DS6707 DIGITAL IMAGER SCANNER

PRODUCT REFERENCE GUIDE

DS6707 DIGITAL IMAGER SCANNER PRODUCT REFERENCE GUIDE

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Revision A
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Zebra Technologies Corporation
Lincolnshire, IL U.S.A
http://www.zebra.com

Warranty

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

Revision History

Changes to the original manual are listed below:

Change	Date	Description
-01 Rev A	8/2006	Initial release
-02 Rev A	4/2007	Updated service information, updated operating temperature and drop specifications, added Host Trigger Mode option, added new UPC/EAN supplemental options, changed RSS references to GS1 DataBar, added following parameters: Illumination Bank Control, Fixed Exposure, Fixed Gain, Gain/Exposure Priority for Snapshot Mode, Image Brightness, JPEG Target File Size, Image Enhancement, Bookland ISBN format, 4State Postal, Inverse 1D, Data Matrix Inverse, Micro QR, QR Inverse, Aztec, Aztec Inverse
-03 Rev A	8/2007	Updated decode zone/range information
-04 Rev A	8/2008	Added DP and HD model information, added Fuzzy 1D, Decode Mirror Images, Low Light Enhancement, and Presentation Mode Field of View parameters, updated Signature Capture Width and Height options, added Code 128 Lengths and Post US4, changed code type name from UCC/EAN-128 to GS1-128
-05 Rev A	10/2008	Updated wall mount template, added separate dimensions and weight specifications for the Zebra DS6707-DP model, added custom defaults options, added specific string search and new move cursor options in ADF chapter
-06 Rev A	5/2009	Added ISSN EAN, Matrix 2 of 5, and Chinese 2 of 5 code types, added ISBT concatenation parameters
-07 Rev A	9/2009	Added DS6707 with base model, added cable installation/removing instructions, presentation mode bar code parameters and updated technical specifications. Added RS-232 parameters: Code 39 Full ASCII, PDF417, GS1 Databar 14/Limited/ Expanded.
-08 Rev A	12/2010	Added DS6707-HC configuration, Mobile Phone Display and Mobile Phone Decode Aggressiveness parameters, CUTE parameters, added all Image Kit parameters, Simulated Scan Base Mode, Presentation Time Delay Mode, Added Send Alt 2 parameter and corrected Send Alt @ parameter in ADF chapter, updated Maintenance section, updated 123Scan^2 chapter, corrected *Terminal Specific RS-232* Olivetti column: ETX changed from 1002 to 1003 and STX changed from 1003 to 1002.

Change	Date	Description
-09 Rev A	6/2013	Added: - To Timeout Between Decodes, Same Symbol - The bar code must be out of the field of view for the timeout period before the scanner reads the same consecutive symbol - PDF Prioritization - PDF Prioritization Timeout - Video Mode Format Selector - To USB country Keyboard Types - French Belgian Windows bar code - USB Convert Unknown to Code 39 - USB Polling Interval (for DS6707-SR) - Fast HID Keyboard - Quick Keypad Emulation - USB Ignore Beep Directive - USB Ignore Type Directive - Ignore Beep on <BEL> over CDC - IBM Specification Level - Codabar Upper or Lower Case Start/Stop Characters Detection - GS1 DataBar Limited Security Level - Intelligent Document Capture (IDC) chapter Updated: - URLs - Service information - Default value for Decode Mirror Image to Auto - Terminal Specific Code ID Characters table - HID Keyboard Emulation to USB Keyboard (HID) - CDC COM Port Emulation to USB CDC Host - 123Scan2 chapter - Default value for Coupon Report to New Coupon Format - Default value for Aztec Inverse to Inverse Autodetect for all models - Replaced ADF chapter content with a reference to the *Advanced Data Formatting Programmer Guide*. Deleted: - "Symbol" in product name - Reference to www.symbol.com/usb (no longer an active URL)
-10 Rev A	3/2015	Zebra Rebranding

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Chapter 5: Imaging Preferences

Chapter 6: SSI Interface

ABOUT THIS GUIDE

Introduction

The *DS6707 Digital Imager Scanner Product Reference Guide* provides general instructions for setting up, operating, maintaining, and troubleshooting the DS6707 digital imager scanner.

Configurations

This guide includes the following digital imager scanner configurations:

- DS6707-SR: Standard Range digital imager scanner for point of sale scanning.
- DS6707-SR20007NSR: Standard Range digital imager scanner with base for presentation (hands-free) point of sale scanning.
- DS6707-HD: High Density digital imager scanner for high-density 1D and 2D bar codes.
- DS6707-HC: Standard Range digital imager scanner; healthcare white.
- DS6707-DP: Direct Part Mark digital imager scanner for DPM scanning.
- DS6707-DC: Document Capture digital imager scanner for 8 1/2 in. by 11 in. imaging.

Chapter Descriptions

Topics included in this guide are as follows:

- *Chapter 1, Getting Started* provides a product overview, unpacking instructions, and cable connection information.
- *Chapter 2, Scanning* describes parts of the digital imager scanner, beeper and LED definitions, and how to use the scanner in hand-held and presentation (hands-free) modes.
- *Chapter 3, Maintenance & Technical Specifications* provides information on how to care for the digital imager scanner, troubleshooting, and technical specifications.
- *Chapter 4, User Preferences & Miscellaneous Digital Imager Scanner Options* provides frequently used features to customize how data transmits to the host, and programming bar codes for selecting these features for the digital imager scanner.
- *Chapter 5, Imaging Preferences* provides programming bar codes for selecting imaging features.
- *Chapter 6, SSI Interface* describes how to set up the digital imager scanner with a Simple Serial Interface (SSI) host. When using SSI, program the digital imager scanner via bar code menu or SSI host commands.
- *Chapter 7, USB Interface* describes how to set up the digital imager scanner with a USB host.
- *Chapter 8, RS-232 Interface* describes how to set up the digital imager scanner with an RS-232 host, such as point-of-sale devices, host computers, or other devices with an available RS-232 port.
- *Chapter 9, 123Scan2* describes the 123Scan^2 PC-based scanner configuration tool, and provides the bar code to scan to communicate with the 123Scan^2 program.
- *Chapter 10, Symbologies* describes all symbology features and provides programming bar codes for selecting these features for the digital imager scanner.
- *Chapter 11, Intelligent Document Capture* describes the Zebra advanced image processing firmware for select imager based scanners, and includes parameter bar codes and a quick start procedure.
- *Chapter 12, Advanced Data Formatting* briefly describes ADF, a means of customizing data before transmission to the host device, and includes a reference to the *ADF Programmer Guide*.
- *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 of various code types.
- *Appendix D, Numeric Bar Codes* includes the numeric bar codes to scan for parameters requiring specific numeric values.
- *Appendix E, ASCII Character Sets* provides ASCII character value tables.

Notational Conventions

The following conventions are used in this document:

- *Italics* are used to highlight the following:
  - Chapters and sections in this and related documents
  - Dialog box, window and screen names
  - Drop-down list and list box names
  - Check box and radio button names
- **Bold** text is used to highlight the following:
  - Key names on a keypad
  - Button names on a screen.
- 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.

Related Documents

The *DS6707 Digital Imager Scanner Quick Start Guide*, p/n 72-83972-xx, provides general information for getting started with the DS6707 digital imager scanner, and includes basic set up and operation instructions.

The latest version of this guide and all guides, are available at: www.zebra.com/support

Service Information

If you have a problem using the equipment, contact your facility's technical or systems support. If there is a problem with the equipment, they will contact the Zebra Global Customer Support Center at: www.zebra.com/support

When contacting Zebra support, please have the following information available:

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

Zebra responds to calls by e-mail, telephone or fax within the time limits set forth in service agreements. If your problem cannot be solved by Zebra support, you may need to return your equipment for servicing and will be given specific directions. Zebra is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

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

CHAPTER 1 GETTING STARTED

Introduction

The DS6707 digital imager scanner combines superior 1D and 2D omnidirectional bar code scanning and sub-second image capture and transfer to provide the best value in a digital imager scanner. Whether in hand-held mode or presentation (hands-free) mode, the digital imager scanner ensures comfort and ease of use for extended periods of time.

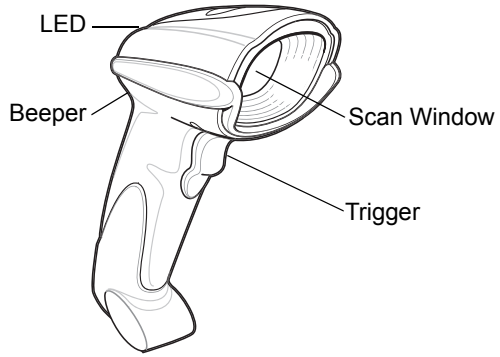


Figure 1-1 *DS6707 Digital Imager Scanner*

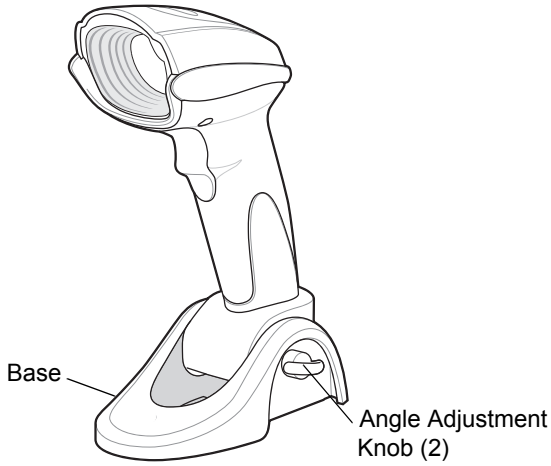


Figure 1-2 *DS6707 Digital Imager Scanner with Base*

Supported Interfaces

The DS6707digital imager scanner supports:

- Simple Serial Interface (SSI) connection to a host. When using SSI, program the digital imager scanner via bar code menu or SSI host commands.
- Standard RS-232 connection to a host. Scan bar code menus to set up communication between the digital imager scanner and the host.
- USB connection to a host. The digital imager scanner autodetects a USB host and defaults to the USB Keyboard (HID) interface type. Select other USB interface types by scanning programming bar code menus.This interface supports the following international keyboards (for Windows® environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Portuguese-Brazilian, and Japanese.
- Configuration via 123Scan².

Unpacking

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

Setting Up the Digital Imager Scanner

Standard Model

Installing the Interface Cable

1. Plug the interface cable modular connector into the cable interface port on the bottom of the scanner handle. See *Figure 1-3*.
2. Gently tug the cable to ensure the connector is properly secured.
3. Connect the other end of the interface cable to the host (see the specific host chapter for information on host connections).

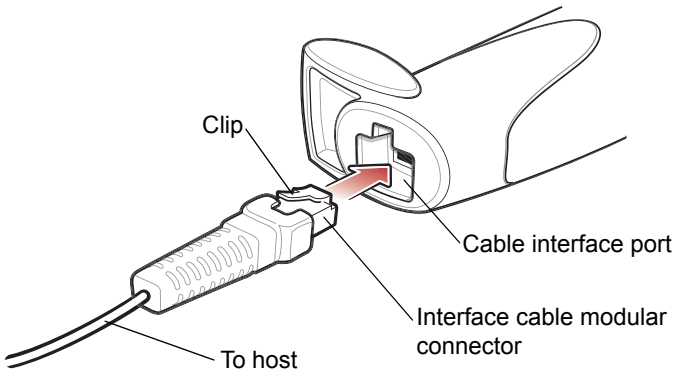


Figure 1-3 *Installing the Cable*

NOTE Different hosts require different cables. The connectors illustrated in each host chapter are examples only. Connectors vary from those illustrated, but the steps to connect the digital imager scanner are the same.

Removing the Interface Cable

1. Using the tip of a screwdriver, depress the cable's modular connector clip.

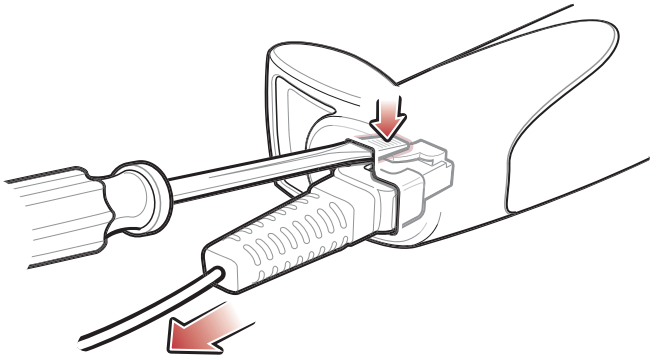


Figure 1-4 *Removing the Cable*

2. Carefully slide out the cable.
3. Follow the steps for *Installing the Interface Cable* to connect a new cable.

Connecting Power (if required)

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

1. Connect the interface cable to the bottom of the digital imager scanner, as described in *Installing the Interface Cable on page 1-3*.
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.

Model with Base

Installing the Interface Cable

1. Turn both angle adjustment knobs left to loosen the scanner in the base. See *Figure 1-5*.
2. Move the scanner forward until there is full access to the cable interface port on the bottom of the scanner.

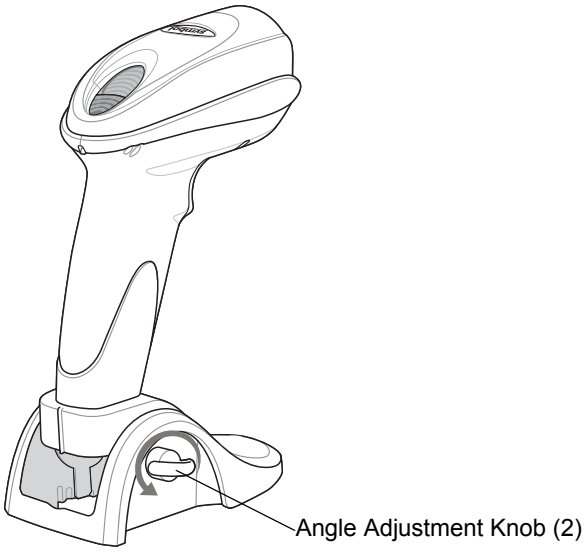


Figure 1-5 *Adjust the Scanner for Cable Installation*

3. Insert the interface cable through the opening at the back of the base.

NOTE Ensure the cable is inserted through the opening at the back and not underneath the base.

4. Plug the interface cable modular connector into the cable interface port on the bottom of the scanner handle.
5. Gently tug the cable to ensure the connector is properly secured.
6. Move the scanner to preferred angle and turn the angle adjustment knobs right to tighten.
7. Connect the other end of the interface cable to the host (refer to the host manual to locate the correct port).

NOTE Different hosts require different cables. The connectors illustrated in each host chapter are examples only. Connectors vary from those illustrated, but the steps to connect the digital imager scanner are the same.

Removing the Interface Cable for Scanner with Base

1. Turn both angle adjustment knobs left to loosen the scanner in the base. See*Figure 1-5*.
2. Move the scanner forward until there is full access to the cable interface port on the bottom of the scanner.
3. Using the tip of a screwdriver, depress the cable's modular connector clip. See *Figure 1-4*.
4. Carefully slide out the cable.
5. Follow the steps for *Installing the Interface Cable* to connect a new cable.
6. Move the scanner to preferred angle and turn the angle adjustment knobs right to tighten.

Configuring the Digital Imager Scanner

To configure the digital imager scanner, use the bar codes in this manual, or the 123Scan^2 configuration program.

See *Chapter 4, User Preferences & Miscellaneous Digital Imager Scanner Options* and *Chapter 5, Imaging Preferences* for information about programming the digital imager scanner using bar code menus. Also see each host-specific chapter to set up connection to a specific host type.

1. See *Chapter 9, 123Scan2* to configure the digital imager scanner using this configuration program. The program includes a help file.

Mounting the Digital Imager Scanner

Desk Mount

Use the optional desk mount for convenient and protective placement of the digital imager scanner on a flat surface. Simply place the mount on the surface. The rubber feet hold the mount securely in place when inserting and removing the digital imager scanner.

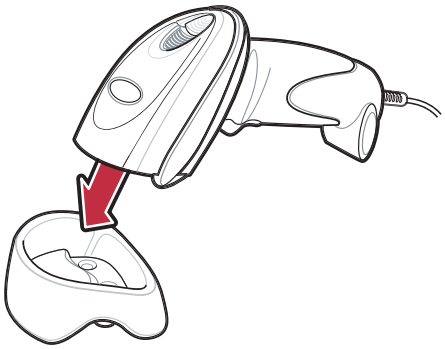


Figure 1-6 *Inserting the Digital Imager Scanner in the Desk Mount*

Alternatively, secure the desk mount to a desk surface by inserting two screws* appropriate for the mounting surface through the screw holes of the desk mount, and into the surface. Screw the desk mount onto the surface with or without the rubber feet.

*The recommended screws are two #6 screws (5/8" long).

Wall Mount

To use the optional wall mount to mount the digital imager scanner on a wall, place the mount in the desired location on the wall and secure by inserting two screws* appropriate for the mounting surface through the screw holes on the mount, and into the surface. Insert the digital imager scanner into the mount as shown.

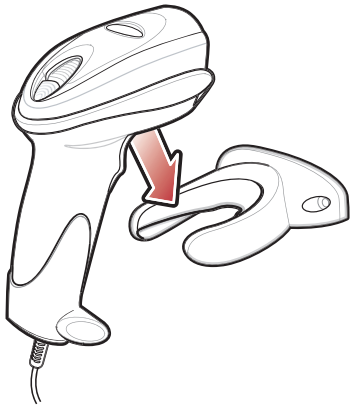


Figure 1-7 *Securing the Wall Mount*

*The recommended screws are two #6 screws (1” long) and two #6 washers.

For convenience, print this page and use the template below for mounting hole locations.

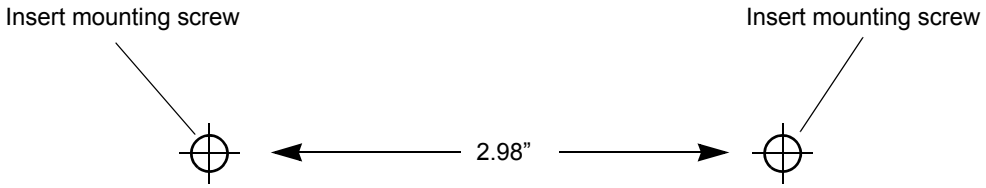


Figure 1-8 *Wall Mounting Template*

CHAPTER 2 SCANNING

Introduction

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

Beeper Definitions

The digital imager scanner issues different beep sequences and patterns to indicate status. *Table 2-1* defines beep sequences that occur during both normal scanning and while programming the digital imager scanner.

Table 2-1 *Beeper Definitions*

Beeper Sequence	Indication
Standard Use	
Low/medium/high beeps	Power up.
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. This occurs if the digital imager scanner is not properly configured. Check option setting.
5 low beeps	Conversion or format error.
Low/high/low beeps	ADF transmit error. See *Chapter 12, Advanced Data Formatting*.
High/high/high/low beeps	RS-232 receive error.
Parameter Menu Scanning	
Short high beep	Correct entry scanned or correct menu sequence performed.
Low/high beeps	Input error; incorrect bar code, programming sequence, or **Cancel** scanned; remain in ADF program mode.
High/low beeps	Keyboard parameter selected. Enter value using numeric bar codes.
High/low/high/low beeps	Successful program exit with change in parameter setting.
Low/high/low/high beeps	Out of host parameter storage space. Scan *Set Default Parameter on page 4-4*.
Code 39 Buffering	
High/low beeps	New Code 39 data was entered into the buffer.
3 long high beeps	Code 39 buffer is full.
Low/high/low beeps	The Code 39 buffer was erased or there was an attempt to clear or transmit an empty buffer.
Low/high beeps	A successful transmission of buffered data.
Macro PDF	
2 long low beeps	File ID error. A bar code not in the current MPDF sequence was scanned.
3 long low beeps	Out of memory. There is not enough buffer space to store the current MPDF symbol.
4 long low beeps	Bad symbology. Scanned a 1D or 2D bar code in a MPDF sequence, a duplicate MPDF label, a label in an incorrect order, or trying to transmit an empty or illegal MPDF field.
5 long low beeps	Flushing MPDF buffer.

Table 2-1 *Beeper Definitions (Continued)*

Beeper Sequence	Indication
Fast warble beep	Aborting MPDF sequence.
Low/high beeps	Flushing an already empty MPDF buffer.
ADF Programming: Normal Data Entry. Duration of tones are short.	
High/low beeps	Enter another digit. Add leading zeros to the front if necessary.
Low/low beeps	Enter another alphabetic character or scan the **End of Message** bar code.
High/high beeps	Enter another criterion or action, or scan the **Save Rule** bar code.
High/low/high/low beeps	Rule saved. Rule entry mode exited.
High/low/low beeps	All criteria or actions cleared for current rule, continue entering rule.
Low beep	Delete last saved rule. The current rule is left intact.
Low/high/high beeps	All rules are deleted.
ADF Programming: Error Indications. Duration of tones are very long.	
Low/high/low/high beeps	Out of rule memory. Erase some existing rules, then try to save rule again. (It is not necessary to re-enter the current rule.)
Low/high/low beeps	Cancel rule entry. Rule entry mode exited because of an error or the user asked to exit rule entry.
Low/high beeps	Entry error, wrong bar code scanned. Re-enter criterion or action. All previously entered criteria and actions are retained. Criteria or action list is too long for a rule.
Host Specific	
USB only	
4 short high beeps	The digital imager scanner has not completed initialization. Wait several seconds and scan again.
Low/medium/high beeps upon scanning a USB device type	Communication with the bus must be established before the digital imager scanner can operate at the highest power level.
Low/medium/high beeps occur more than once.	The USB bus can put the digital imager scanner in a state where power to the digital imager scanner is cycled on and off more than once. This is normal and usually happens when the PC cold boots.
RS-232 only	
1 short high beep	A <BEL> character is received and Beep on <BEL> is enabled.

LED Definitions

In addition to beep sequences, the digital imager scanner uses a two-color LED to indicate status. *Table 2-2* defines LED colors that display during scanning.

Table 2-2 *Standard LED Definitions*

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

Scanning in Hand-Held Mode

Install and program the digital imager scanner (see *Setting Up the Digital Imager Scanner on page 1-3*). For assistance, contact the local supplier or Zebra Support.

Scanning with the Digital Imager Scanner

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

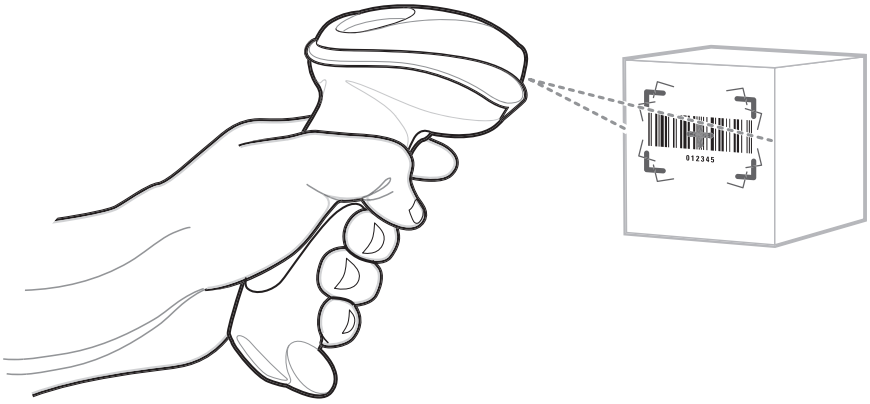


Figure 2-1 *Scanning in Hand-Held Mode*

3. When the digital imager scanner senses movement, in its default **Auto Aim** trigger mode, it projects a red laser aiming pattern (*Figure 2-2*) which allows positioning the bar code or object within the field of view. (To turn off the default **Auto Aim** trigger mode, see *Trigger Mode on page 4-9*.) If necessary, the digital imager scanner turns on its red LEDs to illuminate the target bar code.

   The DS6707-DP version uses a donut-shaped pattern with a center aiming dot.

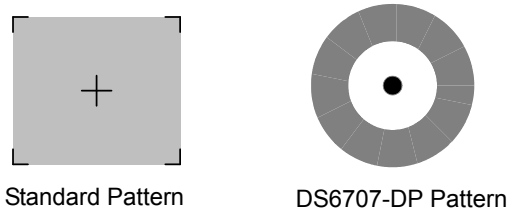


Figure 2-2 *Laser Aiming Pattern*

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

   When scanning with the DS6707-DP, ensure part of the bar code is visible on the inside of the donut-shaped pattern.

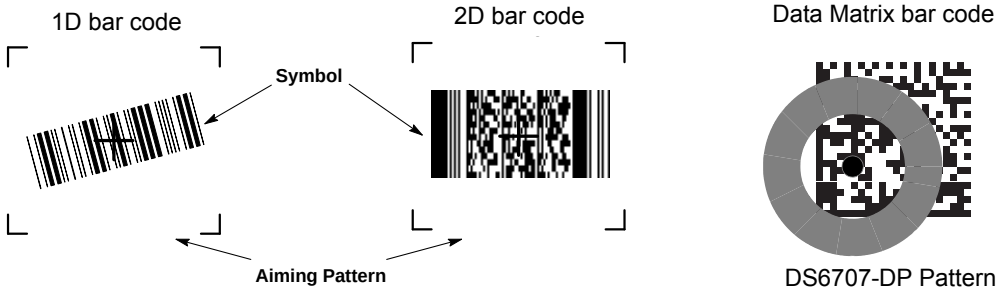


Figure 2-3 *Placing Symbol in Aiming Pattern*

5. Hold the trigger until the digital imager scanner beeps, indicating the bar code is successfully decoded. For more information on beeper and LED definitions, see *Table 2-1* and *Table 2-2*.

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

Aiming

Hold the digital imager scanner between two and nine inches (depending on symbol density; see *Decode Zones on page 2-9*) from the symbol, centering the aiming pattern on the symbol. Ensure the cross hair falls on the symbol. For the DS6707-DP, ensure part of the symbol is visible within the donut-shaped pattern.

The aiming pattern is smaller when the digital imager scanner is closer to the symbol and larger when it is farther from the symbol. Scan symbols with smaller bars or elements (mil size) closer to the digital imager scanner, and those with larger bars or elements (mil size) farther from the digital imager scanner.

The digital imager scanner can also read a bar code presented within the aiming pattern but not centered. The top examples in *Figure 2-4* and *Figure 2-5* show acceptable aiming options, while the bottom examples can not decode.

NOTE For best performance, ensure the pattern's cross hair, or in the case of the DS6707-DP the aiming dot, falls on the symbol.

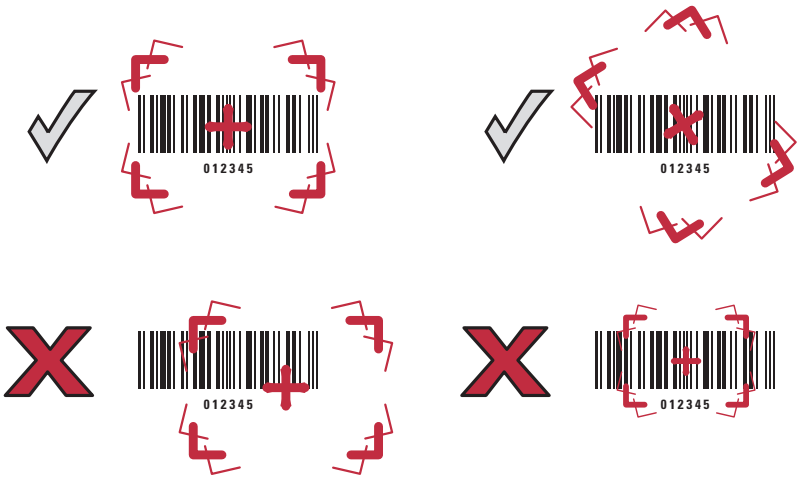


Figure 2-4 *Acceptable and Incorrect Aiming - Standard Pattern*

Figure 2-5 *Acceptable and Incorrect Aiming - DS6707-DP Pattern*

Scanning in Presentation Mode

Scanning with the Digital Imager Scanner in the Intellistand

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

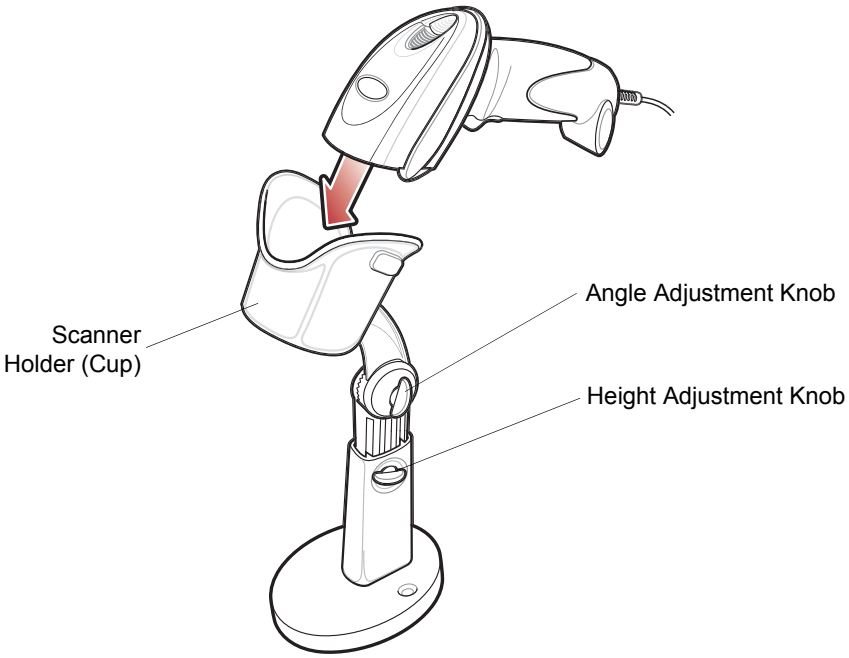


Figure 2-6 *Inserting the Digital Imager Scanner in the Intellistand*

To operate the digital imager scanner in the IntelliStand:

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

Scanning with the Digital Imager Scanner with Base

The DS6707 digital imager scanner with base (DS670X-SR2000XNSR) offers the flexibility of switching between presentation (hands-free) mode and hand-held mode. The default mode is presentation mode.

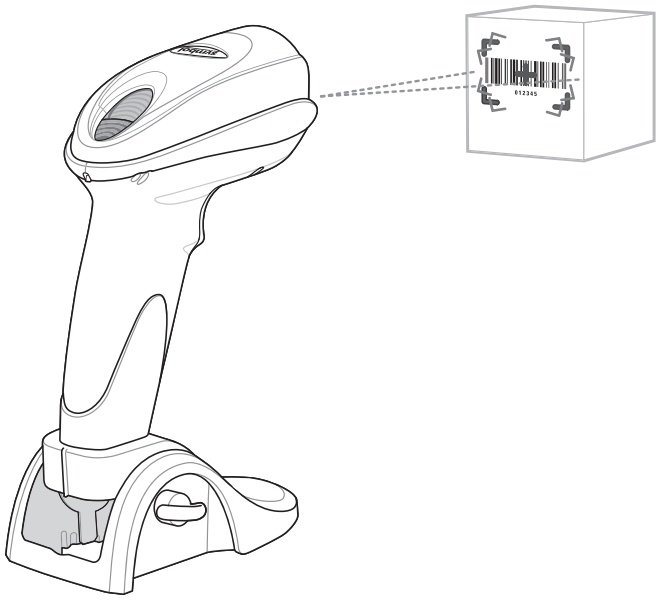


Figure 2-7 *Scanning in Presentation Mode*

Scanning with the Digital Imager Scanner

1. Ensure all connections are secure (see the appropriate host chapter).
2. Use the base adjustment knobs to adjust the angle of the digital imager scanner.
3. Center the symbol in the aiming pattern. The entire symbol must be within the brackets.
4. Upon successful decode, the digital imager scanner beeps and the LED turns green. For more information on beeper and LED definitions, see *Table 2-1* and *Table 2-2*.

Switching to Hand-Held Mode

1. Lift the scanner for hand-held use.
2. Center the symbol in the aiming pattern. The entire symbol must be within the brackets.
3. Pull the trigger. Upon successful decode, the digital imager scanner beeps and the LED turns green. For more information on beeper and LED definitions, see *Table 2-1* and *Table 2-2*.
4. The digital imager scanner automatically reverts back to presentation mode after a predetermined time delay. The default is 3 seconds. (To change the time delay settings, see *Presentation Time Delay Mode on page 4-11*.)

Decode Zones

DS6707-SR Standard Range Digital Imager Scanner - 1D Bar Codes

Note: Typical performance at 73.4° F (23° C) on high quality symbols.

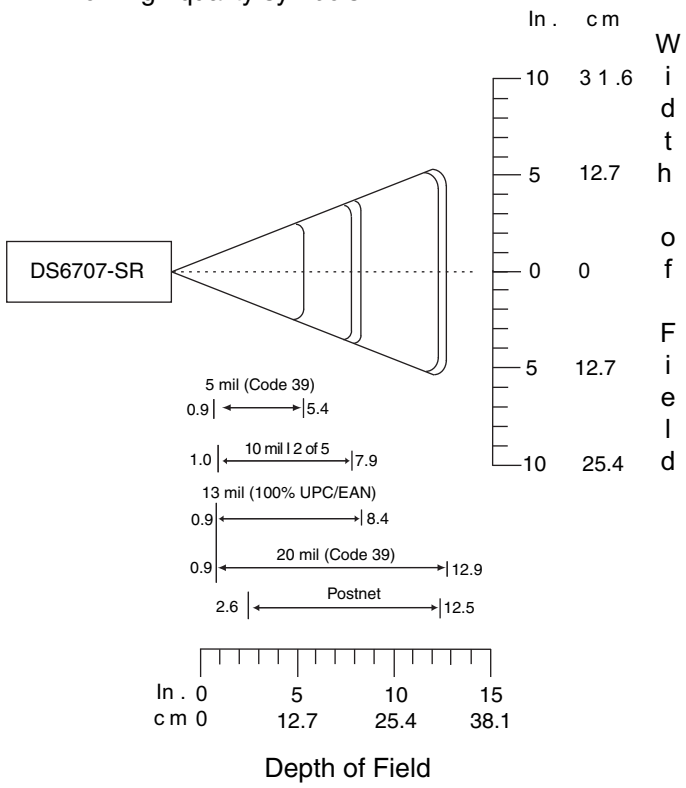


Figure 2-8 *DS6707-SR Standard Range Decode Zone for 1D Bar Codes*

DS6707-SR Standard Range Digital Imager Scanner - 2D Bar Codes

Note: Typical performance at 73.4° F (23° C) on high quality symbols.

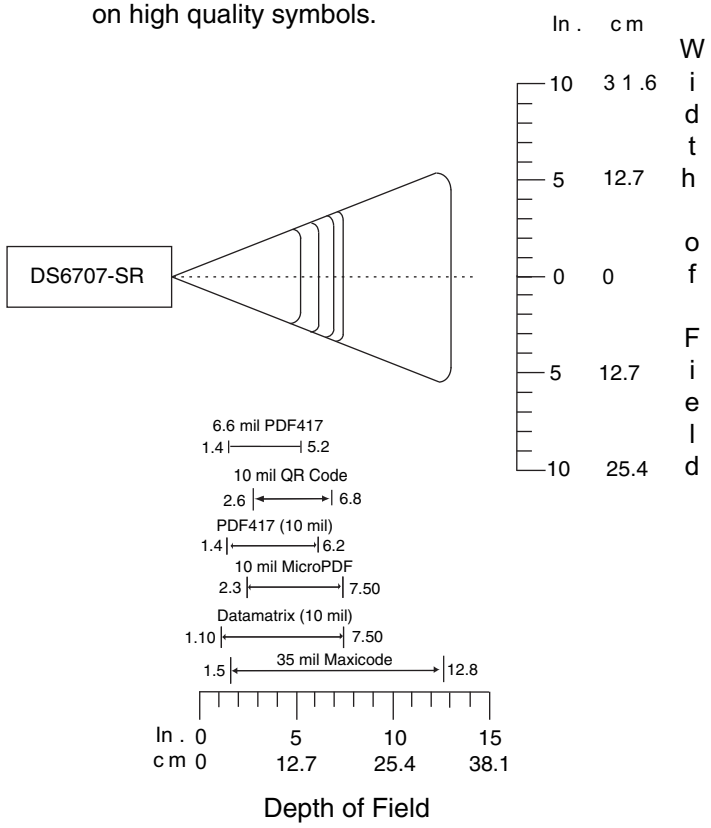


Figure 2-9 *DS6707-SR Standard Range Decode Zone for 2D Bar Codes*

DS6707-DC Document Capture Digital Imager Scanner - 1D Bar Codes

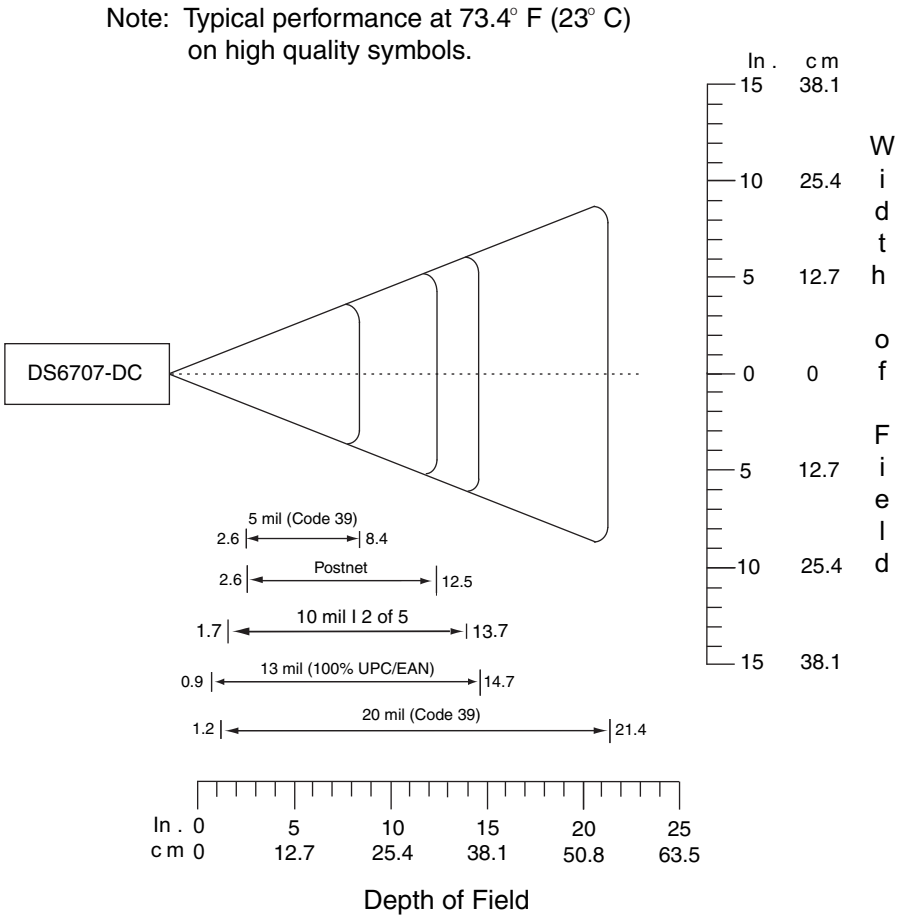


Figure 2-10 *DS6707-DC Document Capture Digital Imager Scanner Decode Zone for 1D Bar Codes*

DS6707-DC Document Capture Digital Imager Scanner - 2D Bar Codes

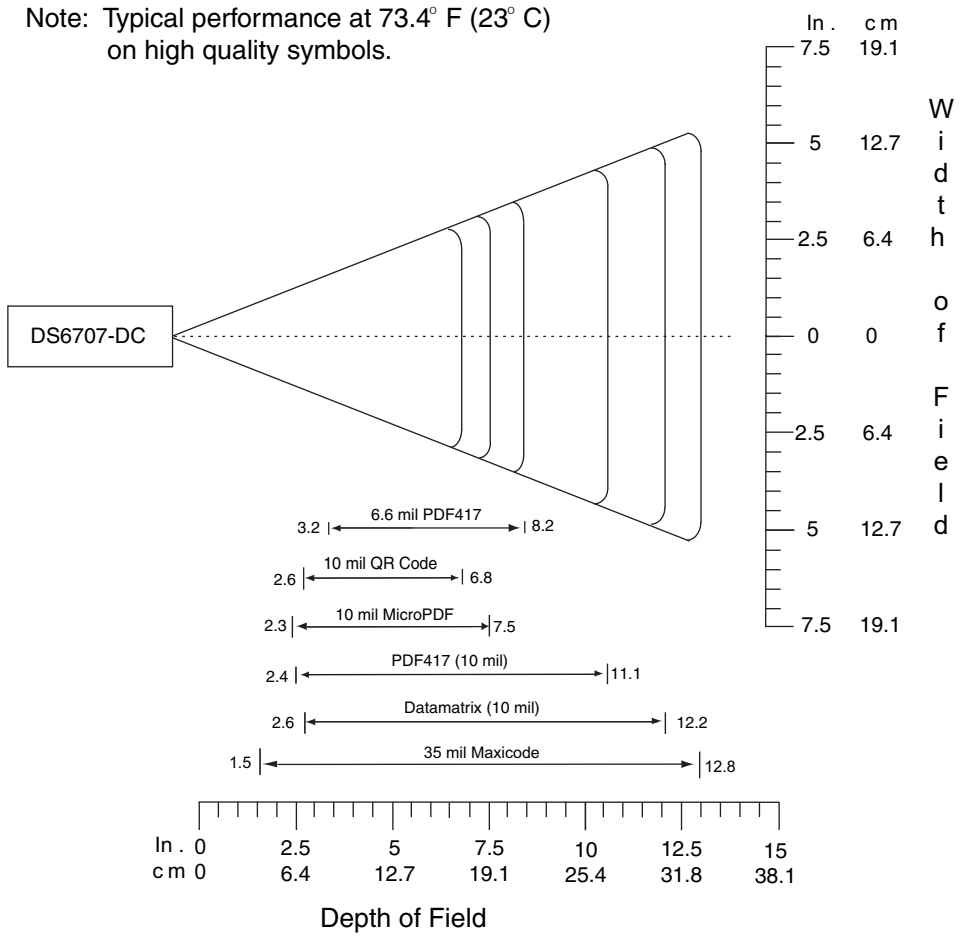


Figure 2-11 *DS6707-DC Document Capture Digital Imager Scanner Decode Zone for 2D Bar Codes*

DS6707-DP Direct Part Mark Digital Imager Scanner - 1D and PDF417 Bar Codes

Note: Typical performance at 73.4° F (23° C)
on high quality symbols.

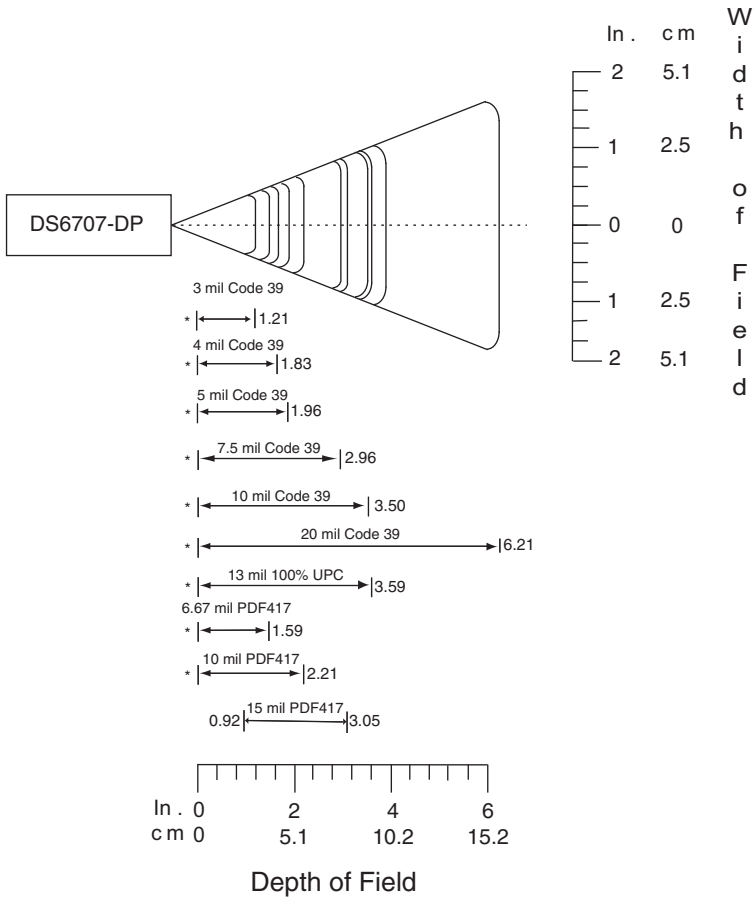


Figure 2-12 *DS6707-DP Direct Part Mark Digital Imager Scanner Decode Zone for 1D and PDF417 Bar Codes*

DS6707-DP Direct Part Mark Digital Imager Scanner - 2D Bar Codes

Note: Typical performance at 73.4 F°(23 C)° on high quality symbols.

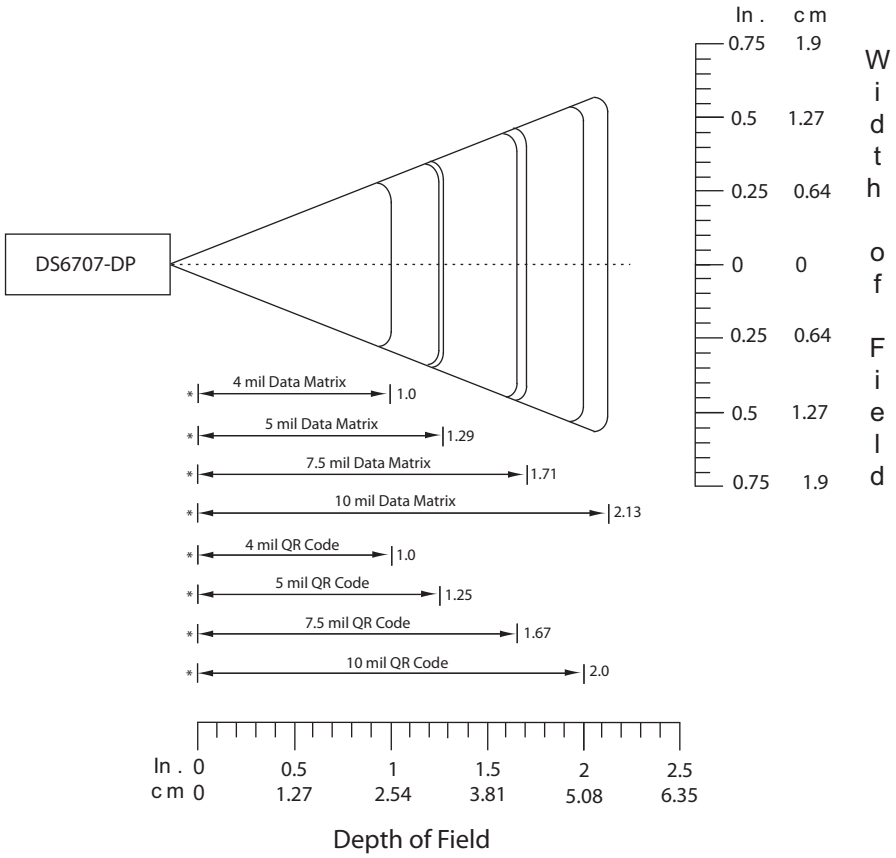


Figure 2-13 *DS6707-DP Direct Part Mark Digital Imager Scanner Decode Zone for 2D Bar Codes*

DS6707-HD High Density Digital Imager Scanner - 1D and PDF417 Bar Codes

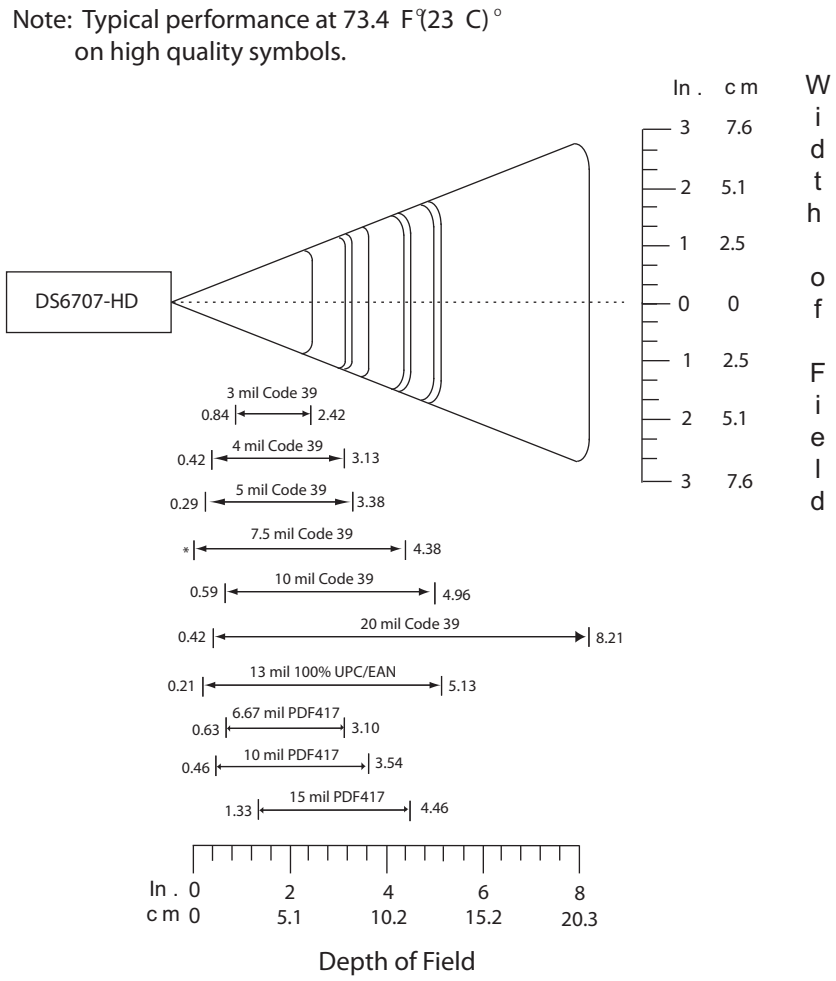


Figure 2-14 *DS6707-HD High Density Digital Imager Scanner Decode Zone for 1D and PDF417 Bar Codes*

DS6707-HD High Density Digital Imager Scanner - 2D Bar Codes

Note: Typical performance at 73.4° F (23° C)
on high quality symbols.

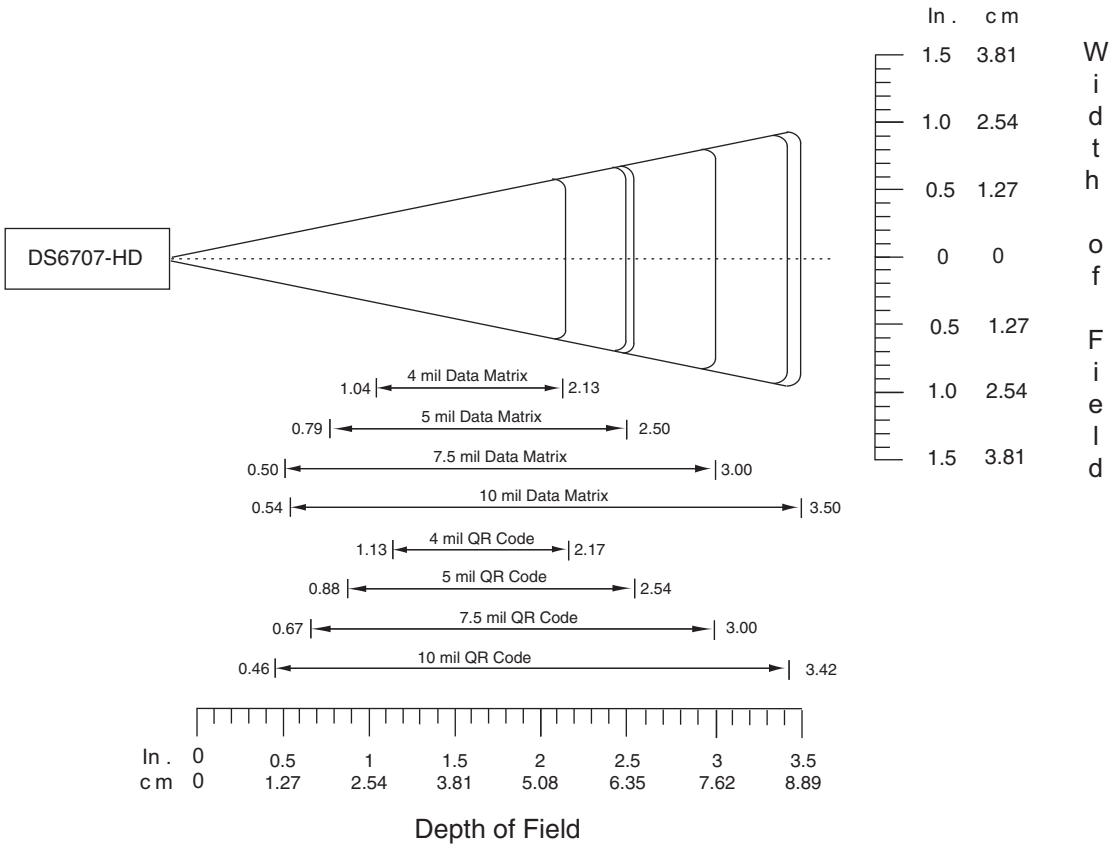


Figure 2-15 *DS6707-HD High Density Digital Imager Scanner Decode Zone for 2D Bar Codes*

CHAPTER 3 MAINTENANCE & TECHNICAL SPECIFICATIONS

Introduction

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

Maintenance

Digital Scanner

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

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

The DS6707-HC design allows safe cleansing of the product plastics with a variety of cleaning products and disinfectants. If required, wipe the digital imager scanner with the following list of approved cleansers:

- Super Sani-Cloth® Wipes
- Clorox® Bleach
- Windex® Antimicrobial
- Cavi-Wipes
- Isopropyl 70-80%
- Virex® 5 Wipes®
- Ethanol 80%
- Gentle dish soap and water

Troubleshooting

Table 3-1 *Troubleshooting*

Problem	Possible Causes	Possible Solutions
The aiming pattern does not appear when pressing the trigger.	No power to the digital imager scanner.	If the configuration requires a power supply, re-connect the power supply.
	Incorrect host interface cable is used.	Connect the correct host interface cable.
	Interface/power cables are loose.	Re-connect cables.
	Digital imager scanner is disabled.	See the technical person in charge of scanning.
	If using RS-232 Nixdorf B mode, CTS is not asserted.	Assert CTS line.
	Aiming pattern is disabled.	Enable the aiming pattern. See *Decode Aiming Pattern on page 4-18*.
Scanner emits short low/short medium/short high beep sequence (power-up beep sequence) more than once.	The USB bus may put the digital imager scanner in a state where power to the digital imager scanner is cycled on and off more than once.	Normal during host reset.
Digital imager scanner emits aiming pattern, but does not decode the bar code.	Digital imager scanner is not programmed for the correct bar code type.	Program the digital imager scanner to read that type of bar code. See *Chapter 10, Symbologies*.
	Bar code symbol is unreadable.	Scan test symbols of the same bar code type to determine if the bar code is defaced.
	The symbol is not completely inside aiming pattern.	Move the symbol completely within the aiming pattern.
Digital imager scanner emits 4 short high beeps during decode attempt.	Digital imager scanner has not completed USB initialization.	Wait several seconds and scan again.
Host displays scanned data incorrectly.	Digital imager scanner is not programmed to work with the host.	Scan the appropriate host type programming bar code.
		For RS-232, set the digital imager scanner's communication parameters to match the host's settings.
		Program the proper editing options (e.g., UPC-E to UPC-A Conversion).

Table 3-1 *Troubleshooting (Continued)*

Problem	Possible Causes	Possible Solutions
Digital imager scanner decodes bar code, but does not transmit the data to the host.	Digital imager scanner is not programmed for the correct host type.	Scan the appropriate host type programming bar code. See the chapter corresponding to the host type.
	Interface cable is loose.	Re-connect the cable.
	If 4 long low beeps are heard, a transmission error occurred.	Set the digital imager scanner's communication parameters to match the host's setting.
	If 5 low beeps are heard, a conversion or format error occurred.	Configure the digital imager scanner's conversion parameters properly.
	If low/high/low beeps sound, an invalid ADF rule is detected.	Program the correct ADF rules.
	If high/low beeps sound, the digital imager scanner is buffering Code 39 data.	Normal scanning a Code 39 bar code and the Code 39 Buffering option is enabled.
Digital imager scanner emits high/high/high/low beeps when not in use.	RS-232 receive error.	Normal during host reset. Otherwise, set the digital imager scanner's RS-232 parity to match the host setting.
Digital imager scanner emits low/high beeps during programming.	Input error or **Cancel** bar code was scanned.	Scan the correct numeric bar codes within range for the parameter programmed.
Digital imager scanner emits low/high/low/high beeps during programming.	Out of ADF parameter storage space.	Erase all rules and re-program with shorter rules.
Digital imager scanner emits low/high/low beeps.	Clearing Code 39 buffer.	Normal when scanning the Code 39 Buffering **Clear Buffer** bar code or upon attempt to transmit an empty Code 39 buffer.
Digital imager scanner emits a power-up beep after changing USB host type.	The USB bus re-established power to the digital imager scanner.	Normal when changing USB host type.
Digital imager scanner emits one high beep when not in use.	In RS-232 mode, a <BEL> character was received and Beep on <BEL> option is enabled.	Normal when **Beep on <BEL>** is enabled and the digital imager scanner is in RS-232 mode.

NOTE If after performing these checks the digital imager scanner still experiences problems, contact the distributor or Zebra Support. See *page xviii* for the telephone numbers.

Technical Specifications

Table 3-2 *Technical Specifications*

Item	Description
Physical Characteristics	
Dimensions (For Scanner Only; Not Including Base)	DS6707-DP: 6.55 in. x 5.08 in. x 2.82 in. (16.6 cm x 12.9 cm x 7.1 cm) (H x L x W) All other models: 6.55 in. x 4.72 in. x 2.82 in. (16.6 cm x 11.9 cm x 7.1 cm) (H x L x W)
Weight:	DS6707-DP: 7.4 oz. (209 gm) All other models: 6.4 oz. (182 gm)
Voltage & Current:	5 +/-10%VDC @ 350 mA
Color	Cash Register White or Twilight Black (DS6707-DP is only available in Cash Register White)
Performance Characteristics	
Light Source	Aiming: 650 nm laser diode Illumination: 630 nm LED
Field of View (Vertical x Horizontal)	Document Capture: 35º (V) x 44º (H) Standard Range, Direct Part Mark, High Density: 34º (V) x 43º (H)
Roll Pitch Yaw	360º +/- 65º +/- 60º
Symbology Decode Capability	
1D	UPC/EAN and with supplementals, Bookland EAN, ISSN EAN, Code 128, Code 128 Full ASCII, GS1-128, ISBT 128, Code 39, Code 39 Full ASCII, Trioptic Code 39, Code 32, Code 93, Code 11, Interleaved 2 of 5, Discrete 2 of 5, Codabar (NW1), MSI, Chinese 2 of 5, Matrix 2 of 5, GS1 DataBar variants, IATA, Inverse 1D
Postal	US Postnet and Planet, UK Postal, Japan, Australia, Netherlands KIX Code, USPS 4CB/One Code/Intelligent Mail, UPU FICS Postal
PDF417 (& Variants)	PDF417, MicroPDF417, Composite Codes
2D	Data Matrix (ECC 200), MaxiCode, QR Code, Aztec
DPM (DS6707-DP only)	Data Matrix marks applied by dot peening; laser etch, ink marks, chemical etch, inkjet mold, cast and thermal spray

Table 3-2 *Technical Specifications (Continued)*

Item	Description	
Typical Working Distance: SR - Standard Range Focus	5 mil Code 39: 10 mil I 2 of 5: 13 mil 100% UPC/EAN: 20 mil Code 39: Postnet: 6.6 mil PDF417: 10 mil PDF417: 10 mil QR Code: 10 mil MicroPDF 10 mil Data Matrix: 35 mil Maxicode:	0.9 - 5.4 in. (2.3 - 13.7 cm) 1.0 - 7.9 in. (2.5 - 20.1 cm) 0.9 - 8.4 in. (2.3 - 21.3 cm) 0.9 - 12.9 in. (2.3 - 32.8 cm) 2.6 - 12.5 in. (6.6 - 31.8 cm) 3.4 - 5.7 in. (8.6 - 14.5 cm) 1.4 - 6.2 in. (3.6 - 15.7 cm) 2.6 - 6.8 in. (6.6 - 17.3 cm) 2.3 - 7.5 in. (5.8 - 19.1 cm) 1.1 - 7.5 in. (2.8 - 19.1 cm) 1.5 - 12.8 in. (3.8 - 32.5 cm)
Typical Working Distance: DC - Document Capture focus	5 mil Code 39: 10 mil I 2 of 5: 13 mil 100% UPC/EAN: 20 mil Code 39: Postnet: 6.6 mil PDF417: 10 mil PDF417: 10 mil QR Code: 10 mil MicroPDF: 10 mil Data Matrix: 35 mil Maxicode:	2.6 - 8.4 in. (6.6 - 21.3 cm) 1.7 - 13.7 in. (4.3 - 34.8 cm) 0.9 - 14.7 in. (2.3 - 37.3 cm) 1.2 - 21.4 in. (3.0 - 54.4 cm) 2.6 - 12.5 in. (6.6 - 31.8 cm) 3.2 - 8.2 in. (8.1 - 20.8 cm) 2.4 - 11.1 in. (6.1 - 28.2 cm) 2.6 - 6.8 in. (6.6 - 17.3 cm) 2.3 - 7.5 in. (5.8 - 19.1 cm) 2.6 - 12.2 in. (6.6 - 31.0 cm) 1.5 - 12.8 in. (3.8 - 32.5 cm)
Typical Working Distance: DP - Direct Part Mark focus	3 mil Code 39: 4 mil Code 39: 5 mil Code 39: 7.5 mil Code 39: 10 mil Code 39: 20 mil Code 39: 13 mil 100% UPC/EAN: 6.67 mil PDF417: 10 mil PDF417: 15 mil PDF417: 4 mil Data Matrix: 5 mil Data Matrix: 7.5 mil Data Matrix: 10 mil Data Matrix: 4 mil QR Code: 5 mil QR Code: 7.5 mil QR Code: 10 mil QR Code:	Up to 1.21 in. (3.07 cm) Up to 1.83 in. (4.65 cm) Up to 1.96 in. (4.98 cm) Up to 2.96 in. (7.52 cm) Up to 3.50 in. (8.89 cm) Up to 6.21 in. (15.77 cm) Up to 3.59 in. (9.12 cm) Up to 1.59 in. (4.04 cm) Up to 2.21 in. (5.61 cm) 0.92 - 3.05 in. (2.34 - 7.75 cm) Up to 1.00 in. (2.54 cm) Up to 1.29 in. (3.28 cm) Up to 1.71 in. (4.34 cm) Up to 2.13 in. (5.41 cm) Up to 1.00 in. (2.54 cm) Up to 1.25 in. (3.18 cm) Up to 1.67 in. (4.24 cm) Up to 2.00 in. (5.08 cm)

Table 3-2 *Technical Specifications (Continued)*

Item	Description	
Typical Working Distance: HD - High Density	3 mil Code 39: 4 mil Code 39: 5 mil Code 39: 7.5 mil Code 39: 10 mil Code 39: 20 mil Code 39: 13 mil 100% UPC: 6.67 mil PDF417: 10 mil PDF417: 15 mil PDF417: 4 mil Data Matrix: 5 mil Data Matrix: 7.5 mil Data Matrix: 10 mil Data Matrix: 4 mil QR Code: 5 mil QR Code: 7.5 mil QR Code: 10 mil QR Code:	0.84 - 2.42 in. (2.13 - 6.15 cm) 0.42 - 3.13 in. (1.07 - 7.95 cm) 0.29 - 3.38 in. (0.74 - 8.59 cm) Up to 4.38 in. (11.13 cm) 0.59 - 4.96 in. (1.50 - 12.60 cm) 0.42 - 8.21 in. (1.07 - 20.85 cm) 0.21 - 5.13 in. (0.53 - 13.03 cm) 0.63 - 3.10 in. (1.60 - 7.87 cm) 0.46 - 3.54 in. (1.17 - 9.00 cm) 1.33 - 4.46 in. (3.38 - 11.33 cm) 1.04 - 2.13 in. (2.64 - 5.41 cm) 0.79 - 2.50 in. (2.01 - 6.35 cm) 0.50 - 3.00 in. (1.27 - 7.62 cm) 0.54 - 3.50 in. (1.37 - 8.89 cm) 1.13 - 2.17 in. (2.87 - 5.51 cm) 0.88 - 2.54 in. (2.24 - 6.45 cm) 0.67 - 3.00 in. (1.70 - 7.62 cm) 0.46 - 3.42 in. (1.17 - 8.69 cm)
Print Contrast	25% minimum reflectance	
Motion Tolerances	Horizontal Velocity: 5 in. (12.7 cm) per second	
Interfaces Supported	RS-232C (Standard, Nixdorf, ICL, & Fujitsu) and USB (Standard, IBM SurePOS, Macintosh) allows for connectivity to all of the above plus many non-standard interfaces.	
Imaging Characteristics		
Image (# of Pixels)	1.3 Mega Pixel: 1280 (H) x 1024 (V)	
Graphics Format Support	Images can be exported as Bitmap, JPEG, and TIFF	
Image Transfer Speed	USB 1.1:Up to 12 Megabits/second RS232:Up to 115 kB Baud Rate	
Image Transfer Time	Typical USB application is ~ 0.2 seconds with a compressed JPEG of 100 kB	
Imaging Distance (Vertical x Horizontal)	Documents Sizes: 2.125 x 3.375 in. (5.4 x 8.6 cm) 4 x 6 in. (10.2 x 15.2 cm) 5 x 7 in. (12.7 x 17.8 cm) 8½ x 11 (21.6 x 28 cm) Ranges are from the nose of the scanner and are based on document capture focus only.	Minimum Distance (Approximate) 2.4 in. (6.1 cm) 5.7 in. (14.5 cm) 11.9 in. (30.2 cm) 11.9 in.

Table 3-2 *Technical Specifications (Continued)*

Item	Description
User Environment	
Operating Temperature	32º F to 104º F (0º C to 40º C)
Storage Temperature	-40º F to 158º F (-40º C to 70º C)
Humidity	5% to 95%, non-condensing
Drop Specifications (For Scanner Only; Not Including Base)	Withstands multiple 5 ft. (1.52 m) drops to concrete at operating temperature extremes, and multiple 6 ft. (1.8 m) drops to concrete at room temperature (23º C)
Ambient Light Immunity	Immune to normal artificial indoor and natural outdoor (direct sunlight) lighting

Digital Imager Scanner Signal Descriptions

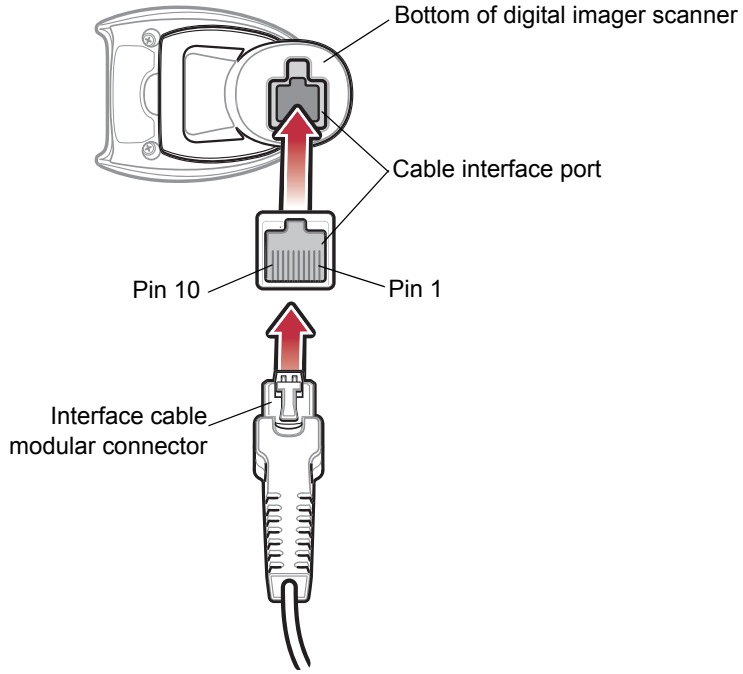


Figure 3-1 *Digital Imager Scanner Cable Pinouts*

The signal descriptions in *Table 3-3* apply to the connectors on the DS6707 digital imager scanner and are for reference only.

Table 3-3 *DS6707 Digital Imager Scanner Signal Pin-outs*

Pin	RS-232/SSI	USB
1	Reserved	Jump to Pin 6
2	Power	Power
3	Ground	Ground
4	TxD	Reserved
5	RxD	D +
6	RTS	Jump to Pin 1
7	CTS	D -
8	Reserved	Reserved
9	Reserved	Reserved
10	Reserved	Reserved

CHAPTER 4 USER PREFERENCES & MISCELLANEOUS DIGITAL IMAGER SCANNER OPTIONS

Introduction

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

The digital imager scanner ships with the settings shown in *Table 4-1 on page 4-2* (also see *Appendix A, Standard Default Parameters* for all host device and miscellaneous defaults). If the default values suit requirements, programming is not necessary.

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

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

If not using a USB cable, select a host type after the power-up beeps sound. See *Chapter 6, SSI Interface Chapter 7, USB Interface* and *Chapter 8, RS-232 Interface* for specific host information. This is only necessary upon the first power-up when connected to a new host.

To return all features to default values, scan the *Set Default Parameter on page 4-4*. Throughout the programming bar code menus, asterisks (*) indicate default values.

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

(00h) — Option Hex Value for programming via SSI command

Scanning Sequence Examples

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

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

Errors While Scanning

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

User Preferences and Miscellaneous Options - Parameter Defaults

Table 4-1 lists defaults for user preferences parameters. There are two ways to change the default values:

- Scan the appropriate bar codes in this guide. These new values replace the standard default values in memory. To recall the default parameter values, see the *Set Default Parameter on page 4-4*.
- Download data through the device's serial port using SSI. Hexadecimal parameter numbers appear in this chapter below the parameter title, and options appear in parenthesis beneath the accompanying bar codes. Refer to the *Simple Serial Interface (SSI) Programmer's Guide* for detailed instructions for changing parameters using this method.

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

Table 4-1 *User Preferences Parameter Defaults*

Parameter	Parameter Number	Default	Page Number
User Preferences			
Set Default Parameter		Restore Defaults	*4-4*
Parameter Scanning	ECh	Enable	*4-5*
Beeper Tone	91h	Medium	*4-5*
Beeper Volume	8Ch	High	*4-6*
Suppress Power-up Beeps	F1h D1h	Do not suppress	*4-6*
Power Mode	80h	Continuous On	*4-7*
Time Delay to Low Power Mode	92h	1 Minute	*4-8*
Trigger Mode	8Ah	Auto Aim	*4-9*
Picklist Mode	F0h 92h	Disabled Always	*4-10*
Presentation Mode Time Delay	F1h E9h	Disable (3 Secs for Scanner with Base)	*4-11*

Table 4-1 *User Preferences Parameter Defaults (Continued)*

Parameter	Parameter Number	Default	Page Number
Mobile Phone/Display Mode	F1h CCh	Disable	*4-13*
Mobile Phone Decode Aggressiveness	F1h D6h		*4-14*
Decode Session Timeout	88h	9.9 Sec	*4-15*
Timeout Between Decodes, Same Symbol	89h	0.6 Sec	*4-15*
Beep After Good Decode	38h	Enable	*4-16*
Decoding Illumination	F0h 2Ah	Enable	*4-16*
DP Illumination	F1h 3Bh	Auto	*4-17*
Decode Aiming Pattern	F0h 32h	Enable	*4-18*
Fuzzy 1D Processing	F1h 02h	Enable	*4-18*
Decode Mirror Images	F1h 19h	Auto	*4-19*
PDF Prioritization	F1h CFh	Disable	*4-20*
PDF Prioritization Timeout	F1h D0h	200 ms	*4-20*
Miscellaneous Options			
Transmit Code ID Character	2Dh	None	*4-21*
Prefix Value	63h 69h	7013 <CR><LF>	*4-22*
Suffix 1 Value Suffix 2 Value	62h 68h 64h 6Ah	7013 <CR><LF>	*4-22*
Scan Data Transmission Format	EBh	Data as is	*4-23*
FN1 Substitution Values	67h 6Dh	Set	*4-24*
Transmit “No Read” Message	5Eh	Disable	*4-25*

User Preferences

Set Default Parameter

You can reset the DS6707 to two types of defaults: factory defaults or custom defaults. Scan the appropriate bar code below to reset the scanner to its default settings and/or set its current settings as custom defaults.

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

***Restore Defaults**

Set Factory Defaults

Write to Custom Defaults

Parameter Scanning

Parameter # ECh

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

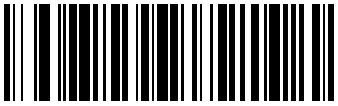
***Enable Parameter Scanning**
(01h)

Disable Parameter Scanning
(00h)

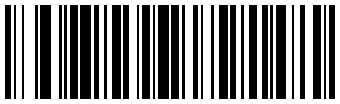
Beeper Tone

Parameter # 91h

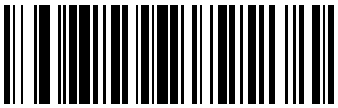
To select a decode beep frequency (tone), scan the **Low Frequency, Medium Frequency**, or **High Frequency** bar code.



Low Frequency
(02h)



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



High Frequency
(00h)

Beeper Volume

Parameter # 8Ch

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

Low Volume
(02h)

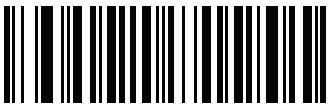
Medium Volume
(01h)

***High Volume**
(00h)

Suppress Power-up Beeps

Parameter # F1h D1h

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



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

Suppress Power-up Beeps
(01h)

Power Mode

Parameter # 80h

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

***Continuous On (00h)**

Reduced Power Mode (01h)

Time Delay to Low Power Mode

Parameter # 92h

NOTE This parameter only applies when Power Mode is set to Reduced Power.

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

1 Second
(11h)

5 Seconds
(15h)

***1 Minute**
(21h)

5 Minutes
(25h)

15 Minutes
(2Bh)

1 Hour
(31h)

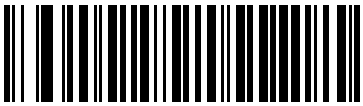
Trigger Mode

Parameter # 8Ah

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

- **Level** - A trigger pull activates decode processing. Decode processing continues until the bar code is decoded, the trigger is released, or the Decode Session Timeout is reached.
- **Blink** - This trigger mode is used in presentation (hands-free) mode. The digital imager scanner activates decode processing when it detects a bar code in its field of view. Decoding range is reduced in this mode.
- **Auto Aim** - This trigger mode turns on the red laser aiming pattern when the digital imager scanner senses motion. A trigger pull activates decode processing. After 2 seconds of inactivity the red laser aiming pattern automatically shuts off.
- **Host** - A host command issues the triggering signal. The digital imager scanner interprets an actual trigger pull as a Level triggering option.

Level
(00h)



Blink
(07h)

***Auto Aim**
(09h)

Host
(08h)

Picklist Mode

Parameter # F0h 92h

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

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

***Disabled Always**
(00h)

Enabled Out of Scanstand
(01h)

Enabled Always
(02h)

Presentation Time Delay Mode

Parameter # F1h E9h

Use this option to set the time the digital imager scanner enters into in hands-free mode. The default is **Disable** feature. The digital imager scanner will remain in hands-free mode until the trigger is pulled and released at which point the digital imager scanner will revert to the *current* trigger mode setting. If the trigger is unused for the duration of the time delay mode, the digital imager scanner will remain in hands-free mode.

Simulated Scan Base Operation

When using the Digital Imager Scanner with Base (see *Figure 1-2 on page 1-1*), this parameter is enabled with a default of 3 Seconds.

***Disable**

1 Sec

2 Secs

****3 Secs**

4 Secs

5 Secs

Presentation Time Delay Mode (continued)

6 Secs

7 Secs

8 Secs

9 Secs

✓ ***NOTE*** *The Digital Imager Scanner default is **Disable** for the *Presentation Time Delay Mode* parameter.
The Digital Imager Scanner with Base default is **3 Secs for the *Presentation Time Delay Mode* parameter.

Mobile Phone/Display Mode

Parameter # F1h CCh

This mode improves bar code reading performance off mobile phones and electronic displays. Enable this in hand-held, hands-free, or both modes, or disable this.

***Disable Mobile Phone/Display Mode (00h)**

Enable in Hand-Held Mode (01h)

Enable in Hands-Free Mode (02h)

Enable in Both Modes (03h)

Mobile Phone Decode Aggressiveness

Parameter # F1h D6h

This mode is used to decode bar codes from the LCD display. This parameter is used to adjust the aggressiveness of cell phone bar code reading versus paper label bar code reading.

NOTE When higher cell phone aggressiveness parameter settings are used, it may impact the paper label bar code reading.

Low
(04h)

***Medium**
(07h)

High
(odh)

Decode Session Timeout

Parameter # 88h

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

To set a Decode Session Timeout, scan the bar code below. Next, scan two numeric bar codes from *Appendix D, Numeric Bar Codes* that correspond to the desired on time. Enter a leading zero for single digit numbers. For example, to set a Decode Session Timeout of 0.5 seconds, scan the bar code below, then scan the **0** and **5** bar codes. To correct an error or change the selection, scan **Cancel** on *page D-2*.

Decode Session Timeout

Timeout Between Decodes, Same Symbol

Parameter # 89h

Use this option in presentation (hands-free) mode to prevent the beeper from continuously beeping when a symbol is left in the digital imager scanner's field of view. The bar code must be out of the field of view for the timeout period before the scanner reads the same consecutive symbol. It is programmable in 0.1 second increments from 0.0 to 9.9 seconds. The default interval is 0.6 seconds.

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

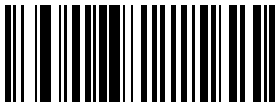
Timeout Between Decodes, Same Symbol

Beep After Good Decode

Parameter # 38h

Select a bar code below to choose whether or not the digital imager scanner beeps after a good decode (or image capture in Snapshot mode). If you select **Do Not Beep After Good Decode**, the beeper still operates during parameter menu scanning and to indicate error conditions.

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



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

Decoding Illumination

Parameter # F0h 2Ah

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

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

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

Disable Decoding Illumination
(00h)

DP Illumination

Parameter # F1h 3Bh

This parameter controls whether the digital imager scanner uses direct or indirect illumination. Options are:

- **Auto Illumination**: Alternates direct and indirect illumination.
- **Direct Illumination**: Optimizes scanning of symbols printed on low contrast or opaque surfaces. For best results, hold the scanner at an angle when scanning using this option.
- **Indirect Illumination**: Optimizes scanning of symbols printed on mirror-like or shiny surfaces.

***Auto Illumination**
(01h)

Direct Illumination
(02h)

Indirect Illumination
(03h)

Decode Aiming Pattern

Parameter # F0h 32h

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

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

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

Disable Decode Aiming Pattern
(00h)

Fuzzy 1D Processing

Parameter # F1h 02h

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

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

Disable Fuzzy 1D Processing
(00h)

Decode Mirror Images (Data Matrix Only)

Parameter # F1h 19h

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

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

Never
(00h)

Always
(01h)

***Auto**
(02h)

PDF Prioritization

Parameter # F1h CFh

Enable this feature to delay decoding a 1D bar code (Code 128 of 8 to 25 characters length) by the value specified in *PDF Prioritization Timeout*. During that time the digital imager scanner attempts to decode a PDF417 symbol (e.g., on a US driver's license), and if successful reports this only. If it does not decode (can not find) a PDF417 symbol, it reports the 1D symbol after the timeout. The 1D symbol must be in the device's field of view for the scanner to report it. This parameter does not affect decoding other symbologies.

*** Disable PDF Prioritization (00h)**

Enable PDF Prioritization (01h)

PDF Prioritization Timeout

Parameter # F1h D0h

When *PDF Prioritization* is enabled, this timeout specifies how long the digital imager scanner attempts to decode a PDF417 symbol before reporting the 1D bar code in the field of view.

Scan the following bar code, then scan four digits from *Appendix D, Numeric Bar Codes* that specify the timeout in milliseconds. For example, to enter 400 ms, scan the following bar code, then scan 0400. The range is 0 to 5000 ms, and the default is 200 ms.

PDF Prioritization Timeout

NOTE PDF Prioritization Timeout must be at least one second lower than the Decode Session Timeout.

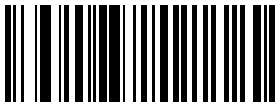
Miscellaneous Scanner Parameters

Transmit Code ID Character

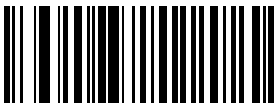
Parameter # 2Dh

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

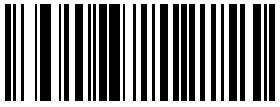
Select no Code ID character, a Symbol Code ID character, or an AIM Code ID character. For Code ID Characters, see *Symbol Code Identifiers on page B-1* and *AIM Code Identifiers on page B-3*.



Symbol Code ID Character
(02h)



AIM Code ID Character
(01h)



***None**
(00h)

Prefix/Suffix Values

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

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

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

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

To correct an error or change a selection, scan *Cancel on page D-2*.

NOTE To use Prefix/Suffix values, first set the *Scan Data Transmission Format on page 4-23*.

Scan Prefix
(07h)

Scan Suffix 1
(06h)

Scan Suffix 2
(08h)

Data Format Cancel

Scan Data Transmission Format

Parameter # EBh

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

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

To set values for the prefix and/or suffix, see *Prefix/Suffix Values on page 4-22*.

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

<DATA> <SUFFIX 1>
(01h)

<DATA> <SUFFIX 2>
(02h)

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

<PREFIX> <DATA >
(04h)

Scan Data Transmission Format (continued)

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

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

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

FN1 Substitution Values

Key Category Parameter # 67h

Decimal Value Parameter # 6Dh

The USB Keyboard (HID) host supports a FN1 substitution feature. Enabling this substitutes any FN1 character (0x1b) in a GS1-128 bar code with a user-defined value. This value defaults to 7013 (Enter Key).

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

To select a FN1 substitution value via bar code menus:

1. Scan the bar code below.

Set FN1 Substitution Value

2. Locate the keystroke desired for FN1 Substitution in the ASCII Character Set table for the current host interface. Enter the 4-digit ASCII value by scanning each digit in *Appendix D, Numeric Bar Codes*.

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

To enable FN1 substitution for USB Keyboard (HID), scan the **Enable FN1 Substitution** bar code on *page 4-24*.

Transmit “No Read” Message

Parameter # 5Eh

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

Enable No Read
(01h)

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

CHAPTER 5 IMAGING PREFERENCES

Introduction

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

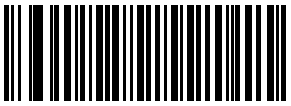
The digital imager scanner ships with the settings in *Imaging Preferences Parameter Defaults on page 5-2* (also see *Appendix A, Standard Default Parameters* for all host device and miscellaneous defaults). If the default values suit requirements, programming is not necessary.

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

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

If not using a USB cable, select a host type after the power-up beeps sound. See *Chapter 6, SSI Interface*, *Chapter 7, USB Interface* and *Chapter 8, RS-232 Interface* for specific host information. This is only necessary upon the first power-up when connecting to a new host.

To return all features to default values, scan the *Set Default Parameter on page 4-4*. Throughout the programming bar code menus, asterisks (*) indicate default values.



* Indicates Default — ***Enable Decode Aiming Pattern** — Feature/Option

(02h) — Option Hex Value for programming via SSI command

Scanning Sequence Examples

In most cases scanning one bar code sets the parameter value. For example, to disable the decode aiming pattern, scan the **Disable Decode Aiming Pattern** bar code under *Decode Aiming Pattern on page 4-18*. The digital imager scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

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

Errors While Scanning

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

Imaging Preferences Parameter Defaults

Table 5-1 lists the defaults for imaging preferences parameters. There are two ways to change the default values:

- Scan the appropriate bar codes in this guide. These new values replace the standard default values in memory. To recall the default parameter values, scan the *Set Default Parameter on page 4-4*.
- Download data through the device's serial port using SSI. Hexadecimal parameter numbers appear in this chapter below the parameter title, and options appear in parenthesis beneath the accompanying bar codes. Refer to the *Simple Serial Interface (SSI) Programmer's Guide* for detailed instructions for changing parameters using this method.

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

Table 5-1 *Imaging Preferences Parameter Defaults*

Parameter	Parameter Number	Default	Page Number
Imaging Preferences			
Operational Modes	N/A	N/A	*5-4*
Low Light Enhancement	F1h 64h	Disable	*5-5*
Presentation Mode Field of View	F1h 61h	Default (Reduced)	*5-5*
Image Capture Autoexposure	F0h 68h	Enable	*5-6*
Image Capture Illumination	F0h 69h	Enable	*5-6*
Illumination Bank Control	F1h 3Bh	Full	*5-7*
Fixed Exposure	F4h F1h 37h	100	*5-8*
Fixed Gain	F1h 38h	50	*5-8*
Gain / Exposure Priority for Snapshot Mode	F1h 32h	Autodetect	*5-9*
Snapshot Mode Timeout	F0h 43h	0 (30 seconds)	*5-10*

Table 5-1 *Imaging Preferences Parameter Defaults (Continued)*

Parameter	Parameter Number	Default	Page Number
Snapshot Aiming Pattern	F0h 2Ch	Enable	5-10
Image Cropping	F0h 2Dh	Disable	5-11
Crop to Pixel Addresses	F4h F0h 3Bh; F4h F0h 3Ch; F4h F0h 3Dh; F4h F0h 3Eh	0 top, 0 left, 1023 bottom, 1279 right	5-12
Image Size (Number of Pixels)	F0h 2Eh	Full	5-13
Image Brightness (Target White)	F0h 86h	180	5-14
JPEG Image Options	F0h 2Bh	Quality	5-14
JPEG Target File Size	F1h 31h	160 kB	5-15
JPEG Quality and Size Value	F0h 31h	65	5-15
Image Enhancement	F1h 34h	Off (0)	5-16
Image File Format Selection	F0h 30h	JPEG	5-17
Image Rotation	F1h 99h	0	5-18
Bits per Pixel (BPP)	F0h 2Fh	8 BPP	5-19
Signature Capture	5Dh	Disable	5-20
Signature Capture Image File Format Selection	F0h 39h	JPEG	5-21
Signature Capture Bits per Pixel (BPP)	F0h 3Ah	8 BPP	5-22
Signature Capture Width	F4h F0h 6Eh	400	5-23
Signature Capture Height	F4h F0h 6Fh	100	5-23
Signature Capture JPEG Quality	F0h A5h	65	5-23
Video Mode Format Selector	F2h 94h	JPEG	5-24
Video View Finder	F0h 44h	Disable	5-24
Target Video Frame Size	F0h 48h	2200 bytes	5-25
Video View Finder Image Size	F0h 49h	1700 bytes	5-25

Imaging Preferences

The parameters in this chapter control image capture characteristics. Image capture occurs in all modes of operation, including decode, video, and snapshot.

Operational Modes

The digital imager scanner has three modes of operation:

- Decode Mode
- Snapshot Mode
- Video Mode.

Decode Mode

By default, when you pull the trigger the digital imager scanner attempts to locate and decode enabled bar codes within its field of view. The digital imager scanner remains in this mode until it decodes a bar code or you release the trigger.

Snapshot Mode

Use Snapshot Mode to capture a high-quality image and transmit it to the host. To temporarily enter this mode scan the **Snapshot Mode** bar code. While in this mode the digital imager scanner blinks the green LED at 1-second intervals to indicate it is not in standard operating (decode) mode.

In Snapshot Mode, the digital imager scanner turns on its laser aiming pattern to highlight the area to capture in the image. The next trigger pull instructs the digital imager scanner to capture a high quality image and transmit it to the host. A short time may pass (less than 2 seconds) between when the trigger is pulled and the image is captured as the digital imager scanner adjusts to the lighting conditions. Hold the digital imager scanner steady until the image is captured, denoted by a single beep.

If you do not press the trigger within the Snapshot Mode Timeout period, the digital imager scanner returns to Decode Mode. Use *Snapshot Mode Timeout on page 5-10* to adjust this timeout period. The default timeout period is 30 seconds.

To disable the laser aiming pattern during Snapshot Mode, see *Snapshot Aiming Pattern on page 5-10*.

Video Mode

In this mode the digital imager scanner behaves as a video camera as long as you press the trigger. Release the trigger to return the digital imager scanner to Decode Mode. Scan this bar code to temporarily enter Video Capture Mode.

Snapshot Mode

Video Mode

Low Light Enhancement

Parameter # F1h 64h

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

Enable Low Light Enhancement (01h)

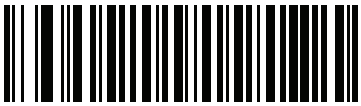
***Disable Low Light Enhancement (00h)**

Presentation Mode Field of View

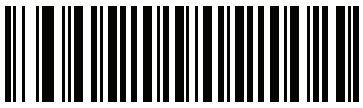
Parameter # F1h 61h

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

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



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



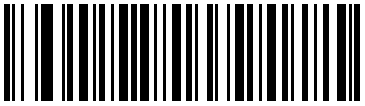
Presentation Mode Full Field of View (02h)

Image Capture Autoexposure

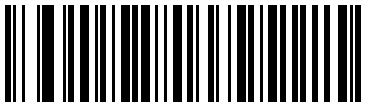
Parameter # F0h 68h

Select **Enable Image Capture Autoexposure** to allow the digital imager scanner to control gain settings and exposure (integration) time to best capture an image for the selected operation mode.

Select **Disable Image Capture Autoexposure** to manually adjust the gain and exposure time (see the following pages). This option is only recommended for advanced users with difficult image capture situations.



***Enable Image Capture Autoexposure**
(01h)



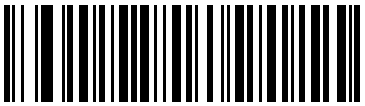
Disable Image Capture Autoexposure
(00h)

Image Capture Illumination

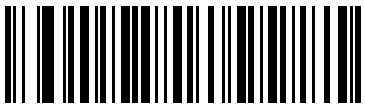
Parameter # F0h 69h

Selecting **Enable Image Capture Illumination** causes the digital imager scanner to flash on every image capture. Select **Disable Image Capture Illumination** to prevent the digital imager scanner from using artificial illumination.

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



***Enable Image Capture Illumination**
(01h)



Disable Image Capture Illumination
(00h)

Illumination Bank Control

Parameter # F1h 3Bh

This parameter controls the illumination banks on the scan engine. Options are:

- **Full**: Enables the full illumination system (default).
- **Auto**: Switches the illumination system from left to right bank.
- **Left**: Enables the left bank.
- **Right**: Enables the right bank.

***Full**
(00h)

Auto
(01h)

Left
(02h)

Right
(03h)

Fixed Exposure

Parameter #: F4h F1h 37h

Type: Word

Range: 5 - 5000

This parameter configures the exposure used in manual mode for both Decode and Snapshot/Video/Video viewfinder modes.

Each integer value represents 100 µs worth of exposure. The default value is 100 which results in an exposure setting of 10 ms.

To set the Fixed Exposure parameter, scan **Fixed Exposure** followed by four numeric bar codes representing the value. Leading zeros are required. For example, to set a Fixed Exposure value of 99, scan 0, 0, 9, 9. See *Appendix D, Numeric Bar Codes* for numeric bar codes.

Fixed Exposure
(4 digits)

Fixed Gain

Parameter #: F1h 38h

Type: Byte

Range 1 - 100

This parameter configures the gain setting used in manual mode for both Decode and Snapshot/Video/Video viewfinder modes.

A value of 1 indicates that gain is not used for image capture. A value of 100 indicates that maximum gain is used for image capture. The default value of this parameter is 50.

To set the Fixed Gain parameter, scan **Fixed Gain** below followed by three numeric bar codes representing the value. Leading zeros are required. For example, to set a Fixed Gain value of 99, scan 0, 9, 9. See *Appendix D, Numeric Bar Codes* for numeric bar codes.

Fixed Gain

Gain/Exposure Priority for Snapshot Mode

Parameter # F1h 32h

This parameter alters the digital imager scanner's gain exposure priority when it acquires an image in Snapshot Mode in auto exposure mode.

- Scan **Low Exposure Priority** to set a mode in which the digital imager scanner favors higher gain over exposure to capture an image. This results in an image that is less susceptible to motion blur at the expense of noise artifacts. However, for most applications, the amount of noise is acceptable.
- Scan **Low Gain Priority** to set a mode in which the digital imager scanner favors longer exposure time rather than higher gain to capture an image. This ensures that the image is less noisy and produces fewer artifacts during post processing activities like image enhancement (sharpening). The mode is recommended for fixed mount / fixed object image capture since the image acquired is susceptible to motion blur.
- Scan **Autodetect** (default) to set a mode in which the digital imager scanner automatically selects Gain Priority or Low Exposure Priority mode for Snapshot Mode. If the digital imager scanner is in a magnetic read switch enabled stand (or it is configured in Blink Mode), it uses Low Gain Priority mode. Otherwise, it uses the Low Exposure Priority mode.

Low Gain Priority
(0)

Low Exposure Priority
(1)

*** Autodetect**
(2)

Snapshot Mode Timeout

Parameter # F0h 43h

This parameter sets the amount of time the digital imager scanner remains in Snapshot Mode. The digital imager scanner exits Snapshot Mode when you pull the trigger, or when the Snapshot Mode Timeout elapses. To set this timeout value, scan the bar code below followed by a bar code from *Appendix D, Numeric Bar Codes*. The default value is 0 which represents 30 seconds; values increment by 30. For example, 1 = 60 seconds, 2 = 90 seconds, etc.

Snapshot Mode Timeout

Snapshot Aiming Pattern

Parameter # F0h 2Ch

Select **Enable Snapshot Aiming Pattern** to project the aiming pattern when in Snapshot Mode, or **Disable Snapshot Aiming Pattern** to turn the aiming pattern off.

***Enable Snapshot Aiming Pattern**
(01h)

Disable Snapshot Aiming Pattern
(00h)

Image Cropping

Parameter # F0h 2Dh

This parameter crops a captured image. Select **Disable Image Cropping** to present the full 1280 x 1024 pixels. Select **Enable Image Cropping** to crop the image to the pixel addresses set in *Crop to Pixel Addresses on page 5-12*.

✓ ***NOTE*** The digital imager scanner has a cropping resolution of 4 pixels. Setting the cropping area to less than 3 pixels transfers the entire image.

Enable Image Cropping
(01h)

***Disable Image Cropping**
(Use Full 1280 x 1024 Pixels)
(00h)

Crop to Pixel Addresses

Parameter # F4h, F0h, 3Bh (Top)
Parameter # F4h, F0h, 3Ch (Left)
Parameter # F4h, F0h, 3Dh (Bottom)
Parameter # F4h, F0h, 3Eh (Right)

If you selected **Enable Image Cropping**, set the pixel addresses from (0,0) to (1279,1023) to crop to.

Columns are numbered from 0 to 1279, rows from 0 to 1023. Specify four values for Top, Left, Bottom, and Right, where Top and Bottom correspond to row pixel addresses, and Left and Right correspond to column pixel addresses. For example, for a 4 row x 8 column image in the extreme bottom-right section of the image set the following values:

Top = 1020, Bottom = 1023, Left = 1272, Right = 1279

To set the crop to pixel address, scan each pixel address bar code below followed by four numeric bar codes representing the value. Leading zeros are required. For example, to crop the top pixel address to 3, scan 0, 0, 0, 3. See *Appendix D, Numeric Bar Codes* for numeric bar codes.

Top Pixel Address
(0 - 1023 Decimal)

Left Pixel Address
(0 - 1279 Decimal)

Bottom Pixel Address
(0 - 1023 Decimal)

Right Pixel Address
(0 - 1279 Decimal)

Image Size (Number of Pixels)

Parameter # F0h 2Eh

This option alters image resolution before compression. Multiple pixels are combined to one pixel, resulting in a smaller image containing the original content with reduced resolution.

Select one of the following values:

Resolution Value	Uncropped Image Size
Full	1280 x 1024
1/2	640 x 512
1/4	320 x 160

***Full Resolution**
(00h)

1/2 Resolution
(01h)

1/4 Resolution
(03h)

Image Brightness (Target White)

Parameter # F0h 86h

Type: Byte

Range: 1 - 240

This parameter sets the Target White value used in Snapshot, Video and Video Viewfinder mode when using auto exposure. White and black are defined as 255 decimal and 0, respectively. Setting the value to the factory default of 180 sets the white level of the image to ~180.

To set the Image Brightness parameter, scan **Image Brightness** below followed by three numeric bar codes representing the value. Leading zeros are required. For example, to set an Image Brightness value of 99, scan 0, 9, 9. See *Appendix D, Numeric Bar Codes* for numeric bar codes.

***180**

Image Brightness (3 digits)

JPEG Image Options

Parameter # F0h 2Bh

Select an option to optimize JPEG images for either size or for quality. Scan the **JPEG Quality Selector** bar code to enter a quality value; the digital imager scanner then selects the corresponding image size. Scan the **JPEG Size Selector** bar code to enter a size value; the digital imager scanner then selects the best image quality.

***JPEG Quality Selector (01h)**

JPEG Size Selector (00h)

JPEG Target File Size

Parameter # F4h F1h 31h

Type: Word

Range: 5-600

This parameter defines the target JPEG file size in terms 1 Kilobytes (1024 bytes). The default value is 160 kB which represents 160 Kilobytes.

CAUTION JPEG compress may take 10 to 15 seconds based on the amount of information in the target image. Scanning **JPEG Quality Selector** (default setting) on *page 5-14* produces a compressed image that is consistent in quality and compression time.

To set the JPEG Target File Size parameter, scan **JPEG Target File Size** below followed by three numeric bar codes representing the value. Leading zeros are required. For example, to set an Image Brightness value of 99, scan 0, 9, 9 in *Appendix D, Numeric Bar Codes*.

***JPEG Target File Size**
(3 digits)

JPEG Quality and Size Value

JPEG Quality = Parameter # F0h 31h

If you selected **JPEG Quality Selector**, scan the **JPEG Quality Value** bar code followed by 3 bar codes from *Appendix D, Numeric Bar Codes* corresponding to a value from 5 to 100, where 100 represents the highest quality image.

JPEG Quality Value
(Default: 065)
(5 - 100 Decimal)

Image Enhancement

Parameter # F1h 34h

This parameter configures the digital imager scanner's Image Enhance feature. This feature uses a combination of edge sharpening and contrast enhancement to produce an image that is visually pleasing.

The levels of image enhancement are:

- Off (0) - Default
- Low(1)
- Med(2)
- High(3).

***Off**
(0)

Low
(1)

Medium
(2)

High
(3)

Image File Format Selector

Parameter # F0h 30h

Select an image format appropriate for the system (BMP, TIFF, or JPEG). The digital imager scanner stores captured images in the selected format.

BMP File Format
(03h)

***JPEG File Format**
(01h)

TIFF File Format
(04h)

Image Rotation

Parameter # F1h 99h

This parameter controls the rotation of the image by 0, 90,180, or 270 degrees.

***Rotate 0°**
(00h)

Rotate 90°
(01h)

Rotate 180°
(02h)

Rotate 270°
(03h)

Bits Per Pixel

Parameter # F0h 2Fh

Select the number of significant bits per pixel (BPP) to use when capturing an image. Select **1 BPP** for a black and white image, **4 BPP** to assign 1 of 16 levels of grey to each pixel, or **8 BPP** to assign 1 of 256 levels of grey to each pixel.

NOTE The digital imager scanner ignores these settings for JPEG file formats, which only support **8 BPP**.

The digital imager scanner ignores 1 BPP for TIFF file formats, which only support **4 BPP** and **8 BPP**. 1 BPP is coerced to 4 BPP for TIFF file formats.

1 BPP
(00h)

4 BPP
(01h)

***8 BPP**
(02h)

Signature Capture

Parameter # 5Dh

A signature capture bar code is a special-purpose symbology which delineates a signature capture area in a document with a machine-readable format. The recognition pattern is variable so it can optionally provide an index to various signatures. The region inside the bar code pattern is considered the signature capture area.

Output File Format

Decoding a signature capture bar code de-skews the signature image and converts the image to a BMP, JPEG, or TIFF file format. The output data includes the file descriptor followed by the formatted signature image.

File Descriptor			Signature Image
Output Format (1 byte)	Signature Type (1 byte)	Signature Image Size (4 bytes) (BIG Endian)	
JPEG - 1 BMP - 3 TIFF - 4	1-8	0x00000400	0x00010203….

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

Enable Signature Capture (01h)

***Disable Signature Capture (00h)**

Signature Capture File Format Selector

Parameter # F0h 39h

Select a signature file format appropriate for the system (BMP, TIFF, or JPEG). The digital imager scanner stores captured signatures in the selected format.

BMP Signature Format
(03h)

***JPEG Signature Format**
(01h)

TIFF Signature Format
(04h)

Signature Capture Bits Per Pixel

Parameter # F0h 3Ah

Select the number of significant bits per pixel (BPP) to use when capturing a signature. Select **1 BPP** for a black and white image, **4 BPP** to assign 1 of 16 levels of grey to each pixel, or **8 BPP** to assign 1 of 256 levels of grey to each pixel.

NOTE The digital imager scanner ignores these settings for JPEG file formats, which only support **8 BPP**.

The digital imager scanner ignores 1 BPP for TIFF file formats, which only support **4 BPP** and **8 BPP**. 1 BPP is coerced to 4 BPP for TIFF file formats.

1 BPP
(00h)

4 BPP
(01h)

***8 BPP**
(02h)

Signature Capture Width

Parameter # F4h F0h 6Eh

The aspect ratio of the Signature Capture Width and Signature Capture Height parameters must match that of the signature capture area. For example, a 4 x 1 inch signature capture area would require a 4 to 1 aspect ratio of width to height.

To set the width of the signature capture box, scan the **Signature Capture Width** bar code, followed by 3 bar codes from *Appendix D, Numeric Bar Codes* corresponding to a value in the range of 001 to 640 decimal.

Signature Capture Width
(Default: 400)
(001 - 640 Decimal)

Signature Capture Height

Parameter # F4h F0h 6Fh

To set the height of the signature capture box, scan the **Signature Capture Height** bar code, followed by 3 bar codes from *Appendix D, Numeric Bar Codes* corresponding to a value in the range of 001 to 480 decimal.

Signature Capture Height (Default: 100)
(001 - 480 Decimal)

Signature Capture JPEG Quality

Parameter # F0h A5h

Scan the **JPEG Quality Value** bar code followed by 3 bar codes from *Appendix D, Numeric Bar Codes* corresponding to a value from 005 to 100, where 100 represents the highest quality image.

JPEG Quality Value (Default: 065)
(5 - 100 Decimal)

Video Mode Format Selector

Parameter # F2h 94h

When the digital imager scanner is in Video Mode, select whether to send data in BMP or JPEG format.

BMP File Format
(03h)

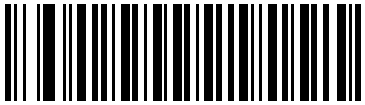
***JPEG File Format**
(01h)

Video View Finder

Parameter # F0h 44h

Select **Enable Video View Finder** to project the video view finder while in Video Mode, or **Disable Video View Finder** to turn the video view finder off.

***Disable Video View Finder**
(00h)



Enable Video View Finder
(01h)

Target Video Frame Size

Parameter # F0h 48h

Select the number of 100-byte blocks to transmit per second. Selecting a smaller value transmits more frames per second but reduces video quality; selecting a larger value increases video quality but slows transmission.

To set the Target Video Frame Size, scan the bar code below followed by two bar codes from *Appendix D, Numeric Bar Codes* corresponding to the 100-byte value from 800 to 3300 bytes. For example, to select 1500 bytes, enter 1, 5. To select 900 bytes, enter 0, 9.

Target Video Frame Size

Video View Finder Image Size

Parameter # F0h 49h

Select the number of 100-byte blocks. Values range from 800 to 3000 bytes. Selecting a smaller value transmits more frames per second; selecting a larger value increases video quality.

To set the Video View Finder Image Size, scan the bar code below followed by two bar codes from *Appendix D, Numeric Bar Codes* corresponding to the 100-byte value from 800 to 3000 bytes. For example, to select 1500 bytes, enter 1, 5. To select 900 bytes, enter 0, 9.

Video View Finder Image Size

CHAPTER 6 SSI INTERFACE

Introduction

This chapter describes how to set up the digital imager scanner with a Simple Serial Interface (SSI) host. When using SSI, program the digital imager scanner via bar code menu or SSI host commands.

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

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

Connecting Using Simple Serial Interface

Connect the digital imager scanner to an SSI host.

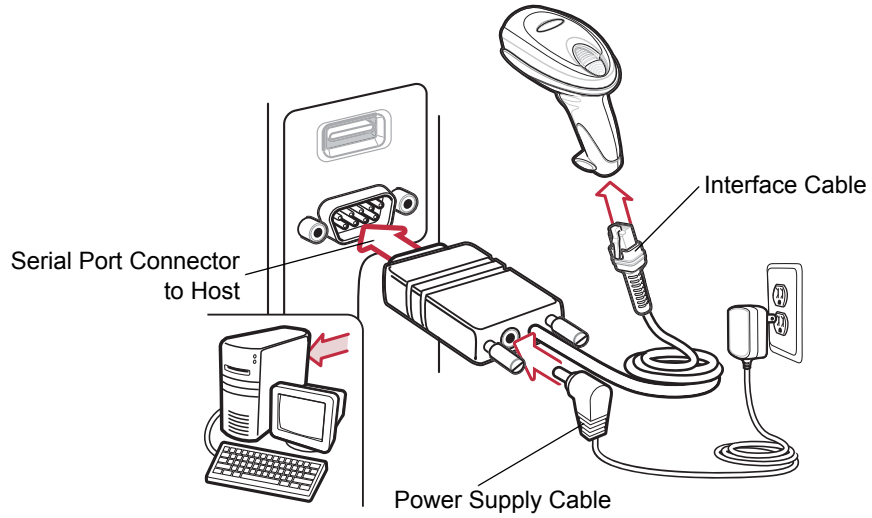


Figure 6-1 *SSI Host Connection*

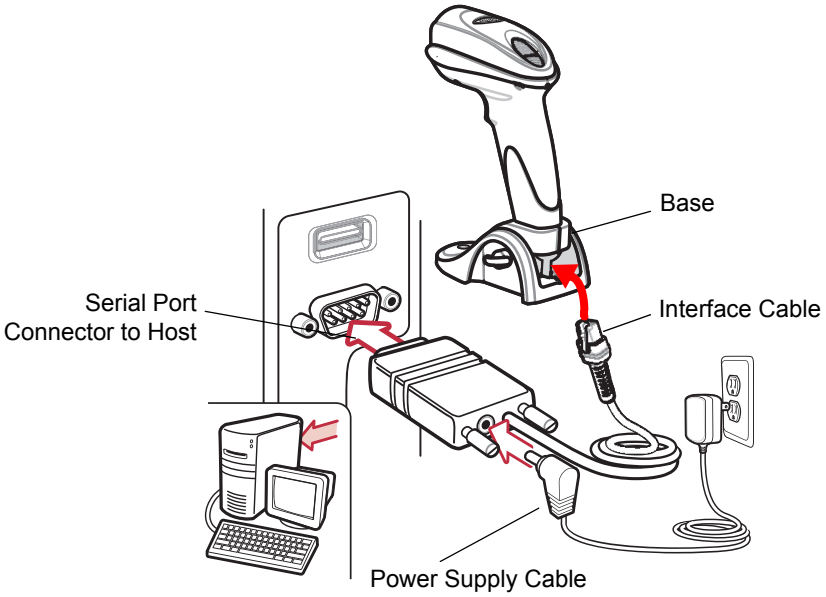


Figure 6-2 *SSI Host Connection for Scanner with Base*

1. Attach the modular connector of the interface cable to the cable interface port on the digital imager scanner (see *Installing the Interface Cable on page 1-3*).
2. Connect the other end of the interface cable to the serial port on the host.
3. Connect the power supply to the serial connector end of the interface cable. Plug the power supply into an appropriate outlet.
4. Scan the appropriate baud rate bar code from *Baud Rate on page 6-4* that matches the host's baud rate setting.
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

Simple Serial Interface Default Parameters

Table 6-1 lists the defaults for the SSI host. There are two ways to change the default values:

- Scan the appropriate bar codes in this guide. These new values replace the standard default values in memory. To recall the default parameter values, scan the *Set Default Parameter on page 4-4*.
- Download data through the device's serial port using SSI. Hexadecimal parameter numbers appear in this chapter below the parameter title, and options appear in parenthesis beneath the accompanying bar codes. Refer to the *Simple Serial Interface (SSI) Programmer's Guide* for detailed instructions for changing parameters using this method.

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

Table 6-1 *SSI Interface Parameter Defaults*

Parameter	Parameter Number	Default	Page Number
Baud Rate	9Ch	9600	*6-4*
Parity	9Eh	None	*6-6*
Check Parity	97h	Enable	*6-7*
Software Handshaking	9Fh	ACK/NAK	*6-7*
Host RTS Line State	9Ah	Low	*6-8*
Decode Data Packet Format	EEh	Send Raw Decode Data	*6-8*
Stop Bits	9Dh	1	*6-9*
Host Serial Response Time-out	9Bh	2 sec	*6-10*
Host Character Time-out	EFh	200 msec	*6-11*
Multipacket Option	F0h 4Eh	Option 1	*6-12*
Interpacket Delay	F0h 4Fh	0 ms	*6-13*
Event Reporting			
Decode Event	F0h 00h	Disable	*6-14*
Boot Up Event	F0h 02h	Disable	*6-15*
Parameter Event	F0h 03h	Disable	*6-15*

NOTE SSI interprets Prefix, Suffix1, and Suffix2 values listed in *Table A-1 on page A-1* differently than other interfaces. SSI does not recognize key categories, only the 3-digit decimal value. The default value of 7013 is interpreted as CR only.

SSI Host Parameters

Baud Rate

Parameter # 9Ch

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

To enable the SSI host, scan the appropriate baud rate bar code that matches the baud rate setting of the host device.

Baud Rate 600
(02h)

Baud Rate 1200
(03h)

Baud Rate 2400
(04h)

Baud Rate 4800
(05h)

***Baud Rate 9600**
(06h)

Baud Rate (continued)

Baud Rate 19,200
(07h)

38,400
(08h)

57,600
(0Ah)

115,200
(0Bh)

230,400
(0Ch)

Parity

Parameter # 9Eh

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

- Select **Odd** parity to set the parity bit to a value 0 or 1, based on data, to ensure that the coded character contains an odd number of 1 bits.
- Select **Even** parity to set the parity bit to a value 0 or 1, based on data, to ensure that the coded character contains an even number of 1 bits.
- If no parity is required, select **None**.

Odd
(00h)

Even
|(01h)

***None**
(04h)

Check Parity

Parameter # 97h

Select whether or not to check the parity of received characters. Use the Parity parameter to select the type of parity.

*Check Parity
(01h)

Do Not Check Parity
(00h)

Software Handshaking

Parameter # 9Fh

This parameter offers control of the data transmission process in addition to that offered by hardware handshaking. Hardware handshaking is always enabled and cannot be disabled by the user.

- **Disable ACK/NAK Handshaking**: If you select this option, the decoder neither generates nor expects ACK/NAK handshaking packets.
- **Enable ACK/NAK Handshaking**: If you select this option, after transmitting data, the digital imager scanner expects either an ACK or NAK response from the host. The digital imager scanner also ACKs or NAKs messages from the host.

  The digital imager 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 resends its data up to two times before discarding the data and declaring a transmit error.

Disable ACK/NAK
(00h)

*Enable ACK/NAK
(01h)

Host RTS Line State

Parameter # 9Ah

This parameter sets the expected idle state of the Serial Host RTS line.

The SSI Interface is used with host applications which also implement the SSI protocol. However, you can also use the digital imager scanner in a "scan-and-transmit" mode to communicate with any standard serial communication software on a host PC (see *Decode Data Packet Format on page 6-8*). If transmission errors occur in this mode, the host PC may be asserting hardware handshaking lines which interfere with the SSI protocol. Scan the **Host: RTS High** bar code to address this problem.

***Host: RTS Low**
(00h)

Host: RTS High
(01h)

Decode Data Packet Format

Parameter # EEh

This parameter selects whether to transmit decoded data in raw format (unpacketed), or with the packet format defined by the serial protocol.

Selecting the raw format disables ACK/NAK handshaking for decode data.

***Send Raw Decode Data**
(00h)

Send Packeted Decode Data
(01h)

Stop Bit Select

Parameter # 9Dh

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

***1 Stop Bit**
(01h)

2 Stop Bits
(02h)

Host Serial Response Time-out

Parameter # 9Bh

This parameter specifies how long the decoder waits for an ACK or NAK before resending. Also, if the decoder wants to send, and the host was already granted permission to send, the decoder waits for the designated time-out before declaring an error.

To set the delay period (options are 2, 5, 7.5, or 9.9 seconds), scan one of the following bar codes.

NOTE Other values are available via SSI command.

***Low - 2 Seconds**
(14h)

Medium - 5 Seconds
(32h)

High - 7.5 Seconds
(4Bh)

Maximum - 9.9 Seconds
(63h)

Host Character Time-out

Parameter # EFh

This parameter determines the maximum time the decoder waits between characters transmitted by the host before discarding the received data and declaring an error.

To set the delay period (options are 200, 500, 750, or 990 ms), scan one of the following bar codes.

NOTE Other values are available via SSI command.

***Low - 200 ms**
(0Ah)

Medium - 500 ms
(32h)

High - 750 ms
(4Bh)

Maximum - 990 ms
(63h)

Multipacket Option

Parameter # F0h, 4Eh

This parameter controls ACK/NAK handshaking for multi-packet transmissions.

- **Multi-Packet Option 1**: The host sends an ACK / NAK for each data packet during a multi-packet transmission.
- **Multi-Packet Option 2**: The digital imager scanner sends data packets continuously, with no ACK/NAK handshaking to pace the transmission. The host, if overrun, can use hardware handshaking to temporarily delay digital imager scanner transmissions. At the end of transmission, the digital imager scanner waits for a CMD_ACK or CMD_NAK.
- **Multi-Packet Option 3**: Option 3 is the same as option 2 with the addition of a programmable interpacket delay.

***Multipacket Option 1**
(00h)

Multipacket Option 2
(01h)

Multipacket Option 3
(02h)

Interpacket Delay

Parameter # F0h, 4Fh

This parameter specifies the interpacket delay when **Multipacket Option 3** is selected.

To set the delay period (options are 0, 25, 50, 75, or 99 ms), scan one of the following bar codes.

NOTE Other values are available via SSI command.

***Minimum - 0 ms**
(00h)

Low - 25 ms
(19h)

Medium - 50 ms
(32h)

High - 75 ms
(4Bh)

Maximum - 99 ms
(63h)

Event Reporting

The host can request the digital imager scanner to provide certain information (events) relative to the digital imager scanner's behavior. Enable or disable the events listed in *Table 6-2* and on the following pages by scanning the appropriate bar codes.

Table 6-2 *Event Codes*

Event Class	Event	Code Reported
Decode Event	Non parameter decode	0x01
Boot Up Event	System power-up	0x03
Parameter Event	Parameter entry error Parameter stored Defaults set (and parameter event is enabled by default) Number expected	0x07 0x08 0x0A 0x0F

Decode Event

Parameter # F0h, 00h

When enabled, the digital imager scanner generates a message to the host when it successfully decodes a bar code. When disabled, no notification is sent.

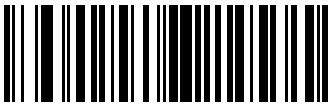
Enable Decode Event
(01h)

***Disable Decode Event**
(00h)

Boot Up Event

Parameter # F0h, 02h

When enabled, the digital imager scanner generates a message to the host when power is applied. When disabled, no notification is sent.



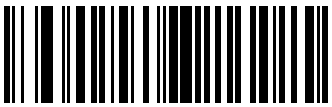
Enable Boot Up Event
(01h)

***Disable Boot Up Event**
(00h)

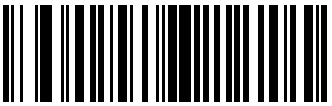
Parameter Event

Parameter # F0h, 03h

When enabled, the digital imager scanner generates a message to the host when one of the events specified in *Table 6-2 on page 6-14* occurs. When disabled, no notification is sent.



Enable Parameter Event
(01h)



***Disable Parameter Event**
(00h)

CHAPTER 7 USB INTERFACE

Introduction

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

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

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

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

Connecting a USB Interface

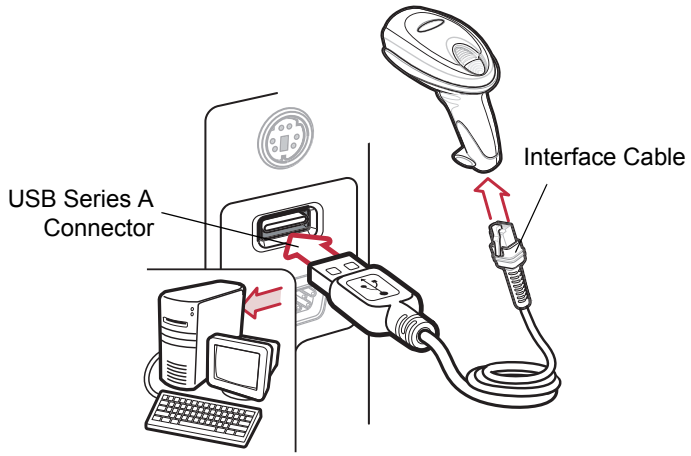


Figure 7-1 *USB Connection*

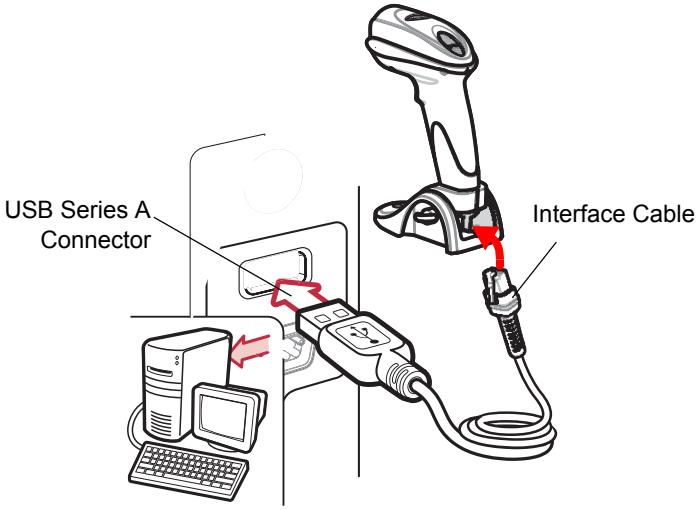


Figure 7-2 *USB Connection for Scanner with Base*

The digital imager scanner connects with USB-capable hosts including:

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

The following operating systems support the digital imager scanner through USB:

- Windows® 98, 2000, ME, XP
- MacOS 8.5 - MacOS 10.3
- IBM 4690 OS.

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

To set up the digital imager scanner:

> ***NOTE*** Interface cables vary depending on configuration. The connectors illustrated in *Figure 7-1*and *Figure 7-2* are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner are the same.

1. Connect the modular connector of the USB interface cable to the cable interface port on the digital imager scanner (see *Installing the Interface Cable on page 1-3*).
2. Plug the series A connector in the USB host or hub, or plug the Plus Power connector in an available port of the IBM SurePOS terminal.
3. Select the USB device type by scanning the appropriate bar code from *USB Device Type on page 7-5*.
4. On first installation when using Windows, the software prompts to select or install the Human Interface Device driver. To install this driver, provided by Windows, click **Next** through all the choices and click **Finished** on the last choice. The digital imager scanner powers up during this installation.
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

If problems occur with the system, see *Troubleshooting on page 3-2*.

USB Parameter Defaults

Table 7-1 lists the defaults for USB host parameters. To change an option, scan the appropriate bar code(s) provided in the Parameter Descriptions section beginning on *page 7-5*.

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

Table 7-1 *USB Interface Parameter Defaults*

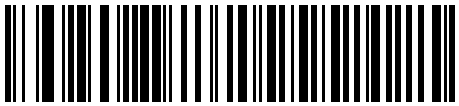
Parameter	Default	Page Number
USB Host Parameters		
USB Device Type	USB Keyboard (HID)	*7-5*
Symbol Native API (SNAPI) Status Handshaking	Enable	*7-7*
USB Country Keyboard Types (Country Codes)	North American	*7-8*
USB Keystroke Delay	No Delay	*7-10*
USB CAPS Lock Override	Disable	*7-10*
USB Ignore Unknown Characters	Enable	*7-11*
USB Convert Unknown to Code 39	Disable	*7-11*
Emulate Keypad	Disable	*7-12*
Emulate Keypad with Leading Zero	Disable	*7-12*
USB FN1 Substitution	Disable	*7-13*
Function Key Mapping	Disable	*7-13*
Simulated Caps Lock	Disable	*7-14*
Convert Case	No Case Conversion	*7-14*
USB Static CDC	Enable	*7-15*
USB Polling Interval	8 msec	*7-16*
Fast HID Keyboard	Disable	*7-18*
Quick Keypad Emulation	Disable	*7-18*
USB Ignore Beep Directive	Honor	*7-19*
USB Ignore Type Directive	Honor	*7-19*
Ignore Beep on <BEL> over CDC	Disable	*7-20*
IBM Specification Level	Version 0 (Original)	*7-20*

USB Host Parameters

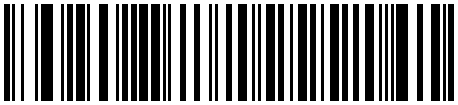
USB Device Type

Select the desired USB device type.

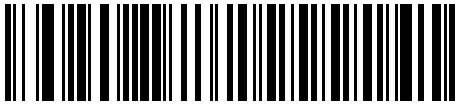
NOTE When changing USB Device Types, the digital imager scanner automatically resets and issues the standard startup beep sequences.



***USB Keyboard (HID)**



IBM Table Top USB



IBM Hand-Held USB

USB OPOS Hand-Held

USB Device Type (continued)

Simple COM Port Emulation

USB CDC Host

Symbol Native API (SNAPI) with Imaging Interface

Symbol Native API (SNAPI) without Imaging Interface

NOTE Before selecting **USB CDC Host**, install the CDC INF file on the host to ensure the digital imager scanner does not stall during power up (due to a failure to enumerate USB). If the digital imager scanner stalls, to recover it:

1. Install the CDC INF file

   or

2. After power-up, hold the trigger for 10 seconds, which allows the digital imager scanner to power up using an alternate USB configuration. Upon power-up, scan another **USB Device Type**.

Symbol Native API (SNAPI) Status Handshaking

After selecting a SNAPI interface as the USB device type, select whether to enable or disable status handshaking.

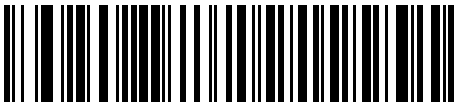
***Enable SNAPI Status Handshaking**

Disable SNAPI Status Handshaking

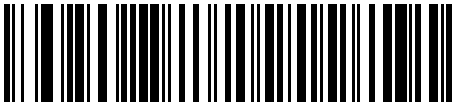
USB Country Keyboard Types (Country Codes)

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

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

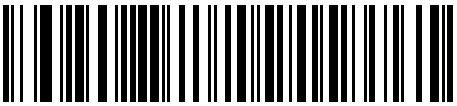


***North American Standard USB Keyboard**



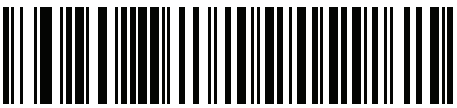
German Windows

French Windows



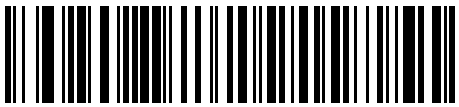
French Canadian Windows 95/98

French Canadian Windows 2000/XP

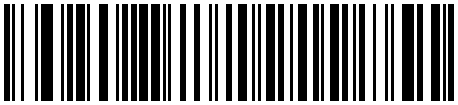


French Belgian Windows

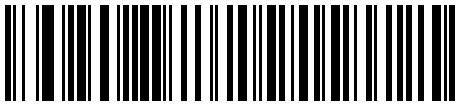
USB Country Keyboard Types (continued)



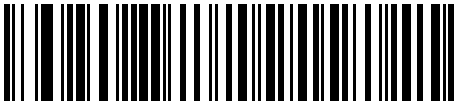
Spanish Windows



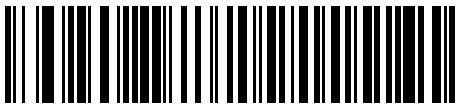
Italian Windows



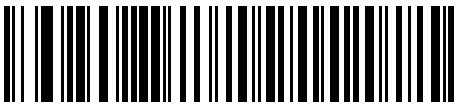
Swedish Windows



UK English Windows



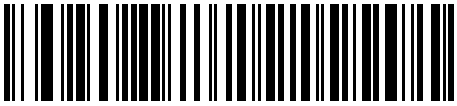
Japanese Windows (ASCII)



Portuguese-Brazilian Windows

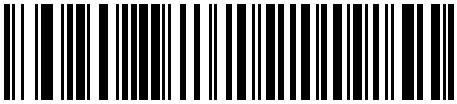
USB Keystroke Delay

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



***No Delay**

Medium Delay (20 msec)

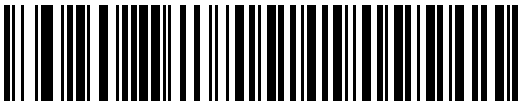


Long Delay (40 msec)

USB CAPS Lock Override

This option applies only to the USB Keyboard (HID) device. Enable this to preserve the case of the data regardless of the state of the **Caps Lock** key. This setting is always enabled for the Japanese, Windows (ASCII) keyboard type and can not be disabled.

Override Caps Lock Key (Enable)



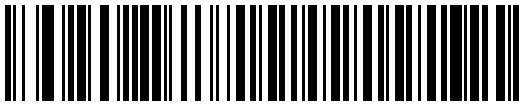
***Do Not Override Caps Lock Key (Disable)**

USB Ignore Unknown Characters

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

If you select **Do Not Send Bar Codes With Unknown Characters**, for IBM devices, bar codes containing at least one unknown character are not sent to the host, and the scanner sounds an error beep. For USB Keyboard (HID) devices, the bar code characters up to the unknown character are sent, and the scanner sounds an error beep.

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



Do Not Send Bar Codes with Unknown Characters (Disable)

USB Convert Unknown to Code 39

This option applies only to the IBM hand-held, IBM table top, and OPOS devices. Scan a bar code below to enable or disable converting unknown bar code type data to Code 39.

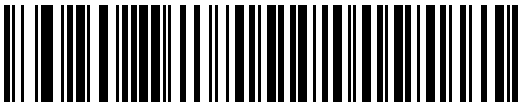
***Disable Convert Unknown to Code 39**

Enable Convert Unknown to Code 39

Emulate Keypad

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

***Disable Keypad Emulation**



Enable Keypad Emulation

Emulate Keypad with Leading Zero

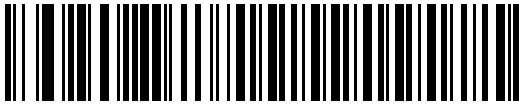
Enable this to send character sequences sent over the numeric keypad as ISO characters which have a leading zero. For example ASCII A transmits as “ALT MAKE” 0 0 6 5 “ALT BREAK”.

***Disable Keypad Emulation with Leading Zero**

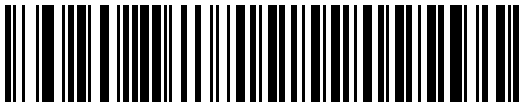
Enable Keypad Emulation with Leading Zero

USB Keyboard FN 1 Substitution

This option applies only to the USB Keyboard (HID) device. Enable this to replace any FN 1 characters in a GS1-128 bar code with a user-selected Key Category and value (see *FN1 Substitution Values on page 4-24* to set the Key Category and Key Value).



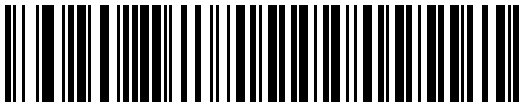
Enable



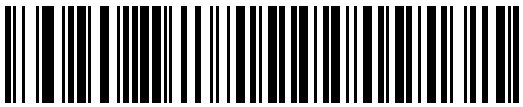
***Disable**

Function Key Mapping

ASCII values under 32 are normally sent as a control-key sequences (see *Table 7-2 on page 7-21*). Enable this to send the keys in bold in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not you enable this parameter.



***Disable Function Key Mapping**

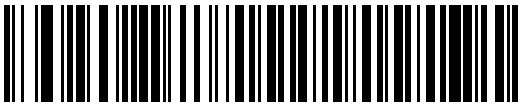


Enable Function Key Mapping

Simulated Caps Lock

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

***Disable Simulated Caps Lock**

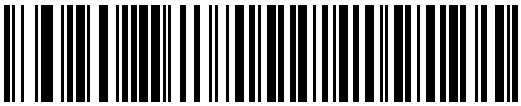


Enable Simulated Caps Lock

Convert Case

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

***No Case Conversion**



Convert All to Upper Case

Convert All to Lower Case

USB Static CDC

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

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

***Enable USB Static CDC**

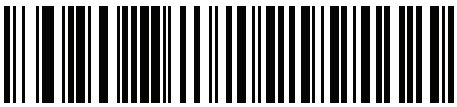
Disable USB Static CDC

USB Polling Interval (DS6707-SR only)

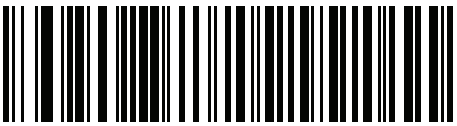
Scan a bar code below to set the polling interval. The polling interval determines the rate at which data can be sent between the scanner and host computer. A lower number indicates a faster data rate.

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

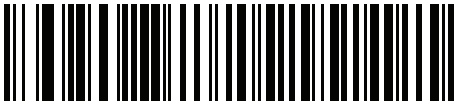
IMPORTANT Ensure your host machine can handle the selected data rate.



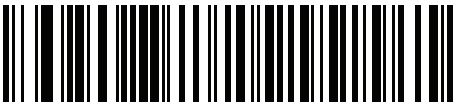
1 msec



2 msec

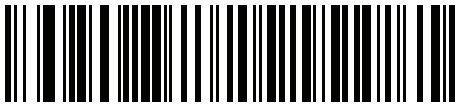


3 msec

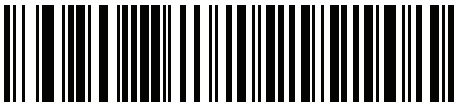


4 msec

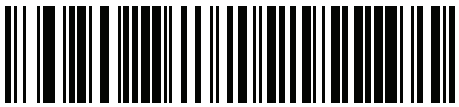
USB Polling Interval (continued)



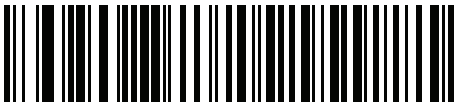
5 msec



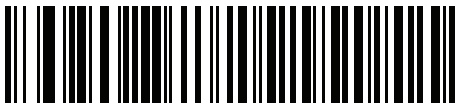
6 msec



7 msec



* 8 msec

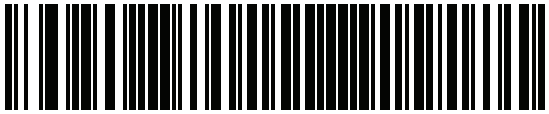


9 msec

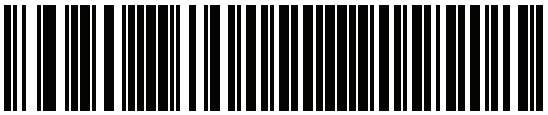
Fast HID Keyboard

This option transmits USB Keyboard HID data at a faster rate.

NOTE **Quick Emulation** overrides **Fast HID**.



Enable



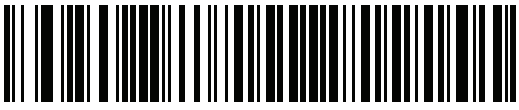
*** Disable**

Quick Keypad Emulation

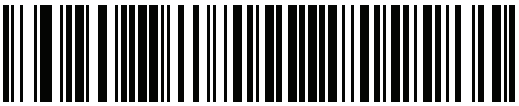
This option applies only to the USB Keyboard HID Device and if Emulate Keypad is enabled. This parameter enables a quicker method of keypad emulation where ASCII sequences are only sent for ASCII characters not found on the keyboard. The default value is **Disable**.

This option applies only to the USB Keyboard HID device when *Emulate Keypad on page 7-12* is enabled. This parameter enables a quicker method of emulation utilizing the numeric keypad. The default value is **Disable**.

NOTE This feature is not compatible with **Fast HID Keyboard** mode.



Enable



*** Disable**

USB Ignore Beep Directive

This applies only to IBM hand-held, IBM table top, and OPOS devices. Scan one of the following bar codes to honor or ignore a beep directive. All directives are still acknowledged as if they were processed.

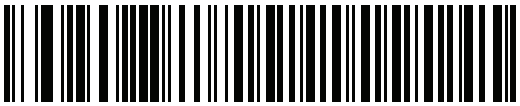
*** Honor USB Beep Directive**

Ignore USB Beep Directive

USB Ignore Type Directive

This applies only to IBM hand-held, IBM table top, and OPOS devices. Scan one of the following bar codes to honor or ignore a code type enable/disable directive. All directives are still acknowledged as if they were processed.

*** Honor USB Ignore Type Directive**

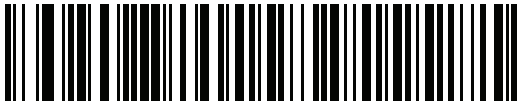


Ignore USB Ignore Type Directive

Ignore Beep on <BEL> over CDC

If you enable this parameter, the USB CDC host ignores the beep upon detection of a <BEL> character. <BEL> gains a user's attention to an illegal entry or other important event.

Ignore Beep On <BEL> over CDC (Enable)



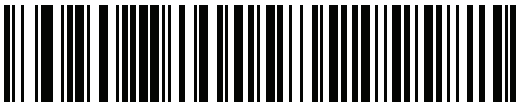
***Do Not Ignore Beep On <BEL> over CDC (Disable)**

IBM Specification Level

When the IBM Specification Level is set to **Version 0 (Original)**, the following code types are sent as Unknown:

- Data Matrix
- QR Code
- MicroQR Code
- Aztec

When the level is set to **Version 2.2**, the code types are sent with the appropriate IBM identifiers.



***IBM Specification Level Version 0 (Original)**

IBM Specification Level Version 2.2

ASCII Character Set for USB

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
1021	$U	CTRL U
1022	$V	CTRL V
1023	$W	CTRL W
1024	$X	CTRL X
1025	$Y	CTRL Y

[1]The keystroke in bold transmits only if you enabled *Function Key Mapping on page 7-13*. Otherwise, the unbolded keystroke transmits.

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

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1026	$Z	CTRL Z
1027	%A	CTRL [/**ESC**[1]
1028	%B	CTRL \
1029	%C	CTRL]
1030	%D	CTRL 6
1031	%E	CTRL -
1032	Space	Space
1033	/A	!
1034	/B	“
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	‘
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6

[1]The keystroke in bold transmits only if you enabled *Function Key Mapping on page 7-13*. Otherwise, the unbolded keystroke transmits.

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

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A
1066	B	B
1067	C	C
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S

[1]The keystroke in bold transmits only if you enabled *Function Key Mapping on page 7-13*. Otherwise, the unbolded keystroke transmits.

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

Prefix/ Suffix Value	Full ASCII Code 39 Encode Char.acter	Keystroke
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	`
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p

[1]The keystroke in bold transmits only if you enabled *Function Key Mapping on page 7-13*. Otherwise, the unbolded keystroke transmits.

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

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

[1]The keystroke in bold transmits only if you enabled *Function Key Mapping on page 7-13*. Otherwise, the unbolded keystroke transmits.

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
2073	ALT I
2074	ALT J
2075	ALT K

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

ALT Keys	Keystroke
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
3049	GUI 1
3050	GUI 2
3051	GUI 3
3052	GUI 4
3053	GUI 5
3054	GUI 6
3055	GUI 7
3056	GUI 8

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
3057	GUI 9
3065	GUI A
3066	GUI B
3067	GUI C
3068	GUI D
3069	GUI E
3070	GUI F
3071	GUI G
3072	GUI H
3073	GUI I
3074	GUI J
3075	GUI K
3076	GUI L
3077	GUI M
3078	GUI N
3079	GUI O
3080	GUI P
3081	GUI Q
3082	GUI R
3083	GUI S
3084	GUI T
3085	GUI U
3086	GUI V
3087	GUI W
3088	GUI X
3089	GUI Y
3090	GUI Z
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
5010	F10
5011	F11
5012	F12
5013	F13
5014	F14
5015	F15
5016	F16
5017	F17
5018	F18
5019	F19
5020	F20
5021	F21
5022	F22
5023	F23
5024	F24

Table 7-6 *USB Numeric Keypad Character Set*

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

Table 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
7012	Home
7013	Enter
7014	Escape
7015	Up Arrow
7016	Down Arrow
7017	Left Arrow
7018	Right Arrow

CHAPTER 8 RS-232 INTERFACE

Introduction

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

If your host does not appear in *Table* , refer to the documentation for the host device to set communication parameters to match the host.

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

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

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

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

Connecting an RS-232 Interface

The digital imager scanner connects directly to the host computer.

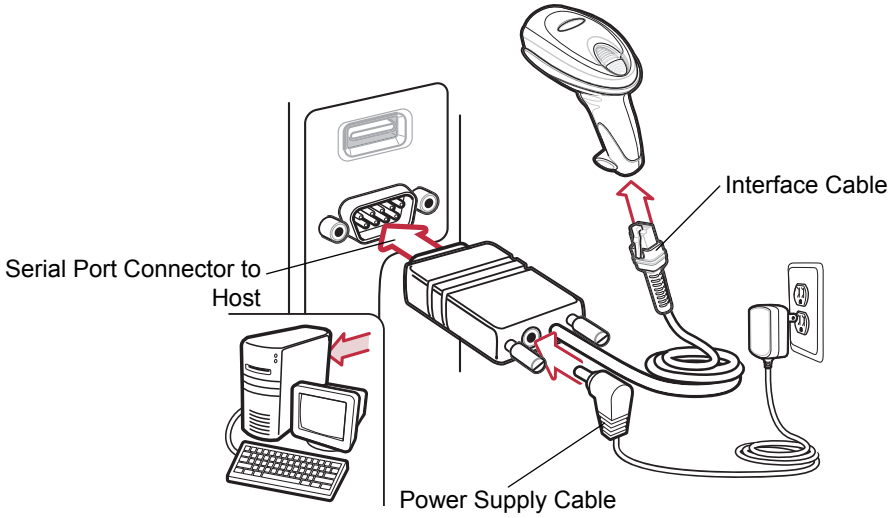


Figure 8-1 *RS-232 Direct Connection*

NOTE Interface cables vary depending on configuration. The connectors illustrated in *Figure 8-1* and *Figure 8-2* are examples only. The connectors may be different than those illustrated, but the steps to connect the scanner are the same.

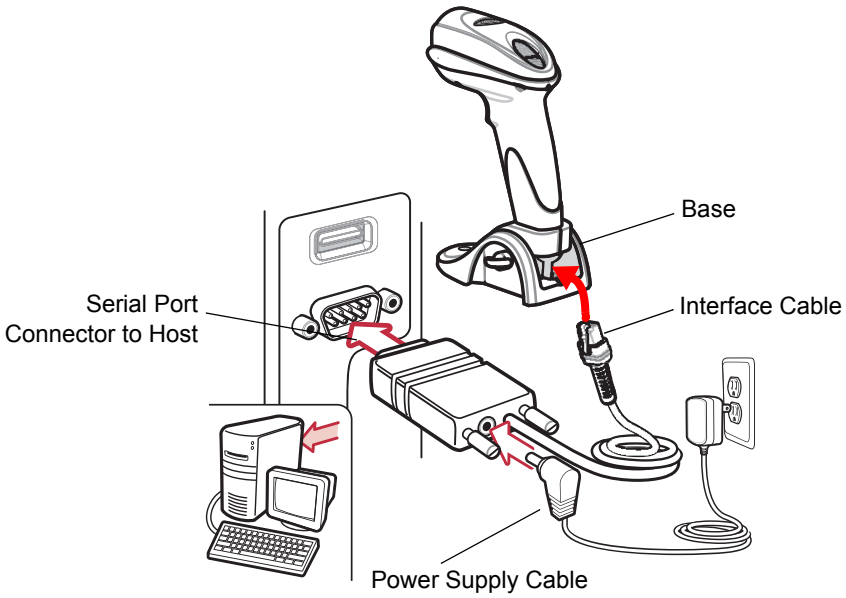


Figure 8-2 *RS-232 Direct Connection for Scanner with Base*

1. Connect the modular connector of the RS-232 interface cable to the cable interface port on the digital imager scanner (see *Installing the Interface Cable on page 1-3*).
2. Connect the other end of the RS-232 interface cable to the serial port on the host.
3. Connect the power supply to the serial connector end of the RS-232 interface cable. Plug the power supply into an appropriate outlet.
4. Select the RS-232 host type by scanning the appropriate bar code from *RS-232 Host Types on page 8-8*.
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

RS-232 Parameter Defaults

Table 8-1 lists the defaults for RS-232 host parameters. To change any option, scan the appropriate bar code(s) provided in the RS-232 Host Parameters section beginning on *page 8-5*.

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

Table 8-1 *RS-232 Host Default Table*

Parameter	Default	Page Number
RS-232 Host Parameters		
RS-232 Host Types	Standard	*8-8*
Baud Rate	9600	*8-10*
Parity Type	None	*8-11*
Stop Bit Select	1 Stop Bit	*8-12*
Data Bits	8-Bit	*8-12*
Check Receive Errors	Enable	*8-13*
Hardware Handshaking	None	*8-13*
Software Handshaking	None	*8-15*
Host Serial Response Time-out	2 Sec	*8-17*
RTS Line State	Low RTS	*8-18*
Beep on <BEL>	Disable	*8-18*
Intercharacter Delay	0 msec	*8-19*
Nixdorf Beep/LED Options	Normal Operation	*8-20*
Ignore Unknown Characters	Send Bar Code	*8-20*

RS-232 Host Parameters

Various RS-232 hosts use their own parameter default settings. Selecting standard, ICL, Fujitsu, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, OPOS/JPOS, Olivetti, Omron or Common Use Terminal Equipment (CUTE-LP/LG bar code readers) sets the defaults listed in *Table 8-2*.

Table 8-2 *Terminal Specific RS-232*

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

In the Nixdorf Mode B, if CTS is low, scanning is disabled. When CTS is high, scanning is enabled. If you scan Nixdorf Mode B without connecting the digital imager scanner to the proper host, it may appear unable to scan. If this happens, scan a different RS-232 host type within 5 seconds of cycling power to the digital imager scanner.
The CUTE host disables all parameter scanning, including Set Defaults. If you inadvertently select CUTE, scan **Enable Parameter Scanning (01h) on page 4-5*, then change the host selection.

RS-232 Host Parameters (continued)

Selecting ICL, Fujitsu, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, OPOS/JPOS, Olivetti, Omron or Common Use Terminal Equipment (CUTE-LP/LG bar code readers) enables the transmission of code ID characters listed in *Table 8-3*. These code ID characters are not programmable and are separate from the Transmit Code ID feature. Do not enable the Transmit Code ID feature for these terminals.

Table 8-3 *Terminal Specific Code ID Characters*

Code Type	ICL	Fujitsu	Wincor Nixdorf Mode A	Wincor-Nixdorf Mode B/ OPOS/ JPOS	Olivetti	Omron	CUTE
UPC-A	A	A	A	A	A	A	A
UPC-E	E	E	C	C	C	E	None
EAN-8/JAN-8	FF	FF	B	B	B	FF	None
EAN-13/JAN-13	F	F	A	A	A	F	A
Bookland EAN	F	F	A	A	A	F	None
Code 128	L <len>	None	K	K	K <len>	L <len>	5
GS1-128	L <len>	None	P	P	P <len>	L <len>	5
Code 39	C <len>	None	M	M	M <len>	C <len>	3
Code 39 Full ASCII	None	None	M	M	None	None	3
Trioptic	None	None	None	None	None	None	None
Code 32	None	None	None	None	None	None	None
Code 93	None	None	L	L	L <len>	None	None
Code 11	None	None	None	None	None	None	None
I 2 of 5	I <len>	None	I	I	I <len>	I <len>	1
D 2 of 5	H <len>	None	H	H	H <len>	H <len>	2
Codabar	N <len>	None	N	N	N <len>	N <len>	None
MSI	None	None	O	O	O <len>	None	None
IATA	H<len>	None	H	H	None	None	2
PDF417	None	None	S	S	None	None	None
MicroPDF417	None	None	Q	Q	None	None	6
GS1 Databar 14/ Limited/Expanded	None	None	E	E	None	None	None
Data Matrix	None	None	R	R	None	None	None

Table 8-3 *Terminal Specific Code ID Characters (Continued)*

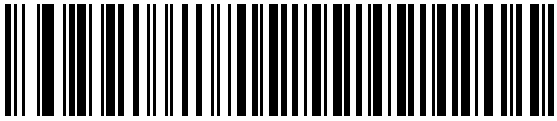
Code Type	ICL	Fujitsu	Wincor Nixdorf Mode A	Wincor-Nixdorf Mode B/ OPOS/ JPOS	Olivetti	Omron	CUTE
Maxicode	None	None	T	T	None	None	None
QR Codes	None	None	U	U	None	None	None
Aztec/Aztec Rune	None	None	V	V	None	None	None

RS-232 Host Types

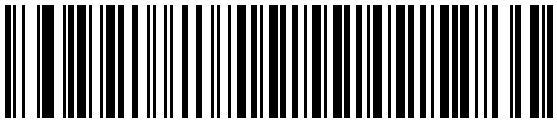
To select an RS-232 host interface, scan one of the following bar codes.

Standard RS-232[1]

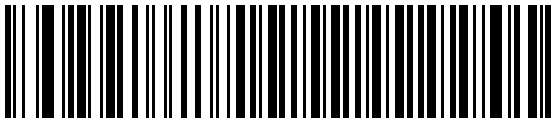
ICL RS-232



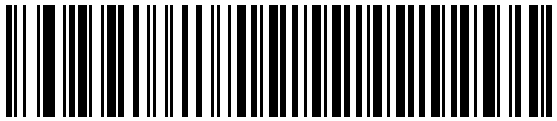
Wincor-Nixdorf RS-232 Mode A



Wincor-Nixdorf RS-232 Mode B



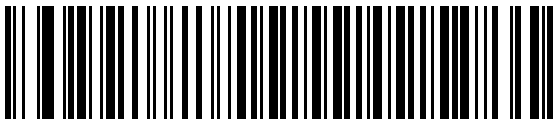
Olivetti ORS4500



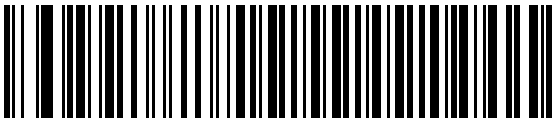
Omron

[1]Scanning Enable RS-232 (No Variant) activates the RS-232 driver, but does not change port settings (e.g., parity, data bits, handshaking). Selecting another RS-232 host type bar code changes these settings.

RS-232 Host Types (continued)



OPOS/JPOS



Fujitsu RS-232

CUTE[2]

[2] The CUTE host disables all parameter scanning, including Set Defaults. If you inadvertently select CUTE, scan *Enable Parameter Scanning (01h) on page 4-5, then change the host selection.

Baud Rate

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

Baud Rate 600

Baud Rate 1200

Baud Rate 2400

Baud Rate 4800

***Baud Rate 9600**

Baud Rate 19,200

Baud Rate (continued)

Baud Rate 38,400

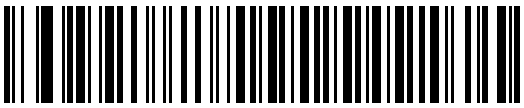
Baud Rate 57,600

Baud Rate 115,200

Parity

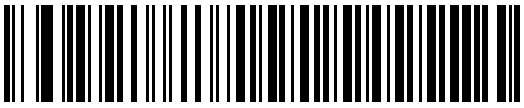
A parity check bit is the most significant bit of each ASCII coded character. Select the parity type according to host device requirements.

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



Odd

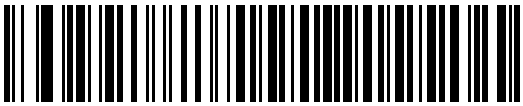
Even



***None**

Stop Bit Select

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

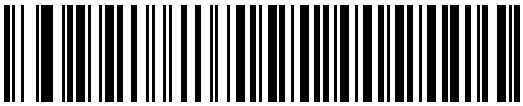


***1 Stop Bit**

2 Stop Bits

Data Bits

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

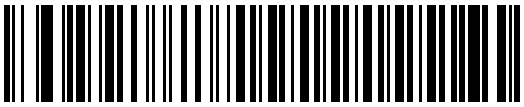


7-Bit

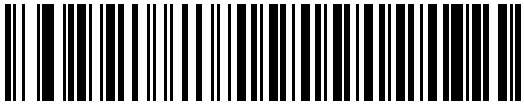
***8-Bit**

Check Receive Errors

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



***Check For Received Errors**



Do Not Check For Received Errors

Hardware Handshaking

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

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

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

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

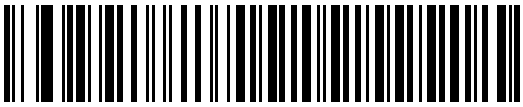
If this communication sequence fails, the digital imager scanner issues an error indication. In this case, the data is lost and must be rescanned.

If hardware handshaking and software handshaking are both enabled, hardware handshaking takes precedence.

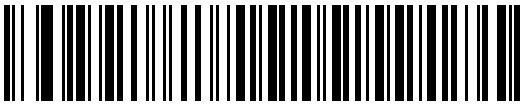
✓ ***NOTE*** The DTR signal is jumpered to the active state.

Hardware Handshaking (continued)

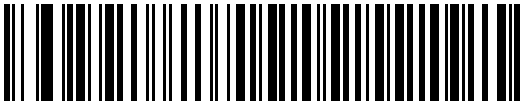
- **None**: Scan this bar code to disable hardware handshaking.
- **Standard RTS/CTS**: Scan this bar code to select Standard RTS/CTS Hardware Handshaking.
- **RTS/CTS Option 1**: If you select RTS/CTS Option 1, the digital imager scanner asserts RTS before transmitting and ignores the state of CTS.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



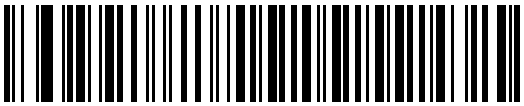
***None**



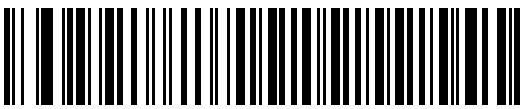
Standard RTS/CTS



RTS/CTS Option 1



RTS/CTS Option 2



RTS/CTS Option 3

Software Handshaking

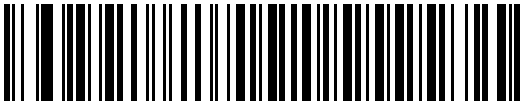
This parameter offers control of the data transmission process in addition to, or instead of, that offered by hardware handshaking. There are five options.

If software handshaking and hardware handshaking are both enabled, hardware handshaking takes precedence.

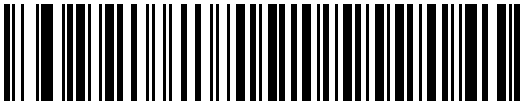
- **None**: Select this option to transmit data immediately. No response is expected from host.
- **ACK/NAK**: If you select this option, after transmitting data, the digital imager scanner expects either an ACK or NAK response from the host. When it receives a NAK, the digital imager scanner transmits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

  The digital imager scanner waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the digital imager scanner does not get a response in this time, it issues an error indication and discards the data. There are no retries when a time-out occurs.
- **ENQ**: If you select this option, the digital imager scanner waits for an ENQ character from the host before transmitting data. If it does not receive an ENQ within the Host Serial Response Time-out, the digital imager scanner issues an error indication and discards the data. The host must transmit an ENQ character at least every Host Serial Response Time-out to prevent transmission errors.
- **ACK/NAK with ENQ**: This combines the two previous options. For re-transmissions of data, due to a NAK from the host, an additional ENQ is not required.
- **XON/XOFF**: An XOFF character turns the digital imager scanner transmission off until the digital imager scanner receives an XON character. There are two situations for XON/XOFF:
  - The scanner receives an XOFF before it has data to send. When the digital imager scanner has data to send, it waits up to Host Serial Response Time-out for an XON character before transmission. If it does not receive the XON within this time, the digital imager scanner issues an error indication and discards the data.
  - The scanner receives an XOFF during a transmission. Data transmission then stops after sending the current byte. When the digital imager scanner receives an XON character, it sends the rest of the data message. The digital imager scanner waits indefinitely for the XON.

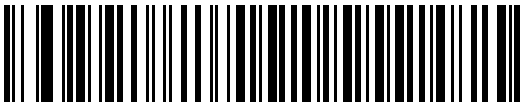
Software Handshaking (continued)



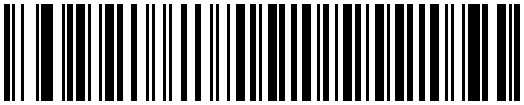
*None



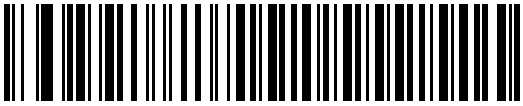
ACK/NAK



ENQ



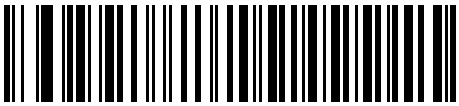
ACK/NAK with ENQ



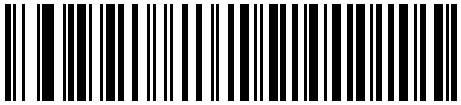
XON/XOFF

Host Serial Response Time-out

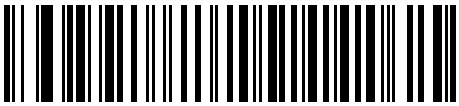
This parameter specifies how long the digital imager scanner waits for an ACK, NAK, or CTS before determining that a transmission error occurred. This only applies when in one of the ACK/NAK software handshaking modes, or RTS/CTS hardware handshaking mode.



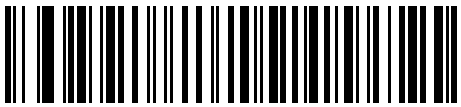
***Minimum: 2 Sec**



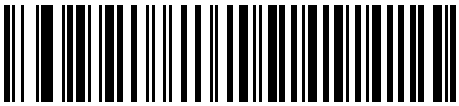
Low: 2.5 Sec



Medium: 5 Sec



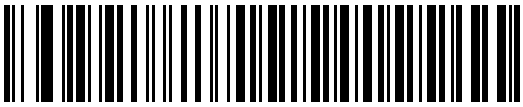
High: 7.5 Sec



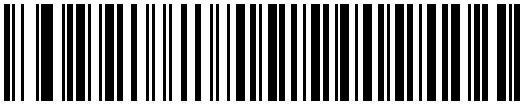
Maximum: 9.9 Sec

RTS Line State

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



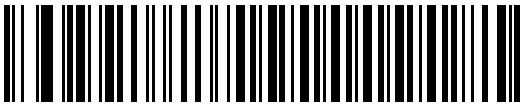
***Host: Low RTS**



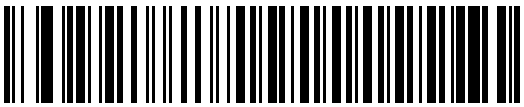
Host: High RTS

Beep on <BEL>

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



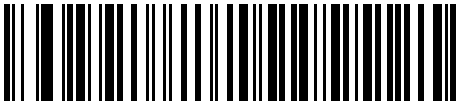
Beep On <BEL> Character (Enable)



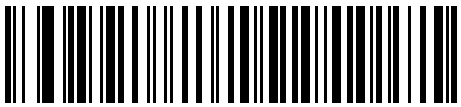
***Do Not Beep On <BEL> Character (Disable)**

Intercharacter Delay

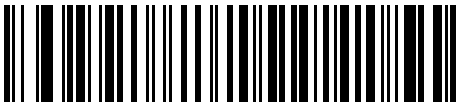
This parameter specifies the intercharacter delay inserted between character transmissions.



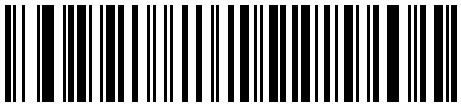
***Minimum: 0 msec**



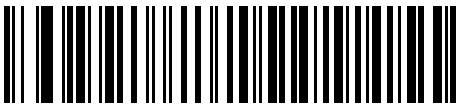
Low: 25 msec



Medium: 50 msec



High: 75 msec

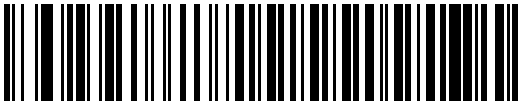


Maximum: 99 msec

Nixdorf Beep/LED Options

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

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



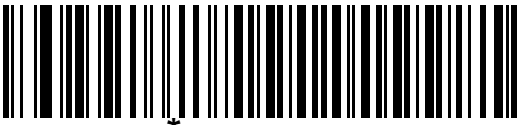
Beep/LED After Transmission

Beep/LED After CTS Pulse

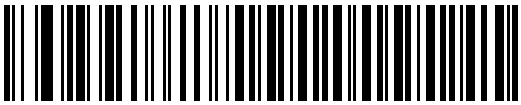
Ignore Unknown Characters

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

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



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



Do Not Send Bar Codes
(with unknown characters)

ASCII Character Set for RS-232

You can assign the values in *Table 8-4* as prefixes or suffixes for ASCII character data transmission.

Table 8-4 *Prefix/Suffix Values*

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1000	%U	NUL
1001	$A	SOH
1002	$B	STX
1003	$C	ETX
1004	$D	EOT
1005	$E	ENQ
1006	$F	ACK
1007	$G	BELL
1008	$H	BCKSPC
1009	$I	HORIZ TAB
1010	$J	LF/NW LN
1011	$K	VT
1012	$L	FF
1013	$M	CR/ENTER
1014	$N	SO
1015	$O	SI
1016	$P	DLE
1017	$Q	DC1/XON
1018	$R	DC2
1019	$S	DC3/XOFF
1020	$T	DC4
1021	$U	NAK
1022	$V	SYN
1023	$W	ETB
1024	$X	CAN
1025	$Y	EM
1026	$Z	SUB
1027	%A	ESC

Table 8-4 *Prefix/Suffix Values (Continued)*

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1028	%B	FS
1029	%C	GS
1030	%D	RS
1031	%E	US
1032	Space	Space
1033	/A	!
1034	/B	"
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	‘
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2
1051	3	3
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:

Table 8-4 *Prefix/Suffix Values (Continued)*

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1059	%F	;
1060	%G	<
1061	%H	=
1062	%I	>
1063	%J	?
1064	%V	@
1065	A	A
1066	B	B
1067	C	C
1068	D	D
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y

Table 8-4 *Prefix/Suffix Values (Continued)*

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	`
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x

Table 8-4 *Prefix/Suffix Values (Continued)*

Prefix/Suffix Value	Full ASCII Code 39 Encode Character	ASCII Character
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	|
1125	%R	}
1126	%S	~
1127		Undefined
7013		ENTER

CHAPTER 9 123SCAN2

Introduction

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

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

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

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

Communication with 123Scan^2

To communicate with the 123Scan² program which runs on a host computer running a Windows XP SP2 and Windows 7 operating system, use a USB cable to connect the scanner cradle to the host computer.

123Scan² Requirements

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

For more information on 123Scan², go to:

www.zebra.com/123scan2

For a 1 minute tour of 123Scan², go to:

www.zebra.com/scannersoftwarevideos

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

www.zebra.com/support

Scanner SDK, Other Software Tools, and Videos

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

www.zebra.com/software.

- 123Scan² Configuration Utility (described in this chapter)
- Scanner SDK for Windows
- “How to...” Videos
- Virtual Com Port Driver
- OPOS Driver
- JPOS Driver
- Scanner User Documentation
- Archive of Older Drivers.

CHAPTER 10 SYMBOLOGIES

Introduction

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

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

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

Select a host type (see each host chapter for specific host information) after the power-up beeps sound. This is only necessary upon the first power-up when connecting to a new host.

To return all features to default values, scan the *Set Default Parameter on page 4-4*. Throughout the programming bar code menus, asterisks (*) indicate default values.

* Indicates Default — *Enable UPC-A (01h) — Feature/Option; Option Hex Value for programming via SSI command

Scanning Sequence Examples

In most cases, scanning one bar code sets the parameter value. For example, to transmit bar code data without the UPC-A check digit, simply scan the **Do Not Transmit UPC-A Check Digit** bar code under *Transmit UPC-A Check Digit on page 10-17*. The digital imager scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

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

Errors While Scanning

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

Symbology Parameter Defaults

Table 10-1 lists the defaults for all symbologies parameters. There are two ways to change the default values:

- Scan the appropriate bar codes in this guide. These new values replace the standard default values in memory. To recall the default parameter values, scan the *Set Default Parameter on page 4-4*.
- Download data through the device's serial port using SSI. Hexadecimal parameter numbers appear in this chapter below the parameter title, and options appear in parenthesis beneath the accompanying bar codes. Refer to the *Simple Serial Interface (SSI) Programmer's Guide* for detailed instructions for changing parameters using this method.

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

Table 10-1 *Parameter Defaults*

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

Table 10-1 *Parameter Defaults (Continued)*

Parameter	Parameter Number	Default	Page Number
UPC-A Preamble	22h	System Character	*10-18*
UPC-E Preamble	23h	System Character	*10-18*
UPC-E1 Preamble	24h	System Character	*10-20*
Convert UPC-E to A	25h	Disable	*10-21*
Convert UPC-E1 to A	26h	Disable	*10-21*
EAN-8/JAN-8 Extend	27h	Disable	*10-22*
Bookland ISBN Format	F1h 40h	ISBN-10	*10-23*
UCC Coupon Extended Code	55h	Disable	*10-24*
Coupon Report	F1h DAh	New Coupon Format	*10-25*
ISSN EAN	F1h 69h	Disable	*10-26*
Code 128			
Code 128	08h	Enable	*10-27*
Set Length(s) for Code 128	D1h D2h	Any Length	*10-27*
GS1-128 (formerly UCC/EAN-128)	0Eh	Enable	*10-29*
ISBT 128	54h	Enable	*10-29*
ISBT Concatenation	F1h 41h	Disable	*10-30*
Check ISBT Table	F1h 42h	Enable	*10-31*
ISBT Concatenation Redundancy	DFh	10	*10-31*
Code 39			
Code 39	00h	Enable	*10-32*
Trioptic Code 39	0Dh	Disable	*10-32*
Convert Code 39 to Code 32 (Italian Pharmacy Code)	56h	Disable	*10-33*
Code 32 Prefix	E7h	Disable	*10-33*
Set Length(s) for Code 39	12h 13h	2 to 55	*10-34*
Code 39 Check Digit Verification	30h	Disable	*10-35*
Transmit Code 39 Check Digit	2Bh	Disable	*10-36*
Code 39 Full ASCII Conversion	11h	Disable	*10-36*
Buffer Code 39	71h	Disable	*10-37*

Table 10-1 *Parameter Defaults (Continued)*

Parameter	Parameter Number	Default	Page Number
Code 93			
Code 93	09h	Disable	*10-40*
Set Length(s) for Code 93	1Ah 1Bh	4 to 55	*10-40*
Code 11			
Code 11	0Ah	Disable	*10-42*
Set Lengths for Code 11	1Ch 1Dh	4 to 55	*10-42*
Code 11 Check Digit Verification	34h	Disable	*10-44*
Transmit Code 11 Check Digit(s)	2Fh	Disable	*10-45*
Interleaved 2 of 5 (ITF)			
Interleaved 2 of 5 (ITF)	06h	Enable	*10-46*
Set Lengths for I 2 of 5	16h 17h	14	*10-46*
I 2 of 5 Check Digit Verification	31h	Disable	*10-48*
Transmit I 2 of 5 Check Digit	2Ch	Disable	*10-48*
Convert I 2 of 5 to EAN 13	52h	Disable	*10-49*
Discrete 2 of 5 (DTF)			
Discrete 2 of 5	05h	Disable	*10-50*
Set Length(s) for D 2 of 5	14h 15h	12	*10-50*
Codabar (NW - 7)			
Codabar	07h	Disable	*10-52*
Set Lengths for Codabar	18h 19h	5 to 55	*10-52*
CLSI Editing	36h	Disable	*10-54*
NOTIS Editing	37h	Disable	*10-54*
Codabar Upper or Lower Case Start/Stop Characters Transmission	F2h 57h	Upper Case	*10-55*
MSI			
MSI	0Bh	Disable	*10-56*
Set Length(s) for MSI	1Eh 1Fh	4 to 55	*10-56*
MSI Check Digits	32h	One	*10-57*
Transmit MSI Check Digit	2Eh	Disable	*10-58*
MSI Check Digit Algorithm	33h	Mod 10/Mod 10	*10-58*

Table 10-1 *Parameter Defaults (Continued)*

Parameter	Parameter Number	Default	Page Number
Chinese 2 of 5			
Chinese 2 of 5	F0h 98h	Disable	*10-59*
Matrix 2 of 5			
Matrix 2 of 5	F1h 6Ah	Disable	*10-59*
Matrix 2 of 5 Lengths	F1h 6Bh F1h 6Ch	1 Length - 14	*10-60*
Matrix 2 of 5 Check Digit	F1h 6Eh	Disable	*10-61*
Transmit Matrix 2 of 5 Check Digit	F1h 6Fh	Disable	*10-61*
Korean 3 of 5			
Korean 3 of 5	F1h 45h	Disable	*10-62*
Inverse 1D	F1h 4Ah	SR, DC: Regular DP, HD: Autodetect	*10-63*
Postal Codes			
US Postnet	59h	Enable	*10-64*
US Planet	5Ah	Enable	*10-64*
Transmit US Postal Check Digit	5Fh	Enable	*10-65*
UK Postal	5Bh	Enable	*10-65*
Transmit UK Postal Check Digit	60h	Enable	*10-66*
Japan Postal	F0h 22h	Enable	*10-66*
Australia Post	F0h 23h	Enable	*10-67*
Australia Post Format	F1h CEh	Autodiscriminate	*10-68*
Netherlands KIX Code	F0h 46h	Enable	*10-69*
USPS 4CB/One Code/Intelligent Mail	F1h 50h	Disable	*10-69*
UPU FICS Postal	F1h 63h	Disable	*10-70*
GS1 DataBar			
GS1 DataBar-14	F0h 52h	Enable	*10-71*
GS1 DataBar Limited	F0h 53h	Disable	*10-71*
GS1 DataBar Limited Security Level	F1h D8h	Level 3	*10-72*
GS1 DataBar Expanded	F0h 54h	Enable	*10-73*
Convert GS1 DataBar to UPC/EAN	F0h 8Dh	Disable	*10-73*

Table 10-1 *Parameter Defaults (Continued)*

Parameter	Parameter Number	Default	Page Number
Composite			
Composite CC-C	F0h 55h	Disable	*10-74*
Composite CC-A/B	F0h 56h	Disable	*10-74*
Composite TLC-39	F0h 73h	Disable	*10-75*
UPC Composite Mode	F0h 58h	Always Linked	*10-76*
Composite Beep Mode	F0h 8Eh	Beep As Each Code Type is Decoded	*10-77*
GS1-128 Emulation Mode for UCC/EAN Composite Codes	F0h ABh	Disable	*10-77*
2-D Symbologies			
PDF417	0Fh	Enable	*10-78*
MicroPDF417	E3h	Disable	*10-78*
Code 128 Emulation	7Bh	Disable	*10-79*
Data Matrix	F0h 24h	Enable	*10-80*
Data Matrix Inverse	F1h 4Ch	SR, DC: Regular DP, HD: Autodetect	*10-81*
Maxicode	F0h 26h	Enable	*10-82*
QR Code	F0h 25h	Enable	*10-82*
QR Inverse	F1h 4Bh	SR, DC: Regular DP, HD: Autodetect	*10-83*
MicroQR	F1h 3Dh	Enable	*10-84*
Aztec	F1h 3Eh	Enable	*10-84*
Aztec Inverse	F1h 4Dh	Inverse Autodetect	*10-85*
Symbology-Specific Security Levels			
Redundancy Level	4Eh	1	*10-86*
Security Level	4Dh	1	*10-88*
Intercharacter Gap Size	F0h 7Dh	Normal	*10-89*
Report Version			*10-89*
Macro PDF			
Flush Macro PDF Buffer			*10-90*
Abort Macro PDF Entry			*10-90*

Disable All Code Types

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

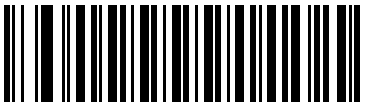
Disable All Code Types

UPC/EAN

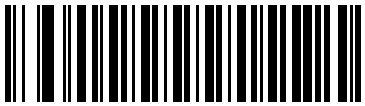
Enable/Disable UPC-A

Parameter # 01h

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



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

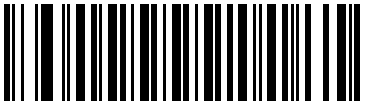


Disable UPC-A
(00h)

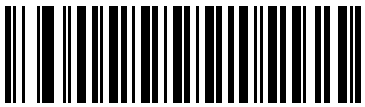
Enable/Disable UPC-E

Parameter # 02h

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



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



Disable UPC-E
(00h)

Enable/Disable UPC-E1

Parameter # 0Ch

UPC-E1 is disabled by default.

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

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

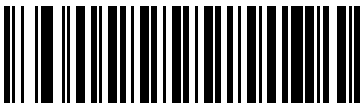
Enable UPC-E1
(01h)

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

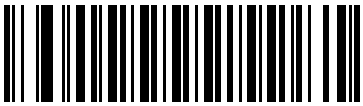
Enable/Disable EAN-8/JAN-8

Parameter # 04h

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



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



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

Enable/Disable EAN-13/JAN-13

Parameter # 03h

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

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

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

Enable/Disable Bookland EAN

Parameter # 53h

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

Enable Bookland EAN
(01h)

*Disable Bookland EAN
(00h)

NOTE If you enable Bookland EAN, select a *Bookland ISBN Format on page 10-23*. Also select either Decode UPC/EAN Supplementals, Autodiscriminate UPC/EAN Supplementals, or Enable 978/979 Supplemental Mode in *Decode UPC/EAN/JAN Supplementals on page 10-11*.

Decode UPC/EAN/JAN Supplementals

Parameter # 10h

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

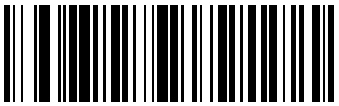
- If you select **Ignore UPC/EAN with Supplementals**, and the scanner is presented with a UPC/EAN plus supplemental symbol, the scanner decodes UPC/EAN and ignores the supplemental characters.
- If you select **Decode UPC/EAN with Supplementals**, the scanner only decodes UPC/EAN symbols with supplemental characters, and ignores symbols without supplementals.
- If you select **Autodiscriminate UPC/EAN Supplementals**, the scanner decodes UPC/EAN symbols with supplemental characters immediately. If the symbol does not have a supplemental, the scanner must decode the bar code the number of times set via *UPC/EAN/JAN Supplemental Redundancy on page 10-15* before transmitting its data to confirm that there is no supplemental.
- If you select one of the following **Supplemental Mode** options, the scanner immediately transmits EAN-13 bar codes starting with that prefix that have supplemental characters. If the symbol does not have a supplemental, the scanner must decode the bar code the number of times set via *UPC/EAN/JAN Supplemental Redundancy on page 10-15* before transmitting its data to confirm that there is no supplemental. The scanner transmits UPC/EAN bar codes that do not have that prefix immediately.
  - **Enable 378/379 Supplemental Mode**
  - **Enable 978/979 Supplemental Mode**

✓ ***NOTE*** If you select 978/979 Supplemental Mode and are scanning Bookland EAN bar codes, see *Enable/Disable Bookland EAN on page 10-10* to enable Bookland EAN, and select a format using *Bookland ISBN Format on page 10-23*.

  - **Enable 977 Supplemental Mode**
  - **Enable 414/419/434/439 Supplemental Mode**
  - **Enable 491 Supplemental Mode**
  - **Enable Smart Supplemental Mode** - applies to EAN-13 bar codes starting with any prefix listed previously.
  - **Supplemental User-Programmable Type 1** - applies to EAN-13 bar codes starting with a 3-digit user-defined prefix. Set this 3-digit prefix using *User-Programmable Supplementals on page 10-14*.
  - **Supplemental User-Programmable Type 1 and 2 -** applies to EAN-13 bar codes starting with either of two 3-digit user-defined prefixes. Set the 3-digit prefixes using *User-Programmable Supplementals on page 10-14*.
  - **Smart Supplemental Plus User-Programmable 1** - applies to EAN-13 bar codes starting with any prefix listed previously or the user-defined prefix set using *User-Programmable Supplementals on page 10-14*.
  - **Smart Supplemental Plus User-Programmable 1 and 2 -** applies to EAN-13 bar codes starting with any prefix listed previously or one of the two user-defined prefixes set using *User-Programmable Supplementals on page 10-14*.

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

Decode UPC/EAN/JAN Supplementals (continued)



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

***Ignore Supplementals**
(00h)

Autodiscriminate UPC/EAN/JAN Supplementals
(02h)

Enable 378/379 Supplemental Mode
(04h)

Enable 978/979 Supplemental Mode
(05h)

Enable 977 Supplemental Mode
(07h)

Decode UPC/EAN/JAN Supplementals (continued)

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

Enable 491 Supplemental Mode
(08h)

Enable Smart Supplemental Mode
(03h)

Supplemental User-Programmable Type 1
(09h)

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

Smart Supplemental Plus User-Programmable 1
(0Bh)

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

User-Programmable Supplementals

Supplemental 1: Parameter # F1h 43h

Supplemental 2: Parameter # F1h 44h

If you selected a Supplemental User-Programmable option from *Decode UPC/EAN/JAN Supplementals on page 10-11*, select **User-Programmable Supplemental 1** to set the 3-digit prefix. Then select the 3 digits using the numeric bar codes beginning on *page D-1*. Select **User-Programmable Supplemental 2** to set a second 3-digit prefix. Then select the 3 digits using the numeric bar codes beginning on *page D-1*.

User-Programmable Supplemental 1

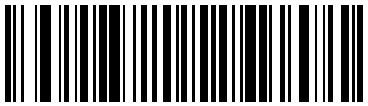
User-Programmable Supplemental 2

UPC/EAN/JAN Supplemental Redundancy

Parameter # 50h

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

Scan the bar code below to set a decode redundancy value. Next, scan two numeric bar codes in *Appendix D, Numeric Bar Codes*. Enter a leading zero for single digit numbers. To correct an error or change a selection, scan *Cancel on page D-2*.



UPC/EAN/JAN Supplemental Redundancy

UPC/EAN/JAN Supplemental AIM ID Format

Parameter # F1h A0h

Select an output format when reporting UPC/EAN/JAN bar codes with Supplementals with *Transmit Code ID Character on page 4-21* set to **AIM Code ID Character**:

- **Separate** - transmit UPC/EAN with supplementals with separate AIM IDs but one transmission, i.e.:

  ]E<0 or 4><data>]E<1 or 2>[supplemental data]

- **Combined** – transmit UPC/EAN with supplementals with one AIM ID and one transmission, i.e.:

  ]E3<data+supplemental data>

- **Separate Transmissions** - transmit UPC/EAN with supplementals with separate AIM IDs and separate transmissions, i.e.:

  ]E<0 or 4><data>
  ]E<1 or 2>[supplemental data]

Separate
(00h)

***Combined**
(01h)

Separate Transmissions
(02h)

Transmit UPC-A Check Digit

Parameter # 28h

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

***Transmit UPC-A Check Digit**
(01h)

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

Transmit UPC-E Check Digit

Parameter # 29h

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

***Transmit UPC-E Check Digit**
(01h)

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

Transmit UPC-E1 Check Digit

Parameter # 2Ah

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

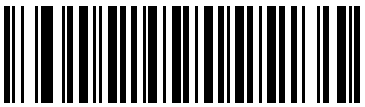
***Transmit UPC-E1 Check Digit**
(01h)

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

UPC-A Preamble

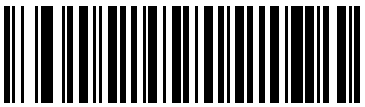
Parameter # 22h

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



No Preamble (<DATA>)
(00h)

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

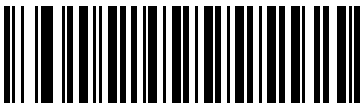


System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)
(02h)

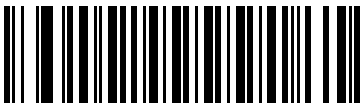
UPC-E Preamble

Parameter # 23h

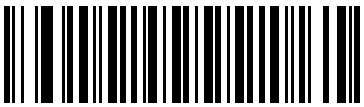
Preamble characters are part of the UPC symbol, and include Country Code and System Character. There are three options for transmitting a UPC-E preamble to the host device: transmit System Character only, transmit System Character and Country Code (“0” for USA), and transmit no preamble. Select the appropriate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



No Preamble (<DATA>)
(00h)



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

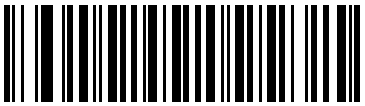


System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)
(02h)

UPC-E1 Preamble

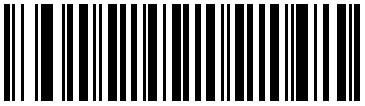
Parameter # 24h

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



No Preamble (<DATA>)
(00h)

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



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

Convert UPC-E to UPC-A

Parameter # 25h

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

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

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

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

Convert UPC-E1 to UPC-A

Parameter # 26h

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

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

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

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

EAN-8/JAN-8 Extend

Parameter # 27h

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

Disable this to transmit EAN-8 symbols as is.

Enable EAN/JAN Zero Extend (01h)

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

Bookland ISBN Format

Parameter # F1h 40h

If you enabled Bookland EAN using *Enable/Disable Bookland EAN on page 10-10*, select one of the following formats for Bookland data:

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

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

Bookland ISBN-13
(01h)

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

UCC Coupon Extended Code

Parameter # 55h

Enable this to decode UPC-A bar codes starting with digit ‘5’, EAN-13 bar codes starting with digit ‘99’, and UPC-A/GS1-128 Coupon Codes. UPCA, EAN-13, and GS1-128 must be enabled to scan all types of Coupon Codes.

Enable UCC Coupon Extended Code (01h)

***Disable UCC Coupon Extended Code (00h)**

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

Coupon Report

Parameter # F1h DAh

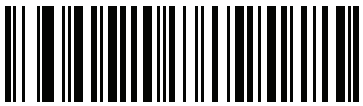
Traditional coupon symbols (old coupon symbols) are composed of two bar codes: UPC/EAN and Code128. A new coupon symbol is composed of a single Databar Expanded bar code. The new coupon format offers more options for purchase values (up to $999.99) and supports complex discount offers such as a second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

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

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

- **Old Coupon Format** - Scanning an old coupon symbol reports both the UPC and Code 128 portion of the symbol if both are present in the field of view. The scanner may report either the UPC or the Code 128 if only one is within the field of view or is readable. *UPC/EAN/JAN Supplemental Redundancy on page 10-15* controls the number of times the scanner attempts to decode the entire symbol before transmission. Additionally, scanning an interim coupon symbol reports UPC, and scanning a new coupon symbol reports nothing (no decode).
- **New Coupon Format** - Scanning an old coupon symbol reports either UPC or Code 128, and scanning an interim coupon symbol or a new coupon symbol reports Databar Expanded.
- **Both Coupon Formats** - Scanning an old coupon symbol reports both the UPC and Code 128 portion of the symbol if both are present in the field of view. The scanner may report either the UPC or the Code 128 if only one is within the field of view or is readable. *UPC/EAN/JAN Supplemental Redundancy on page 10-15* controls the number of times the scanner attempts to decode the entire symbol before transmission. Additionally, scanning an interim coupon symbol or a new coupon symbol reports Databar Expanded.

Old Coupon Format
(00h)



***New Coupon Format**
(01h)

Both Coupon Formats
(02h)

ISSN EAN

Parameter # F1h 69h

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

Enable ISSN EAN
(01h)

***Disable ISSN EAN**
(00h)

Code 128

Enable/Disable Code 128

Parameter # 08h

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

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

Disable Code 128
(00h)

Set Lengths for Code 128

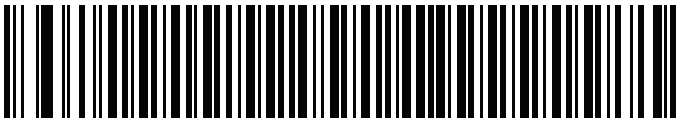
Parameter # L1 = D1h, L2 = D2h

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Set lengths for Code 128 to any length, one or two discrete lengths, or lengths within a specific range.

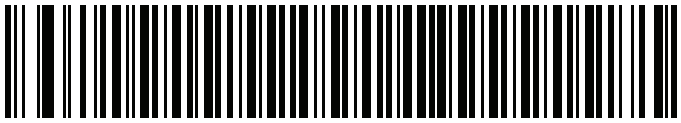
NOTE When setting lengths for different bar code types, enter a leading zero for single digit numbers.

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

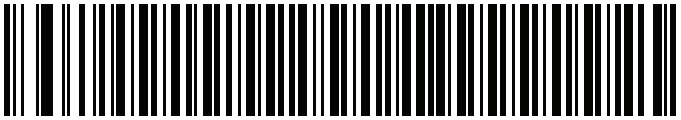
Set Lengths for Code 128 (continued)



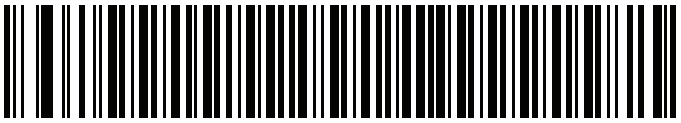
Code 128 - One Discrete Length



Code 128 - Two Discrete Lengths



Code 128 - Length Within Range



***Code 128 - Any Length**

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

Parameter # 0Eh

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

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

Disable GS1-128
(00h)

Enable/Disable ISBT 128

Parameter # 54h

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

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

Disable ISBT 128
(00h)

ISBT Concatenation

Parameter # F1h 41h

Select an option for concatenating pairs of ISBT code types:

- If you select **Disable ISBT Concatenation**, the digital imager scanner does not concatenate pairs of ISBT codes it encounters.
- If you select **Enable ISBT Concatenation**, there must be two ISBT codes in order for the digital imager scanner to decode and perform concatenation. The digital imager scanner does not decode single ISBT symbols.
- If you select **Autodiscriminate ISBT Concatenation**, the digital imager scanner decodes and concatenates pairs of ISBT codes immediately. If only a single ISBT symbol is present, the digital imager scanner must decode the symbol the number of times set via *ISBT Concatenation Redundancy on page 10-31* before transmitting its data to confirm that there is no additional ISBT symbol.

***Disable ISBT Concatenation**
(00h)

Enable ISBT Concatenation
(01h)

Autodiscriminate ISBT Concatenation
(02h)

Check ISBT Table

Parameter # F1h 42h

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

***Enable Check ISBT Table (01h)**

Disable Check ISBT Table (00h)

ISBT Concatenation Redundancy

Parameter # DFh

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

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

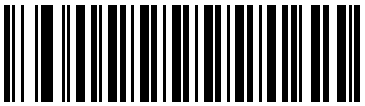
ISBT Concatenation Redundancy

Code 39

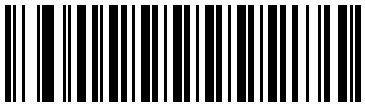
Enable/Disable Code 39

Parameter # 00h

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



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

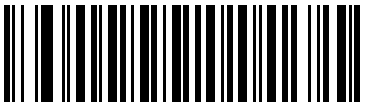


Disable Code 39
(00h)

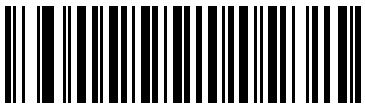
Enable/Disable Trioptic Code 39

Parameter # 0Dh

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



Enable Trioptic Code 39
(01h)



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

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

Convert Code 39 to Code 32

Parameter # 56h

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

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

Enable Convert Code 39 to Code 32 (01h)

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

Code 32 Prefix

Parameter # E7h

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

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

Enable Code 32 Prefix (01h)

***Disable Code 32 Prefix (00h)**

Set Lengths for Code 39

Parameter # L1 = 12h, L2 = 13h

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

NOTE When setting lengths for different bar code types, enter a leading zero for single digit numbers.

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

Code 39 - One Discrete Length

Code 39 - Two Discrete Lengths

Set Lengths for Code 39 (continued)

Code 39 - Length Within Range

Code 39 - Any Length

Code 39 Check Digit Verification

Parameter # 30h

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

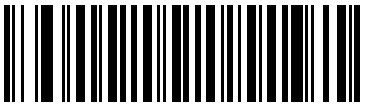
Enable Code 39 Check Digit (01h)

***Disable Code 39 Check Digit (00h)**

Transmit Code 39 Check Digit

Parameter # 2Bh

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



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

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

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

Code 39 Full ASCII Conversion

Parameter # 11h

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

Enable Code 39 Full ASCII
(01h)

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

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

Code 39 Full ASCII to Full ASCII Correlation is host-dependent. See the *ASCII Character Set for USB on page 7-21* or the *ASCII Character Set for RS-232 on page 8-21* for more information.

Code 39 Buffering (Scan & Store)

Parameter # 71h

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

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

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

Select **Do Not Buffer Code 39** to transmit all decoded Code 39 symbols immediately without being stored in the buffer.

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

Buffer Code 39 (Enable)
(01h)

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

While there is data in the transmission buffer, you cannot select **Do Not Buffer Code 39**. The buffer holds 200 bytes of information.

To disable Code 39 buffering when there is data in the transmission buffer, first force the buffer transmission (see *Transmit Buffer on page 10-38*) or clear the buffer.

Buffer Data

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

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

Clear Transmission Buffer

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

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

Clear Buffer

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

Transmit Buffer

There are two methods to transmit the Code 39 buffer.

1. Scan the **Transmit Buffer** bar code, which includes only a start character, a plus (+), and a stop character.
2. The digital imager scanner transmits and clears the buffer.
   - The digital imager scanner issues a Low/High beep.

Transmit Buffer

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

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

Overfilling Transmission Buffer

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

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

Attempt to Transmit an Empty Buffer

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

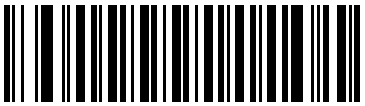
- A short low/high/low beep signals that the buffer is empty.
- No transmission occurs.
- The buffer remains empty.

Code 93

Enable/Disable Code 93

Parameter # 09h

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



Enable Code 93
(01h)

***Disable Code 93**
(00h)

Set Lengths for Code 93

Parameter # L1 = 1Ah, L2 = 1Bh

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

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

Set Lengths for Code 93 (continued)

Code 93 - One Discrete Length

Code 93 - Two Discrete Lengths

Code 93 - Length Within Range

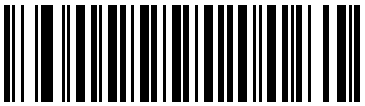
Code 93 - Any Length

Code 11

Code 11

Parameter # 0Ah

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



Enable Code 11
(01h)

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

Set Lengths for Code 11

Parameter # L1 = 1Ch, L2 = 1Dh

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

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

Set Lengths for Code 11 (continued)

Code 11 - One Discrete Length

Code 11 - Two Discrete Lengths

Code 11 - Length Within Range

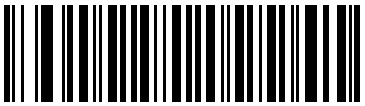
Code 11 - Any Length

Code 11 Check Digit Verification

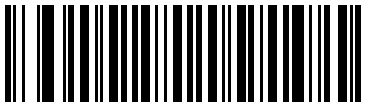
Parameter # 34h

Enable this 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.

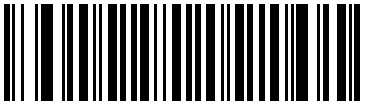
To enable this feature, scan the bar code below corresponding to the number of check digits encoded in the Code 11 symbols.



***Disable**
(00h)



One Check Digit
(01h)



Two Check Digits
(02h)

Transmit Code 11 Check Digits

Parameter # 2Fh

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

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

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

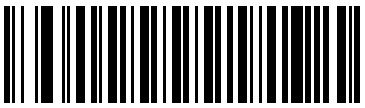
NOTE Code 11 Check Digit Verification must be enabled for this parameter to function.

Interleaved 2 of 5 (ITF)

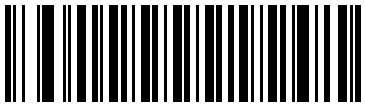
Enable/Disable Interleaved 2 of 5

Parameter # 06h

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



***Enable Interleaved 2 of 5**
(01h)



Disable Interleaved 2 of 5
(00h)

Set Lengths for Interleaved 2 of 5

Parameter # L1 = 16h, L2 = 17h

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

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

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

Set Lengths for Interleaved 2 of 5

I 2 of 5 - One Discrete Length

I 2 of 5 - Two Discrete Lengths

I 2 of 5 - Length Within Range

I 2 of 5 - Any Length

I 2 of 5 Check Digit Verification

Parameter # 31h

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

***Disable**
(00h)

USS Check Digit
(01h)

OPCC Check Digit
(02h)

Transmit I 2 of 5 Check Digit

Parameter # 2Ch

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

Transmit I 2 of 5 Check Digit (Enable)
(01h)

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

Convert I 2 of 5 to EAN-13

Parameter # 52h

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

Convert I 2 of 5 to EAN-13 (Enable) (01h)

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

Discrete 2 of 5 (DTF)

Enable/Disable Discrete 2 of 5

Parameter # 05h

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

Enable Discrete 2 of 5 (01h)

***Disable Discrete 2 of 5 (00h)**

Set Lengths for Discrete 2 of 5

Parameter # L1 = 14h, L2 = 15h

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

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

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

Set Lengths for Discrete 2 of 5 (continued)

D 2 of 5 - One Discrete Length

D 2 of 5 - Two Discrete Lengths

D 2 of 5 - Length Within Range

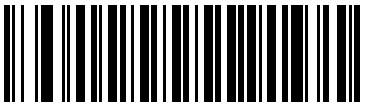
D 2 of 5 - Any Length

Codabar (NW - 7)

Enable/Disable Codabar

Parameter # 07h

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



Enable Codabar
(01h)

***Disable Codabar**
(00h)

Set Lengths for Codabar

Parameter # L1 = 18h, L2 = 19h

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

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

Set Lengths for Codabar (continued)

Codabar - One Discrete Length

Codabar - Two Discrete Lengths

Codabar - Length Within Range

Codabar - Any Length

CLSI Editing

Parameter # 36h

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

NOTE Symbol length does not include start and stop characters.

Enable CLSI Editing
(01h)

***Disable CLSI Editing**
(00h)

NOTIS Editing

Parameter # 37h

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

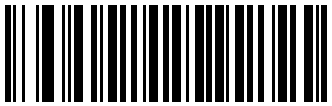
Enable NOTIS Editing
(01h)

***Disable NOTIS Editing**
(00h)

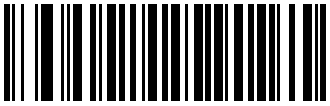
Codabar Upper or Lower Case Start/Stop Characters Transmission

Parameter # F2h 57h

Select whether to transmit upper case or lower case Codabar start/stop characters.



***Upper Case**
(00h)



Lower Case
(01h)

MSI

Enable/Disable MSI

Parameter # 0Bh

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

Enable MSI
(01h)

***Disable MSI**
(00h)

Set Lengths for MSI

Parameter # L1 = 1Eh, L2 = 1Fh

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

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

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

Set Lengths for MSI (continued)

MSI - One Discrete Length

MSI - Two Discrete Lengths

MSI - Length Within Range

MSI - Any Length

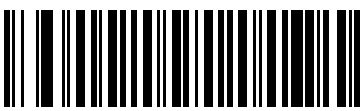
MSI Check Digits

Parameter # 32h

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

See *MSI Check Digit Algorithm on page 10-58* for the selection of second digit algorithms.

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



Two MSI Check Digits
(01h)

Transmit MSI Check Digit(s)

Parameter # 2Eh

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

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

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

MSI Check Digit Algorithm

Parameter # 33h

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

MOD 10/MOD 11
(00h)

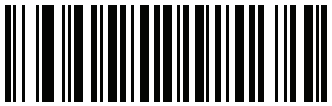
***MOD 10/MOD 10**
(01h)

Chinese 2 of 5

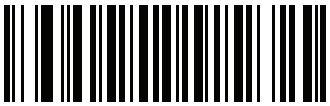
Enable/Disable Chinese 2 of 5

Parameter # F0h 98h

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



Enable Chinese 2 of 5
(01h)



***Disable Chinese 2 of 5**
(00h)

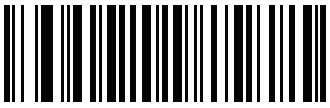
Matrix 2 of 5

Enable/Disable Matrix 2 of 5

Parameter # F1h 6Ah

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

Enable Matrix 2 of 5
(01h)



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

Set Lengths for Matrix 2 of 5

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

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

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

***Matrix 2 of 5 - One Discrete Length**

Matrix 2 of 5 - Two Discrete Lengths

Matrix 2 of 5 - Length Within Range

Matrix 2 of 5 - Any Length

Matrix 2 of 5 Check Digit

Parameter # F1h 6Eh

The check digit is the last character of the symbol used to verify the integrity of the data. Scan the appropriate bar code below to transmit the bar code data with or without the Matrix 2 of 5 check digit.

Enable Matrix 2 of 5 Check Digit (01h)

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

Transmit Matrix 2 of 5 Check Digit

Parameter # F1h 6Fh

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

Transmit Matrix 2 of 5 Check Digit (01h)

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

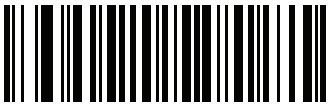
Korean 3 of 5

Enable/Disable Korean 3 of 5

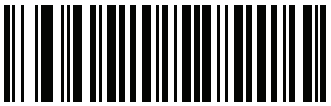
Parameter # F1h 45h

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

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



Enable Korean 3 of 5
(01h)



***Disable Korean 3 of 5**
(00h)

Inverse 1D

Parameter # F1h 4Ah

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

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

NOTE The default for this option varies by scanner model as follows:
DS6707-SR, DS6707-DC: Regular
DS6707-DP, DS6707-HD: Inverse Autodetect

Regular
(00h)

Inverse Only
(01h)

Inverse Autodetect
(02h)

Postal Codes

US Postnet

Parameter # 59h

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

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

Disable US Postnet
(00h)

US Planet

Parameter # 5Ah

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

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

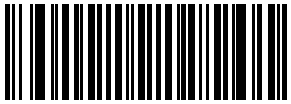
Disable US Planet
(00h)

Transmit US Postal Check Digit

Parameter # 5Fh

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

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



Do Not Transmit US Postal Check Digit
(00h)

UK Postal

Parameter # 5Bh

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

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

Disable UK Postal
(00h)

Transmit UK Postal Check Digit

Parameter # 60h

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

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

Do Not Transmit UK Postal Check Digit (00h)

Japan Postal

Parameter # F0h 22h

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

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

Disable Japan Postal (00h)

Australia Post

Parameter # F0h 23h

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

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

Disable Australia Post
(00h)

Australia Post Format

Parameter # F1h CEh

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

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

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

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

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

***Autodiscriminate**
(00h)

Raw Format
(01h)

Alphanumeric Encoding
(02h)

Numeric Encoding
(03h)

Netherlands KIX Code

Parameter # F0h 46h

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

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

Disable Netherlands KIX Code (00h)

USPS 4CB/One Code/Intelligent Mail

Parameter # F1h 50h

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

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

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

UPU FICS Postal

Parameter # F1h 63h

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

Enable UPU FICS Postal (01h)

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

GS1 DataBar (formerly RSS, Reduced Space Symbology)

The variants of GS1 DataBar are DataBar-14, DataBar Expanded, and DataBar Limited. The limited and expanded versions have stacked variants. Scan the appropriate bar codes to enable or disable each variant of GS1 DataBar.

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

GS1 DataBar-14

Parameter # F0h 52h

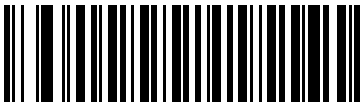
***Enable GS1 DataBar-14**
(01h)

Disable GS1 DataBar-14
(00h)

GS1 DataBar Limited

Parameter # F0h 53h

Enable GS1 DataBar Limited
(01h)



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

GS1 DataBar Limited Security Level

Parameter # F1h D8h

The digital imager scanner offers four levels of decode security for GS1 DataBar Limited bar codes. There is an inverse relationship between security and digital scanner aggressiveness. Increasing the level of security may result in reduced aggressiveness in scanning, so only choose the level of security necessary.

- Level 1 – No clear margin required. This complies with the original GS1 standard, yet might result in erroneous[1] decoding of the DataBar Limited bar code when scanning some UPC symbols that start with the digits “9” and “7”.
- Level 2 – Automatic risk detection. This level of security may result in erroneous decoding of DataBar Limited bar codes when scanning some UPC symbols. If a misdecode is detected, the scanner operates in Level 3 or Level 1.
- Level 3 – Security level reflects newly proposed GS1 standard that requires a 5X trailing clear margin.
- Level 4 – Security level extends beyond the standard required by GS1. This level of security requires a 5X leading and trailing clear margin.

GS1 DataBar Limited Security Level 1
(01h)

GS1 DataBar Limited Security Level 2
(02h)

***GS1 DataBar Limited Security Level 3**
(03h)

GS1 DataBar Limited Security Level 4
(04h)

1. May result in erroneous decoding due to Databar Limited and UPC symbologies.

GS1 DataBar Expanded

Parameter # F0h 54h

*Enable GS1 DataBar Expanded
(01h)

Disable GS1 DataBar Expanded
(00h)

Convert GS1 DataBar to UPC/EAN

Parameter # F0h 8Dh

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

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

Enable Convert GS1 DataBar to UPC/EAN
(01h)

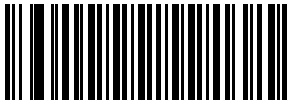
*Disable Convert GS1 DataBar to UPC/EAN
(00h)

Composite

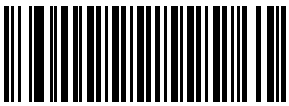
Composite CC-C

Parameter # F0h 55h

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



Enable CC-C
(01h)



***Disable CC-C**
(00h)

Composite CC-A/B

Parameter # F0h 56h

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

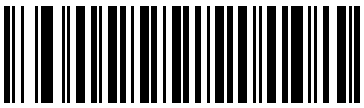
Enable CC-A/B
(01h)

***Disable CC-A/B**
(00h)

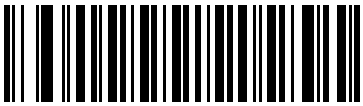
Composite TLC-39

Parameter # F0h 73h

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



Enable TLC39
(01h)



***Disable TLC39**
(00h)

UPC Composite Mode

Parameter # F0h 58h

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

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

UPC Never Linked
(00h)

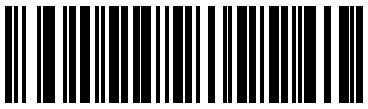
***UPC Always Linked**
(01h)

Autodiscriminate UPC Composites
(02h)

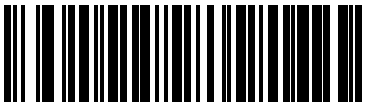
Composite Beep Mode

Parameter # F0h 8Eh

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



Single Beep after both are decoded (00h)



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

Double Beep after both are decoded (02h)

GS1-128 Emulation Mode for UCC/EAN Composite Codes

Parameter # F0h ABh

Select whether to enable or disable this mode.

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

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

2D Symbologies

Enable/Disable PDF417

Parameter # 0Fh

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

***Enable PDF417**
(01h)

Disable PDF417
(00h)

Enable/Disable MicroPDF417

Parameter # E3h

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

Enable MicroPDF417
(01h)

***Disable MicroPDF417**
(00h)

Code 128 Emulation

Parameter # 7Bh

Enable this parameter to transmit data from certain MicroPDF417 symbols as if it was encoded in Code 128 symbols. You must select *AIM Code ID Character (01h) on page 4-21* for this parameter to work.

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

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

Disable this to transmit them with one of the following prefixes:

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

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

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

Enable Code 128 Emulation (01h)

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

Data Matrix

Parameter # F0h 24h

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

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

Disable Data Matrix
(00h)

Data Matrix Inverse

Parameter # F1h 4Ch

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

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

✓ ***NOTE*** The default for this option varies by scanner model as follows:
DS6707-SR, DS6707-DC: Regular
DS6707-DP, DS6707-HD: Inverse Autodetect

Regular
(00h)

Inverse Only
(01h)

Inverse Autodetect
(02h)

Maxicode

Parameter # F0h 26h

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

***Enable Maxicode (01h)**

Disable Maxicode (00h)

QR Code

Parameter # F0h 25h

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

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

Disable QR Code (00h)

QR Inverse

Parameter # F1h 4Bh

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

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

NOTE The default for this option varies by scanner model as follows:
DS6707-SR, DS6707-DC: Regular
DS6707-DP, DS6707-HD: Inverse Autodetect

Regular
(00h)

Inverse Only
(01h)

Inverse Autodetect
(02h)

MicroQR

Parameter # F1h 3Dh

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

***Enable MicroQR**
(01h)

Disable MicroQR
(00h)

Aztec

Parameter # F1h 3Eh

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

***Enable Aztec**
(01h)

Disable Aztec
(00h)

Aztec Inverse

Parameter # F1h 4Dh

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

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

Regular
(00h)

Inverse Only
(01h)

***Inverse Autodetect**
(02h)

Redundancy Level

Parameter # 4Eh

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

Table 10-2 *Redundancy Level 1 Codes*

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

Redundancy Level 2

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

Table 10-3 *Redundancy Level 2 Codes*

Code Type	Code Length
All	All

Redundancy Level 3

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

Table 10-4 *Redundancy Level 3 Codes*

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

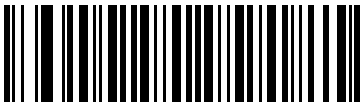
Redundancy Level (continued)

Redundancy Level 4

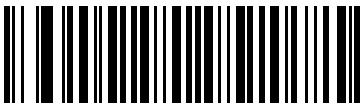
The following code types must be successfully read three times before being decoded:

Table 10-5 *Redundancy Level 4 Codes*

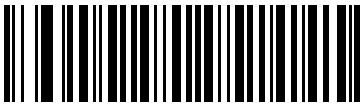
Code Type	Code Length
All	All



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



Redundancy Level 2
(02h)



Redundancy Level 3
(03h)

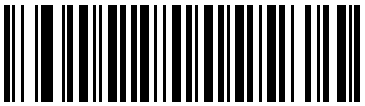
Redundancy Level 4
(04h)

Security Level

Parameter # 4Dh

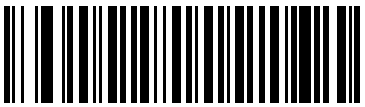
The digital imager scanner offers four levels of decode security for delta bar codes, which include the Code 128 family, UPC/EAN, and Code 93. Select increasing levels of security for decreasing levels of bar code quality. There is an inverse relationship between security and digital imager scanner aggressiveness,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

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



Security Level 0
(00h)

***Security Level 1**
(01h)



Security Level 2
(02h)

Security Level 3
(03h)

Intercharacter Gap Size

Parameter # F0h 7Dh

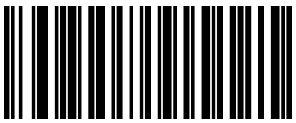
The Code 39 and Codabar symbologies have an intercharacter gap that is typically quite small. Due to various bar code-printing technologies, this gap can grow larger than the maximum size allowed, preventing the digital imager scanner from decoding the symbol. If this problem occurs, scan **Large Intercharacter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

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

Large Intercharacter Gaps (0Ah)

Report Version

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



Report Software Version

Macro PDF Features

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

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

Flush Macro Buffer

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

Flush Macro PDF Buffer

Abort Macro PDF Entry

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

Abort Macro PDF Entry

CHAPTER 11 INTELLIGENT DOCUMENT CAPTURE

Introduction

Intelligent Document Capture (IDC) is Zebra advanced image processing firmware for select imager based scanners. This chapter describes the IDC functionality, provides parameter bar codes to control its features, and includes a quick start procedure to get you started with IDC.

NOTE IDC is intended for use with the DS6707-DC configuration, and is fully supported by this model only.

The IDC Process

Intelligent Document Capture:

1. Verifies a bar code is appropriate to use as an IDC anchor or link. See *Bar Code Acceptance Test*.
2. Determines the rectangular region to capture as an image. See *Capture Region Determination on page 11-2*.
3. Processes the captured image. See *Image Post Processing on page 11-3*.
4. Transmits the data. See *Data Transmission on page 11-3*.

Bar Code Acceptance Test

Upon decoding a bar code, the scanner checks to ensure that the bar code fits the description of a bar code that anchors or links to an IDC form. To be accepted as an IDC bar code:

- The symbology must be enabled in the IDC symbology parameter and enabled for decode in the scanner. The IDC firmware allows enabling between zero and eight symbologies simultaneously: Code 128, Code 39, Interleaved 2 of 5, Discrete 2 of 5, Codabar, PDF417, Data Matrix, and EAN-128.
- The decoded data must satisfy the values set in the *IDC Minimum Text Length* and *IDC Maximum Text Length* parameters. To disable either of these checks, set the value to zero.

If the bar code does not satisfy both requirements, it is sent as a normal (non-IDC) decode.

An IDC bar code is required when *IDC Operating Mode on page 11-5* is set to **Anchored** or **Linked**.

Free-Form operating mode does not require a bar code, but transmits decoded data if one is found and satisfies the requirements. If no bar code is decoded, the document capture process starts but can be subject to the following condition: specify a non-zero value for the *IDC Delay Time on page 11-14*. The scanner must wait for at least this amount of time after trigger pull before capturing a document, unless a bar code is decoded before the time expires.

If *Picklist Mode on page 4-10* is enabled, the bar code must be directly under the aiming pattern, within the scanner's decode range, and the region to capture completely within the scanner's field-of-view.

Capture Region Determination

After accepting an IDC bar code, the firmware establishes the region to capture as an image. The method used depends on the setting of the *IDC Operating Mode* as follows.

The IDC firmware emits a single low beep after successfully capturing a region. The scanner is then no longer capturing images and can be moved without disturbing the IDC output. Be sure to hold the trigger button until the decode beep, otherwise the IDC process may be aborted.

IDC Operating Mode = Anchored

A coordinate system is built based on the bar code in its rectified (de-skewed) form. The origin is the center of the bar code, and the x-axis is set toward the right, from the bar code's point of view. The unit module width of the bar code is the unit for x. The bar code can be of different sizes for the same form, as long as the center of the bar code is the same when the bar code's length changes.

From this coordinate system, the IDC area is determined using four parameters: offsets in x and y (*IDC X Coordinate*, *IDC Y Coordinate*) to the region's top-left corner, and width and height (*IDC Width*, *IDC Height*).

If the capture area is relatively large as compared to the bar code area, the calculation to obtain the capture area is prone to significant errors. A recommended solution is to enclose the form with a single black-lined rectangular border (a box), which is not in contact with any other line on the outside of the form (although it can be connected to lines on the inside of the form). When the *IDC Find Box Outline* is set, the firmware searches for the box, and does not decode if any edges are broken (such as by a protruding thumb).

The *IDC Zoom Limit* parameter controls the quality of the captured form. The IDC firmware rejects capturing a form unless the width is at least the *IDC Zoom Limit* percentage of the *IDC Width* parameter. For example, if *IDC Zoom Limit* is set to 100 and *IDC Width* is set to 150, the form must be at least 300 pixels wide before it is captured (each unit module is scaled to two pixels).

The *IDC Maximum Rotation* parameter controls the maximum rotation any edge of the form can have in relation to the imager's horizontal or vertical axis.

IDC Operating Mode = Free-Form or Linked

The document capture region is a rectangular piece of paper, or a portion of it enclosed by a rectangular border. In either case, all four sides of the capture region must be completely within the scanner's field-of-view, and there must be sufficient contrast at the border of the capture region. For example, if a piece of white paper contains the document to capture, it must be put in front of a dark background.

By default, the scanner captures the largest rectangular region within the field-of-view. To specify a particular border type, use the *IDC Border Type* parameter.

The region must contain at least 10% of the field-of-view in two dimensions.

If an IDC bar code is decoded, its location is used to start the search for the capture region. Otherwise, the capture region is searched from the center of the field-of-view. IDC also uses the orientation of a decoded IDC bar code to orient the output image.

Image Post Processing

After determining the document capture region, the firmware de-skews and re-samples the region as described below. Enabling *IDC Captured Image Brighten* calls normalization, where the brightness of the image is made uniform, and contrast is enhanced as a large percent of background pixels is made completely white (a smaller percent of pixels is made completely black if the firmware determines there is no danger of enhancing the contrast of a very bland area). Enabling *IDC Captured Image Sharpen* enhances the sharpness of the image.

The image is re-sampled about one output pixel per input pixel for **Free-Form** or **Linked** modes and two pixels-per-module in **Anchored** mode if *IDC De-Skew* is enabled. If *IDC De-Skew* is disabled, the firmware performs a rectangular crop of the area.

The image is compressed and transmitted in one of the standard image formats selected by the *IDC File Format Selector*, *IDC Bits Per Pixel*, and *IDC JPEG Quality* parameters.

Note that it may take several seconds for post processing to complete, depending on the size of the captured region, the options enabled, and the scanner model.

Data Transmission

After processing the captured image, it is assembled with the decoded bar code data (if applicable) into an ISO/IEC 15434 style packet and transmitted to the host. The scanner issues the standard decode beep and the trigger can be released. Be sure the *USB Device Type on page 7-5* is set to **Symbol Native API (SNAPI) with Imaging Interface**.

PC Application and Programming Support

For a sample application running on the Microsoft Windows operating system, contact your Zebra representative. This application displays bar code data and/or captured images from Intelligent Document Capture enabled scanners and allows setting and reading IDC parameters. Complete source code and documentation are also provided for developing custom applications. The application includes documentation for the ISO/IEC 15434 format as used by the IDC firmware and C# code to process it.

Parameters

This section describes the parameters controlling the IDC firmware and provides programming bar codes for setting them.

To set parameters requiring a range of values, scan the parameter bar code followed by two, three, or four bar codes from *Appendix D, Numeric Bar Codes* corresponding to the desired value. Scan two numeric bar codes for parameters with a maximum value of less than 100, for example, *IDC Minimum Text Length*. *IDC Delay Time* requires scanning three digits since the maximum value is 200. Leading zeros are required.

Alternatively, use the sample application to set parameters using the parameter name. The application provides prompts and error checking to assist in setting the parameters correctly and easily. You must use an application to set a parameter to a negative value, as the *IDC X Coordinate* can require.

Table 11-1 *Intelligent Document Capture (IDC) Parameter Defaults*

Parameter	Parameter Name	Parameter Number	Default	Page Number
Intelligent Document Capture (IDC)				
IDC Operating Mode	DocCap_MODE	F1h 52h	Off	*11-5*
IDC Symbology	DocCap_SYMBOLOGY	F1h 8Fh	001	*11-6*
IDC X Coordinate	DocCap_X	F4h F1h 54h	-151	*11-7*
IDC Y Coordinate	DocCap_Y	F4h F1h 55h	-050	*11-7*
IDC Width	DocCap_WIDTH	F1h 56h	0300	*11-8*
IDC Height	DocCap_HEIGHT	F1h 57h	0050	*11-8*
IDC File Format Selector	DocCap_FMT	F1h 59h	JPEG	*11-9*
IDC Bits Per Pixel	DocCap_BPP	F1h 5Ah	8 BPP	*11-10*
IDC JPEG Quality	DocCap_JPEG_Qual	F1h 5Bh	065	*11-10*
IDC Find Box Outline	Sig_FINDBOX	F1h D7h	Disable	*11-11*
IDC Minimum Text Length	DocCap_MIN_TEXT	F1h 90h	00	*11-11*
IDC Maximum Text Length	DocCap_MAX_TEXT	F1h 91h	00	*11-12*
IDC Captured Image Brighten	Sig_BRIGHTEN	F1h 8Eh	Enable	*11-12*
IDC Captured Image Sharpen	Sig_SHARPEN	F1h 92h	Enable	*11-13*
IDC De-Skew	Sig_DESKEW	F1h 8Dh	Enable	*11-13*
IDC Border Type	DocCap_BORDER	F2h 3Dh	None	*11-14*
IDC Delay Time	DocCap_DELAY	F2h 3Eh	000	*11-14*
IDC Zoom Limit	Sig_MIN_PERCENT	F1h 8Bh	000	*11-15*
IDC Maximum Rotation	Sig_MAX_ROT	F1h 8Ch	00	*11-15*
IDC HiBlur Filter	DocCap_HIBLUR	F1h 93h	Enable	*11-16*

IDC Operating Mode

Parameter Name: DocCap_MODE

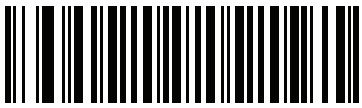
Parameter # F1h 52h

Select the operating mode of the Intelligent Document Capture firmware:

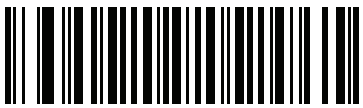
- **Off** - Disables the IDC feature.
- **Anchored** - Requires a bar code decode. The image capture region is based off this bar code.
- **Free-Form** - A printed border or page edge defines the image capture region. A bar code is optional.
- **Linked** - A printed border or page edge defines the image capture region. A bar code is required.

***Off**
(00h)

Anchored
(01h)



Free-Form
(02h)



Linked
(03h)

IDC Symbology

Parameter Name: DocCap_SYMBOLOGY

Parameter # F1h 8Fh

Select the bar code type(s) to use when Document Capture mode is not set to **Off**. To enable more than one symbology at a time, simply add the values together. For example, to enable PDF417, Data Matrix, and Code 39 write a value of 98 (32 + 64 + 2).

Scan the bar code below, followed by three bar codes from *Appendix D, Numeric Bar Codes* in the range of 000 to 255 decimal. The default is 001.

Table 11-2 *IDC Symbologies*

Symbology	Value (Decimal)
Code 128	1
Code 39	2
I 2 of 5	4
D 2 of 5	8
Codabar	16
PD 417	32
Data Matrix	64
EAN 128	128

IDC Symbology

IDC X Coordinate

Parameter Name: DocCap_X

Parameter # F4h F1h 54h

Specify the horizontal offset to the top left corner of the region to capture relative to the center of the bar code. Negative values move toward the left. This parameter only applies when *IDC Operating Mode* is set to **Anchored.**

Scan the bar code below, followed by four bar codes from *Appendix D, Numeric Bar Codes* in the range of +/- 1279. The default is -151. Note that you must use an application to set a negative value.

IDC X Coordinate

IDC Y Coordinate

Parameter Name: DocCap_Y

Parameter # F4h F1h 55h

Specify the vertical offset to the top left corner of the region to capture relative to the center of the bar code. Negative values move toward the top. This parameter only applies when *IDC Operating Mode* is set to **Anchored.**

Scan the bar code below, followed by four bar codes from *Appendix D, Numeric Bar Codes* in the range of +/- 1023. The default is -050. Note that you must use an application to set a negative value.

IDC Y Coordinate

IDC Width

Parameter Name: DocCap_WIDTH

Parameter # F1h 56h

Specify the width of the region to capture. This parameter only applies when *IDC Operating Mode* is set to **Anchored.**

Scan the bar code below, followed by four bar codes from *Appendix D, Numeric Bar Codes* in the range of 0000 to 1279. The default is 0300.

IDC Width

IDC Height

Parameter Name: DocCap_HEIGHT

Parameter # F1h 57h

Specify the height of the region to capture. This parameter only applies when *IDC Operating Mode* is set to **Anchored.**

Scan the bar code below, followed by four bar codes from *Appendix D, Numeric Bar Codes* in the range of 0000 to 1023. The default is 0050.

IDC Height

IDC File Format Selector

Parameter Name: DocCap_FMT

Parameter # F1h 59h

Select a document capture file format appropriate for your system (BMP, TIFF, or JPEG). The scanner stores captured areas in the selected format.

***JPEG**
(01h)

BMP
(03h)

TIFF
(04h)

IDC Bits Per Pixel

Parameter Name: DocCap_BPP

Parameter # F1h 5Ah

Select the number of significant bits per pixel (BPP) to use when capturing an image. Select 1 BPP for a black and white image, 4 BPP to assign 1 of 16 grey levels to each pixel, or 8 BPP to assign 1 of 256 levels of grey to each pixel.

NOTE The scanner ignores these settings for JPEG file formats, which only support 8 BPP.

1 BPP
(00h)

4 BPP
(01h)

***8 BPP**
(02h)

IDC JPEG Quality

Parameter Name: DocCap_JPEG_Qual

Parameter # F1h 5Bh

Set the amount of JPEG compression to perform on the captured image. Higher numbers produce a better quality image but larger files.

Scan the bar code below, followed by three bar codes from *Appendix D, Numeric Bar Codes* in the range of 005 to 100 decimal. The default is 065.

IDC JPEG Quality

IDC Find Box Outline

Parameter Name: Sig_FINDBOX

Parameter # F1h D7h

Select **Enable Find Box Outline** to instruct the firmware to search for a rectangular border during document capture. This parameter only applies when *IDC Operating Mode* is set to **Anchored**.

***Disable Find Box Outline**
(00h)

Enable Find Box Outline
(01h)

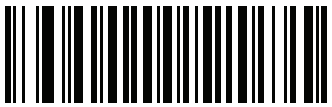
IDC Minimum Text Length

Parameter Name: DocCap_MIN_TEXT

Parameter # F1h 90h

Specify the minimum number of characters encoded in a bar code for the IDC firmware to use it as an anchored or linked bar code. Set this to zero (the default) to disable all checking and use all bar codes.

Scan the bar code below, followed by two bar codes from *Appendix D, Numeric Bar Codes* in the range of 00 to 55 decimal. The default is 00.



IDC Minimum Text Length

IDC Maximum Text Length

Parameter Name: DocCap_MAX_TEXT

Parameter # F1h 91h

Specify the maximum number of characters encoded in a bar code for the IDC firmware to use it as an anchored or linked bar code. Set this to zero (the default) to disable all checking and use all bar codes.

Scan the bar code below, followed by two bar codes from *Appendix D, Numeric Bar Codes* in the range of 00 to 55 decimal. The default is 00.

IDC Maximum Text Length

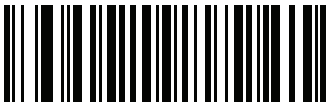
IDC Captured Image Brighten

Parameter Name: Sig_BRIGHTEN

Parameter # F1h 8Eh

Enable **Captured Image Brighten** to make image brightness uniform and enhance contrast such that a large percent of the background pixels is made completely white (a smaller percentage of pixels is made completely black if the program determines there is no danger of enhancing the contrast of a very bland area).

NOTE This parameter is also used for Signature Capture.



Disable Captured Image Brighten (00h)

***Enable Captured Image Brighten (01h)**

IDC Captured Image Sharpen

Parameter Name: Sig_SHARPEN

Parameter # F1h 92h

Enable this to enhance the sharpness of the image.

NOTE This parameter is also used for Signature Capture.

Disable Captured Image Sharpen (00h)

***Enable Captured Image Sharpen (01h)**

IDC De-Skew

Parameter Name: Sig_DESKEW

Parameter # F1h 8Dh

Enable this to de-skew the captured image. Disable this to crop the image to a rectangular area.

Disable Document Capture De-skew (00h)

***Enable Document Capture De-skew (01h)**

IDC Border Type

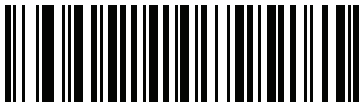
Parameter Name: DocCap_BORDER

Parameter # F2h 3Dh

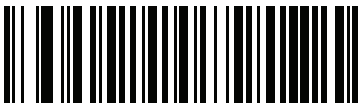
Select the style of border used to determine the outline of the capture region in **Free-Form** and **Linked** modes:

- Select **None** to capture the largest rectangular region within the field-of-view.
- Select **Black** to indicate that the border must be black (such as a printed rectangular border).
- Select **White** to indicate that the border must be white (e.g., paper edge on a dark background).

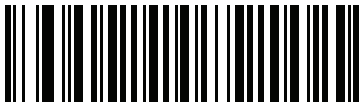
This parameter is only used in **Free-Form** and **Linked** modes.



***None**
(00h)



Black
(01h)



White
(02h)

IDC Delay Time

Parameter Name: DocCap_DELAY

Parameter # F2h 3Eh

Set the delay for capturing a document after a trigger pull. Decoding a bar code aborts this delay. This parameter only applies in **Free-Form** mode.

Scan the bar code below, followed by three bar codes from *Appendix D, Numeric Bar Codes* in the range of 000 to 200 decimal in units of 10 msec. The default is 000.

IDC Delay Time

IDC Zoom Limit

Parameter Name: Sig_MIN_PERCENT

Parameter # F1h 8Bh

Set the minimal "zoom" percentage value of a form for it to be considered for capture. This controls the quality of the captured form. The IDC firmware rejects capturing a form unless the width is at least the *IDC Zoom Limit* percentage of the *IDC Width* parameter. For example, if you set this parameter to 100 and *IDC Width* to 150, the form must be at least 300 pixels wide before it is captured (each unit module is scaled to two pixels).

Set this to zero (the default) to disable all checking. This parameter only applies in **Anchored** mode.

Scan the bar code below, followed by three bar codes from *Appendix D, Numeric Bar Codes* in the range of 000 to 100 percent. The default is 000.

IDC Zoom Limit

IDC Maximum Rotation

Parameter Name: Sig_MAX_ROT

Parameter # F1h 8Ch

Set the maximum rotation any edge of the form can have in relation to the scanner's horizontal or vertical axis for it to be considered for capture. Set this to zero (the default) to disable all checking. This parameter only applies in **Anchored** mode.

Scan the bar code below, followed by two bar codes from *Appendix D, Numeric Bar Codes* in the range of 00 to 45 decimal. The default is 00.

IDC Maximum Rotation

IDC HiBlur Filter

Parameter Name: DocCap_HIBLUR

Parameter # F1h 93h

Select whether blurred 1D bar codes are used as an anchor or link.

Disable Blurred 1D Anchors (00h)

***Enable Blurred 1D Anchors (01h)**

Quick Start

This section familiarizes you with some of the Intelligent Document Capture features. *IDC Demonstrations on page 11-18* includes instructions to demonstrate the Anchored, Free-Form, and Linked modes using a sample form to help provide an understanding of how to use IDC. These examples do not illustrate all capabilities of the advanced IDC firmware. Build upon these using different parameter settings and forms.

Sample IDC Setup

To set up IDC with the scanner:

1. Connect a scanner equipped with the Intelligent Document Capture feature to the host computer's USB port.
2. To set the scanner to the default settings and proper USB host type, scan **Set Defaults** followed by the **Symbol Native API (SNAPI) with Imaging Interface** bar code. Allow time for the scanner to reset and the USB connection to remunerate after each scan before continuing.

Set Defaults

Symbol Native API (SNAPI) with Imaging Interface

3. Start the *Scanner SDK C# Sample Application* and click the **Discover Scanners** button. Select the scanner from the **Connected Scanners** list, and then click on the **IDC** tab to display the IDC items.

> ***NOTE*** For a more comprehensive IDC sample application, contact your Zebra representative.

4. Set the parameters as specified in *IDC Demonstrations on page 11-18* using the sample application or by scanning parameter bar codes in this guide. The bar code in the sample form is Code 128, which is enabled by default for decoding and as a Document Capture symbology. You can change these settings for your IDC application.
5. Perform the list of suggestions in each demo. When scanning, aim the scanner at the bar code in the center of the rectangle. Pull the scanner back so the rectangle is fully contained in the aiming pattern. When you pull the trigger, the scanner emits a low tone to indicate that the IDC firmware identified and captured an image, then a decode beep to indicate that the data is processed and transmitted. There may be several seconds between the two beeps, depending on the size of the captured image and options selected (de-skew, brighten, etc). You can move the scanner after the first beep, but continue the hold the trigger or the scanner may end the session before sending the data.

IDC Demonstrations

Anchored Mode Demo

Set parameters to these values:

Table 11-3 *Anchored Mode Sample Parameter Values*

Parameter	Value
IDC Operating Mode	Anchored
IDC Height	100
IDC Width	90
IDC X Coordinate	-175
IDC Y Coordinate	-50

- Pull the trigger. The scanner decodes the bar code and captures an image of the text scroll.
- Rotate the form clockwise so the word **Capture** is along the bottom edge, and pull the trigger. The scanner decodes the bar code and captures the same image, including orientation. (This example also works with the form rotated counter-clockwise or upside down).
- Modify the values for height, width, x, and y. Pull the trigger. The captured area changes in size and location.
- Cover the bar code with a small piece of paper (or your finger) and pull the trigger. The scanner does not decode the bar code or capture an image.

What this demonstrates:

The Intelligent Document Capture Anchored mode captures an image of fixed size and location relative to a bar code on the page. Parameters control the height, width, and location. The IDC firmware requires that a bar code is present in order to capture an image, decodes it, and uses it to adjust the image to the upright orientation.

Free-Form Mode Demo

Set IDC Operating Mode to **Free-Form**.

- Pull the trigger. The scanner decodes the bar code and captures an image of the entire rectangle, including the contents.
- Modify the values for height, width, x, and y. Pull the trigger. Note that the captured image is not affected.
- Rotate the form clockwise so the word **Capture** is along the bottom edge, and pull the trigger. The scanner decodes the bar code and captures the same image, including orientation. (This example also works with the form rotated counter-clockwise or upside down).
- Cover the bar code with a small piece of paper and pull the trigger. The scanner does not decode the bar code and does not re-orient the captured image to the normal position, i.e., with the Zebra logo in upper-left corner.

What this demonstrates:

The Intelligent Document Capture Free-Form mode captures an image whose size and position are determined by a rectangular border on the page. It adjusts the image to the upright orientation if a bar code is found and decoded in the image.

Linked Mode Demo

Set IDC Operating Mode to **Linked.**

The examples from Free-Form mode also work in Linked mode except that the last one (with the bar code covered) does not decode the bar code or capture an image.

What this demonstrates:

The Intelligent Document Capture Linked mode captures an image whose size and position are determined by a rectangular border on the page. The IDC firmware requires that a bar code is present in order to capture an image, decodes it, and uses it to adjust the image to the upright orientation

Other Suggestions

Hold the scanner at an angle (up/down or side to side) to the page instead of perpendicular to it. The IDC firmware de-skews and adjusts the brightness (enabled by default) to produce a quality image when the scanner is held at less than ideal conditions.

Quick Start Form

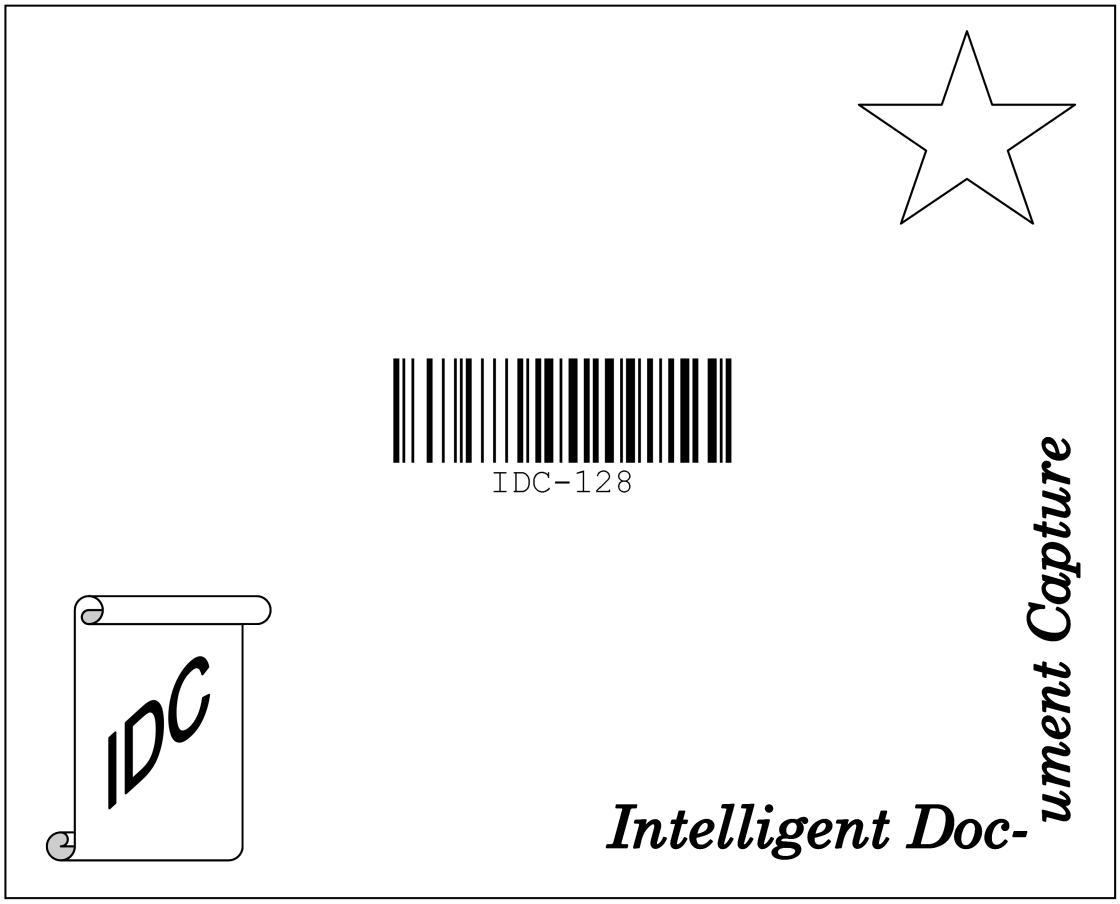


Figure 11-1 *Quick Start Form*

CHAPTER 12 ADVANCED DATA FORMATTING

Introduction

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

For information and programming bar codes for ADF, refer to the *Advanced Data Formatting Programmer Guide*, p/n 72E-69680-xx.

APPENDIX A STANDARD DEFAULT PARAMETERS

Table A-1 *Standard Default Parameters Table*

Parameter	Parameter Number	Default	Page Number
User Preferences			
Set Default Parameter		Restore Defaults	*4-4*
Parameter Scanning	ECh	Enable	*4-5*
Beeper Tone	91h	Medium	*4-5*
Beeper Volume	8Ch	High	*4-5*
Suppress Power-up Beeps	F1h D1h	Do not suppress	*4-6*
Power Mode	80h	Continuous On	*4-7*
Time Delay to Low Power Mode	92h	1 Minute	*4-8*
Trigger Mode	8Ah	Auto Aim	*4-9*
Picklist Mode	F0h, 92h	Disabled Always	*4-10*
Presentation Mode Time Delay	F1h, E9h	Disable (3 Seconds for Scanner with Base)	*4-11*
Mobile Phone/Display Mode	F1h CCh	Disable	*4-13*
Mobile Phone Decode Aggressiveness	F1h D6h	F1h D6h	*4-14*
Decode Session Timeout	88h	9.9 Sec	*4-15*
Timeout Between Decodes, Same Symbol	89h	0.6 Sec	*4-15*
Beep After Good Decode	38h	Enable	*4-16*
Decoding Illumination	F0h, 2Ah	Enable	*4-16*

[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	Parameter Number	Default	Page Number
DP Illumination	F1h, 3Bh	Auto	*4-17*
Decode Aiming Pattern	F0h, 32h	Enable	*4-18*
Fuzzy 1D Processing	F1h, 02h	Enable	*4-18*
Decode Mirror Images	F1h, 19h	Auto	*4-19*
PDF Prioritization	F1h CFh	Disable	*4-20*
PDF Prioritization Timeout	F1h D0h	200 ms	*4-20*
Miscellaneous Scanner Options			
Transmit Code ID Character	2Dh	None	*4-21*
Prefix Value	63h, 69h	7013 <CR><LF>	*4-22*
Suffix 1 Value Suffix 2 Value	62h, 68h 64h, 6Ah	7013 <CR><LF>	*4-22*
Scan Data Transmission Format	EBh	Data as is	*4-23*
FN1 Substitution Values	67h, 6Dh	Set	*4-24*
Transmit “No Read” Message	5Eh	Disable	*4-25*
Imaging Preferences			
Operational Modes	N/A	N/A	*5-4*
Low Light Enhancement	F1h 64h	Disable	*5-5*
Presentation Mode Field of View	F1h 61h	Default (Reduced)	*5-5*
Image Capture Autoexposure	F0h 68h	Enable	*5-6*
Image Capture Illumination	F0h 69h	Enable	*5-6*
Illumination Bank Control	F1h 3Bh	Full	*5-7*
Fixed Exposure	F4h, F1h, 37h	100	*5-8*
Fixed Gain	F1h 38h	50	*5-8*
Gain Exposure Priority for Snapshot Mode	F1h 32h	Autodetect	*5-9*
Snapshot Mode Timeout	F0h 43h	0 (30 seconds)	*5-10*
Snapshot Aiming Pattern	F0h 2Ch	Enable	*5-10*
Image Cropping	F0h 2Dh	Disable	*5-11*
Crop to Pixel Addresses	F4h F0h 3Bh; F4h F0h 3Ch; F4h F0h 3Dh; F4h F0h 3Eh	0 top, 0 left, 1023 bottom, 1279 right	*5-12*

[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	Parameter Number	Default	Page Number
Image Size (Number of Pixels)	F0h 2Eh	Full	*5-13*
Image Brightness (Target White)	F0h 86h	180	*5-14*
JPEG Image Options	F0h 2Bh	Quality	*5-14*
JPEG Target File Size	F1h 31h	160 kB	*5-15*
JPEG Quality and Size Value	F0h 31h	65	*5-15*
Image Enhancement	F1h 34h	Off (0)	*5-16*
Image File Format Selection	F0h 30h	JPEG	*5-17*
Image Rotation	F1h 99h	0	*5-18*
Bits per Pixel (BPP)	F0h 2Fh	8 BPP	*5-19*
Signature Capture	5Dh	Disable	*5-20*
Signature Capture Image File Format Selection	F0h 39h	JPEG	*5-21*
Signature Capture Bits per Pixel (BPP)	F0h 3Ah	8 BPP	*5-22*
Signature Capture Width	F4h F0h 6Eh	400	*5-23*
Signature Capture Height	F4h F0h 6Fh	100	*5-23*
Signature Capture JPEG Quality	F0h A5h	65	*5-23*
Video Mode Format Selector	F2h 94h	JPEG	*5-24*
Video View Finder	F0h 44h	Disable	*5-24*
Target Video Frame Size	F0h 48h	2200 bytes	*5-25*
Video View Finder Image Size	F0h 49h	1700 bytes	*5-25*
SSI Host Preferences			
Baud Rate	9Ch	9600	*6-4*
Parity	9Eh	None	*6-6*
Check Parity	97h	Enable	*6-7*
Software Handshaking	9Fh	ACK/NAK	*6-7*
Host RTS Line State	9Ah	Low	*6-8*
Decode Data Packet Format	EEh	Send Raw Decode Data	*6-8*
Stop Bits	9Dh	1	*6-9*
Host Serial Response Time-out	9Bh	2 sec	*6-10*
Host Character Time-out	EFh	200 msec	*6-11*

[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	Parameter Number	Default	Page Number
Multipacket Option	F0h 4Eh	Option 1	6-12
Interpacket Delay	F0h 4Fh	0 ms	6-13
SSI Event Reporting			
Decode Event	F0h 00h	Disable	6-14
Boot Up Event	F0h 02h	Disable	6-15
Parameter Event	F0h 03h	Disable	6-15
USB Host Parameters			
USB Device Type		USB Keyboard (HID)	7-5
Symbol Native API (SNAPI) Status Handshaking		Enable	7-7
USB Country Keyboard Types (Country Codes)		North American	7-8
USB Keystroke Delay		No Delay	7-10
USB CAPS Lock Override		Disable	7-10
USB Ignore Unknown Characters		Enable	7-11
USB Convert Unknown to Code 39		Disable	7-11
Emulate Keypad		Disable	7-12
Emulate Keypad with Leading Zero		Disable	7-12
USB Keyboard FN1 Substitution		Disable	7-13
Function Key Mapping		Disable	7-13
Simulated Caps Lock		Disable	7-14
Convert Case		No Case Conversion	7-14
USB Static CDC		Enable	7-15
USB Polling Interval		8 msec	7-16
Fast HID Keyboard		Disable	7-18
Quick Keypad Emulation		Disable	7-18
USB Ignore Beep Directive		Honor	7-19
USB Ignore Type Directive		Honor	7-19
Ignore Beep on <BEL> over CDC		Disable	7-20
IBM Specification Level		Version 0 (Original)	7-20

[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	Parameter Number	Default	Page Number
RS-232 Host Parameters			
RS-232 Host Types		Standard[1]	*8-8*
Baud Rate		9600	*8-10*
Parity Type		None	*8-11*
Stop Bit Select		1 Stop Bit	*8-12*
Data Bits		8-Bit	*8-12*
Check Receive Errors		Enable	*8-13*
Hardware Handshaking		None	*8-13*
Software Handshaking		None	*8-15*
Host Serial Response Time-out		2 Sec	*8-17*
RTS Line State		Low RTS	*8-18*
Beep on <BEL>		Disable	*8-18*
Intercharacter Delay		0 msec	*8-19*
Nixdorf Beep/LED Options		Normal Operation	*8-20*
Ignore Unknown Characters		Send Bar Code	*8-20*
123Scan[2] Configuration Tool			
123Scan[2] Configuration		None[1]	*9-1*
Disable All Code Types			*10-7*
UPC/EAN			
UPC-A	01h	Enable	*10-8*
UPC-E	02h	Enable	*10-8*
UPC-E1	0Ch	Disable	*10-9*
EAN-8/JAN 8	04h	Enable	*10-9*
EAN-13/JAN 13	03h	Enable	*10-10*
Bookland EAN	53h	Disable	*10-10*
Decode UPC/EAN/JAN Supplementals (2 and 5 digits)	10h	Ignore	*10-11*
User-Programmable Supplementals Supplemental 1: Supplemental 2:	 F1h 43h F1h 44h		*10-14*
UPC/EAN/JAN Supplemental Redundancy	50h	10	*10-15*

[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	Parameter Number	Default	Page Number
UPC/EAN/JAN Supplemental AIM ID Format	F1h A0h	Combined	*10-16*
Transmit UPC-A Check Digit	28h	Enable	*10-17*
Transmit UPC-E Check Digit	29h	Enable	*10-17*
Transmit UPC-E1 Check Digit	2Ah	Enable	*10-18*
UPC-A Preamble	22h	System Character	*10-18*
UPC-E Preamble	23h	System Character	*10-19*
UPC-E1 Preamble	24h	System Character	*10-20*
Convert UPC-E to A	25h	Disable	*10-21*
Convert UPC-E1 to A	26h	Disable	*10-21*
EAN-8/JAN-8 Extend	27h	Disable	*10-22*
Bookland ISBN Format	F1h 40h	ISBN-10	*10-23*
UCC Coupon Extended Code	55h	Disable	*10-24*
Coupon Report	F1h DAh	New Coupon Format	*10-25*
ISSN EAN	F1h 69h	Disable	*10-26*
Code 128			
Code 128	08h	Enable	*10-27*
Set Length(s) for Code 128	D1h D2h	Any Length	*10-27*
GS1-128 (formerly UCC/EAN-128)	0Eh	Enable	*10-29*
ISBT 128	54h	Enable	*10-29*
ISBT Concatenation	F1h 41h	Disable	*10-30*
Check ISBT Table	F1h 42h	Enable	*10-31*
ISBT Concatenation Redundancy	DFh	10	*10-31*
Code 39			
Code 39	00h	Enable	*10-32*
Trioptic Code 39	0Dh	Disable	*10-32*
Convert Code 39 to Code 32 (Italian Pharmacy Code)	56h	Disable	*10-33*
Code 32 Prefix	E7h	Disable	*10-33*
Set Length(s) for Code 39	12h 13h	2 to 55	*10-34*
Code 39 Check Digit Verification	30h	Disable	*10-35*

[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	Parameter Number	Default	Page Number
Transmit Code 39 Check Digit	2Bh	Disable	*10-36*
Code 39 Full ASCII Conversion	11h	Disable	*10-36*
Buffer Code 39	71h	Disable	*10-37*
Code 93			
Code 93	09h	Disable	*10-40*
Set Length(s) for Code 93	1Ah 1Bh	4 to 55	*10-40*
Code 11			
Code 11	0Ah	Disable	*10-42*
Set Lengths for Code 11	1Ch 1Dh	4 to 55	*10-42*
Code 11 Check Digit Verification	34h	Disable	*10-44*
Transmit Code 11 Check Digit(s)	2Fh	Disable	*10-45*
Interleaved 2 of 5 (ITF)			
Interleaved 2 of 5 (ITF)	06h	Enable	*10-46*
Set Lengths for I 2 of 5	16h 17h	14	*10-46*
I 2 of 5 Check Digit Verification	31h	Disable	*10-48*
Transmit I 2 of 5 Check Digit	2Ch	Disable	*10-48*
Convert I 2 of 5 to EAN 13	52h	Disable	*10-49*
Discrete 2 of 5 (DTF)			
Discrete 2 of 5	05h	Disable	*10-50*
Set Length(s) for D 2 of 5	14h 15h	12	*10-50*
Codabar (NW - 7)			
Codabar	07h	Disable	*10-52*
Set Lengths for Codabar	18h 19h	5 to 55	*10-52*
CLSI Editing	36h	Disable	*10-54*
NOTIS Editing	37h	Disable	*10-54*
Codabar Upper or Lower Case Start/Stop Characters Transmission	F2h 57h	Upper Case	*10-55*

[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	Parameter Number	Default	Page Number
MSI			
MSI	0Bh	Disable	*10-56*
Set Length(s) for MSI	1Eh 1Fh	4 to 55	*10-56*
MSI Check Digits	32h	One	*10-57*
Transmit MSI Check Digit	2Eh	Disable	*10-58*
MSI Check Digit Algorithm	33h	Mod 10/Mod 10	*10-58*
Chinese 2 of 5			
Chinese 2 of 5	F0h 98h	Disable	*10-59*
Matrix 2 of 5			
Matrix 2 of 5	F1h 6Ah	Disable	*10-59*
Matrix 2 of 5 Lengths	F1h 6Bh F1h 6Ch	1 Length - 14	*10-60*
Matrix 2 of 5 Check Digit	F1h 6Eh	Disable	*10-61*
Transmit Matrix 2 of 5 Check Digit	F1h 6Fh	Disable	*10-61*
Korean 3 of 5			
Korean 3 of 5	F1h 45h	Disable	*10-62*
Inverse 1D Decoder	F1h 4Ah	SR, DC: Regular DP, HD: Autodetect	*10-63*
Postal Codes			
US Postnet	59h	Enable	*10-64*
US Planet	5Ah	Enable	*10-64*
Transmit US Postal Check Digit	5Fh	Enable	*10-65*
UK Postal	5Bh	Enable	*10-65*
Transmit UK Postal Check Digit	60h	Enable	*10-66*
Japan Postal	F0h 22h	Enable	*10-66*
Australian Postal	F0h 23h	Enable	*10-67*
Australia Post Format	F1h CEh	Autodiscriminate	*10-68*
Netherlands KIX Code	F0h 46h	Enable	*10-69*
USPS 4CB/One Code/Intelligent Mail	F1h 50h	Disable	*10-69*
UPU FICS Postal	F1h 63h	Disable	*10-70*

[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	Parameter Number	Default	Page Number
GS1 DataBar			
GS1 DataBar-14	F0h 52h	Enable	*10-71*
GS1 DataBar Limited	F0h 53h	Disable	*10-71*
GS1 DataBar Limited Security Level	F1h D8h	Level 3	*10-72*
GS1 DataBar Expanded	F0h 54h	Enable	*10-73*
Convert GS1 DataBar to UPC/EAN	F0h 8Dh	Disable	*10-73*
Composite			
Composite CC-C	F0h 55h	Disable	*10-74*
Composite CC-A/B	F0h 56h	Disable	*10-74*
Composite TLC-39	F0h 73h	Disable	*10-75*
UPC Composite Mode	F0h 58h	Always Linked	*10-76*
Composite Beep Mode	F0h 8Eh	Beep As Each Code Type is Decoded	*10-77*
GS1-128 Emulation Mode for UCC/EAN Composite Codes	F0h ABh	Disable	*10-77*
2D Symbologies			
PDF417	0Fh	Enable	*10-78*
MicroPDF417	E3h	Disable	*10-78*
Code 128 Emulation	7Bh	Disable	*10-79*
Data Matrix	F0h 24h	Enable	*10-80*
Data Matrix Inverse	F1h 4Ch	SR, DC: Regular DP, HD: Autodetect	*10-81*
Maxicode	F0h 26h	Enable	*10-82*
QR Code	F0h 25h	Enable	*10-82*
QR Inverse	F1h 4Bh	SR, DC: Regular DP, HD: Autodetect	*10-83*
MicroQR	F1h 3Dh	Enable	*10-84*
Aztec	F1h 3Eh	Enable	*10-84*
Aztec Inverse	F1h 4Dh	Inverse Autodetect	*10-85*

[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	Parameter Number	Default	Page Number
Symbology-Specific Security Levels			
Redundancy Level	4Eh	1	*10-86*
Security Level	4Dh	1	*10-88*
Intercharacter Gap Size	F0h 7Dh	Normal	*10-89*
Report Version			*10-89*
Macro PDF			
Flush Macro PDF Buffer			*10-90*
Abort Macro PDF Entry			*10-90*
Intelligent Document Capture (IDC)			
IDC Operating Mode	F1h 52h	Off	*11-5*
IDC Symbology	F1h 8Fh	001	*11-6*
IDC X Coordinate	F4h F1h 54h	-151	*11-7*
IDC Y Coordinate	F4h F1h 55h	-050	*11-7*
IDC Width	F1h 56h	0300	*11-8*
IDC Height	F1h 57h	0050	*11-8*
IDC File Format Selector	F1h 59h	JPEG	*11-9*
IDC Bits Per Pixel	F1h 5Ah	8 BPP	*11-10*
IDC JPEG Quality	F1h 5Bh	065	*11-10*
IDC Find Box Outline	F1h D7h	Disable	*11-11*
IDC Minimum Text Length	F1h 90h	00	*11-11*
IDC Maximum Text Length	F1h 91h	00	*11-12*
IDC Captured Image Brighten	F1h 8Eh	Enable	*11-12*
IDC Captured Image Sharpen	F1h 92h	Enable	*11-13*
IDC De-Skew	F1h 8Dh	Enable	*11-13*
IDC Border Type	F2h 3Dh	None	*11-14*
IDC Delay Time	F2h 3Eh	000	*11-14*
IDC Zoom Limit	F1h 8Bh	000	*11-15*
IDC Maximum Rotation	F1h 8Ch	00	*11-15*
IDC HiBlur Filter	F1h 93h	Enable	*11-16*

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

APPENDIX B PROGRAMMING REFERENCE

Symbol Code Identifiers

Table B-1 *Symbol Code Characters*

Code Character	Code Type
A	UPC-A, UPC-E, UPC-E1, EAN-8, EAN-13
B	Code 39, Code 32
C	Codabar
D	Code 128, ISBT 128, ISBT 128 Concatenated
E	Code 93
F	Interleaved 2 of 5
G	Discrete 2 of 5, or Discrete 2 of 5 IATA
H	Code 11
J	MSI
K	GS1-128
L	Bookland EAN
M	Trioptic Code 39
N	Coupon Code
R	GS1 DataBar Family
S	Matrix 2 of 5
T	UCC Composite, TLC 39
U	Chinese 2 of 5

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

Code Character	Code Type
V	Korean 3 of 5
X	ISSN EAN, PDF417, Macro PDF417, Micro PDF417
z	Aztec, Aztec Rune
P00	Data Matrix
P01	QR Code, MicroQR
P02	Maxicode
P03	US Postnet
P04	US Planet
P05	Japan Postal
P06	UK Postal
P08	Netherlands KIX Code
P09	Australia Post
P0A	USPS 4CB/One Code/Intelligent Mail
P0B	UPU FICS Postal
P0X	Signature Capture

AIM Code Identifiers

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

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

Table B-2 *Aim Code Characters*

Code Character	Code Type
A	Code 39, Code 39 Full ASCII, Code 32
C	Code 128, ISBT 128, ISBT 128 Concatenated, GS1-128, Coupon (Code 128 portion)
d	Data Matrix
E	UPC/EAN, Coupon (UPC portion)
e	GS1 DataBar Family
F	Codabar
G	Code 93
H	Code 11
I	Interleaved 2 of 5
L	PDF417, Macro PDF417, Micro PDF417
L2	TLC 39
M	MSI
Q	QR Code, MicroQR
S	Discrete 2 of 5, IATA 2 of 5
U	Maxicode
z	Aztec, Aztec Rune
X	Bookland EAN, ISSN EAN, Trioptic Code 39, Chinese 2 of 5, Matrix 2 of 5, Korean 3 of 5, US Postnet, US Planet, UK Postal, Japan Postal, Australia Post, Netherlands KIX Code, USPS 4CB/One Code/Intelligent Mail, UPU FICS Postal, Signature Capture

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: A Code (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	
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	

Table B-3 *Modifier Characters (Continued)*

Code Type	Option Value	Option
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, UPC-E, and EAN-13 (not including supplemental data).
	1	Two-digit supplement data only.
	2	Five-digit supplement data only.
	3	Combined data packet comprising 13 digits from a UPC-A, UPC-E, or EAN-13 symbol and 2 or 5 digits from a supplemental symbol.
	4	EAN-8 data packet.
	Example: A UPC-A bar code 012345678905 is transmitted as **]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	
ISSN EAN	0	No options specified at this time. Always transmit 0.
	Example: An ISSN 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.
GS1 DataBar Family		No option specified at this time. Always transmit 0. DataBar-14 and DataBar Limited transmit with an Application Identifier “01”. Note: In GS1-128 emulation mode, GS1 DataBar is transmitted using Code 128 rules (i.e.,]C1).
	Example: A DataBar-14 bar code 0110012345678902 is transmitted as **]e**00110012345678902.	
EAN.UCC Composites (GS1 DataBar, GS1-128, 2D portion of UPC composite)		Native mode transmission. Note: UPC portion of composite is transmitted using UPC rules.
	0	Standard data packet.
	1	Data packet containing the data following an encoded symbol separator character.
	2	Data packet containing the data following an escape mechanism character. The data packet does not support the ECI protocol.
	3	Data packet containing the data following an escape mechanism character. The data packet supports the ECI protocol.
		GS1-128 emulation Note: UPC portion of composite is transmitted using UPC rules.
	1	Data packet is a GS1-128 symbol (i.e., data is preceded with]C1).

Table B-3 *Modifier Characters (Continued)*

Code Type	Option Value	Option
PDF417, Micro PDF417	0	Reader set to conform to protocol defined in 1994 PDF417 symbology specifications. **Note:** When this option is transmitted, the receiver cannot reliably determine whether ECIs have been invoked or whether data byte 92_{DEC} has been doubled in transmission.
	1	Reader set to follow the ECI protocol (Extended Channel Interpretation). All data characters 92_{DEC} are doubled.
	2	Reader set for Basic Channel operation (no escape character transmission protocol). Data characters 92_{DEC} are not doubled. **Note:** When decoders are set to this mode, unbuffered Macro symbols and symbols requiring the decoder to convey ECI escape sequences cannot be transmitted.
	3	The bar code contains a GS1-128 symbol, and the first codeword is 903-907, 912, 914, 915.
	4	The bar code contains a GS1-128 symbol, and the first codeword is in the range 908-909.
	5	The bar code contains a GS1-128 symbol, and the first codeword is in the range 910-911.
	Example: A PDF417 bar code ABCD, with no transmission protocol enabled, is transmitted as]L2ABCD.	
Data Matrix	0	ECC 000-140, not supported.
	1	ECC 200.
	2	ECC 200, FNC1 in first or fifth position.
	3	ECC 200, FNC1 in second or sixth position.
	4	ECC 200, ECI protocol implemented.
	5	ECC 200, FNC1 in first or fifth position, ECI protocol implemented.
	6	ECC 200, FNC1 in second or sixth position, ECI protocol implemented.
MaxiCode	0	Symbol in Mode 4 or 5.
	1	Symbol in Mode 2 or 3.
	2	Symbol in Mode 4 or 5, ECI protocol implemented.
	3	Symbol in Mode 2 or 3, ECI protocol implemented in secondary message.

Table B-3 *Modifier Characters (Continued)*

Code Type	Option Value	Option
QR Code	0	Model 1 symbol.
	1	Model 2 / MicroQR symbol, ECI protocol not implemented.
	2	Model 2 symbol, ECI protocol implemented.
	3	Model 2 symbol, ECI protocol not implemented, FNC1 implied in first position.
	4	Model 2 symbol, ECI protocol implemented, FNC1 implied in first position.
	5	Model 2 symbol, ECI protocol not implemented, FNC1 implied in second position.
	6	Model 2 symbol, ECI protocol implemented, FNC1 implied in second position.
Aztec	0	Aztec symbol.
	C	Aztec Rune symbol.

APPENDIX C SAMPLE BAR CODES

Code 39

UPC/EAN

UPC-A, 100%

EAN-13, 100%

Code 128

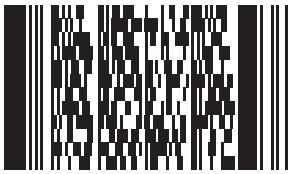
Interleaved 2 of 5

GS1 DataBar-14

NOTE GS1 DataBar-14 must be enabled to read the bar code below (see *GS1 DataBar-14 on page 10-71*).

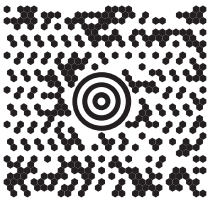
7612341562341

PDF417



Data Matrix

Maxicode



QR Code

US Postnet

UK Postal

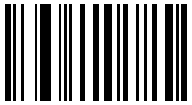
APPENDIX D NUMERIC BAR CODES

Numeric Bar Codes

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

0

1



2

3

4

Numeric Bar Codes (continued)

5

6

7

8

9

Cancel

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

Cancel

APPENDIX E ASCII CHARACTER SETS

Table E-1 *ASCII Value Table*

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

The keystroke in bold transmits only if Function Key Mapping is enabled. Otherwise, the unbold keystroke transmits.

Table E-1 *ASCII Value Table (Continued)*

ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1016	$P	CTRL P
1017	$Q	CTRL Q
1018	$R	CTRL R
1019	$S	CTRL S
1020	$T	CTRL T
1021	$U	CTRL U
1022	$V	CTRL V
1023	$W	CTRL W
1024	$X	CTRL X
1025	$Y	CTRL Y
1026	$Z	CTRL Z
1027	%A	CTRL [
1028	%B	CTRL \
1029	%C	CTRL]
1030	%D	CTRL 6
1031	%E	CTRL -
1032	Space	Space
1033	/A	!
1034	/B	“
1035	/C	#
1036	/D	$
1037	/E	%
1038	/F	&
1039	/G	‘
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,

The keystroke in bold transmits only if Function Key Mapping is enabled. Otherwise, the unbold keystroke transmits.

Table E-1 *ASCII Value Table (Continued)*

ASCII Value	Full ASCII Code 39 Encode Char	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
1069	E	E
1070	F	F
1071	G	G
1072	H	H
1073	I	I

The keystroke in bold transmits only if Function Key Mapping is enabled. Otherwise, the unbold keystroke transmits.

Table E-1 *ASCII Value Table (Continued)*

ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1074	J	J
1075	K	K
1076	L	L
1077	M	M
1078	N	N
1079	O	O
1080	P	P
1081	Q	Q
1082	R	R
1083	S	S
1084	T	T
1085	U	U
1086	V	V
1087	W	W
1088	X	X
1089	Y	Y
1090	Z	Z
1091	%K	[
1092	%L	\
1093	%M	]
1094	%N	^
1095	%O	_
1096	%W	‘
1097	+A	a
1098	+B	b
1099	+C	c
1100	+D	d
1101	+E	e
1102	+F	f

The keystroke in bold transmits only if Function Key Mapping is enabled. Otherwise, the unbold keystroke transmits.

Table E-1 *ASCII Value Table (Continued)*

ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1103	+G	g
1104	+H	h
1105	+I	i
1106	+J	j
1107	+K	k
1108	+L	l
1109	+M	m
1110	+N	n
1111	+O	o
1112	+P	p
1113	+Q	q
1114	+R	r
1115	+S	s
1116	+T	t
1117	+U	u
1118	+V	v
1119	+W	w
1120	+X	x
1121	+Y	y
1122	+Z	z
1123	%P	{
1124	%Q	I
1125	%R	}
1126	%S	~
The keystroke in bold transmits only if Function Key Mapping is enabled. Otherwise, the unbold keystroke transmits.		

Table E-2 *ALT Key Standard Default Tables*

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

Table E-3 *USB GUI Key Character Set*

GUI Key	Keystroke
3000	Right Control Key
3048	GUI 0
3049	GUI 1
3050	GUI 2
3051	GUI 3
3052	GUI 4
3053	GUI 5
3054	GUI 6
3055	GUI 7
3056	GUI 8
3057	GUI 9
3065	GUI A
3066	GUI B
3067	GUI C
3068	GUI D
3069	GUI E
3070	GUI F
3071	GUI G
3072	GUI H
3073	GUI I
3074	GUI J
3075	GUI K
3076	GUI L
3077	GUI M
3078	GUI N
3079	GUI O
3080	GUI P
3081	GUI Q

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

Table E-3 *USB GUI Key Character Set (Continued)*

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

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

Table E-4 *PF Key Standard Default Table*

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

Table E-5 *F key Standard Default Table*

F Keys	Keystroke
5001	F 1
5002	F 2
5003	F 3
5004	F 4
5005	F 5
5006	F 6
5007	F 7
5008	F 8
5009	F 9
5010	F 10
5011	F 11
5012	F 12
5013	F 13
5014	F 14
5015	F 15
5016	F 16
5017	F 17
5018	F 18
5019	F 19
5020	F 20
5021	F 21
5022	F 22
5023	F 23
5024	F 24

Table E-6 *Numeric Key Standard Default Table*

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

Table E-7 *Extended Keypad Standard Default Table*

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

GLOSSARY

A

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

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

Application Programming Interface. See **API**.

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

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

B

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

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

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

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

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

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

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

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

Boot or Boot-up. The process a computer goes through when it starts. During boot-up, the computer can run self-diagnostic tests and configure hardware and software.

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

bps. See **Bits Per Second**.

Byte. On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory is used to store one ASCII character.

C

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

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

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

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

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

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

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

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

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

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

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

Cold Boot. A cold boot restarts the mobile computer and erases all user stored records and entries.

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

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

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

D

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

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

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

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

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

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

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

DRAM. Dynamic random access memory.

E

EAN. European Article Number. This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.

Element. Generic term for a bar or space.

Encoded Area. Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.

ENQ (RS-232). ENQ software handshaking is also supported for the data sent to the host.

ESD. Electro-Static Discharge

F

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

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

FTP. See **File Transfer Protocol**.

H

Hard Reset. See **Cold Boot**.

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

Hz. Hertz; A unit of frequency equal to one cycle per second.

I

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

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

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

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

Intercharacter Gap. The space between two adjacent bar code characters in a discrete code.

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

Interleaved Bar Code. A bar code in which characters are paired together, using bars to represent the first character and the intervening spaces to represent the second.

I/O Ports. interface The connection between two devices, defined by common physical characteristics, signal characteristics, and signal meanings. Types of interfaces include RS-232 and PCMCIA.

IOCTL. Input/Output Control.

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

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

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

K

Key. A key is the specific code used by the algorithm to encrypt or decrypt the data. Also see, **Encryption** and **Decrypting**.

L

LASER. Light Amplification by Stimulated Emission of Radiation.The laser is an intense light source. Light from a laser is all the same frequency, unlike the output of an incandescent bulb. Laser light is typically coherent and has a high energy density.

Laser Diode. A gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.

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

LCD. See **Liquid Crystal Display**.

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

Light Emitting Diode. See **LED**.

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

M

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

MIL. 1 mil = 1 thousandth of an inch.

MIN. Mobile Identification Number. The unique account number associated with a cellular device. It is broadcast by the cellular device when accessing the cellular system.

Misread (Misdecode). A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.

N

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

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

NVM. Non-Volatile Memory.

O

ODI. See **Open Data-Link Interface**.

Open Data-Link Interface (ODI). Novell’s driver specification for an interface between network hardware and higher-level protocols. It supports multiple protocols on a single NIC (Network Interface Controller). It is capable of understanding and translating any network information or request sent by any other ODI-compatible protocol into something a NetWare client can understand and process.

Open System Authentication. Open System authentication is a null authentication algorithm.

P

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

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

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

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

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

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

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

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

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

Q

Quiet Zone. A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.

QWERTY. A standard keyboard commonly used on North American and some European PC keyboards. “QWERTY” refers to the arrangement of keys on the left side of the third row of keys.

R

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

Reflectance. Amount of light returned from an illuminated surface.

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

RF. Radio Frequency.

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

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

RS-232. An Electronic Industries Association (EIA) standard that defines the connector, connector pins, and signals used to transfer data serially from one device to another.

S

Scan Area. Area intended to contain a symbol.

Scanner. An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are: 1) Light source (laser or photoelectric cell) - illuminates a bar code,; 2) Photodetector - registers the difference in reflected light (more light reflected from spaces); 3) Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.

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

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

SDK. Software Development Kit

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

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

SHIP. Symbol Host Interface Program.

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

Soft Reset. See **Warm Boot**.

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

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

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

STEP. Symbol Terminal Enabler Program.

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

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

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

SVTP. Symbol Virtual Terminal Program.

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

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

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

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

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

T

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

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

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

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

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

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

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

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

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

U

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

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

V

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

W

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

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