pad Spaces To Length 15

Pad Spaces To Length 16

Pad Data with Spaces (continued)

Pad Spaces To Length 17

Pad Spaces To Length 18

Pad Spaces To Length 19

Pad Spaces To Length 20

Pad Spaces To Length 21

Pad Spaces To Length 22

Pad Data with Spaces (continued)

Pad Spaces To Length 23

Pad Spaces To Length 24

Pad Spaces To Length 25

Pad Spaces To Length 26

Pad Spaces To Length 27

Pad Spaces To Length 28

Pad Data with Spaces (continued)

Pad Spaces To Length 29

Pad Spaces To Length 30

Stop Pad Spaces

Pad Data with Zeros

To pad data to the left, scan the bar code containing the desired number of zeros. This parameter is activated by Send commands.

Pad Zeros To Length 1

Pad Zeros To Length 2

Pad Zeros To Length 3

Pad Zeros To Length 4

Pad Data with Zeros (continued)

Pad Zeros To Length 5

Pad Zeros To Length 6

Pad Zeros To Length 7

Pad Zeros To Length 8

Pad Zeros To Length 9

Pad Zeros To Length 10

Pad Data with Zeros (continued)

Pad Zeros To Length 11

Pad Zeros To Length 12

Pad Zeros To Length 13

Pad Zeros To Length 14

Pad Zeros To Length 15

Pad Zeros To Length 16

Pad Data with Zeros (continued)

Pad Zeros To Length 17

Pad Zeros To Length 18

Pad Zeros To Length 19

Pad Zeros To Length 20

Pad Zeros To Length 21

Pad Zeros To Length 22

Pad Data with Zeros (continued)

Pad Zeros To Length 23

Pad Zeros To Length 24

Pad Zeros To Length 25

Pad Zeros To Length 26

Pad Zeros To Length 27

Pad Zeros To Length 28

Pad Data with Zeros (continued)

Pad Zeros To Length 29

Pad Zeros To Length 30

Stop Pad Zeros

Beeps

Select a beep sequence for each ADF rule.

Beep Once

Beep Twice

Beep Three Times

Send Keystroke (Control Characters and Keyboard Characters)

Control Characters

Scan the "Send __" bar code for the desired keystroke

Send Control 2

Send Control A

Send Control B

Send Control C

.

Control Characters (continued)

Send Control D

Send Control E

Send Control F

Send Control G

Send Control H

Send Control I

Control Characters (continued)

Send Control J

Send Control K

Send Control L

Send Control M

Send Control N

Send Control O

Control Characters (continued)

Send Control P

Send Control Q

Send Control R

Send Control S

Send Control T

Send Control U

Control Characters (continued)

Send Control V

Send Control W

Send Control X

Send Control Y

Send Control Z

Send Control [

Control Characters (continued)

**Send Control **

Send Control]

Send Control 6

Send Control -

Keyboard Characters

Scan the "Send __" bar code for the desired keyboard characters

Send Space

Send !

Send "

Send #

Send $

Send %

Keyboard Characters (continued)

Send &

Send ‘

Send (

Send)

Send *

Send +

Keyboard Characters (continued)

Send ,

Send -

Send .

Send /

Send 0

Send 1

Keyboard Characters (continued)

Send 2

Send 3

Send 4

Send 5

Send 6

Send 7

Keyboard Characters (continued)

Send 8

Send 9

Send :

Send ;

Send <

Send =

Keyboard Characters (continued)

Send >

Send ?

Send @

Send A

Send B

Send C

Keyboard Characters (continued)

Send D

Send E

Send F

Send G

Send H

Send I

Keyboard Characters (continued)

Send J

Send K

Send L

Send M

Send N

Send O

Keyboard Characters (continued)

Send P

Send Q

Send R

Send S

Send T

Send U

Keyboard Characters (continued)

Send V

Send W

Send X

Send Y

Send Z

Send [

Keyboard Characters (continued)

**Send **

Send]

Send ^

Send _

Send `

Send a

Keyboard Characters (continued)

Send b

Send c

Send d

Send e

Send f

Send g

Keyboard Characters (continued)

Send h

Send i

Send j

Send k

Send l

Send m

Keyboard Characters (continued)

Send n

Send o

Send p

Send q

Send r

Send s

Keyboard Characters (continued)

Send t

Send u

Send v

Send w

Send x

Send y

Keyboard Characters (continued)

Send z

Send {

Send |

Send }

Send ~

Send ALT Characters

Send Alt 2

Send Alt A

Send Alt B

Send Alt C

Send Alt D

Send Alt E

Send ALT Characters (continued)

Send Alt F

Send Alt G

Send Alt H

Send Alt I

Send Alt J

Send Alt K

Send ALT Characters (continued)

Send Alt L

Send Alt M

Send Alt N

Send Alt O

Send Alt P

Send Alt Q

Send ALT Characters (continued)

Send Alt R

Send Alt S

Send Alt T

Send Alt U

Send Alt V

Send Alt W

Send ALT Characters (continued)

Send Alt X

Send Alt Y

Send Alt Z

Send Alt [

**Send Alt **

Send Alt]

Send ALT Characters (continued)

Send Alt 6

Send Alt -

Send Keypad Characters

Send Keypad *

Send Keypad +

Send Keypad -

Send Keypad .

Send Keypad /

Send Keypad 0

Send Keypad Characters (continued)

Send Keypad 1

Send Keypad 2

Send Keypad 3

Send Keypad 4

Send Keypad 5

Send Keypad 6

Send Keypad Characters (continued)

Send Keypad 7

Send Keypad 8

Send Keypad 9

Send Keypad Enter

Send Keypad Numlock
NUM LOCK

Send Break Key

Send Keypad Characters (continued)

Send Delete Key

Send Page Up Key

Send End Key

Send Page Down Key

Send Pause Key

Send Scroll Lock Key

Send Keypad Characters (continued)

Send Backspace Key

Send Tab Key

Send Print Screen Key

Send Insert Key

Send Home Key

Send Enter Key

Send Keypad Characters (continued)

Send Escape Key

Send Up Arrow Key

Send Down Arrow Key

Send Left Arrow Key

Send Right Arrow Key

Send Function Key

Send F1 Key

Send F2 Key

Send F3 Key

Send F4 Key

Send F5 Key

Send F6 Key

Send Function Key (continued)

Send F7 Key

Send F8 Key

Send F9 Key

Send F10 Key

Send F11 Key

Send F12 Key

Send Function Key (continued)

Send F13 Key

Send F14 Key

Send F15 Key

Send F16 Key

Send F17 Key

Send F18 Key

Send Function Key (continued)

Send F19 Key

Send F20 Key

Send F21 Key

Send F22 Key

Send F23 Key

Send F24 Key

Send Function Key (continued)

Send PF1 Key

Send PF2 Key

Send PF3 Key

Send PF4 Key

Send PF5 Key

Send PF6 Key

Send Function Key (continued)

Send PF7 Key

Send PF8 Key

Send PF9 Key

Send PF10 Key

Send PF11 Key

Send PF12 Key

Send Function Key (continued)

Send PF13 Key

Send PF14 Key

Send PF15 Key

Send PF16 Key

Send PF17 Key

Send PF18 Key

Send Function Key (continued)

Send PF19 Key

Send PF20 Key

Send PF21 Key

Send PF22 Key

Send PF23 Key

Send PF24 Key

Send Function Key (continued)

Send PF25 Key

Send PF26 Key

Send PF27 Key

Send PF28 Key

Send PF29 Key

Send PF30 Key

Send Right Control Key

The “Send Right Control Key” action sends a tap (press and release) of the Right Control Key.

Send Right Control Key

Send Graphic User Interface (GUI) Characters

The “Send Graphic User Interface Character” actions tap the specified key while holding the System Dependent Graphic User Interface (GUI) Key. The definition of the Graphic User Interface key is dependant upon the attached system:

Send GUI 0

Send GUI 1

Send GUI 2

Send GUI 3

Send Graphic User Interface (GUI) Characters (continued)

Send GUI 4

Send GUI 5

Send GUI 6

Send GUI 7

Send GUI 8

Send GUI 9

Send Graphic User Interface (GUI) Characters (continued)

Send GUI A

Send GUI B

Send GUI C

Send GUI D

Send GUI E

Send GUI F

Send Graphic User Interface (GUI) Characters (continued)

Send GUI G

Send GUI H

Send GUI I

Send GUI J

Send GUI K

Send GUI L

Send Graphic User Interface (GUI) Characters (continued)

Send GUI M

Send GUI N

Send GUI O

Send GUI P

Send GUI Q

Send GUI R

Send Graphic User Interface (GUI) Characters (continued)

Send GUI S

Send GUI T

Send GUI U

Send GUI V

Send GUI W

Send GUI X

Send Graphic User Interface (GUI) Characters (continued)

Send GUI Y

Send GUI Z

Turn On/Off Rule Sets

Use these bar codes to turn rule sets on and off.

Turn On Rule Set 1

Turn On Rule Set 2

Turn On Rule Set 3

Turn On Rule Set 4

Turn On/Off Rule Sets (continued)

Use these bar codes to turn rule sets on and off.

Turn Off Rule Set 1

Turn Off Rule Set 2

Turn Off Rule Set 3

Turn Off Rule Set 4

Alphanumeric Keyboard

Space

#

$

%

*****

+

Alphanumeric Keyboard (continued)

-
(Dash)

.

/

!

“

&

Alphanumeric Keyboard (continued)

“

(

)

:

;

<

Alphanumeric Keyboard (continued)

=

>

?

@

[

\

Alphanumeric Keyboard (continued)

]

^

_
(Underscore)

`

Alphanumeric Keyboard (continued)

Note

Bar codes on this page should not be confused with those on the numeric keypad.

0

1

2

3

Alphanumeric Keyboard (continued)

4

5

6

7

8

9

Alphanumeric Keyboard (continued)

A

B

C

D

E

F

Alphanumeric Keyboard (continued)

G

H

I

J

K

L

Alphanumeric Keyboard (continued)

M

N

O

P

Q

R

Alphanumeric Keyboard (continued)

S

T

U

V

W

X

Alphanumeric Keyboard (continued)

Y

Z

Cancel

End of Message

Alphanumeric Keyboard (continued)

a

b

c

d

e

f

Alphanumeric Keyboard (continued)

g

h

i

j

k

l

Alphanumeric Keyboard (continued)

m

n

o

p

q

r

Alphanumeric Keyboard (continued)

s

t

u

v

w

x

Alphanumeric Keyboard (continued)

y

z

{

|

}

~

A

Standard Default Parameters

Table A-1. Standard Default Parameters Table

Parameter	Default	Page Number
User Preferences		
Set Default Parameter	All Defaults	4-5
Beeper Tone	High	4-5
Beeper Volume	High	4-6
Power Mode	Continuous On	4-7
Laser On Time	3.0 sec	4-7
Beep After Good Decode	Enable	4-8
Trigger Mode	Level	4-8
Aim Duration	0.0 sec	4-10
Keyboard Wedge Host Parameters		
Keyboard Wedge Host Type	IBM PC/AT& IBM PC Compatibles[1]	5-7
Keyboard Wedge Country Types (Country Codes)	North American	5-8
Ignore Unknown Characters	Enable	5-10
Keystroke Delay	0 msec (No Delay)	5-10
Intra-Keystroke Delay	Disable	5-11
Alternate Numeric Keypad Emulation	Disable	5-12
Caps Lock On	Disable	5-12
Caps Lock Override	Disable	5-13
[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
Convert Wedge Data	Do Not Convert Wedge Data	5-14
Function Key Mapping	Disable	5-14
FN1 Substitution	Disable	5-15
Send Make and Break	Send Make and Break Scan Codes	5-15
RS-232 Host Parameters		
RS-232 Host Types	Standard RS-232[1]	6-9
Baud Rate	9600	6-10
Parity	None	6-12
Check Receive Errors	Enable	6-13
Stop Bit Select	1 Stop Bit	6-14
Data Bits	8-Bit	6-14
Hardware Handshaking	None	6-15
Software Handshaking	None	6-18
Host Serial Response Time-out	Minimum: 2 Sec	6-20
RTS Line State	Host: Low RTS	6-21
Beep on <BEL>	Disable	6-22
Intercharacter Delay	Minimum: 0 msec	6-23
Nixdorf Mode A/B and OPOS/JPOS Beep/LED Options	Normal Operation	6-24
Ignore Unknown Characters	Send Bar Code	6-25
[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
USB Host Parameters		
USB Device Type	HID Keyboard Emulation	7-7
USB Country Keyboard Types (Country Codes)	North American	7-8
USB Keystroke Delay	No Delay (0 msec)	7-10
USB CAPS Lock Override	Disable	7-11
USB Ignore Unknown Characters	Enable	7-12
Emulate Keypad	Disable	7-13
USB Keyboard FN1 Substitution	Disable	7-14
Function Key Mapping	Disable	7-14
Simulated Caps Lock	Disable	7-15
Convert Case	No Case Conversion	7-15
UPC/EAN		
UPC-A	Enable	8-10
UPC-E	Enable	8-10
UPC-E1	Disable	8-11
EAN-13/JAN 13	Enable	8-11
EAN-8/JAN 8	Enable	8-12
Bookland EAN	Disable	8-12
Decode UPC/EAN/JAN Supplementals (2 and 5 digits)	Ignore Supplementals	8-13
UPC/EAN/JAN Supplemental Redundancy	14	8-15
[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
Transmit UPC-A Check Digit	Enable	8-15
Transmit UPC-E Check Digit	Enable	8-16
Transmit UPC-E1 Check Digit	Enable	8-16
UPC-A Preamble	System Character	8-17
UPC-E Preamble	System Character	8-18
UPC-E1 Preamble	System Character	8-19
Convert UPC-E to A	Disable	8-20
Convert UPC-E1 to A	Disable	8-21
EAN-8/JAN-8 Extend	Disable	8-22
Code 128		
Code 128	Enable	8-22
UCC/EAN-128	Enable	8-23
ISBT 128	Enable	8-23
Code 39		
Code 39	Enable	8-24
Trioptic Code 39	Disable	8-24
Convert Code 39 to Code 32	Disable	8-25
Code 32 Prefix	Disable	8-26
Set Length(s) for Code 39	2 to 55	8-27
Code 39 Check Digit Verification	Disable	8-29
[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
Transmit Code 39 Check Digit	Disable	8-30
Code 39 Full ASCII Conversion	Disable	8-31
Code 93		
Code 93	Disable	8-32
Set Lengths for Code 93	4 to 55	8-32
Code 11		
Code 11	Disable	8-34
Set Lengths for Code 11	4 to 41	8-34
Code 11 Check Digit Verification	One Check Digit	8-36
Transmit Code 11 Check Digits	Disable	8-37
Interleaved 2 of 5 (I 2 of 5)		
Interleaved 2 of 5 (I 2 of 5)	Enable	8-38
Set Lengths for Interleaved 2 of 5	14	8-38
I 2 of 5 Check Digit Verification	Disable	8-41
Transmit I 2 of 5 Check Digit	Disable	8-42
Convert I 2 of 5 to EAN-13	Disable	8-42
Discrete 2 of 5 (D 2 of 5)		
Discrete 2 of 5	Disable	8-44
Set Lengths for D 2 of 5	12	8-44
[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
Codabar (NW - 7)		
Codabar	Disable	8-46
Set Lengths for Codabar	5 to 55	8-47
CLSI Editing	Disable	8-49
NOTIS Editing	Disable	8-49
MSI		
MSI	Disable	8-50
Set Lengths for MSI	6 to 55	8-50
MSI Check Digits	One	8-52
Transmit MSI Check Digit(s)	Disable	8-53
MSI Check Digit Algorithm	Mod 10/Mod 10	8-53
RSS (Reduced Space Symbology)		
RSS 14	Disable	8-54
RSS Limited	Disable	8-54
RSS Expanded	Disable	8-55
Convert RSS to UPC/EAN	Disable	8-55
Symbology - Specific Security Levels		
Redundancy Level	1	8-56
Security Levels	0	8-58
Bi-Directional Redundancy	Disable	8-60
[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
Miscellaneous Scanner Options		
Transmit Code ID Character	None	9-5
Scan Angle	Normal Angle	9-6
Prefix Value	7013 <CR><LF>	9-6
Suffix Value	7013 <CR><LF>	9-6
Scan Data Transmission Format	Data As Is	9-7
FN1 Substitution Values	Set FN1 Substitution Value	9-9
Transmit “No Read” Message	Disable No Read	9-9
[1]User selection is required to configure this interface and this is the most common selection.		

B

Programming Reference

Symbol Code Identifiers. B-3
AIM Code Identifiers B-4

Symbol Code Identifiers

Table 2-1. 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 **]cm** where:

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

Table 2-2. 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 **]A7**AIMID where 7 = (3+4).	
Trioptic Code 39	0	No option specified at this time. Always transmit 0.
	Example: A Trioptic bar code 412356 is transmitted as **]X0**412356	
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: ACode (EAN) 128 bar code with Function 1 character^{FNC1} in the first position, AIMID is transmitted as **]C1**AIMID	
I 2 of 5	0	No check digit processing.
	1	Reader has validated check digit.
	3	Reader has validated and stripped check digit.
	Example: An I 2 of 5 bar code without check digit, 4123, is transmitted as **]I0**4123	
Codabar	0	No check digit processing.
	1	Reader has checked check digit.
	3	Reader has stripped check digit before transmission.
	Example: A Codabar bar code without check digit, 4123, is transmitted as **]F0**4123	
Code 93	0	No options specified at this time. Always transmit 0.
	Example: A Code 93 bar code 012345678905 is transmitted as **]G0**012345678905	

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 **]M1**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 **]S0**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 **]E0**0012345678905	
Bookland EAN	0	No options specified at this time. Always transmit 0.
	Example: A Bookland EAN bar code 123456789X is transmitted as **]X0**123456789X	
Code 11	0	Single check digit
	1	Two check digits
	3	Check characters validated but not transmitted.

C

Sample Bar Codes

UPC-A C-3
UPC-E C-3
UPC-E1 . . . . C-3
EAN-13 . . . . C-4
EAN-8 . . . . C-4
Code 39 . . . . C-4
Trioptic Code 39. . . . . C-5
Code 93 . . . . C-5
Code 11 . . . . C-5
Codabar C-6
MSI. C-6
Interleaved 2 of 5 . . . . C-6

UPC-A

0 12345 67890 5

UPC-E

0 123456 5

UPC-E1

1 123456 2

EAN-13

3 456789 012340

EAN-8

1234 5670

Code 39

123ABC

Trioptic Code 39

456123

Code 93

12345ABCDE

Code 11

Æ1234567890Æ

Codabar

A1234567890A

MSI

123456789

Interleaved 2 of 5

12345678912345

D

Numeric Bar Codes

0, 1 . . . . D-3
2, 3, 4 . . . . D-4
5, 6, 7 . . . . D-5
8, 9 . . . . D-6
Cancel. D-7

0, 1

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

0

1

2, 3, 4

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

2

3

4

5, 6, 7

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

5

6

7

8, 9

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

8

9

Cancel

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

Cancel

Glossary

AIM — Automatic Identification Manufacturers, Inc. is the trade association for manufacturers of automatic identification systems.

Alphanumeric — A character set that contains letters, numbers and other characters such as special symbols.

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

ASCII

American Standard Code for Information Interchange.
A 7-bit-plus-parity code representing 128 letters, numerals, punctuation marks, and control characters. It is a standard data transmission code in the U.S.

Aspect Ratio

The ratio of symbol height to symbol length in a 2-dimensional symbol.

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.

Automatic Identification System

The application of various technologies, such as bar code recognition, image recognition, voice recognition and RF/MW transponders, for the purpose of data entry into a data processing system and bypassing the key-entry component of traditional data entry.

Background

The area surrounding a printed symbol including the spaces and quiet zones.

Bar

The dark element in a printed bar code symbol.

Bar Code

An array of parallel rectangular bars and spaces arranged according to the encodation rules of a particular symbol specification in order to represent data in machine-readable form (i.e., Code 39).

Bar Code Character

A single group of bars and spaces which represent an individual number, letter, punctuation mark or other symbol.

Bar Code Density

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

Bar Code Reader

A device used to read or decode a bar code symbol.

Bar Code Symbol

The combination of symbol characters and features required by a particular symbology, including quiet zones, start and stop characters, data characters, check characters and other auxiliary patterns, that together form a complete scannable entity (see *Symbol*).

Bar Height

The dimension of a bar measured perpendicular to the bar width (see *Y Dimension*).

Bar Width Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar (see *X Dimension*).

Baud Rate A measure of the data flow or number of signaling events occurring per second. When one bit is the standard "event," this is a measure of bits per second (bps). For example, a baud rate of 50 means transmission of 50 bits of data per second.

Bi-directional Denotes that a machine-readable symbol can be read successfully in two directions – either backwards or forwards. Also identifies a scanner that can operate or a bar code that can be read independent of scanning direction.

Binary Denotes a numbering system to base 2 in which numbers are expressed as combinations of the digits 0 and 1 with positional weighting based on powers of 2. In computing, these can be represented electrically by 'off' and 'on' respectively or in machine-readable symbols by narrow and wide elements or by the absence or presence of a bar module.

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.

Byte A sequential series of bits comprising one character and handled as one unit. Usually encoded in the ASCII format, a byte usually consists of eight bits and represents one alphabetic or special character, two decimal digits or eight binary bits.

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

A set of unambiguous rules specifying the way in which data may be represented as numbers and letters used to represent information.

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 49

This symbol is a stack of 2 to 8 rows. Each row encodes row count information plus data characters. For more information, go to the AIM web site or the ANSI web site (see *Stacked Symbol (2D Symbols)*).

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.

Codeword

As a symbol character value, this is an intermediate level of coding between source data and the graphical encodation in the symbol.

Concatenation

The construction of a string of data from two or more strings by appending each string in succession. The linking or chaining together of separate items of data in a bar code symbol or of the data contained in two or more separate bar code symbols (also referred to as message append and structured append).

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.

Contrast

The difference in reflectance between the black and white (or bar and space) areas of a symbol.

Data Identifier

A specified character or string of characters that defines the intended use of the data element that follows. For the purposes of automatic data capture technologies, data identifier refers to the alphanumeric identifiers as defined in ANSI MH10.8.2, formerly known as ANSI/FACT data identifiers.

Data Matrix
This error correcting, 2-dimensional matrix symbology is capable of encoding various character sets including strictly numeric data, alphanumeric data and all ISO 646 (ASCII) characters, as well as special character sets. The symbology has both error detection and error correction features. Each Data Matrix symbol consists of data regions, which contain nominally square modules set out in a regular array. A dark module is a binary 1 and a light module is a binary 0. There is no specified minimum or maximum for the X or Y dimension. The data region is surrounded by a finder pattern, a perimeter to the data region that is 1 module wide, which is surrounded by a quiet zone on all four sides of the symbol. Two adjacent sides are solid dark lines used primarily to define physical size, orientation and symbol distortion. The two opposite sides consist of alternating dark and light modules. These are used primarily to define the cell structure but also assist in determining physical size and distortion.

There are 2 types of Data Matrix symbologies: ECC 000 - 140 with several available levels of convolutional error correction, and ECC 200, which uses Reed-Solomon error correction. For ISO/IEC JTC 1/SC 31 purposes, only ECC 200 is recommended. The intellectual property rights associated with Data Matrix have been committed to the public domain.

Data Structure
The stipulation of the type of information that is included in a bar code, such as its order and format.

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.

Decoder An electronic package that receives the signals from the scanning function, performs the algorithm to interpret the signals into meaningful data and provides the interface to other devices.

Density Describes the relative amount of memory contained in a radio frequency identification tag (see *Bar Code Density*).

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

Diffuse Reflection The component of reflected light that emanates in all directions from the reflecting surface.

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.

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.

EAN/U.P.C. A fixed-length, numeric 13-digit bar code symbol consisting of 30 dark elements and 29 intervening light elements. Each character is represented by 2 bars and 2 spaces over 7 modules. A bar may be comprised of 1, 2, 3 or 4 modules. Each EAN/U.P.C. symbol consists of a leading quiet zone, a start pattern, 7 left-hand data characters, a center bar pattern, 5 right-hand data characters, a Modulo 10 check character, a stop pattern and a trailing quiet zone. U.P.C. is often considered a 12-digit code. The 13th digit of EAN/U.P.C. symbol is a derived character in the left-most position. In the case of U.P.C., this derived left-most character is a 0.

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.

Error Correction A reader or decoder's use of mathematical schemes to reconstruct or replace damaged or missing symbol characters to enable the reading of the symbol data.

Error Detection This occurs when error-correction characters detect that the presence of errors in the symbol exceeds the error correction capacity, and keeps the symbol from being decoded as erroneous data.

Error-Correction Characters Symbol characters used for error correction and detection, calculated automatically from the other symbol characters.

Error-Correction Level An indicator of the number of characters used in a symbology for error correction. A higher level of error correction allows for correcting greater potential symbol damage.

Error-Detection Characters Symbol characters reserved for error detection that are calculated automatically from the other symbol characters.

Fixed Beam Bar Code Reader A scanning device where scanning motion is achieved by moving the object relative to the reader; as opposed to a moving beam reader.

Guard Bars Bars located at both ends and the center of a UPC and EAN symbol to provide reference points for scanning.

Horizontal Bar Code A bar code or symbol with an overall length dimension that is parallel to the horizon, which resembles a picket fence.

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

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

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

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.

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
An optical bar code reading device using a coherent laser light beam as its source of illumination.

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.

Matrix Symbols
A 2-dimensional array of regular polygon shaped cells where the center-to-center distance of adjacent elements is uniform. The arrangement of the cells represents data and/or symbology functions. Matrix symbols may include recognition patterns that do not follow the same rule as the other elements within the symbol (i.e., Data Matrix and MaxiCode).

MIL

1 mil = 1 thousandth of an inch; a unit of measure often used to quantify bar code printing and scanning dimensions.

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.

Module

(1) The narrowest nominal width unit of measure in a symbol. In certain symbologies, element widths are specified as multiples of 1 module. Equivalent to X dimension; or (2) a single cell in a matrix symbology used to encode 1 bit of data. In MaxiCode, the module shape is a regular hexagon. In Data Matrix, the module shape is nominally square. In PDF417, the module shape is a regular rectangle. In bar code symbologies, the module shape is a regular rectangle.

Module Check Digit or Character

A character within the symbol data field calculated using modular arithmetic that is used for error detection. The calculated character is determined by applying a code algorithm to the data field contents (see *Check Digit*).

Moving Beam Bar Code Reader

A device where scanning motion is achieved by mechanically moving the optical geometry.

MRD

Minimum reflectance difference: a formula that is used to determine if there is an adequate difference between absorbed and reflected light.

Nanometer

Unit of measure used to define the wavelength of light that is equal to 10-9 meter.

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).

Non-Contact Reader/Scanner

Bar code readers requiring no physical contact with the printed symbol.

Non-read

The absence of data at the scanner output after an attempted scan, which is due to no code, defective code, scanner failure or operator error.

Omnidirectional	Bar codes read in any orientation relative to the scanner.
Optical Throw	The distance from the scanner face to the closest point at which symbol can be read; also, optical throw is the difference between range and depth of field.
Orientation	The alignment of the symbol's scan path. Two possible orientations are horizontal with vertical bars and spaces (picket fence) and vertical with horizontal bars and spaces (ladder).
Overhead	The fixed number of characters required for start, stop and checking in a given symbol. For example, a symbol requiring a start, stop and 2 check characters contains 4 characters of overhead.
Parameter	A variable that can have different values assigned to it.
PDF417	An error correcting 2-dimensional multi-row symbol developed in 1992 by Symbol Technologies, PDF417 symbols are constructed from 4 bars and 4 spaces over 17 modules. The symbol size is from 3 to 90 rows. There is no specified minimum or maximum for X or Y dimension. With at least the recommended minimum level of error correction, the recommended Y dimension is 3X. With less than the minimum recommended level of error correction, the recommended Y dimension is 4X. A quiet zone of 2X is specified on each side of a symbol. Because of delta decode techniques, the symbology is immune from uniform bar width growth. PDF417 supports cross-row scanning. The intellectual property rights associated with PDF417 have been committed to the public domain.
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%.
Pitch	Rotation of a bar code symbol in an axis parallel to the direction of the bars.
Plessey Code	A pulse-width, modulated bar code commonly used for shelf marking in grocery stores.

Postnet Code	Code developed by the U.S. Postal Service to assist in the automatic sorting of mail.
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*).
Quiet Zone	A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.
Radio Frequency	Non-optical automatic identification devices that use radio waves to transmit data.
Radio Frequency Data Communication (RFDC)	Handheld or vehicle mounted units that send and receive messages by radio frequency. Information from the units is displayed on a screen for workers and allows real-time, two-way exchange of data between terminals when one terminal is mobile and the other is a host computer at a remote location.
Radio Frequency Identification (RFID)	The use of small radio transponders that are activated by a reading transmitter. The transponder carries a unique ID code or other information in its memory and can be read at a distance without line of sight.
Radio Frequency Tag	An electronic tag capable of receiving, storing and/or transmitting digital information.
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.
RSS	Reduced Space Symbology: A family of space efficient symbologies developed by UCC.EAN.
Scan Area	Area intended to contain a symbol.

Scanner An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are:

1. Light source (laser or photoelectric cell) - illuminates a bar code.

2. Photodetector - registers the difference in reflected light (more light reflected from spaces).

3. Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.

Scanning Mode The scanner is energized, programmed, and ready to read a bar code.

Scanning Sequence A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.

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

Skew Rotation of a bar code symbol on an axis parallel to the symbol's length.

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

Space Width The thickness of a space measured from the edge closest to the symbol start character to the trailing edge of the same space.

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

Stacked Symbol (2D Symbols) A 2-dimensional (2D) symbol with sequences of linear (width-coded) data that are stacked one upon another (i.e., PDF417).

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

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

Symbol	A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters, and check characters.
Symbol Aspect Ratio	The ratio of symbol height to symbol width.
Symbol Density	The number of data characters per unit length; usually expressed as characters per inch (CPI).
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).
Tilt	Rotation of a bar code symbol on an axis perpendicular to the substrate.
Tolerance	Allowable deviation from the nominal bar or space width.
2-dimensional (2D) symbology	A machine-readable symbol which must be examined both vertically and horizontally to read the entire message. A 2D symbol may be one of two types of machine-readable symbols: a Matrix Symbol or a stacked symbol. 2D symbols differ from linear bar codes with the ability for high data content, small size, data efficiency and error correction capability.
UCC	Uniform Code Council: the organization that administers the U.P.C and other retail standards.
UCC.EAN-128	Code 128 with a Function 1 character in the first position that is the symbology used with the UCC.EAN format for a universal product number (UPN).
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.

Variable Length Code
A code with a number of encoded characters within a range, as opposed to a code with a fixed number of encoded characters.

Vertical Bar Code
A bar code pattern presented in such orientation that the symbol from start to stop is perpendicular to the horizon. The individual bars are in an array appearing as rungs of a ladder.

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

Wedge
A device that plugs in between a keyboard and a terminal and allows data to be entered by a keyboard or by various types of scanners.

X Dimension
The dimension of the narrowest bar and narrowest space in a bar code.

Y Dimension
The height of the modules in a row of a 2-dimensional symbols.

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