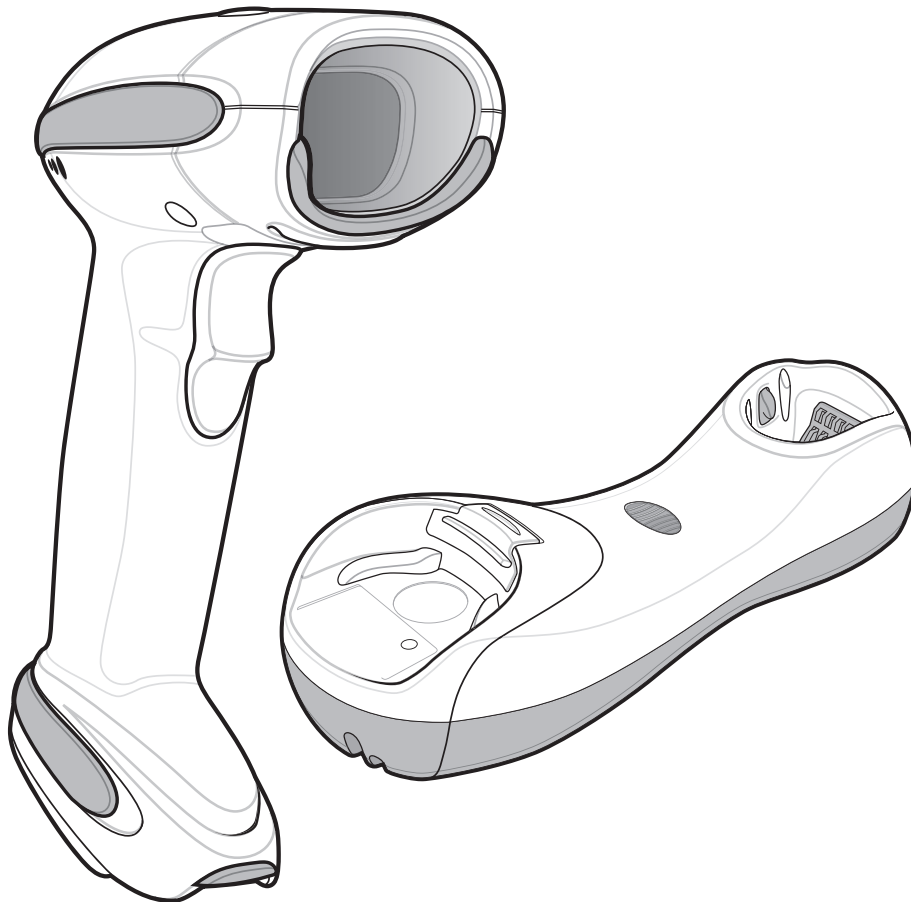




# Symbol DS6878

## Product Reference Guide





***Symbol DS6878***  
***Product Reference Guide***

*72E-131700-01*

*Revision A*

*March 2010*

© 2009 by Motorola, Inc. All rights reserved.

No part of this publication may be reproduced or used in any form, or by any electrical or mechanical means, without permission in writing from Motorola. This includes electronic or mechanical means, such as photocopying, recording, or information storage and retrieval systems. The material in this manual is subject to change without notice.

The software is provided strictly on an "as is" basis. All software, including firmware, furnished to the user is on a licensed basis. Motorola grants to the user a non-transferable and non-exclusive license to use each software or firmware program delivered hereunder (licensed program). Except as noted below, such license may not be assigned, sublicensed, or otherwise transferred by the user without prior written consent of Motorola. No right to copy a licensed program in whole or in part is granted, except as permitted under copyright law. The user shall not modify, merge, or incorporate any form or portion of a licensed program with other program material, create a derivative work from a licensed program, or use a licensed program in a network without written permission from Motorola. The user agrees to maintain Motorola's copyright notice on the licensed programs delivered hereunder, and to include the same on any authorized copies it makes, in whole or in part. The user agrees not to decompile, disassemble, decode, or reverse engineer any licensed program delivered to the user or any portion thereof.

Motorola reserves the right to make changes to any software or product to improve reliability, function, or design.

Motorola does not assume any product liability arising out of, or in connection with, the application or use of any product, circuit, or application described herein.

No license is granted, either expressly or by implication, estoppel, or otherwise under any Motorola, Inc., intellectual property rights. An implied license only exists for equipment, circuits, and subsystems contained in Motorola products.

MOTOROLA and the Stylized M Logo and Symbol and the Symbol logo are registered in the US Patent & Trademark Office. Bluetooth is a registered trademark of Bluetooth SIG. Microsoft, Windows and ActiveSync are either registered trademarks or trademarks of Microsoft Corporation. All other product or service names are the property of their respective owners.

This media, or Motorola Product, may include Motorola Software, Commercial Third Party Software, and Publicly Available Software.

The Motorola Software that may be included on this media, or included in the Motorola Product, is Copyright (c) by Motorola, Inc., and its use is subject to the licenses, terms and conditions of the agreement in force between the purchaser of the Motorola Product and Motorola, Inc.

The Commercial Third Party Software that may be included on this media, or included in the Motorola Product, is subject to the licenses, terms and conditions of the agreement in force between the purchaser of the Motorola Product and Motorola, Inc., unless a separate Commercial Third Party Software License is included, in which case, your use of the Commercial Third Party Software will then be governed by the separate Commercial Third Party License.

The Publicly Available Software that may be included on this media, or in the Motorola Product, is listed below. The use of the listed Publicly Available Software is subject to the licenses, terms and conditions of the agreement in force between the purchaser of the Motorola Product and Motorola, Inc., as well as, the terms and conditions of the license of each Publicly Available Software package. Copies of the licenses for the listed Publicly Available Software, as well as, all attributions, acknowledgements, and software information details, are included below. Motorola is required to reproduce the software licenses, acknowledgments and copyright notices as provided by the Authors and Owners, thus, all such information is provided in its native language form, without modification or translation.

The Publicly Available Software in the list below is limited to the Publicly Available Software included by Motorola. The Publicly Available Software included by Commercial Third Party Software or Products, that is used in the Motorola Product, are disclosed in the Commercial Third Party Licenses, or via the respective Commercial Third Party Publicly Available Software Legal Notices.

Publicly available software list:

Name:	Regular Expression Evaluator
Version:	8.3
Description:	Compiles and executes regular expressions
Software Site:	<a href="http://www.freebsd.org/cgi/cvsweb.cgi/src/lib/libc/regex/">http://www.freebsd.org/cgi/cvsweb.cgi/src/lib/libc/regex/</a>
Source Code:	No Source Distribution Obligations. Motorola will not provide nor distribute the Source Code for the Regular Expression Evaluator.
License:	BSD Style License

© 1992 Henry Spencer.

© 1992, 1993 The Regents of the University of California. All rights reserved.

This code is derived from software contributed to Berkeley by Henry Spencer of the University of Toronto. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgement:

This product includes software developed by the University of California, Berkeley and its contributors.

4. Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE REGENTS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE REGENTS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Motorola, Inc.  
One Motorola Plaza  
Holtsville, New York 11742-1300  
<http://www.motorola.com/enterprisemobility>

## Patents

This product is covered by one or more of the patents listed on the website:  
<http://www.motorola.com/enterprisemobility/patents>.

## Warranty

The complete Motorola hardware product warranty statement is available at:  
<http://www.motorola.com/enterprisemobility/warranty>.

## Revision History

Changes to the original manual are listed below:

Change	Date	Description
-01 Rev A	3/2010	Initial release.



# Table of Contents

Patents.....	iii
Warranty .....	iii
Revision History .....	iii

## About This Guide

Introduction .....	xvii
Configurations.....	xvii
Chapter Descriptions .....	xvii
Notational Conventions.....	xviii
Related Documents .....	xix
Service Information.....	xix

## Chapter 1: Getting Started

Introduction .....	1-1
Interfaces .....	1-2
Unpacking the Digital Scanner and Cradle .....	1-2
Parts .....	1-3
Scanner .....	1-3
Cradle .....	1-4
Digital Scanner Cradle .....	1-6
Connecting the Cradle .....	1-6
Supplying Power to the Cradle .....	1-7
Using the USB Interface to Supply Power .....	1-7
Lost Connection to Host .....	1-7
Mounting the Cradle .....	1-7
Replacing the Digital Scanner Battery .....	1-8
Charging the Digital Scanner Battery .....	1-9
Charging LED .....	1-9
Shutting Off the Digital Scanner Battery .....	1-9
Reconditioning the Digital Scanner Battery .....	1-9
Battery Reconditioning LED Definitions .....	1-10
Inserting the Digital Scanner in the Cradle .....	1-10

Horizontal Cradle Mount .....	1-10
Vertical Cradle Mount .....	1-10
Radio Communications .....	1-11
Configuring the Digital Scanner .....	1-11
Accessories .....	1-12
Lanyard .....	1-12

**Chapter 2: Scanning**

Introduction .....	2-1
Beeper Definitions .....	2-1
LED Definitions .....	2-3
Scanning .....	2-5
Aiming .....	2-5
Decode Ranges .....	2-7

**Chapter 3: Maintenance, Troubleshooting & Technical Specifications**

Introduction .....	3-1
Maintenance .....	3-1
Digital Scanner .....	3-1
Cradle .....	3-2
Battery Information .....	3-2
Troubleshooting .....	3-2
Technical Specifications .....	3-7
Cradle Signal Descriptions .....	3-10

**Chapter 4: Radio Communications**

Introduction .....	4-1
Scanning Sequence Examples .....	4-1
Errors While Scanning .....	4-1
Radio Communications Parameter Defaults .....	4-2
Wireless Beeper Definitions .....	4-3
Radio Communications Host Types .....	4-4
Bluetooth Technology Profile Support .....	4-6
Master/Slave Set Up .....	4-6
Master .....	4-6
Slave .....	4-6
Bluetooth Friendly Name .....	4-7
Discoverable Mode .....	4-7
HID Host Parameters .....	4-8
HID Country Keyboard Types (Country Codes) .....	4-8
HID Keyboard Keystroke Delay .....	4-10
HID CAPS Lock Override .....	4-10
HID Ignore Unknown Characters .....	4-11
Emulate Keypad .....	4-11
HID Keyboard FN1 Substitution .....	4-12
HID Function Key Mapping .....	4-12
Simulated Caps Lock .....	4-13



Convert Case .....	4-13
Auto-reconnect Feature .....	4-14
Reconnect Attempt Beep Feedback .....	4-14
Reconnect Attempt Interval .....	4-15
Auto-reconnect in Bluetooth Keyboard Emulation (HID Slave) Mode .....	4-17
Out of Range Indicator .....	4-17
Digital Scanner(s) To Cradle Support .....	4-18
Modes of Operation .....	4-18
Point-to-Point Communication .....	4-18
Multipoint-to-Point Communication .....	4-18
Parameter Broadcast (Cradle Host Only) .....	4-19
Pairing .....	4-19
Pairing Modes .....	4-20
Lock Override .....	4-20
Pairing Methods .....	4-21
Unpairing .....	4-21
Pairing Bar Code Format .....	4-22
Pairing Bar Code Example .....	4-22
Connection Maintenance Interval .....	4-23
Considerations .....	4-23
Bluetooth Security .....	4-25
Authentication .....	4-25
PIN Code .....	4-26
Variable PIN Code .....	4-26
Encryption .....	4-27

## Chapter 5: User Preferences & Miscellaneous Digital Scanner Options

Introduction .....	5-1
Scanning Sequence Examples .....	5-2
Errors While Scanning .....	5-2
User Preferences/Miscellaneous Option Parameter Defaults .....	5-2
User Preferences .....	5-4
Default Parameters .....	5-4
Parameter Bar Code Scanning .....	5-5
Beep After Good Decode .....	5-5
Suppress Power Up Beeps .....	5-6
Beeper Tone .....	5-7
Beeper Volume .....	5-8
Beeper Duration .....	5-9
Beep on Insertion .....	5-9
Batch Mode .....	5-10
Modes of Operation .....	5-10
Low Power Mode .....	5-12
Time Delay to Reduced Power Mode .....	5-13
Timeout to Low Power Mode from Auto Aim .....	5-14
Hand-Held Trigger Mode .....	5-15
Picklist Mode .....	5-16
Mobile Phone/Display Mode .....	5-17
Continuous Bar Code Read .....	5-18

Unique Bar Code Reporting .....	5-18
Decode Session Timeout .....	5-19
Timeout Between Decodes, Same Symbol .....	5-20
Timeout Between Decodes, Different Symbols .....	5-20
Fuzzy 1D Processing .....	5-21
Hand-Held Decode Aiming Pattern .....	5-22
Decoding Illumination .....	5-23
Multicode Mode .....	5-23
Multicode Expression .....	5-24
Multicode Expression Syntax .....	5-24
Defining Multicode Expression Notes .....	5-25
Multicode Mode Concatenation .....	5-29
Multicode Concatenation Symbology .....	5-30
Multicode Troubleshooting .....	5-31
Troubleshooting Multicode Expression Programming .....	5-31
Troubleshooting Multicode Mode Scanning and Decoding .....	5-31
Miscellaneous Scanner Parameters .....	5-33
Transmit Code ID Character .....	5-33
Prefix/Suffix Values .....	5-34
Scan Data Transmission Format .....	5-35
FN1 Substitution Values .....	5-36
Transmit “No Read” Message .....	5-37

## Chapter 6: USB Interface

Introduction .....	6-1
Connecting a USB Interface .....	6-2
USB Parameter Defaults .....	6-3
USB Host Parameters .....	6-4
USB Device Type .....	6-4
USB Country Keyboard Types (Country Codes) .....	6-5
USB Keystroke Delay .....	6-7
USB CAPS Lock Override .....	6-7
USB Ignore Unknown Characters .....	6-8
Emulate Keypad .....	6-8
USB Keyboard FN 1 Substitution .....	6-9
Function Key Mapping .....	6-9
Simulated Caps Lock .....	6-10
Convert Case .....	6-10
Optional USB Parameters .....	6-11
Ignore Beep .....	6-11
Ignore Bar Code Configuration .....	6-11
ASCII Character Set for USB .....	6-12

## Chapter 7: RS-232 Interface

Introduction .....	7-1
Connecting an RS-232 Interface .....	7-2
RS-232 Parameter Defaults .....	7-3
RS-232 Host Parameters .....	7-4

RS-232 Host Types .....	7-6
Baud Rate .....	7-8
Parity .....	7-9
Stop Bit Select .....	7-9
Data Bits (ASCII Format) .....	7-10
Check Receive Errors .....	7-11
Hardware Handshaking .....	7-11
Software Handshaking .....	7-13
Host Serial Response Time-out .....	7-15
RTS Line State .....	7-16
Beep on <BEL> .....	7-16
Intercharacter Delay .....	7-17
Nixdorf Beep/LED Options .....	7-18
Ignore Unknown Characters .....	7-18
ASCII Character Set for RS-232 .....	7-19

## Chapter 8: Keyboard Wedge Interface

Introduction .....	8-1
Connecting a Keyboard Wedge Interface .....	8-2
Keyboard Wedge Parameter Defaults .....	8-3
Keyboard Wedge Host Parameters .....	8-4
Keyboard Wedge Host Types .....	8-4
Keyboard Wedge Country Types (Country Codes) .....	8-5
Ignore Unknown Characters .....	8-6
Keystroke Delay .....	8-7
Intra-Keystroke Delay .....	8-7
Alternate Numeric Keypad Emulation .....	8-8
Caps Lock On .....	8-8
Caps Lock Override .....	8-9
Convert Wedge Data .....	8-9
Function Key Mapping .....	8-10
FN1 Substitution .....	8-10
Send Make and Break .....	8-11
Keyboard Maps .....	8-12
ASCII Character Set for Keyboard Wedge .....	8-13

## Chapter 9: IBM Interface

Introduction .....	9-1
Connecting to an IBM 468X/469X Host .....	9-2
IBM Parameter Defaults .....	9-3
IBM 468X/469X Host Parameters .....	9-4
Port Address .....	9-4
Convert Unknown to Code 39 .....	9-5
Optional IBM Parameters .....	9-5
Ignore Beep .....	9-5
Ignore Bar Code Configuration .....	9-6

**Chapter 10: Wand Emulation Interface**

Introduction ..... 10-1

Connecting Using Wand Emulation ..... 10-2

Wand Emulation Parameter Defaults ..... 10-3

Wand Emulation Host Parameters ..... 10-4

    Wand Emulation Host Types ..... 10-4

    Leading Margin (Quiet Zone) ..... 10-5

    Polarity ..... 10-6

    Ignore Unknown Characters ..... 10-6

    Convert All Bar Codes to Code 39 ..... 10-7

    Convert Code 39 to Full ASCII ..... 10-8

**Chapter 11: Scanner Emulation Interface**

Connecting Using Scanner Emulation ..... 11-2

Scanner Emulation Parameter Defaults ..... 11-3

Scanner Emulation Host ..... 11-3

Scanner Emulation Host Parameters ..... 11-4

    Beep Style ..... 11-4

    Parameter Pass-Through ..... 11-5

    Convert Newer Code Types ..... 11-6

    Module Width ..... 11-6

    Convert All Bar Codes to Code 39 ..... 11-7

    Code 39 Full ASCII Conversion ..... 11-7

    Transmission Timeout ..... 11-8

    Ignore Unknown Characters ..... 11-9

    Leading Margin ..... 11-9

    Check For Decode LED ..... 11-10

**Chapter 12: 123Scan2**

Introduction ..... 12-1

Communication with 123Scan2 ..... 12-1

123Scan2 Requirements ..... 12-1

**Chapter 13: OCR Programming**

Introduction ..... 13-1

OCR Parameter Defaults ..... 13-2

OCR Programming Parameters ..... 13-3

    Enable/Disable OCR-A ..... 13-3

    OCR-A Variant ..... 13-3

    Enable/Disable OCR-B ..... 13-5

    OCR-B Variant ..... 13-6

    Enable/Disable MICR E13B ..... 13-9

    Enable/Disable US Currency Serial Number ..... 13-10

    OCR Orientation ..... 13-10

    OCR Lines ..... 13-12

    OCR Minimum Characters ..... 13-12

    OCR Maximum Characters ..... 13-13

OCR Security Level .....	13-13
OCR Subset .....	13-14
OCR Quiet Zone .....	13-14
OCR Bright Illumination .....	13-15
OCR Template .....	13-16
Required Digit (9) .....	13-16
Required Alpha (A) .....	13-16
Optional Alphanumeric (1) .....	13-17
Optional Alpha (2) .....	13-17
Alpha or Digit (3) .....	13-17
Any Including Space & Reject (4) .....	13-18
Any except Space & Reject (5) .....	13-18
Optional Digit (7) .....	13-18
Digit or Fill (8) .....	13-19
Alpha or Fill (F) .....	13-19
Required Space ( ) .....	13-19
Optional Small Special (.) .....	13-20
Other Template Operators .....	13-20
Repeat Previous (R) .....	13-24
Template Examples .....	13-25
OCR Check Digit Modulus .....	13-25
OCR Check Digit Multiplier .....	13-26
OCR Check Digit Validation .....	13-27
None .....	13-27
Product Add Left to Right .....	13-27
Product Add Right to Left .....	13-28
Digit Add Left to Right .....	13-28
Digit Add Right to Left .....	13-29
Product Add Right to Left Simple Remainder .....	13-30
Digit Add Right To Left Simple Remainder .....	13-31
Health Industry - HIBCC43 .....	13-31

## Chapter 14: Symbolologies

Introduction .....	14-1
Scanning Sequence Examples .....	14-1
Errors While Scanning .....	14-2
Symbology Parameter Defaults .....	14-2
UPC/EAN .....	14-7
Enable/Disable UPC-A .....	14-7
Enable/Disable UPC-E .....	14-7
Enable/Disable UPC-E1 .....	14-8
Enable/Disable EAN-8/JAN-8 .....	14-8
Enable/Disable EAN-13/JAN-13 .....	14-9
Enable/Disable Bookland EAN .....	14-9
Decode UPC/EAN/JAN Supplementals .....	14-10
User-Programmable Supplementals .....	14-13
UPC/EAN/JAN Supplemental Redundancy .....	14-13
UPC/EAN/JAN Supplemental AIM ID Format .....	14-14
Transmit UPC-A Check Digit .....	14-14

Transmit UPC-E Check Digit .....	14-15
Transmit UPC-E1 Check Digit .....	14-15
UPC-A Preamble .....	14-16
UPC-E Preamble .....	14-17
UPC-E1 Preamble .....	14-18
Convert UPC-E to UPC-A .....	14-19
Convert UPC-E1 to UPC-A .....	14-19
EAN-8/JAN-8 Extend .....	14-20
Bookland ISBN Format .....	14-21
UCC Coupon Extended Code .....	14-22
ISSN EAN .....	14-22
Code 128 .....	14-23
Enable/Disable Code 128 .....	14-23
Set Lengths for Code 128 .....	14-23
Enable/Disable GS1-128 (formerly UCC/EAN-128) .....	14-24
Enable/Disable ISBT 128 .....	14-25
ISBT Concatenation .....	14-26
Check ISBT Table .....	14-27
ISBT Concatenation Redundancy .....	14-27
Code 39 .....	14-28
Enable/Disable Code 39 .....	14-28
Enable/Disable Trioptic Code 39 .....	14-28
Convert Code 39 to Code 32 .....	14-29
Code 32 Prefix .....	14-29
Set Lengths for Code 39 .....	14-30
Code 39 Check Digit Verification .....	14-31
Transmit Code 39 Check Digit .....	14-31
Code 39 Full ASCII Conversion .....	14-32
Code 39 Buffering - Scan & Store .....	14-32
Buffer Data .....	14-33
Clear Transmission Buffer .....	14-33
Transmit Buffer .....	14-34
Overfilling Transmission Buffer .....	14-34
Attempt to Transmit an Empty Buffer .....	14-34
Code 93 .....	14-35
Enable/Disable Code 93 .....	14-35
Set Lengths for Code 93 .....	14-35
Code 11 .....	14-37
Code 11 .....	14-37
Set Lengths for Code 11 .....	14-37
Code 11 Check Digit Verification .....	14-39
Transmit Code 11 Check Digits .....	14-40
Interleaved 2 of 5 (ITF) .....	14-40
Enable/Disable Interleaved 2 of 5 .....	14-40
Set Lengths for Interleaved 2 of 5 .....	14-41
I 2 of 5 Check Digit Verification .....	14-43
Transmit I 2 of 5 Check Digit .....	14-43
Convert I 2 of 5 to EAN-13 .....	14-44
Discrete 2 of 5 (DTF) .....	14-44
Enable/Disable Discrete 2 of 5 .....	14-44

Set Lengths for Discrete 2 of 5 .....	14-45
Codabar (NW - 7) .....	14-47
Enable/Disable Codabar .....	14-47
Set Lengths for Codabar .....	14-47
CLSI Editing .....	14-49
NOTIS Editing .....	14-49
MSI .....	14-50
Enable/Disable MSI .....	14-50
Set Lengths for MSI .....	14-50
MSI Check Digits .....	14-52
Transmit MSI Check Digit(s) .....	14-52
MSI Check Digit Algorithm .....	14-53
Chinese 2 of 5 .....	14-53
Enable/Disable Chinese 2 of 5 .....	14-53
Matrix 2 of 5 .....	14-54
Enable/Disable Matrix 2 of 5 .....	14-54
Set Lengths for Matrix 2 of 5 .....	14-55
Matrix 2 of 5 Redundancy .....	14-56
Matrix 2 of 5 Check Digit .....	14-56
Transmit Matrix 2 of 5 Check Digit .....	14-57
Korean 3 of 5 .....	14-57
Enable/Disable Korean 3 of 5 .....	14-57
Inverse 1D .....	14-58
Postal Codes .....	14-59
US Postnet .....	14-59
US Planet .....	14-59
Transmit US Postal Check Digit .....	14-60
UK Postal .....	14-60
Transmit UK Postal Check Digit .....	14-61
Japan Postal .....	14-61
Australian Postal .....	14-62
Netherlands KIX Code .....	14-62
USPS 4CB/One Code/Intelligent Mail .....	14-63
UPU FICS Postal .....	14-63
GS1 DataBar .....	14-64
GS1 DataBar-14 .....	14-64
GS1 DataBar Limited .....	14-64
GS1 DataBar Expanded .....	14-65
Convert GS1 DataBar to UPC/EAN .....	14-65
Composite .....	14-66
Composite CC-C .....	14-66
Composite CC-A/B .....	14-66
Composite TLC-39 .....	14-67
UPC Composite Mode .....	14-67
Composite Beep Mode .....	14-68
GS1-128 Emulation Mode for UCC/EAN Composite Codes .....	14-68
2D Symbolologies .....	14-69
Enable/Disable PDF417 .....	14-69
Enable/Disable MicroPDF417 .....	14-69
Code 128 Emulation .....	14-70

Data Matrix .....	14-71
Data Matrix Inverse .....	14-71
Maxicode .....	14-72
QR Code .....	14-72
QR Inverse .....	14-73
MicroQR .....	14-73
Aztec .....	14-74
Aztec Inverse .....	14-74
Redundancy Level .....	14-75
Redundancy Level 1 .....	14-75
Redundancy Level 2 .....	14-75
Redundancy Level 3 .....	14-75
Redundancy Level 4 .....	14-76
Security Level .....	14-77
Intercharacter Gap Size .....	14-78
Report Version .....	14-78
Macro PDF Features .....	14-79
Flush Macro Buffer .....	14-79
Abort Macro PDF Entry .....	14-79

## Chapter 15: Advanced Data Formatting

Introduction .....	15-1
Rules: Criteria Linked to Actions .....	15-1
Using ADF Bar Codes .....	15-2
ADF Bar Code Menu Example .....	15-2
Rule 1: The Code 128 Scanning Rule .....	15-3
Rule 2: The UPC Scanning Rule .....	15-3
Alternate Rule Sets .....	15-3
Rules Hierarchy (in Bar Codes) .....	15-4
Default Rules .....	15-5
ADF Bar Codes .....	15-6
Special Commands .....	15-8
Pause Duration .....	15-8
Begin New Rule .....	15-8
Save Rule .....	15-8
Erase .....	15-9
Quit Entering Rules .....	15-9
Disable Rule Set .....	15-10
Criteria .....	15-11
Code Types .....	15-11
Code Lengths .....	15-15
Message Containing A Specific Data String .....	15-19
Specific String at Start .....	15-19
Specific String, Any Location .....	15-20
Any Message OK .....	15-20
Numeric Keypad .....	15-21
Rule Belongs To Set .....	15-23
Actions .....	15-24
Send Data .....	15-24



Setup Field(s) .....	15-27
Move Cursor .....	15-28
Send Pause .....	15-28
Skip Ahead .....	15-29
Skip Back .....	15-30
Send Preset Value .....	15-32
Modify Data .....	15-32
Remove All Spaces .....	15-32
Crunch All Spaces .....	15-32
Stop Space Removal .....	15-32
Remove Leading Zeros .....	15-33
Stop Zero Removal .....	15-33
Pad Data with Spaces .....	15-34
Pad Data with Zeros .....	15-38
Beeps .....	15-43
Send Keystroke (Control Characters and Keyboard Characters) .....	15-43
Control Characters .....	15-43
Keyboard Characters .....	15-48
Send ALT Characters .....	15-61
Send Keypad Characters .....	15-67
Send Function Key .....	15-72
Send Right Control Key .....	15-79
Send Graphic User Interface (GUI) Characters .....	15-80
Turn On/Off Rule Sets .....	15-85
Alphanumeric Keyboard .....	15-87

## Chapter 16: Driver's License Set Up (DS6878-DL)

Introduction .....	16-1
Driver's License Parsing .....	16-2
Parsing Driver's License Data Fields (Embedded Driver's License Parsing) .....	16-3
Embedded Driver's License Parsing Criteria - Code Type .....	16-3
Driver's License Parse Field Bar Codes .....	16-4
AAMVA Parse Field Bar Codes .....	16-7
Parsing Rule Example .....	16-17
Embedded Driver's License Parsing ADF Example .....	16-21
Field Update Procedure .....	16-23
User Preferences .....	16-24
Set Default Parameter .....	16-24
Send Keystroke (Control Characters and Keyboard Characters) .....	16-24
Control Characters .....	16-24
Keyboard Characters .....	16-29

## Appendix A: Standard Default Parameters

## Appendix B: Programming Reference

Symbol Code Identifiers .....	B-1
AIM Code Identifiers .....	B-3

**Appendix C: Sample Bar Codes**

Code 39 .....	C-1
UPC/EAN .....	C-1
UPC-A, 100% .....	C-1
EAN-13, 100% .....	C-2
Code 128 .....	C-2
Interleaved 2 of 5 .....	C-2
GS1 DataBar .....	C-3
GS1 DataBar-14 .....	C-4
PDF417 .....	C-4
Data Matrix .....	C-4
Maxicode .....	C-5
QR Code .....	C-5
US Postnet .....	C-5
UK Postal .....	C-5

**Appendix D: Numeric Bar Codes**

Numeric Bar Codes .....	D-2
Cancel .....	D-3

**Appendix E: Alphanumeric Bar Codes**

Alphanumeric Keyboard .....	E-1
-----------------------------	-----

**Appendix F: ASCII Character Sets**

**Glossary**

**Index**

**Tell Us What You Think...**

# About This Guide

---

## Introduction

The *Symbol DS6878 Product Reference Guide* provides general instructions for setting up, operating, maintaining, and troubleshooting the Symbol DS6878 digital scanner and cradles.

---

## Configurations

This guide includes the following configurations:

- DS6878-SR20001WR - DS6878 digital scanner, standard range, cash register white
- DS6878-SR20007WR - DS6878 digital scanner, standard range, twilight black
- DS6878-HC2000BWR - DS6878 digital scanner, standard range, healthcare white
- DS6878-DL20001WR - DS6878 digital scanner, standard range, DL parsing, cash register white
- DS6878-DL20007WR - DS6878 digital scanner, standard range, DL parsing, twilight black
- DS6878-HD20007WR - DS6878 digital scanner, high density, twilight black

---

## Chapter Descriptions

Topics covered in this guide are as follows:

- [Chapter 1, Getting Started](#) provides a product overview, unpacking instructions, and cable connection information.
- [Chapter 2, Scanning](#) describes parts of the digital scanner, beeper and LED definitions, and how to use the digital scanner.
- [Chapter 3, Maintenance, Troubleshooting & Technical Specifications](#) provides information on how to care for the digital scanner and cradle, troubleshooting, and technical specifications.
- [Chapter 4, Radio Communications](#) provides information about the modes of operation and features available for wireless communication. This chapter also includes programming bar codes to configure the digital scanner.

- [Chapter 5, User Preferences & Miscellaneous Digital Scanner Options](#) provides programming bar codes for selecting user preference features for the digital scanner and commonly used bar codes to customize how the data is transmitted to the host device.
- [Chapter 6, USB Interface](#) provides information for setting up the digital scanner and cradle for USB operation.
- [Chapter 7, RS-232 Interface](#) provides information for setting up the digital scanner and cradle for RS-232 operation.
- [Chapter 8, Keyboard Wedge Interface](#) provides information for setting up the digital scanner and cradle for Keyboard Wedge operation.
- [Chapter 9, IBM Interface](#) provides all information for setting up the digital scanner and cradle with IBM 468X/469X POS systems.
- [Chapter 10, Wand Emulation Interface](#) provides all information for setting up the digital scanner and cradle for Wand Emulation operation.
- [Chapter 11, Scanner Emulation Interface](#) provides information for setting up the digital scanner and cradle for Scanner Emulation operation.
- [Chapter 12, 123Scan2](#) (PC based scanner configuration tool) enables rapid and easy customized setup of Symbol scanners by Motorola.
- [Chapter 13, OCR Programming](#) describes how to set up the digital scanner for OCR programming.
- [Chapter 14, Symbologies](#) describes all symbology features and provides the programming bar codes necessary for selecting these features for the digital scanner.
- [Chapter 15, Advanced Data Formatting](#) (ADF) describes how to customize scanned data before transmitting to the host. This chapter also contains the bar codes for advanced data formatting.
- [Chapter 16, Driver's License Set Up \(DS6878-DL\)](#) describes how the DS6878-DL digital scanner can parse out information from the standard US driver's licenses and certain other American Association of Motor Vehicle Administrators (AAMVA) compliant ID cards.
- [Appendix A, Standard Default Parameters](#) provides a table of all host devices and miscellaneous digital scanner defaults.
- [Appendix B, Programming Reference](#) provides a table of AIM code identifiers, ASCII character conversions, and keyboard maps.
- [Appendix C, Sample Bar Codes](#) includes sample bar codes.
- [Appendix D, Numeric Bar Codes](#) includes the numeric bar codes to scan for parameters requiring specific numeric values.
- [Appendix E, Alphanumeric Bar Codes](#) includes the bar codes representing the alphanumeric keyboard, used when setting ADF rules.
- [Appendix F, ASCII Character Sets](#) provides ASCII character value tables.

---

## Notational Conventions

The following conventions are used in this document:

- *Italics* are used to highlight chapters and sections in this and related documents.
- **Bold** text is used to highlight parameter names and options.

- bullets (•) indicate:
  - Action items
  - Lists of alternatives
  - Lists of required steps that are not necessarily sequential
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.
- Throughout the programming bar code menus, asterisks (\*) are used to denote default parameter settings.



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



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



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



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

---

## Related Documents

- The *Symbol DS6878 Quick Start Guide* (p/n 72-131700-xx) provides general information to help the user get started with the digital scanner. It includes basic operation instructions and start up bar codes.
- The *STB4278/STB4208 Cradle Quick Reference Guide* (p/n 72-71010-xx) provides information to help the user set up and use the charge only and host interface cradles. It includes set up and mounting instructions.

The latest version of this guide and all guides, are available at:  
<http://www.motorola.com/enterprisemobility/manuals>

---

## Service Information

If you have a problem with your equipment, contact Motorola Enterprise Mobility Support for your region. Contact information is available at: <http://www.motorola.com/enterprisemobility/support>

When contacting Enterprise Mobility Support, please have the following information available:

- Serial number of the unit
- Model number or product name

- Software type and version number.

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

If your problem cannot be solved by Motorola Enterprise Mobility Support, you may need to return your equipment for servicing and will be given specific directions. Motorola 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 Enterprise Mobility business product from a Motorola business partner, contact that business partner for support.

# Chapter 1 Getting Started

---

## Introduction

The Symbol DS6878 combines superior 1D and 2D omnidirectional bar code scanning performance and advanced ergonomics in a light-weight design. The digital scanner ensures comfort and ease of use for extended periods of time.



**Figure 1-1** *Symbol DS6878 Digital Scanner*

---

## Interfaces

The STB4278 model cradle (p/n: CR0078-SC) supports the following interfaces:

- USB connection to a host. The cradle auto detects a USB host and defaults to the HID keyboard interface type. Select other USB interface types by scanning programming bar code menus. This interface supports the following international keyboards (for Windows® environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Portuguese-Brazilian, and Japanese.
- Standard RS-232 connection to a host. Scan bar code menus to set up proper communication of the cradle with the host.
- Keyboard Wedge connection to a host. The host interprets scanned data as keystrokes. This interface supports the following international keyboards (for Windows® environment): North America, German, French, French Canadian, Spanish, Italian, Swedish, UK English, Portuguese-Brazilian, and Japanese.
- Connection to IBM® 468X/469X hosts. Scan bar code menus to set up communication of the cradle with the IBM terminal.
- Wand Emulation connection to a host. The cradle is connected to a portable data terminal, a controller, or host which collects the data as wand data and decodes it.
- Scanner Emulation connection to a host. The cradle is connected to a portable data terminal, a controller which collects the data and interprets it for the host.
- Synapse capability which allows connection to a wide variety of host systems using a Synapse and Synapse adapter cable. The cradle auto detects the host.
- Configuration via 123Scan<sup>2</sup>.

---

## Unpacking the Digital Scanner and Cradle

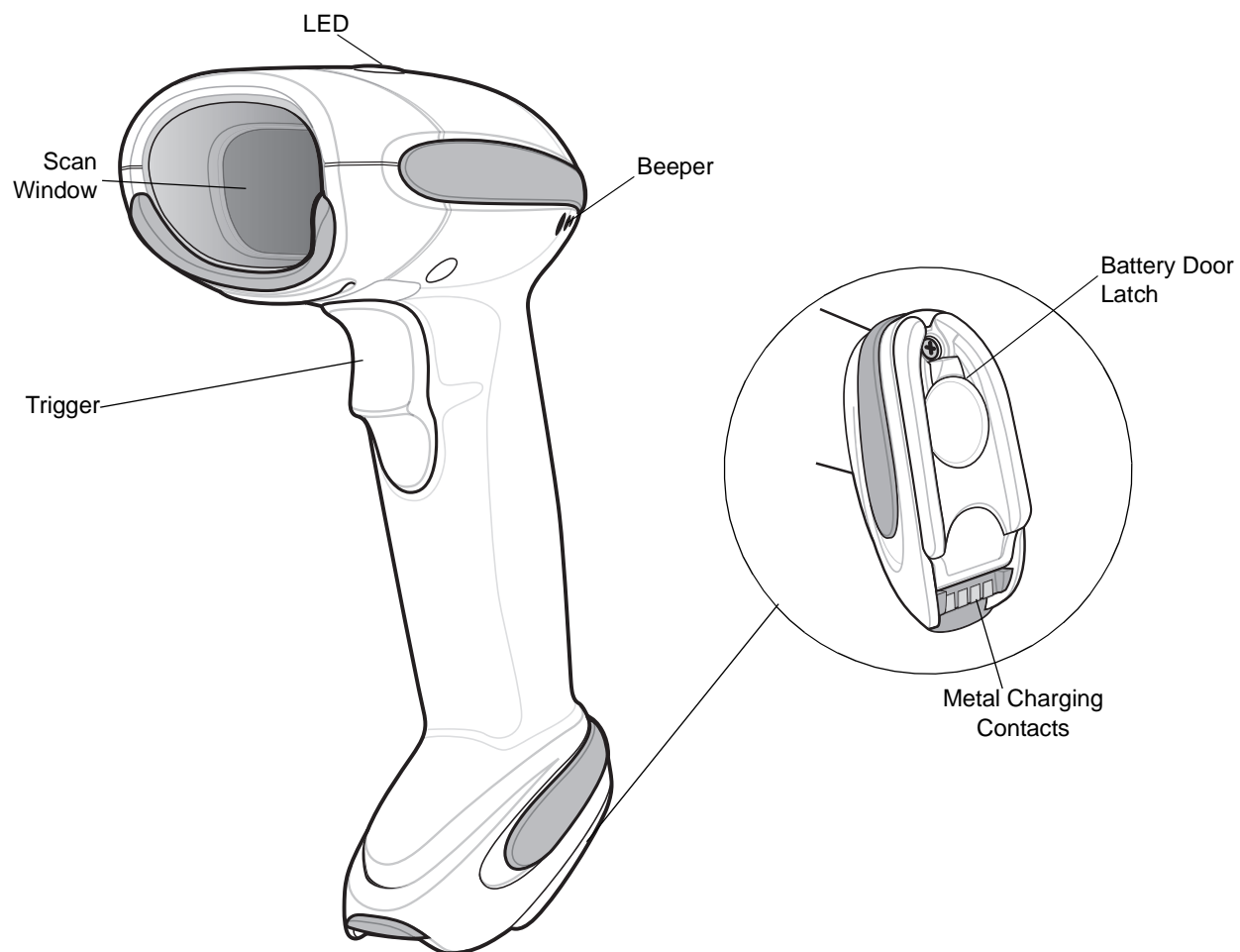
Remove the digital scanner and cradle from their respective packing and inspect for damage. If the digital scanner or cradle was damaged in transit, contact Motorola Enterprise Mobility Support. See [page xix](#) for contact information. **KEEP THE PACKING.** It is the approved shipping container and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



---

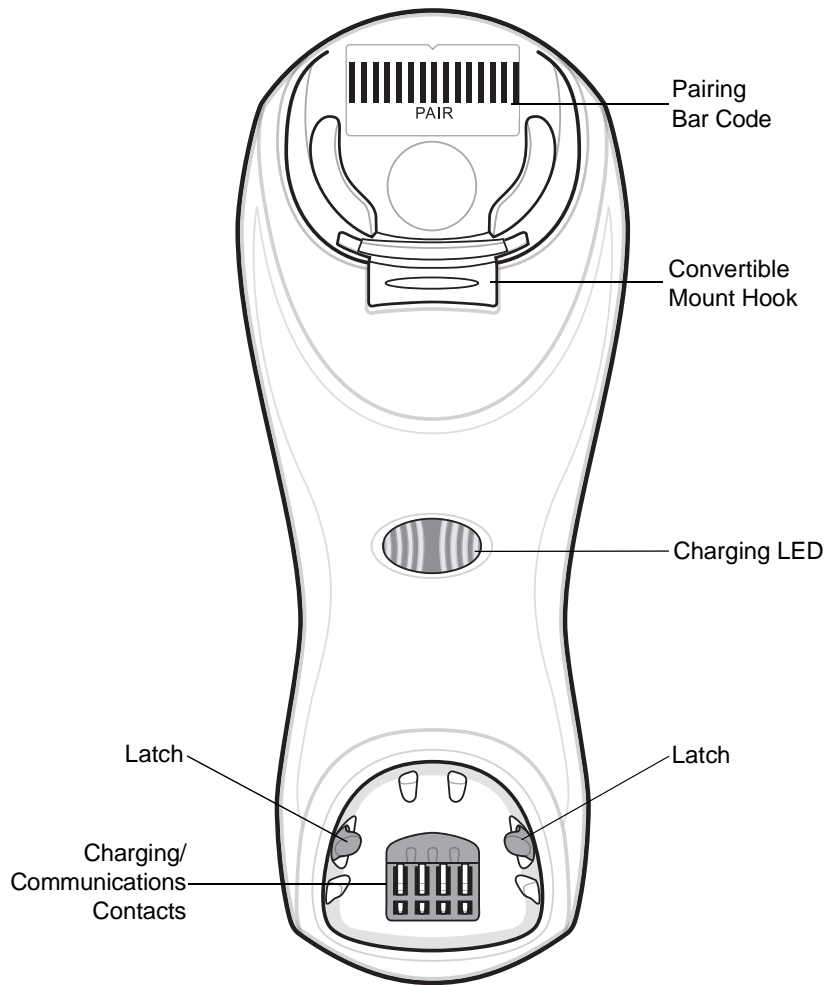
## Parts

### Scanner

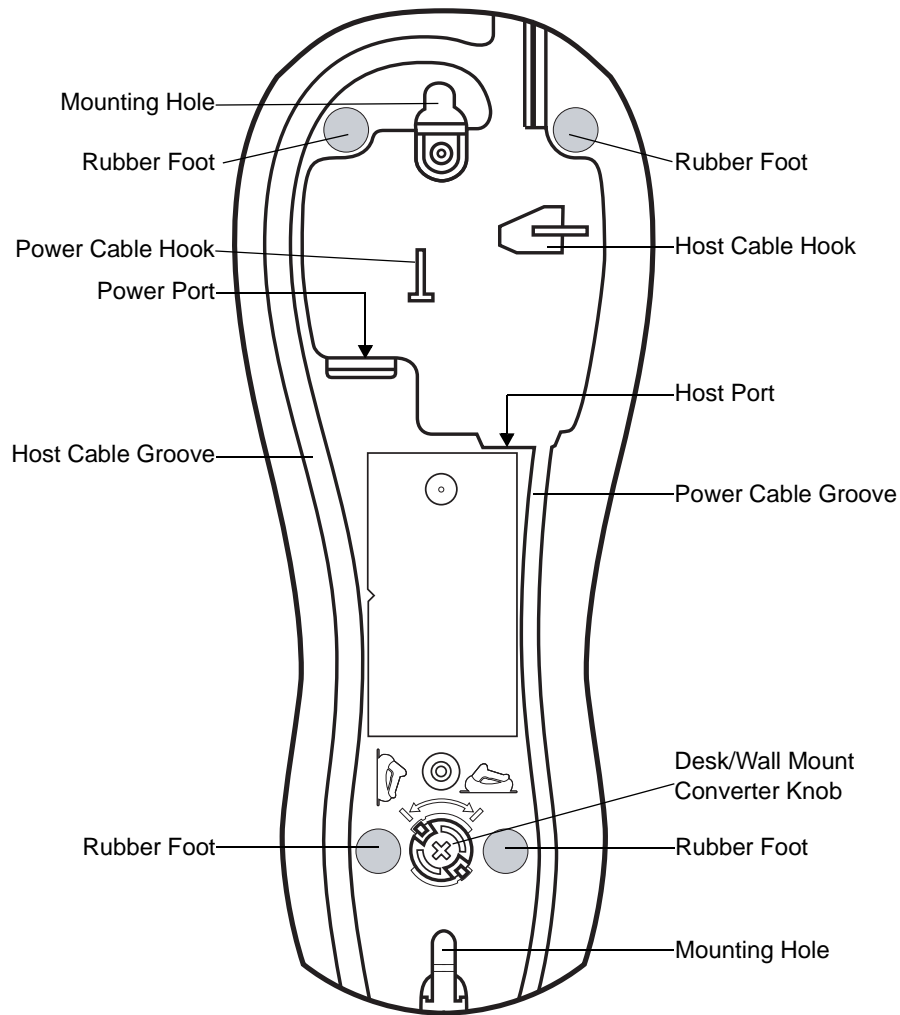


**Figure 1-2** *Parts of the Digital Scanner*

## Cradle



**Figure 1-3** Cradle Front View



**Figure 1-4** *Cradle Back View*

## Digital Scanner Cradle

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

There are two versions of the cradle:

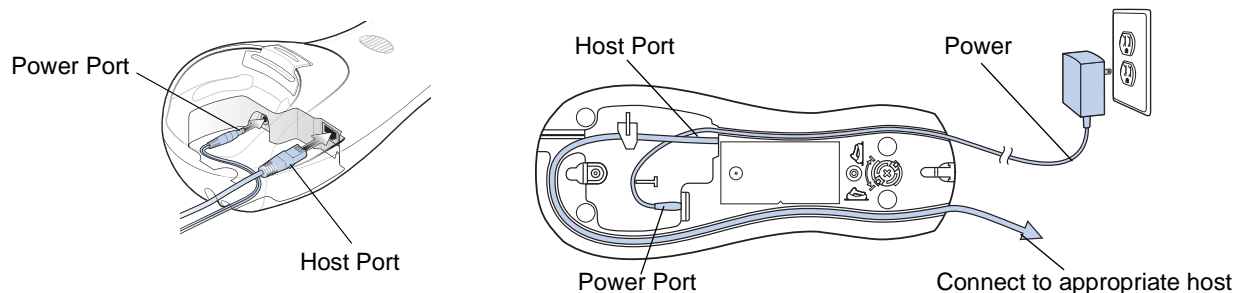
- **Charging cradle with radio:** When the cordless digital scanner is paired to the cradle, all communication between the digital scanner and the host computer is accomplished through the cradle. Each bar code contains programming instructions or other data unique to the bar code pattern. The digital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

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

## Connecting the Cradle

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

1. If a power supply is connected to the cradle, disconnect it. See [Figure 1-5](#).
2. If using an interface cable, insert the cable into the cradle's host port.
3. If using a power supply that connects to the interface cable, insert this power supply into the power connector on the interface cable, and the other end to an AC supply.
4. Insert the other end of the interface cable into the appropriate port on the host computer (see the specific host chapter for information on host connections).
5. If using an external power supply (if required by the interface, or to allow fast charging of the digital scanner), insert the power cable into the power port on the back of the cradle, and connect the power supply to an approved AC supply (refer to the *STB4278/STB4208 Cradle Quick Reference Guide* for more information).



**Figure 1-5** Connecting the Cables to the Cradle

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

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

## Supplying Power to the Cradle

The cradle receives power from one of two sources:

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

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

### Using the USB Interface to Supply Power

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

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

## Lost Connection to Host

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

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

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

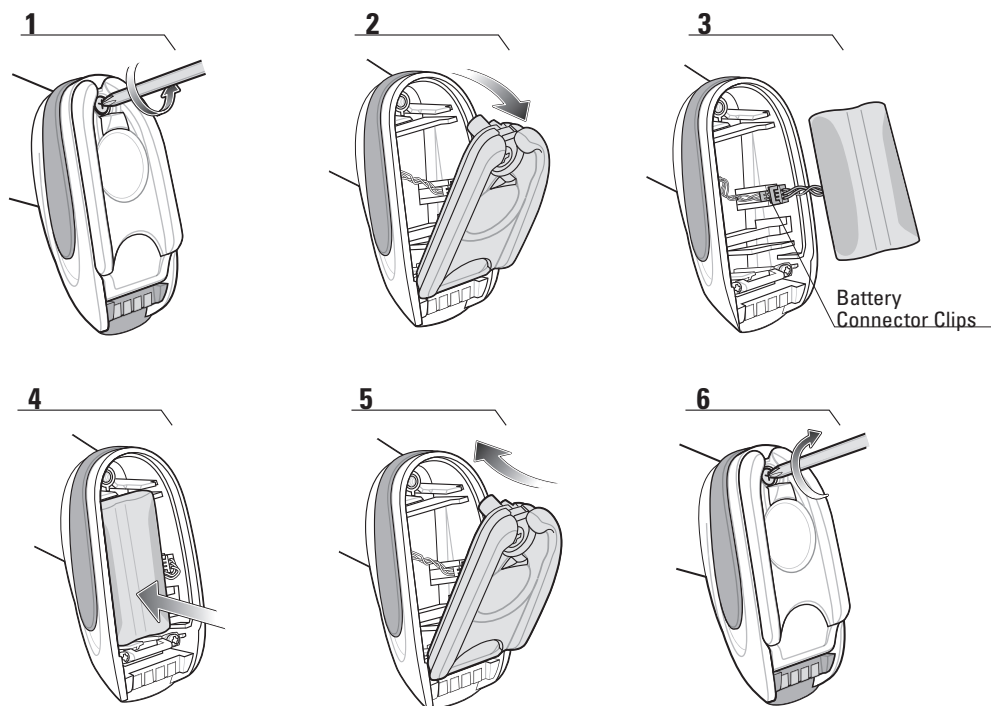
## Mounting the Cradle

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

## Replacing the Digital Scanner Battery

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

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



**Figure 1-6** *Inserting the Battery*

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

---

## Charging the Digital Scanner Battery

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



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

## Charging LED

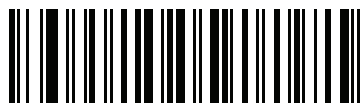
When powered up, the cradle LED is always green. The digital scanner LED flashes a green during charging. See [Table 2-2 on page 2-3](#) for all charging LED indications.

---

## Shutting Off the Digital Scanner Battery

To shut off the NiMH battery for long term storage or shipping:

1. Scan **Battery Off** bar code below.



**Battery Off**

2. To turn the battery back on, place the digital scanner in the cradle.

---

## Reconditioning the Digital Scanner Battery

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

To begin the battery recondition cycle:

1. Scan **Battery Recondition** below.



**Battery Recondition**

2. Place the digital scanner into the cradle.



**NOTE** If the scanner is removed from the cradle during the battery reconditioning cycle, the scanner exits the battery reconditioning mode of operation and returns to the normal mode of battery charging (see *Charging the Digital Scanner Battery on page 1-9*). To restart the battery reconditioning cycle, re-scan the Battery Recondition parameter and place the scanner in the cradle.

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

## Battery Reconditioning LED Definitions

**Table 1-1** Battery Reconditioning LED Definitions

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

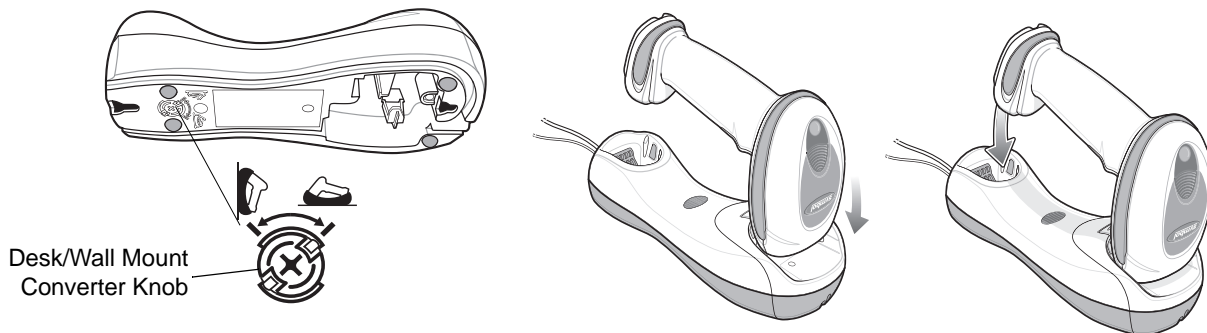
## Inserting the Digital Scanner in the Cradle

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

### Horizontal Cradle Mount

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

- Ensure the rubber feet are attached to the cradle. These feet provide traction and prevent surface damage.
- Ensure the desk/wall mount converter knob is in the position shown in [Figure 1-7](#).



**Figure 1-7** Horizontal Mount - Inserting the Digital Scanner in the Cradle

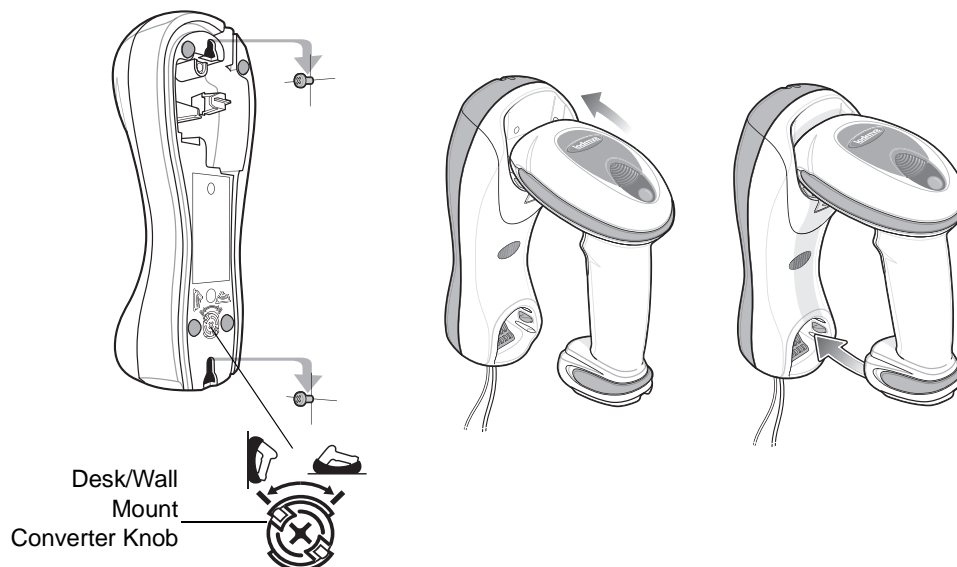
### Vertical Cradle Mount

When mounting the cradle vertically:

- Ensure the rubber feet are attached to the cradle. These feet provide traction and prevent surface damage.



2. Ensure the convertible mount hook on the front of the cradle is inserted with the hook facing up. If not, remove and reverse the hook so that it is in position to secure the digital scanner in place. (See [Figure 1-3 on page 1-4](#) for the location of the convertible mount hook.)
3. Ensure the desk/wall mount converter knob is in the position shown in [Figure 1-8](#).



**Figure 1-8** Vertical Mount - Inserting the Digital Scanner in the Cradle

✓ **NOTE** For your convenience, a wall mount bracket can be purchased from Motorola. For the appropriate measurements and instructions on mounting the cradle, refer to the STB4278/STB4208 *Quick Reference Guide* (p/n 72-71010-xx).

---

## Radio Communications

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

---

## Configuring the Digital Scanner

Use the bar codes in this manual or the 123Scan<sup>2</sup> configuration program to configure the digital scanner. See [Chapter 5, User Preferences & Miscellaneous Digital Scanner Options](#) for information about programming the digital scanner using bar code menus. Also see each host-specific chapter to set up connection to a specific host type. See [Chapter 12, 123Scan2](#) to configure the digital scanner using this configuration program.

---

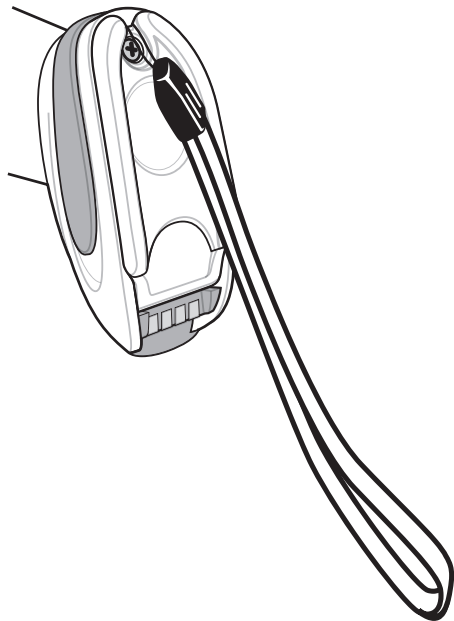
## Accessories

The digital scanner and cradle accessories that are available separately include:

- Power supplies for applications that do not supply power over the host cable. See each host interface chapter for set up information.
- Wall-mount bracket for mounting the cradle vertically. Refer to the *STB4278/STB4208 Cradle Quick Reference Guide* (p/n 72-71010-xx) for a wall mounting template and installation instructions.
- Lanyard for wearing the digital scanner on a wrist.

### Lanyard

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

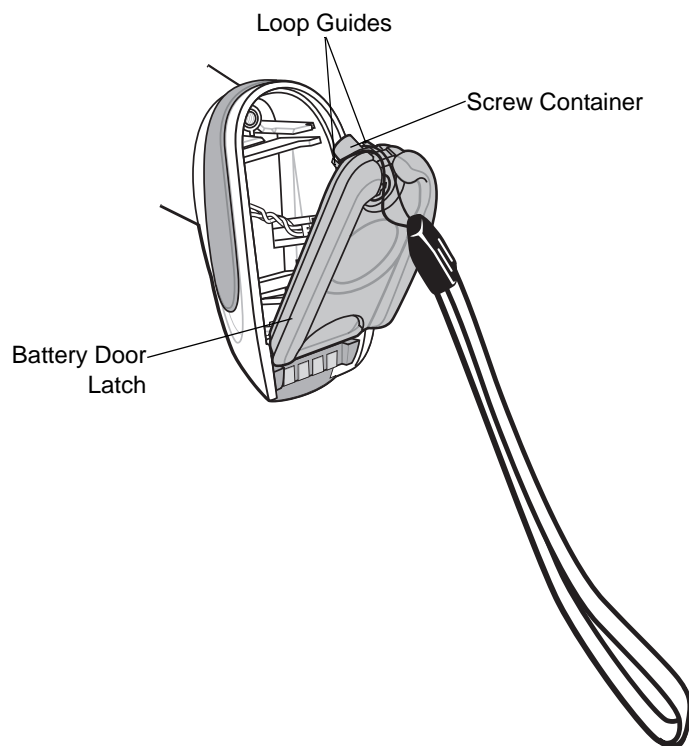


**Figure 1-9** Attached Lanyard

To attach the lanyard:

1. Open the battery door latch as described in *Replacing the Digital Scanner Battery* on page 1-8. Do not remove the battery.

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



**Figure 1-10** *Attaching Lanyard*

- Close the battery door latch.
- Tighten the screw.



# Chapter 2 Scanning

---

## Introduction

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

---

## Beeper Definitions

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

**Table 2-1** Standard Beeper Definitions

Beeper Sequence	Indication
<b>Standard Use</b>	
Low/medium/high beeps	Power up.
High beep	A bar code symbol was decoded (if decode beeper is enabled).
Four long low beeps	<ol style="list-style-type: none"><li>1. A transmission error was detected in a scanned symbol. The data is ignored. This occurs if a unit is not properly configured. Check option setting.</li><li>2. When communicating with a cradle, the cradle acknowledges receipt of data. If the acknowledgment is not received, this transmission error beep sequence sounds. Data may still have been received by the host. Check the host system for receipt of transmitted data. If data was not received by the host, re-scan the bar code.</li></ol>
Four short beeps	Low battery warning.
Five low long beeps	Conversion or format error.

**Table 2-1** Standard Beeper Definitions (Continued)

Beeper Sequence	Indication
Low beep	Digital scanner detects power when inserted into a cradle. Note: This feature is enabled by default and can be disabled (see <a href="#">Beep on Insertion on page 5-9</a> ).
Low/high/low/high beeps	Out of memory - unable to store a new bar code.
Low/high/low beeps	ADF transmit error.
High/high/high/low beeps	RS-232 receive error.
<b>Parameter Menu Scanning</b>	
Long low/long high beeps	Input error, incorrect bar code or <b>Cancel</b> scanned, wrong entry, incorrect bar code programming sequence; remain in program mode.
High/low beeps	Keyboard parameter selected. Enter value using bar code keypad.
High/low/high/low beeps	Successful program exit with change in the parameter setting.
Long low/long high/long low/long high beeps	Out of host parameter storage space. Scan <a href="#">Default Parameters on page 5-4</a> .
<b>Image Capture</b>	
Low beep	Snapshot mode started or completed.
High/low beeps	Snapshot mode timed out.
<b>Wireless Operation</b>	
High/low/high/low beeps	Pairing bar code scanned.
Low/high beeps	Bluetooth connection established.
High/low beeps	Bluetooth disconnection event. Note: When connected to a remote device using SPP or HID, if a disconnect beep sequence sounds immediately after a bar code is scanned, check the host device for receipt of transmitted data. It is possible that an attempt was made to transmit the last bar code scanned after the connection was lost.
Long low/long high beeps	Page timeout; remote device is out of range/not powered.
Long low/long high/long low/long high beeps	Connection attempt was rejected by remote device.
<b>Code 39 Buffering</b>	
High/low beeps	New Code 39 data was entered into the buffer.
Three long high beeps	Code 39 buffer is full.
High/low/high beeps	The Code 39 buffer was erased.
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.

**Table 2-1** Standard Beeper Definitions (Continued)

Beeper Sequence	Indication
<b>Host Specific</b>	
<b>USB only</b>	
Four high beeps	Digital scanner has not completed initialization. Wait several seconds and scan again.
Digital scanner gives a power-up beep after scanning a USB Device Type.	Communication with the bus must be established before the digital scanner can operate at the highest power level.
This power-up beep occurs more than once.	The USB bus may put the digital scanner in a state where power to the digital scanner is cycled on and off more than once. This is normal and usually happens when the host PC cold boots.
<b>RS-232 only</b>	
High beep	A <BEL> character is received and Beep on <BEL> is enabled (Point-to-Point mode only).

## LED Definitions

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

**Table 2-2** Standard Scanner LED Definitions

LED	Indication
<b>Scanning</b>	
Green Flash	A bar code was successfully decoded.
Red	Transmission error or digital scanner malfunction.
<b>Charging</b>	
Green - Slow Continuous Flash <sup>1</sup>	Non-critical battery temperature fault. Battery is above or below normal operating temperature. If this occurs, do not use the digital scanner and move the digital scanner to a location within normal operating temperature. The digital scanner can remain in the cradle while the battery warms or cools to normal operating temperature. Note: For appropriate charging temperatures, see <a href="#">Table 3-3 on page 3-8</a> .
Green - Fast Continuous Flash <sup>2</sup>	Digital scanner is charging.

<sup>1</sup> A slow continuous flash is estimated at 1 flash per second.

<sup>2</sup> A fast continuous flash is estimated at 2 flashes per second.

**Table 2-2** Standard Scanner LED Definitions (Continued)

LED	Indication
Green - Solid	Digital scanner is fully charged.
Red	Battery may require pre-charge.
Amber - Continuous Flash	Critical battery temperature fault. Battery is above or below normal operating temperature. If this occurs, do not use the digital scanner and move the digital scanner to a location within normal operating temperature. The digital scanner can remain in the cradle while the battery warms or cools to normal operating temperature. Note: For appropriate charging temperatures, see <a href="#">Table 3-3 on page 3-8</a> .

<sup>1</sup> A slow continuous flash is estimated at 1 flash per second.  
<sup>2</sup> A fast continuous flash is estimated at 2 flashes per second.

**Table 2-3** Standard Cradle LED Definitions

LED	Indication
Green	Cradle is powered.
Green Flash	Cradle is externally powered with a USB host interface that suspended the cradle. The cradle is no longer connected to the digital scanner but it will charge the digital scanner. Scan the pairing bar code to pair the scanner and cradle (see <i>Pairing on page 4-19</i> ).
Red Flash	Transmission error.

<sup>1</sup> A slow continuous flash is estimated at 1 flash per second.  
<sup>2</sup> A fast continuous flash is estimated at 2 flashes per second.



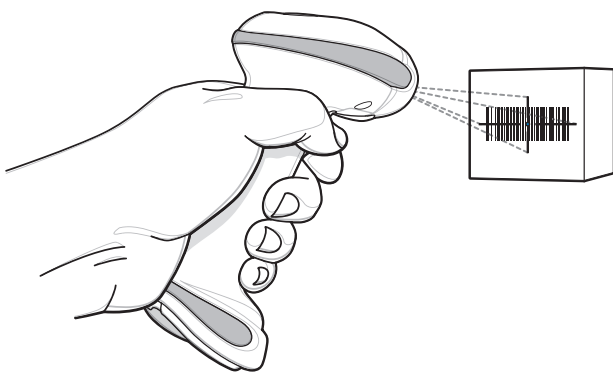
---

## Scanning

To program the digital scanner, see the appropriate host chapter, [Chapter 4, Radio Communications](#) and [Chapter 14, Symbologies](#). (In addition to the parameters included in the chapters mentioned, user preference and miscellaneous digital scanner option parameters are also available in this guide.)

To scan:

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

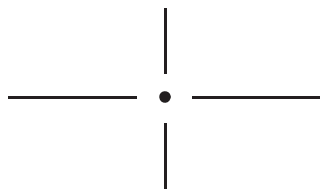


**Figure 2-1** Scanning

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

## Aiming

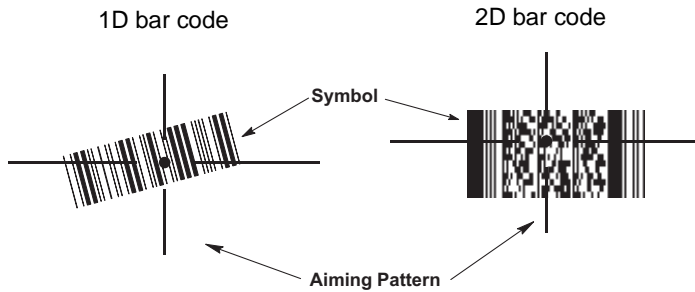
When scanning, the digital scanner projects a red laser aiming pattern which allows positioning the bar code within its field of view. See [Decode Ranges on page 2-7](#) for the proper distance to achieve between the digital scanner and a bar code.



**Figure 2-2** Imager Aiming Pattern

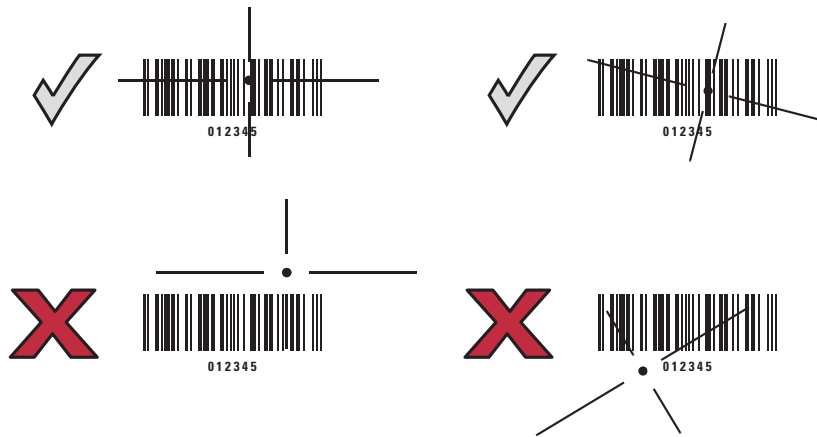
If necessary, the digital scanner turns on its red LEDs to illuminate the target bar code.

To scan a bar code, center the symbol in any orientation within the aiming pattern. Be sure the entire symbol is within the rectangular area formed by the cross pattern.



**Figure 2-3** Scanning Orientation with Imager Aiming Pattern

The digital scanner can also read a bar code presented within the aiming pattern but not centered. The top examples in [Figure 2-4](#) show acceptable aiming options, while the bottom examples can not be decoded.



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

## Decode Ranges

Symbol Density	Bar Code Type	Typical Working Ranges	
		Near	Far
5 mil	Code 39	0.7	6.6
13 mil	100% UPC	1.2	14.2
5 mil	PDF	2.0	4.5
6.6 mil	PDF	1.2	6.0
10 mil	Data Matrix	1.1 ???	7.2 ???

Figure 2-5 DS6878-SR / DS6878-HC / DS6878-DL Decode Ranges

Symbol Density	Bar Code Type	Typical Working Ranges	
		Near	Far
3 mil	Code 39	0.6	3.4
5 mil	Code 39	FOV	4.9
13 mil	100% UPC	1.2	6.8
4 mil	PDF	0.9	2.8
5 mil	Data Matrix	0.9 ???	3.5 ???
10 mil	Data Matrix	0.5 ???	3.7 ???

Figure 2-6 DS6878-HD Decode Ranges



# Chapter 3 Maintenance, Troubleshooting & Technical Specifications

---

## Introduction

This chapter provides suggested digital scanner and cradle 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 DS6878 design allows safe cleansing of the product plastics with a variety of cleaning products and disinfectants. If required, wipe the digital 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

## Cradle

- Do not pour, spray, or spill any liquid on the cradle. Wipe cradle using approved cleansers.



**CAUTION** Avoid using cleansers directly on the digital scanner battery door, contacts and cradle contacts. Use a cotton swab moistened with alcohol to gently clean contacts.

---

## Battery Information

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

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

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

The standard warranty period for all Symbol batteries is 30 days, regardless if the battery was purchased separately or included as part of the mobile computer. For more information on Symbol batteries, please visit: <http://support.symbol.com/support/product/manuals.do>

---

## Troubleshooting

**Table 3-1** *Troubleshooting*

Problem	Possible Causes	Possible Solutions
<b>Battery</b>		
Digital Scanner battery requires frequent charging.	Battery may need reconditioning.	Restore the battery by performing a battery reconditioning cycle. See <i>Reconditioning the Digital Scanner Battery</i> on page 1-9 for more information.
Digital Scanner displays solid red LED longer than 3 seconds when placed in cradle.	Battery may require pre-charge due to excessive discharge.	Wait for the red LED to turn green indicating that the scanner has begun normal charging. Recommend allowing battery to fully recharge.

**Table 3-1** Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
<b>Beeper Indications</b>		
Digital Scanner emits low/high/low beeps.	ADF transmit error.	See <a href="#">Chapter 15, Advanced Data Formatting</a> for information about ADF programming.
	Invalid ADF rule is detected.	See <a href="#">Chapter 15, Advanced Data Formatting</a> for information about ADF programming.
	The Code 39 buffer was erased or there was an attempt to clear or transmit an empty buffer.	Normal when scanning the Code 39 Buffering <b>Clear Buffer</b> bar code or upon attempt to transmit an empty Code 39 buffer.
Digital Scanner emits a low/high/low/high beep sequence while it is being programmed.	Out of ADF parameter storage space.	Erase all rules and re-program with shorter rules.
Digital Scanner emits long low/long high beeps.	Input error, incorrect bar code or <b>Cancel</b> bar code was scanned.	Scan the correct numeric bar codes within range for the parameter programmed.
	Page timeout; remote device is out of range/not powered.	Move the digital scanner back into range of the remote device; try to re-connect; check remote device configuration.
Digital Scanner emits long low/long high/long low/long high beeps.	Out of host parameter storage space.	Scan <i>Default Parameters on page 5-4</i> .
	Out of memory for ADF rules.	Reduce the number of ADF rules or the number of steps in the ADF rules.
	Connection attempt was rejected by remote device.	Free up remote device resources.
Digital Scanner emits high/high/high/low beeps.	RS-232 receive error.	Normal during host reset. Otherwise, set the digital scanner's RS-232 parity to match the host setting.

**Table 3-1** Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
Digital Scanner emits high/low beeps.	The digital scanner is buffering Code 39 data. Or Keyboard parameter selected.	Normal. Or Enter value using bar code keypad.
	Bluetooth disconnection event.	Move the digital scanner back into range of the remote device. In Master (SPP) mode, re-pair the digital scanner and cradle by scanning the <b>PAIR</b> bar code on the cradle; check cradle power. In Slave (SPP/HID) mode, reestablish connection between the digital scanner and remote device from the remote device side.
Digital Scanner emits three long high beeps.	Code 39 buffer is full.	Scan the Code 39 bar code without a leading space or scan <b>Do Not Buffer Code 39</b> on <i>Code 39 Buffering - Scan &amp; Store on page 14-32</i> to transmit stored Code 29 data.
Digital Scanner emits four high beeps on trigger release.	Low battery.	Place digital scanner in cradle to charge the battery.
Digital Scanner emits four long low beeps.	A transmission error was detected in a scanned symbol. The data is ignored.	This occurs if a unit is not properly configured. Check option setting.
	The digital scanner is either: - Out of range - Not paired to the cradle - Not connected to a remote Bluetooth device.	Move the digital scanner back into range of the remote device. Or Scan the <b>PAIR</b> bar code on the cradle.
	Acknowledgment that transmitted data was not received by the cradle.	Data may have been received by the host. Check the host system for receipt of transmitted data. If data was not received by the host, re-scan the bar code.
Digital Scanner emits five low long beeps.	Conversion or format error.	Check ADF rules for the host.
<b>Decoding Bar Codes</b>		
Digital Scanner emits the laser, but does not decode the bar code.	Digital Scanner is not programmed for the correct bar code type.	Program the digital scanner to read that type of bar code. See <a href="#">Chapter 14, Symbologies</a> .
	Bar code symbol is unreadable.	Scan test symbols of the same bar code type to determine if the bar code is defaced.



**Table 3-1** Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
	Distance between digital scanner and bar code is incorrect.	Move the digital scanner closer to or further from the bar code. See <i>Decode Ranges on page 2-7</i> .
	The scan line is not crossing every bar and space of the symbol.	Move the symbol until the scan line is within the acceptable aiming pattern. See <i>Figure 2-1 on page 2-5</i> .
Digital Scanner decodes bar code, but does not transmit the data to the host.	Digital Scanner is not programmed for the correct host type.	Scan the appropriate host type programming bar code. See the chapter corresponding to the host type.
	Interface cable is loose.	Ensure all cable connections are secure.
	Cradle is not programmed for the correct host interface.	Check digital scanner host parameters or edit options.
	Digital Scanner not paired to host-connected interface.	Pair the digital scanner to the cradle by scanning the <b>PAIR</b> bar code on the cradle.
	Cradle has lost connection to host.	<i>In this exact order:</i> disconnect power supply; disconnect host cable; wait three seconds; reconnect host cable; reconnect power supply; reestablish pairing.
Digital Scanner emits five long low beep after a bar code is decoded.	Conversion or format error was detected. The digital scanner's conversion parameters are not properly configured.	Ensure the digital scanner's conversion parameters are properly configured.
	Conversion or format error was detected. An ADF rule was set up with characters that can't be sent for the host selected.	Change the ADF rule, or change to a host that can support the ADF rule.
	Conversion or format error was detected. A bar code was scanned with characters that can't be sent for that host.	Change the bar code, or change to a host that can support the bar code.

**Table 3-1** Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
<b>Host Displays</b>		
Host displays scanned data incorrectly.	Digital Scanner is not programmed to work with the host.	Ensure the proper host is selected. Scan the appropriate host type programming bar code.
		For RS-232, ensure the digital scanner's communication parameters match the host's settings.
		For a USB HID keyboard or Keyboard Wedge configuration, ensure the system is programmed for the correct keyboard type and language, and turn off the CAPS LOCK key.
		Ensure editing options (e.g., ADF, UPC-E to UPC-A Conversion) are properly programmed.
		Check the digital scanner's host type parameters or editing options.
<b>Trigger</b>		
Nothing happens when the trigger is pulled.	No power to the digital scanner.	Check the system power. If the configuration requires a power supply, re-connect the power supply. Check the battery. Ensure that end cap to battery chamber is secured.
	Interface/power cables are loose.	Check for loose cable connections and re-connect cables.
	Digital Scanner is disabled.	For Synapse or IBM-468x mode, enable the digital scanner via the host interface.
The laser aiming or illumination does not appear when the trigger is pulled.	No power to the digital scanner.	Check battery and charging contacts; ensure that end cap to battery chamber is secured; ensure all power and cable connections to cradle are secure.
	Interface/power cables are loose.	Check battery and charging contacts; ensure power and cable connections to cradle are secure.



**NOTE** If after performing these checks the symbol still does not scan, contact the distributor or contact Motorola Enterprise Mobility Support. See [page xix](#) for contact information.

## Technical Specifications

**Table 3-2** Technical Specifications - Symbol DS6878 Digital Scanner

Item	Description
<b>Physical Characteristics</b>	
Dimensions	7.3 in. H x 3.85 in. L x 2.7 in. W (18.5 cm H x 9.7 cm L x 6.9 cm W)
Weight (with battery)	Approximately 8.4 oz. (238 g)
Color	Cash Register White or Twilight Black HC Configuration: Healthcare White
<b>Performance Characteristics</b>	
Light Source:	Aiming Pattern: 650 nm laser diode Illumination: 630 nm LED
Frame Rate	Decode Mode: 60 fps Document Capture Mode: 10 fps
Radio Range	Minimum 33 ft (10m) / Typical warehouse environment 50 ft. (15m)
Battery Specifications	720mAh NiMH - (3) AAA number of scans per full charge: typically 8,500 @ 1 scan/second  Charge Time: Fully discharged battery: < 3 hours via external power / approximately 5.5 hours via host power through cable
Roll Tolerance	± 360°
Pitch Tolerance	± 60°
Yaw Tolerance	± 60°
Nominal Working Distance	(See <i>Decode Ranges on page 2-7</i> )
Decode Capability	UPC/EAN and with supplementals, Code 39, Code 39 Full ASCII, Tri-optic Code 39, GS1 DataBar Variants, GS1-128, Code 128, Code 128 Full ASCII, Code 93, Codabar (NW1), Interleaved 2 of 5, Discrete 2 of 5 MSI, Codell, IATA, Bookland EAN, Code 32
Interfaces Supported	See <a href="#">Table 3-3</a> .
<b>User Environment</b>	
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Charging Temperature	32° to 104° F (0° to 40° C) nominal, 41° to 95° F (5° to 35° C) ideal
Humidity	5% to 95%, non-condensing
Drop Specifications	Withstands multiple 6 ft./1.8 m drops to concrete at room temperature. Withstands multiple 5 ft./1.5m drops to concrete at 0° to 50° C.

**Table 3-2** Technical Specifications - Symbol DS6878 Digital Scanner (Continued)

Item	Description
# of Cradle Insertions	250,000+ insertions
Ambient Light Immunity	Incandescent - 150 ft. candles (1,600 Lux) Sunlight - 8,000 ft. candles (86,000 Lux) Flourescent - 150 ft. candles (1,600 Lux) Mercury Vapor - 150 ft. candles (1,600 Lux) Sodium Vapor - 150 ft. candles (1,600 Lux) Immune to normal or artificial light
<b>Regulatory</b>	
Electrical Safety	UL 60950-1, C22.2 No. 60950-1, EN 60950-1, IEC 60950-1
Laser Safety	EN 60825-1, IEC 60825-1, 21CFR1040.10
EMI/RFI	EN 301 489-1, EN 301 489-17, IEC 60601-1-2, EN 55022, FCC Part 15 Class B, ICES 003 Class B, EN 55024, EN 61000-3-2, EN 61000-3-3 European Union EMC Directive, Australian SMA
Environmental	RoHS Directive 2002/95/EEC
Radio	EN 300 328
RF Exposure	EN 50360, EN 50361, FCC Part 2, OET Bulletin 65, RSS102
<b>Accessories</b>	
Lanyard	Lanyard attaches to the battery door.

**Table 3-3** Technical Specifications - STB4278/STB4208 Cradle

Item	Description										
<b>Physical Characteristics</b>											
Dimensions:	2.0 in. H x 8.35 in. L x 3.4 in. W (5 cm H x 21.1 cm L x 8.6 cm W)										
Weight	Approximately 6.4 oz. (183 gm)										
Voltage & Current	Charging Cradle: <table border="0"> <tr> <td>Voltage</td> <td>Current</td> </tr> <tr> <td>5 +/-10% VDC</td> <td>700mA (External power)</td> </tr> <tr> <td>5 +/-10% VDC</td> <td>475 mA (Host power through cable)</td> </tr> <tr> <td>12 +/-10% VDC</td> <td>300 mA (External power)</td> </tr> <tr> <td>12 +/-10% VDC</td> <td>220 mA (Host power through cable)</td> </tr> </table> Non-charging Cradle: 5V @ 70ma or 12 V @ 50 mA	Voltage	Current	5 +/-10% VDC	700mA (External power)	5 +/-10% VDC	475 mA (Host power through cable)	12 +/-10% VDC	300 mA (External power)	12 +/-10% VDC	220 mA (Host power through cable)
Voltage	Current										
5 +/-10% VDC	700mA (External power)										
5 +/-10% VDC	475 mA (Host power through cable)										
12 +/-10% VDC	300 mA (External power)										
12 +/-10% VDC	220 mA (Host power through cable)										
Color	Cash Register White or Twilight Black HC Configuration: Healthcare White										
Power Requirements	4.75 - 14.0 VDC										

**Table 3-3** *Technical Specifications - STB4278/STB4208 Cradle (Continued)*

Item	Description
<b>Performance Characteristics</b>	
Interfaces Supported (CR0078-SC only)	Features on-board Multiple Interface with: RS-232C (Standard, Nixdorf, ICL, & Fujitsu); IBM 468x/469x; Keyboard Wedge; USB (Standard, IBM SurePOS, Macintosh); Laser/Wand Emulation; 123Scan <sup>2</sup> ; Remote Digital Scanner Management. In addition, Synapse Adaptive Connectivity allows for connectivity to all of the above plus many non-standard interfaces.
<b>User Environment</b>	
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Charging Temperature	32° to 104° F (0° to 40° C) nominal, 41° to 95° F (5° to 35° C) ideal
Humidity	5% to 95% (non-condensing)
<b>Regulatory</b>	
Electrical Safety	UL 60950-1, C22.2 No. 60950-1, EN 60950-1, IEC 60950-1
EMI/RFI	EN 301 489-1, EN 301 489-17, IEC 60601-1-2, EN 55022, FCC Part 15 Class B, ICES 003 Class B, EN 55024, EN 61000-3-2, EN 61000-3-3 European Union EMC Directive, Australian SMA
Radio	EN 300 328
Environmental	RoHS Directive 2002/95/EEC
RF Exposure	EN 50360, EN 50361, FCC Part 2, OET Bulletin 65, RSS102
<b>Accessories</b>	
Mounting Options	Desktop, mount on a wall, computer work station or medical cart.
Power Supplies	Power supplies are available for applications that do not supply power over host cable.

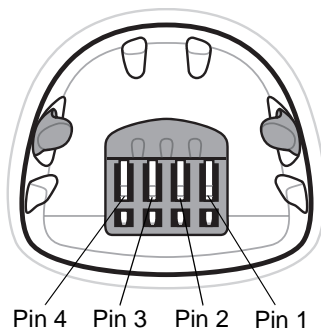
## Cradle Signal Descriptions

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

**Table 3-4** Cradle Signal Pin-outs

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

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



**Figure 3-1** Cradle Pin Assignments

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

**Table 3-5** Cradle Pin-outs

Pin	Description
1	CRADLE_TXD
2	VCC
3	GND
4	CRADLE_RXD

# Chapter 4 Radio Communications

---

## Introduction

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

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

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

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

To return all features to default values, scan a default bar code in *Default Parameters on page 5-4*. Throughout the programming bar code menus, default values are indicated with asterisks (\*).



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

## Scanning Sequence Examples

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

## Errors While Scanning

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

## Radio Communications Parameter Defaults

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

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

**Table 4-1** Radio Communication Default Table

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



## Wireless Beeper Definitions

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

**Table 4-2** *Wireless Beeper Definitions*

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

---

## Radio Communications Host Types

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

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



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

---

## Radio Communications Host Types (continued)



**\*Cradle Host**



**Serial Port Profile (Master)**



**Serial Port Profile (Slave)**



**Bluetooth Keyboard Emulation (HID Slave)**

---

## Bluetooth Technology Profile Support

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

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

### Master/Slave Set Up

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

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

#### Master

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

#### Slave

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

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

## Bluetooth Friendly Name

You can set a meaningful name for the digital scanner that appears in the application during device discovery. The default name is the digital scanner name followed by its serial number, e.g., **DS6878 123456789ABCDEF**. Scanning **Set Defaults** reverts the digital scanner to this name; use custom defaults to maintain the user-programmed name through a **Set Defaults** operation.

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

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



**Bluetooth Friendly Name**

## Discoverable Mode

Select a discoverable mode based on the device initiating discovery:

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

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



**\*General Discoverable Mode**



**Limited Discoverable Mode**

---

## HID Host Parameters

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

Following are the keyboard parameters supported by the HID host.

### HID Country Keyboard Types (Country Codes)

Scan the bar code corresponding to the keyboard type.



**\*North American Standard Keyboards**



**French Windows**



**German Windows**



**French Canadian Windows 98**



**Spanish Windows**



**Italian Windows**

## HID Country Keyboard Types (Country Codes - continued)



**Swedish Windows**



**UK English Windows**



**Japanese Windows**



**French Canadian Windows 2000/XP**



**Portuguese/Brazilian Windows**

## HID Keyboard Keystroke Delay

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



**\*No Delay (0 msec)**



**Medium Delay (20 msec)**



**Long Delay (40 msec)**

## HID CAPS Lock Override

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



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



**Override Caps Lock Key  
(Enable)**



## HID Ignore Unknown Characters

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



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



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

## Emulate Keypad

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



**\*Disable Keypad Emulation**



**Enable Keypad Emulation**

## HID Keyboard FN1 Substitution

When enabled, this parameter allows replacement of any FN1 character in an EAN128 bar code with a Key Category and value chosen by the user. See *FN1 Substitution Values on page 5-36* to set the Key Category and Key Value.



**\*Disable Keyboard FN1 Substitution**



**Enable Keyboard FN1 Substitution**

## HID Function Key Mapping

ASCII values under 32 are normally sent as control-key sequences. When this parameter is enabled, the keys in bold are sent in place of the standard key mapping (see *Table 6-2 on page 6-120*. Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.



**\*Disable Function Key Mapping**



**Enable Function Key Mapping**

## Simulated Caps Lock

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



**\*Disable Simulated Caps Lock**



**Enable Simulated Caps Lock**

## Convert Case

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



**\*No Case Conversion**



**Convert All to Upper Case**



**Convert All to LowerCase**

---

## Auto-reconnect Feature

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

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

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

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

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

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

## Reconnect Attempt Beep Feedback

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

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

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



**\*Disable Beep on Reconnect Attempt**



**Enable Beep on Reconnect Attempt**

## **Reconnect Attempt Interval**

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

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

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



**\*Attempt to Reconnect for 30 Seconds**



**Attempt to Reconnect for 1 Minute**



**Attempt to Reconnect for 5 Minutes**

## Reconnect Attempt Interval (continued)



**Attempt to Reconnect for 30 Minutes**



**Attempt to Reconnect for 1 Hour**

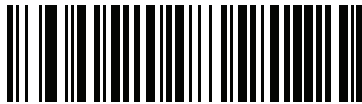


**Attempt to Reconnect Indefinitely**

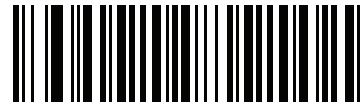
## Auto-reconnect in Bluetooth Keyboard Emulation (HID Slave) Mode

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

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



\*Auto-reconnect on Bar Code Data



Auto-reconnect Immediately



Disable Auto-reconnect

---

## Out of Range Indicator

An out of range indicator can be set by scanning *Enable Beep on Reconnect Attempt* on page 4-15 and extending the time using the *Reconnect Attempt Interval* on page 4-15.

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

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

---

## Digital Scanner(s) To Cradle Support

### Modes of Operation

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

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

#### Point-to-Point Communication

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

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

#### Multipoint-to-Point Communication

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

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

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



**Multipoint-to-Point Mode**



**\*Point-to-Point Mode**



## Parameter Broadcast (Cradle Host Only)

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



\*Enable Parameter Broadcast



Disable Parameter Broadcast

## Pairing

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

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

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

## Pairing Modes

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

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



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

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



**\*Unlocked Pairing Mode**



**Locked Pairing Mode**

## Lock Override

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

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



**LockOverride**

## Pairing Methods

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

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



**\*Enable Pair On Contacts**



**Disable Pair on Contacts**

## Unpairing

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

An unpairing bar code is also included in the *Symbol DS6878 Quick Reference Guide*.



**Unpairing**



## Connection Maintenance Interval

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

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

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

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

Connection Maintenance Interval options are:

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

### Considerations

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

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

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



**\*Set Interval to 15 Minutes**



**Set Interval to 30 Minutes**



**Set Interval to 60 Minutes**



**Set Interval to 2 Hours**



**Set Interval to 4 Hours**



**Set Interval to 8 Hours**



**Set Interval to 24 Hours**



**Set Interval to Forever**

---

## Bluetooth Security

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

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

### Authentication

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



**Enable Authentication**



**\*Disable Authentication**

## PIN Code

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

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



**Set PIN Code**

### Variable PIN Code

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



**\*Static PIN Code**



**Variable PIN Code**



## Encryption

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

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



**Enable Encryption**



**\* Disable Encryption**



# Chapter 5 User Preferences & Miscellaneous Digital Scanner Options

## Introduction

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

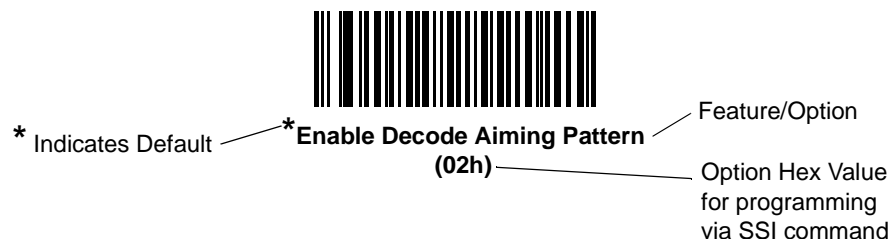
The digital scanner ships with the settings in *User Preferences Parameter Defaults on page 5-2* (also see [Appendix A, Standard Default Parameters](#) for all host device and miscellaneous defaults). If the default values suit requirements, programming is not necessary.

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 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 (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 *Default Parameters on page 5-4*. Throughout the programming bar code menus, asterisks (\*) indicate default values.



## Scanning Sequence Examples

In most cases scanning one bar code sets the parameter value. For example, to set the beeper tone to high, scan the High Frequency (beeper tone) bar code listed under *Beeper Tone on page 5-7*. The digital scanner issues a fast warble beep and the LED turns green, signifying a successful parameter entry.

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

## Errors While Scanning

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

## User Preferences/Miscellaneous Option Parameter Defaults

[Table 5-1](#) lists the defaults for preferences parameters. To change the default values:

- Scan the appropriate bar codes in this guide. These new values replace the standard default values in memory. To recall the default parameter values, scan the *Default Parameters on page 5-4*.
- Configure the digital scanner using the 123Scan<sup>2</sup> configuration program (see *123Scan2 on page 12-1*).

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

**Table 5-1** User Preferences Parameter Defaults

Parameter	Parameter Number	Default	Page Number
<b>User Preferences</b>			
Set Default Parameter		Set Defaults	<a href="#">5-4</a>
Parameter Bar Code Scanning	ECh	Enable	<a href="#">5-5</a>
Beep After Good Decode	38h	Enable	<a href="#">5-5</a>
Suppress Power Up Beeps	F1h D1h	Do Not Suppress	<a href="#">5-6</a>
Beeper Tone	91h	Medium	<a href="#">5-7</a>
Beeper Volume	8Ch	High	<a href="#">5-8</a>
Beeper Duration	F1 74h	Medium	<a href="#">5-9</a>
Beep on Insertion	F0h 20h	Enabled	<a href="#">5-9</a>
Batch Mode	F1h 20h	Normal (Do Not Batch Data)	<a href="#">5-10</a>
Low Power Mode	80h	Enabled	<a href="#">5-12</a>
Time Delay to Reduced Power Mode	92h	100 MSec	<a href="#">5-13</a>
Timeout to Low Power Mode from Auto Aim	F1h D9h	15 Sec	<a href="#">5-14</a>

Parameter	Parameter Number	Default	Page Number
Hand-Held Trigger Mode	8Ah	Level	<a href="#">5-15</a>
Picklist Mode	F0h 92h	Disabled Always	<a href="#">5-16</a>
Mobile Phone/Display Mode	F1h CCh	Disable	<a href="#">5-17</a>
Continuous Bar Code Read	F1 89h	Disable	<a href="#">5-18</a>
Unique Bar Code Reporting	F1h D3h	Disable	<a href="#">5-18</a>
Decode Session Timeout	88h	9.9 Sec	<a href="#">5-19</a>
Timeout Between Decodes, Same Symbol	89h	0.5 Sec	<a href="#">5-20</a>
Timeout Between Decodes, Different Symbols	90h	0.2 Sec	<a href="#">5-20</a>
Fuzzy 1D Processing	F1h 02h	Enable	<a href="#">5-21</a>
Hand-Held Decode Aiming Pattern	F0h 32h	Enable	<a href="#">5-22</a>
Decoding Illumination	F0h, 2Ah	Enable	<a href="#">5-23</a>
Multicode Mode	F1h, A5h	Disable	<a href="#">5-23</a>
Multicode Expression	F1h, 95h	1	<a href="#">5-24</a>
Multicode Mode Concatenation	F1h, CDh	Disable	<a href="#">5-29</a>
Multicode Concatenation Symbology	F1h, D2h	Concatenate as PDF417	<a href="#">5-30</a>
<b>Miscellaneous Options</b>			
Transmit Code ID Character	2Dh	None	<a href="#">5-33</a>
Prefix Value	63h, 69h	7013 <CR><LF>	<a href="#">5-34</a>
Suffix 1 Value Suffix 2 Value	62h 68h 64h 6Ah	7013 <CR><LF>	<a href="#">5-34</a>
Scan Data Transmission Format	EBh	Data as is	<a href="#">5-35</a>
FN1 Substitution Values	67h 6Dh	Set	<a href="#">5-36</a>
Transmit "No Read" Message	5Eh	Disable	<a href="#">5-37</a>

---

## User Preferences

### Default Parameters

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

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



\*Restore Defaults



Set Factory Defaults

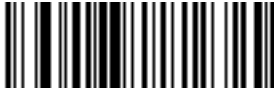


Write to Custom Defaults

## Parameter Bar Code Scanning

Parameter # ECh

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



**\*Enable Parameter Bar Code Scanning**  
(01h)



**Disable Parameter Bar Code Scanning**  
(00h)

## Beep After Good Decode

Parameter # 38h

Scan a bar code below to select whether or not the digital scanner beeps after a good decode. If selecting **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)

## Suppress Power Up Beeps

Parameter # F1h D1h

Scan a bar code below to select whether or not to suppress digital scanner beeps upon power up..



**\*Do Not Suppress Power Up Beeps  
(00h)**



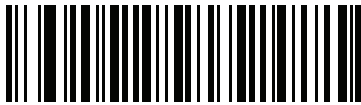
**Suppress Power Up Beeps  
(01h)**



## Beeper Tone

Parameter # 91h

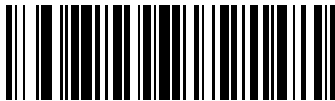
To select a decode beep frequency (tone), scan one of the following bar codes.



**Off**  
**(03h)**



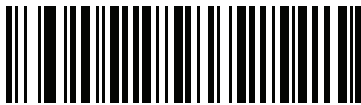
**Low Tone**  
**(02h)**



**\*Medium Tone**  
**(01h)**



**High Tone**  
**(00h)**



**Medium to High Tone (2-tone)**  
**(04h)**

## 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)

## Beeper Duration

Parameter # F1 74h

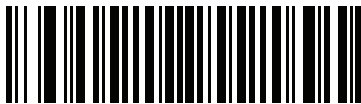
To select the duration for the beeper, scan one of the following bar codes.



**Short  
(00h)**



**\* Medium  
(01h)**



**Long  
(02h)**

## Beep on Insertion

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

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



**\* Enable Beep on Insertion**



**Disable Beep on Insertion**

## Batch Mode

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

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

Number of storable bar codes = 30,720 bytes of memory / (number of characters in the bar code + 3).

- ✓ **NOTE** If the batch mode selection is changed while there is batched data, the new batch mode will take effect only after all the previously batched data is sent.

## Modes of Operation

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

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

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

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

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

## Batch Mode (continued)



**\*Normal**



**Out of Range Batch Mode**



**Standard Batch Mode**



**Cradle Contact Batch Mode**



**Enter Batch Mode**



**Send Batch Data**

## Low Power Mode

Parameter # 80h

If enabled, the digital scanner enters a low power consumption mode after Sleep Mode has expired, in which the LEDs turn off in order to conserve energy and prolong the life of the scanner. The digital scanner wakes when it is lifted, senses a trigger pull, or when the host attempts to communicate.

If disabled, power remains on after each decode attempt.



**Disable Low Power Mode  
(00h)**

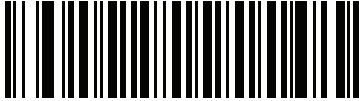


**\*Enable Low Power Mode  
(01h)**

## Time Delay to Reduced Power Mode

Parameter # 92h

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



1 sec



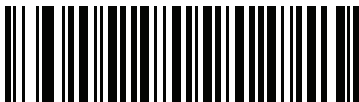
2 secs



3 secs



4 secs



5 secs



\*100 msecs



500 msecs

## Timeout to Low Power Mode from Auto Aim

Parameter # F1h D9h

This parameter sets the time the digital scanner remains in auto aim before entering low power mode.



**Disabled**



**5 secs**



**\*15 secs**



**30 secs**



**1 minute**



## Hand-Held Trigger Mode

Parameter # 8Ah

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

- **Standard (Level)** - A trigger pull activates decode processing. Decode processing continues until the bar code decodes, you release the trigger, or the Decode Session Timeout occurs.
- **Presentation (Blink)** - The digital scanner activates decode processing when it detects a bar code in its field of view. After a period of non-use, the digital scanner enters a low power mode, in which the LEDs turn off until the digital scanner senses motion.

✓ **NOTE** Laser scanning is not applicable in hand-held presentation mode.

- **Auto Aim** - If the primary trigger (trigger A) is set to imager, this trigger mode turns on the laser aiming pattern when you lift the digital scanner. A trigger pull activates decode processing. After 2 seconds of inactivity the aiming pattern shuts off.



**Standard (Level)**  
**(00h)**



**\* Auto Aim**  
**(09h)**

## Picklist Mode

Parameter # F0h 92h

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

- **Disabled Always** - Picklist mode is always disabled.
- **Enabled in Hand-Held Mode** - Picklist mode is enabled in hand-held mode.



\* Disabled Always  
(00h)



Enabled in Hand-Held Mode  
(01h)

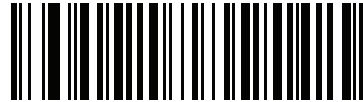
## Mobile Phone/Display Mode

Parameter # F1h CCh

Select **Enable Mobile Phone/Display Mode** to improve bar code reading performance off mobile phones and electronic displays. .



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



Enable Mobile Phone/Display Mode  
(01h)

## Continuous Bar Code Read

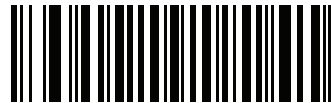
Parameter # F1 89h

Enable this to report every bar code while the trigger is pressed.

- ✓ **NOTE** Motorola strongly recommends enabling *Picklist Mode* on page 5-16 with this feature. Disabling Picklist Mode can cause accidental decodes when more than one bar code is in the imaging engine's field of view.



\*Disable Continuous Bar Code Read  
(0h)



Enable Continuous Bar Code Read  
(1h)

## Unique Bar Code Reporting

Parameter # F1h D3h

Enable this to report only unique bar codes while the trigger is pressed. This option only applies when **Continuous Bar Code Read** is enabled.



\*Disable Continuous Bar Code Read Uniqueness  
(00h)



Enable Continuous Bar Code Read Uniqueness  
(01h)

## 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 mode and Continuous Bar Code Read to prevent the beeper from continuously beeping when a symbol is left in the digital scanner's field of view. It is programmable in 0.1 second increments from 0.0 to 9.9 seconds. The default interval is 0.5 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

## Timeout Between Decodes, Different Symbols

Parameter # 90h

Use this option in presentation mode and Continuous Bar Code Read to control the time the scanner is inactive between decoding different symbols. It is programmable in 0.1 second increments from 0.1 to 9.9 seconds. The default is 0.2 seconds.

To select the timeout between decodes for different symbols, 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, Different Symbols

## 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)**

## Hand-Held Decode Aiming Pattern

Parameter # F0h, 32h

Select **Enable Hand-Held Decode Aiming Pattern** to project the aiming pattern during bar code capture, **Disable Hand-Held Decode Aiming Pattern** to turn the aiming pattern off, or **Enable Hand-Held Decode Aiming Pattern on PDF** to project the aiming pattern when the digital scanner detects a 2D bar code.



**NOTE** With *Picklist Mode on page 5-16* enabled, the decode aiming pattern flashes even when the **Decode Aiming Pattern** is disabled.



\*Enable Hand-Held Decode Aiming Pattern  
(02h)



Disable Hand-Held Decode Aiming Pattern  
(00h)



Enable Hand-Held Decode Aiming Pattern on PDF  
(03h)



## Decoding Illumination

Parameter # F0h, 2Ah

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

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



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



**Disable Decoding Illumination  
(00h)**

## Multicode Mode

Parameter # F1h, A5h

Enable this parameter to allow multiple bar codes to decode upon one trigger event based on the programmed multicode expression. The digital scanner reports a successful decode and provides user indication only if it decodes all bar codes indicated by the multicode expression, otherwise the decode fails. Bar codes are transmitted in the order defined in the multicode expression. Disable this to operate in normal decode mode.

When using this mode, disable *Continuous Bar Code Read* on page 5-18, and always orient the digital scanner at the same distance and angle (perpendicular).



**\*Disable Multicode Mode  
(00h)**



**Enable Multicode Mode  
(01h)**

## Multicode Expression

Parameter # F1h, 95h

Use this feature to program a multicode expression for *Multicode Mode* (grid method). The default is 1, which indicates any bar code.

To set the multicode expression:

1. Scan the bar code below.
2. Scan bar codes from the alphanumeric keyboard in the *Advanced Data Formatting Programmer Guide* to define the expression.
3. Scan the **End of Message** bar code from the *Advanced Data Formatting Programmer Guide*.



Multicode Expression

### Multicode Expression Syntax

[n] [Element 1]; [Element 2 ]; ... [Element n];

Where:

- *n* is the number of elements in the overall expression.

The multicode expression describes the bar code(s) that the digital scanner can expect to find in an image. Each element represents one bar code in the digital scanner's field of view. The order of elements in the expression is the order in which bar code data from each element transmits to the host. Elements are defined using one or more of the following methods:

- **By Region.** This type of element limits decoding to a specific area within the digital scanner's field of view. Region coordinates are defined as the top left and bottom right corners of the region, expressed in percentages of the field of view. These can range from 0% to 100%, or 0x00 to 0x64 in hex, for both horizontal and vertical axes. A region element is constructed as:

[R] [4] [Top, Left] [Bottom, Right]

Where:

- [R] is the character R
  - [4] is 0x04, indicating there are four bytes thereafter to describe the region
  - [Top, Left] are two values representing the top left corner of the region
  - [Bottom, Right] are two values representing the bottom right corner of the region
- **By Code Type.** An element can specify a specific bar code symbology to find and decode somewhere in the field of view. A code type element is constructed as:

[C] [2] [Code Type]

Where:

- [C] is the character C
- [2] is 0x02, indicating there are two bytes thereafter to describe the code type
- [Code Type] is the desired symbology's parameter number (see [Chapter 14, Symbologies](#)). For single-byte parameter numbers, extend the value to two bytes by adding 00 before the parameter number.

### Defining Multicode Expression Notes

When defining multicode expressions consider the following:

- Use the Code Type specifier if there are bar codes of more than one code type in view.
- Always use the Region specifier when there are multiple bar codes of the same code type.
- When transmission order is important (the first element in the expression transmits first), use either type to define the order.
- When there are unwanted bar codes in view, filter them out in one of two ways:
  - Use Code Type to specify only the target bar codes.
  - Use Region to identify only the target bar codes.
- If the expression does not contain a Region specifier, scanning angle and distance do not matter. If you specify a region you must scan in a fixed orientation and at a fixed distance. Because of this, it is preferable to use the Code Type specifier rather than the Region specifier.
- When defining regions:
  - Defining a region much larger than the bar code improves tolerance to scan distance and angle, but can cause a decode of a nearby bar code instead of the target bar code. Therefore, for best performance define larger regions when only a few bar codes are in view and those in view are widely separated.
  - Defining a region close to (or smaller than) the target bar code improves the probability of decoding this bar code rather than one nearby, but scan distance and angle must be more accurate. Therefore, for best performance define small regions when many bar codes are in view or those in view are close together.
- Use Region elements to improve decode speeds by reducing the image area to search for the target bar code.
- Specifying Code Type may also improve decode speeds for some code types.
- Although you can scan parameter bar codes when multicode mode is enabled, be aware of the following: If the multicode expression defined a region(s), to scan a parameter bar code you must position the bar code within the first region defined in the expression. In some cases, this first region is not the center of the image and aiming at the parameter bar code does not result in a successful decode.

The following examples show the multicode expressions in both hex and decimal formats, however in the sample figures the values are decimal. Be sure to use the correct base numbering system when creating an expression. A region specified as 0x00 0x00 0x64 0x32 represents a region with coordinates of Top-Left (0,0) and Bottom Right (100,50).

**Example 1**

To decode one Code 128 bar code anywhere in the image (even when bar codes of other types are in view), as in [Figure 5-1](#), program the expression as follows:

The expression in decimal is (formatted for readability):

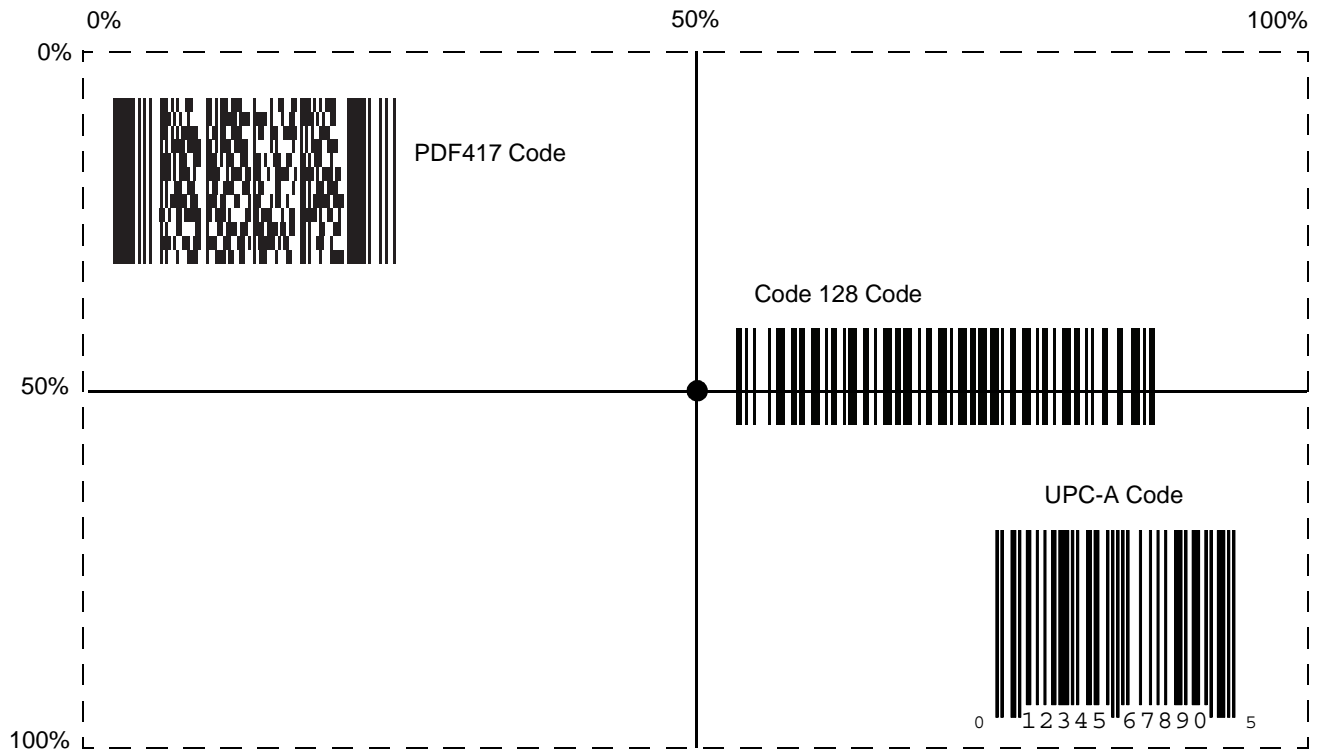
```
1 C 2 0 8 ;
```

To program the expression via scanning parameters the sequence is (spaces are for readability):

```
[MultiCode-Expression] 01 C 02 00 08 ; [End Of Message]
```

To program the expression via host command (SSI/SNAPI) the sequence is:

```
0x01 0x43 0x02 0x00 0x08 0x3b
```



**Figure 5-1** Multicode Expression Example 1

**Example 2a**

To decode a Code128 (Code Type=8) on the top half of the image and a PDF417 (Code Type=15) on the bottom half of the image, as in [Figure 5-2](#), program the expression as follows:

The expression in decimal is (formatted for readability):

```
2 C 2 0 8 R 4 0 0 100 50 ; C 2 0 15 R 4 0 50 100 ;
```

To program the expression via scanning parameters the sequence is:

```
[MultiCode-Expression] 02 C 02 00 08 R 04 00 00 64 32 ; C 02 00 0F R 04 00 32 64 64 ; [End Of Message]
```

To program the expression via host command (SSI/SNAPI) the sequence is:

```
0x02 0x43 0x02 0x00 0x08 0x52 0x04 0x00 0x00 0x64 0x32 0x3B 0x43 0x02 0x00 0x0F 0x52 0x04 0x00 0x32 0x64 0x64 0x3B
```

**Example 2b**

In [Figure 5-2](#), if the bottom PDF417 bar code must transmit first, reverse the sequence of the two bar codes:

The expression in decimal is (formatted for readability):

```
2 C 2 0 15 R 4 0 50 100 ; C 2 0 8 R 4 0 0 100 50 ;
```

To program the expression via scanning parameters the sequence is:

```
[MultiCode-Expression] 02 C 02 00 0F R 04 00 32 64 64 ; C 02 00 08 R 04 00 00 64 32 ; [End Of Message]
```

To program the expression via host command (SSI/SNAPI) the sequence is:

```
0x02 0x43 0x02 0x00 0x0F 0x52 0x04 0x00 0x32 0x64 0x64 0x3B 0x43 0x02 0x00 0x08 0x52 0x04 0x00 0x00 0x64 0x32 0x3B
```



**Figure 5-2** Multicode Expression Example 2

**Example 3**

To decode the set of three bar codes while excluding the center Code 128 bar code, as in *Figure 5-3*, the expression is:

The expression in decimal is (formatted for readability):

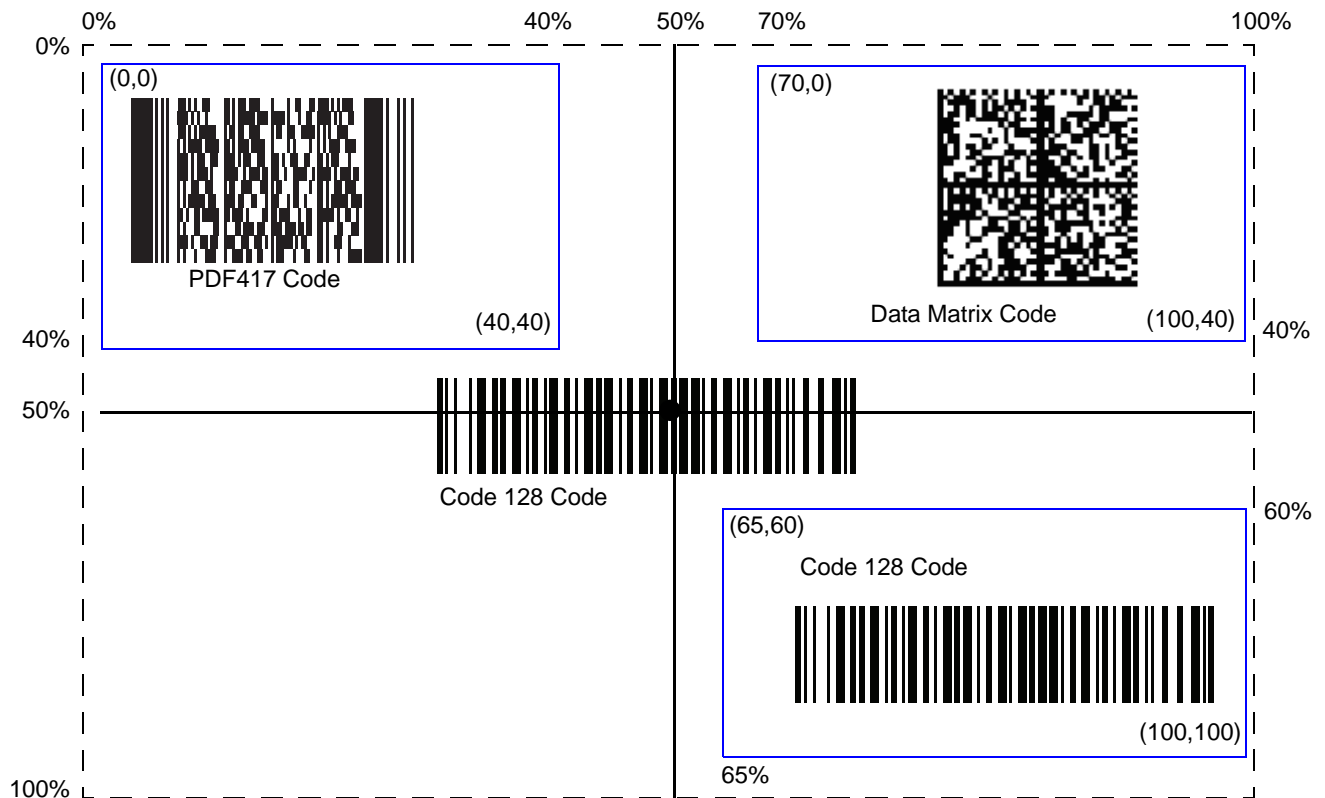
```
3 C 2 0 15 R 4 0 0 50 50 ; C 2 [F0 24] R 4 70 0 100 40 ; C 2 0 8 R 4 65 60 100 100 ;
```

To program the expression via scanning parameters the sequence is:

```
[MultiCode-Expression] 03 C 02 00 0F R 04 00 00 32 32 ; C 02 F0 24 R 04 46 00 64 28 ;  
C 02 00 08 R 04 41 3C 64 64 ; [End Of Message]
```

To program the expression via host command (SSI/SNAPI) the sequence is:

```
0x03 0x43 0x02 0x00 0x0F 0x52 0x04 0x00 0x00 0x32 0x32 0x3B 0x43 0x02 0xF0 0x24 0x52 0x04 0x46 0x00  
0x64 0x28 0x3B 0x43 0x02 0x00 0x08 0x52 0x04 0x41 0x3C 0x64 0x64 0x3B
```



**Figure 5-3** Multicode Expression Example 3

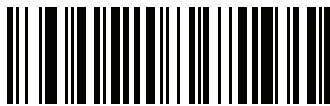
## Multicode Mode Concatenation

Parameter # F1h, CDh

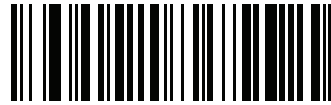
Enable this parameter to transmit multiple decoded bar codes, as specified by the [Multicode Expression](#), as one bar code. Use the [Multicode Concatenation Symbology](#) parameter to specify how the concatenated bar codes transmit.

Disable this to transmit decoded bar codes separately.

✓ **NOTE** When using Multicode Mode Concatenation, disable *Transmit Code ID Character* on page 5-33 and check digits.



**Enable Multicode Mode Concatenation  
(01h)**



**\*Disable Multicode Mode Concatenation  
(00h)**

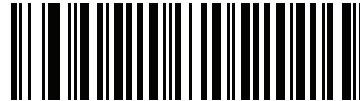
## Multicode Concatenation Symbology

Parameter # F1h, D2h

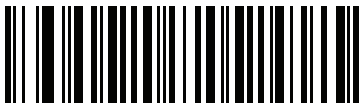
Use this parameter to specify how to transmit the concatenated bar codes decoded as specified by the *Multicode Expression*. *Multicode Mode Concatenation* must be enabled to use this option.



Concatenation as Code 128  
(01h)



\*Concatenation as PDF417  
(02h)



Concatenation as Data Matrix  
(03h)



Concatenation as Maxicode  
(04h)



## Multicode Troubleshooting

### Troubleshooting Multicode Expression Programming

Use the following suggestions if encountering problems programming a multicode expression:

- Ensure the expression is valid. Invalid expressions are rejected during programming. When an expression is rejected the previous expression remains intact. If after programming the expression the digital scanner can still decode any bar code, the expression was possibly rejected.
- When programming the multicode expression via parameter bar code, the digital scanner generates beeps. If any of the following beeps do not sound during programming, an error occurred (see [Table 2-1 on page 2-1](#) and [Table 2-2 on page 2-3](#) for error indicators):
  - Scanning the **Multicode Expression** bar code produces a two-tone (same pitch) beep.
  - Scanning each value of the expression produces a two-tone (same pitch) beep.
  - Scanning the **End Of Message** bar code produces a four-tone (high-low-high-low) beep.
- Check the expression for syntax errors.
- Try programming a simple expression to ensure the syntax is correct. See [Examples of Simple Multicode Expressions](#).
- Review [Defining Multicode Expression Notes on page 5-25](#) for additional hints.

### Troubleshooting Multicode Mode Scanning and Decoding

Use the following suggestions if encountering problems using multicode mode:

- If the digital scanner appears to decode any single bar code instead of the intended multiple bar codes, ensure you enabled *Multicode Mode* on page 5-23. Programming the multicode expression does not enable multicode mode.
- When specifying **Region**, ensure:
  - Coordinates are within range the 0-100 decimal (or 0x00 - 0x64 hexadecimal).
  - Top, Left is above Bottom, Right. Top, Left is 0,0 (0x00, 0x00 hexadecimal), and Bottom, Right is 100,100 (0x64, 0x64 hexadecimal).
  - Regions for two or more bar codes do not overlap.
- When specifying **Code Type** ensure the digital scanner supports the code type. Try decoding a single bar code without using multicode. If it does not decode try enabling the bar code type. See [Chapter 14, Symbologies](#).
- Experiment with simpler expressions, then add to it until you discover the source of the error. For example try the simplest expression (see [Examples of Simple Multicode Expressions](#)) and make sure you can scan a single bar code. If so, extend the expression by adding a second bar code, specifying a region, or specifying the code type. Verify that the digital scanner can decode this new expression. Continue adding to the expression until it fails to decode as expected, indicating the source of the error.
- Review [Defining Multicode Expression Notes on page 5-25](#) for additional hints.

***Examples of Simple Multicode Expressions***

The simplest multicode expression is:

- One bar code of any type, anywhere in the image.
- To program this use: **[MultiCode-Expression] 01 ; [End Of Message]**

Another simple multicode expression is:

- One Code 128 bar code, anywhere in the image.
- To program this use: **[MultiCode-Expression] 01 C 02 00 08 ; [End Of Message]**

---

## Miscellaneous Scanner Parameters

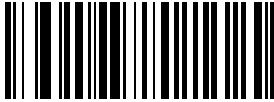
### Transmit Code ID Character

Parameter # 2Dh

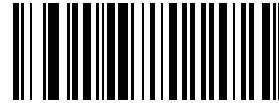
A Code ID character identifies the code type of a scanned bar code. This is useful when decoding more than one code type. In addition to any single character prefix already selected, the Code ID character is inserted between the prefix and the decoded symbol.

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

- ✓ **NOTE** If you enable Symbol Code ID Character or AIM Code ID Character, and enable *Transmit "No Read" Message on page 5-37*, the digital scanner appends the code ID for Code 39 to the NR message.



Symbol Code ID Character  
(02h)



AIM Code ID Character  
(01h)



\*None  
(00h)

## Prefix/Suffix Values

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

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

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

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

To correct an error or change a selection, scan [Cancel on page D-2](#).

✓ **NOTE** To use Prefix/Suffix values, first set the [Scan Data Transmission Format on page 5-35](#).



Scan Prefix  
(07h)



Scan Suffix 1  
(06h)



Scan Suffix 2  
(08h)



Data Format Cancel

## Scan Data Transmission Format

Parameter # EBh

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

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

To set values for the prefix and/or suffix, see [Prefix/Suffix Values on page 5-34](#).



\*Data As Is  
(00h)



<DATA> <SUFFIX 1>  
(01h)



<DATA> <SUFFIX 2>  
(02h)



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



<PREFIX> <DATA >  
(04h)

## Scan Data Transmission Format (continued)



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



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



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

## FN1 Substitution Values

Key Category Parameter # 67h

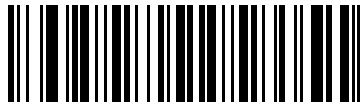
Decimal Value Parameter # 6Dh

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

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

To select a FN1 substitution value via bar code menus:

1. Scan the bar code below.



**Set FN1 Substitution Value**

2. Locate the keystroke 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 HID keyboard, scan the **Enable FN1 Substitution** bar code on page -36.

## 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 successful decode does not occur before trigger release or the **Decode Session Timeout** expires. See *Decode Session Timeout on page 5-19*. Disable this to send nothing to the host if a symbol does not decode.



**NOTE** If you enable **Transmit No Read**, and also enable Symbol Code ID Character or AIM Code ID Character for *Transmit Code ID Character on page 5-33*, the digital scanner appends the code ID for Code 39 to the NR message.



Enable No Read  
(01h)



\*Disable No Read  
(00h)





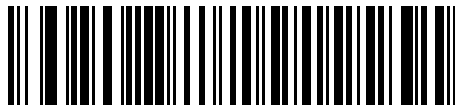
# Chapter 6 USB Interface

---

## Introduction

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

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

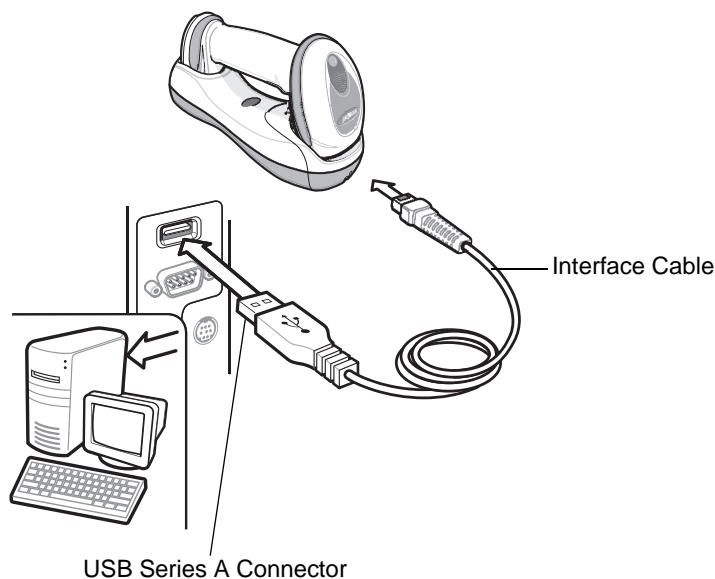


\* Indicates Default — \*North American Standard USB Keyboard — Feature/Option

## Connecting a USB Interface

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

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



**Figure 6-1** USB Connection

The digital scanner cradle connects with USB capable hosts including:

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

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

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

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

To connect the USB interface:

1. Attach the modular connector of the USB interface cable to the host port on the bottom of the digital scanner cradle (see *Connecting the Cradle on page 1-6*).

2. Plug the series A connector in the USB host or hub, or plug the Plus Power connector in an available port of the IBM SurePOS terminal.
3. Select the USB device type by scanning the appropriate bar code from *USB Device Type on page 6-4*.
4. On first installation when using Windows, the software prompts to select or install the Human Interface Device driver. To install this driver, provided by Windows, click *Next* through all the choices and click *Finished* on the last choice. The cradle powers up during this installation.
5. To modify any other parameter options, scan the appropriate bar codes in this chapter.

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

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

## USB Parameter Defaults

*Table 6-1* lists the defaults for USB host parameters. If any option needs to be changed, scan the appropriate bar code(s) provided in the Parameter Descriptions section beginning on *page 6-4*.

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

**Table 6-1** *USB Host Default Table*

Parameter	Default	Page Number
<b>USB Host Parameters</b>		
USB Device Type	HID Keyboard Emulation	<a href="#">6-4</a>
USB Country Keyboard Types (Country Codes)	North American	<a href="#">6-5</a>
USB Keystroke Delay	No Delay	<a href="#">6-7</a>
USB CAPS Lock Override	Disable	<a href="#">6-7</a>
USB Ignore Unknown Characters	Send	<a href="#">6-8</a>
Emulate Keypad	Disable	<a href="#">6-9</a>
USB FN1 Substitution	Disable	<a href="#">6-9</a>
Function Key Mapping	Disable	<a href="#">6-9</a>
Simulated Caps Lock	Disable	<a href="#">6-10</a>
Convert Case	No Case Conversion	<a href="#">6-10</a>
Ignore Beep	Disable	<a href="#">6-11</a>
Ignore Bar Code Configuration	Disable	<a href="#">6-11</a>

---

## USB Host Parameters

### USB Device Type

Select the desired USB device type.



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



\*HID Keyboard Emulation



IBM Table Top USB



IBM Hand-Held USB



USB OPOS Handheld

## USB Country Keyboard Types (Country Codes)

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

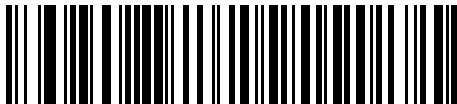
- ✓ **NOTE** When changing USB country keyboard types the digital scanner automatically resets. The digital scanner issues the standard startup beep sequences.



\*North American Standard USB Keyboard



German Windows



French Windows



French Canadian Windows 95/98



French Canadian Windows 2000/XP

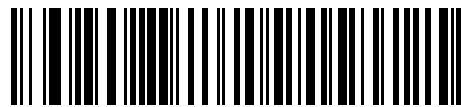


Spanish Windows

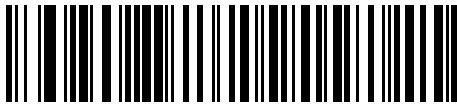
## USB Country Keyboard Types (Country Codes continued)



**Italian Windows**



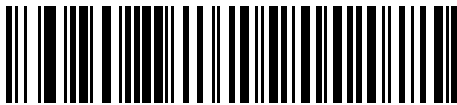
**Swedish Windows**



**UK English Windows**



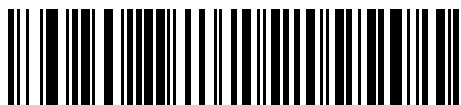
**Japanese Windows (ASCII)**



**Portuguese-Brazilian Windows**

## USB Keystroke Delay

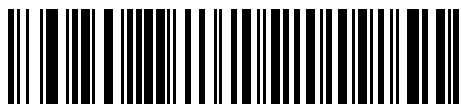
This parameter sets the delay, in milliseconds, between emulated keystrokes. Scan a bar code below to increase the delay when hosts require a slower transmission of data.



**\*No Delay**



**Medium Delay (20 msec)**



**Long Delay (40 msec)**

## USB CAPS Lock Override

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



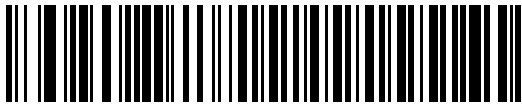
**Override Caps Lock Key  
(Enable)**



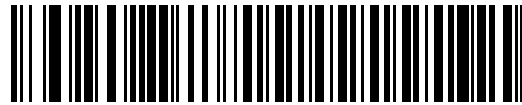
**\*Do Not Override Caps Lock Key  
(Disable)**

## USB Ignore Unknown Characters

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



**\*Send Bar Codes with Unknown Characters**



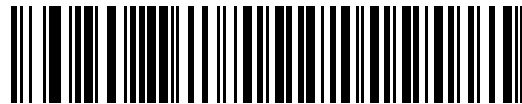
**Do Not Send Bar Codes with Unknown Characters**

## Emulate Keypad

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



**\*Disable Keypad Emulation**



**Enable Keypad Emulation**

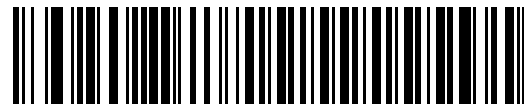


## USB Keyboard FN 1 Substitution

This option applies only to the USB HID Keyboard Emulation device. When enabled, this allows replacement of any FN 1 characters in an EAN 128 bar code with a Key Category and value chosen by the user (see *FN1 Substitution Values on page 5-36* to set the Key Category and Key Value).



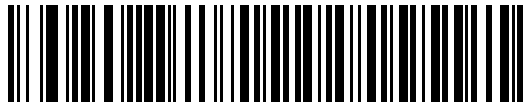
**Enable FN1 Substitution**



**\*Disable FN1 Substitution**

## Function Key Mapping

ASCII values under 32 are normally sent as a control-key sequences (see [Table 6-2 on page 6-12](#)). When this parameter is enabled, the keys in bold are sent in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.



**\*Disable Function Key Mapping**



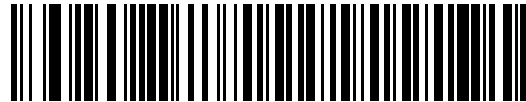
**Enable Function Key Mapping**

## Simulated Caps Lock

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



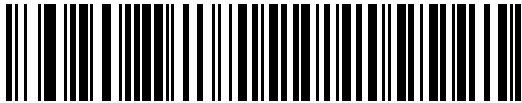
**\*Disable Simulated Caps Lock**



**Enable Simulated Caps Lock**

## Convert Case

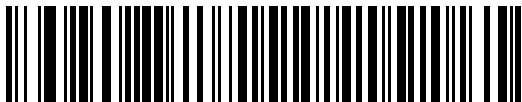
When enabled, the digital scanner converts all bar code data to the selected case.



**\*No Case Conversion**



**Convert All to Upper Case**



**Convert All to Lower Case**

---

## Optional USB Parameters

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

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

### Ignore Beep

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



**\*Disable**



**Enable**

### Ignore Bar Code Configuration

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



**\*Disable**



**Enable**

## ASCII Character Set for USB

**Table 6-2** ASCII Character Set for USB

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

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

**Table 6-2** ASCII Character Set for USB (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1025	\$Y	CTRL Y
1026	\$Z	CTRL Z
1027	%A	CTRL <b>[</b> /ESC <sup>1</sup>
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

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

**Table 6-2** ASCII Character Set for USB (Continued)

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

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

**Table 6-2** ASCII Character Set for USB (Continued)

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

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

**Table 6-2** ASCII Character Set for USB (Continued)

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

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



**Table 6-3** *USB ALT Key Character Set*

<b>ALT Keys</b>	<b>Keystroke</b>
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 6-4** USB GUI Key Character Set

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

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

**Table 6-4** USB GUI Key Character Set (Continued)

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

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

**Table 6-5** USB F Key Character Set

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

**Table 6-5** *USB F Key Character Set (Continued)*

<b>F Keys</b>	<b>Keystroke</b>
5016	F16
5017	F17
5018	F18
5019	F19
5020	F20
5021	F21
5022	F22
5023	F23
5024	F24

**Table 6-6** *USB Numeric Keypad Character Set*

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

**Table 6-7** *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 7 RS-232 Interface

---

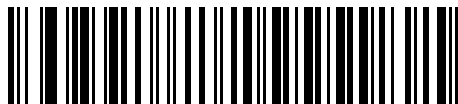
## Introduction

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

If the particular host is not listed in [Table 7-2](#), set the communication parameters to match the host device. Refer to the documentation for the host device.

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

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



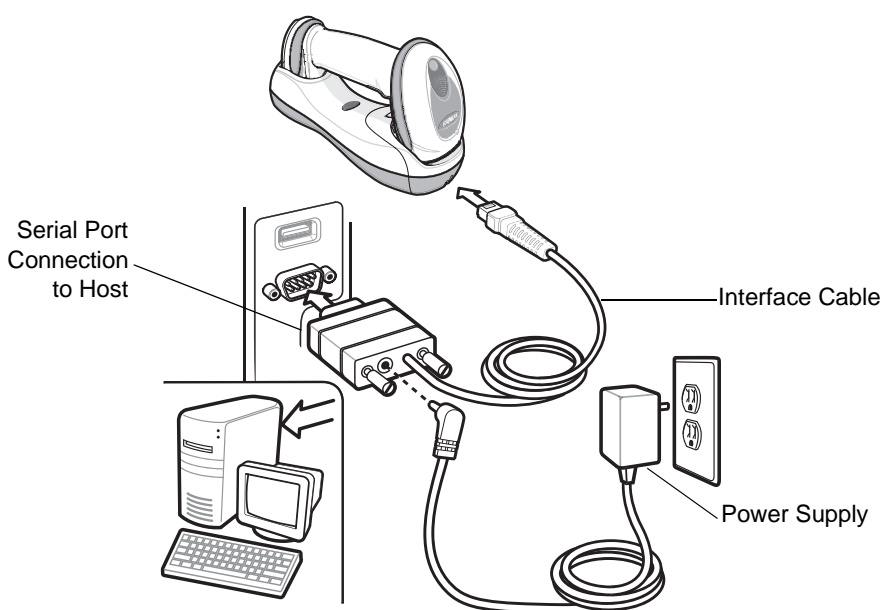
\* Indicates Default    **\*Baud Rate 38,400**    Feature/Option

## Connecting an RS-232 Interface

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

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

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



**Figure 7-1** RS-232 Direct Connection

To connect the RS-232 interface:

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

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

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



## RS-232 Parameter Defaults

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

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

**Table 7-1** RS-232 Host Default Table

Parameter	Default	Page Number
<b>RS-232 Host Parameters</b>		
RS-232 Host Types	Standard	<a href="#">7-6</a>
Baud Rate	9600	<a href="#">7-8</a>
Parity Type	None	<a href="#">7-9</a>
Stop Bit Select	1 Stop Bit	<a href="#">7-9</a>
Data Bits (ASCII Format)	8-Bit	<a href="#">7-10</a>
Check Receive Errors	Enable	<a href="#">7-11</a>
Hardware Handshaking	None	<a href="#">7-11</a>
Software Handshaking	None	<a href="#">7-13</a>
Host Serial Response Time-out	2 sec	<a href="#">7-15</a>
RTS Line State	Low RTS	<a href="#">7-16</a>
Beep on <BEL>	Disable	<a href="#">7-16</a>
Intercharacter Delay	0 msec	<a href="#">7-17</a>
Nixdorf Beep/LED Options	Normal Operation	<a href="#">7-18</a>
Ignore Unknown Characters	Send Bar Code	<a href="#">7-18</a>

## RS-232 Host Parameters

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

**Table 7-2** Terminal Specific RS-232

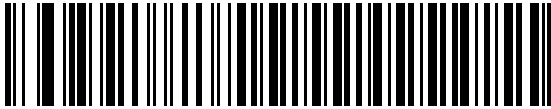
Parameter	ICL	Fujitsu	Wincor-Nixdorf Mode A	Wincor-Nixdorf Mode B/OPOS/JPOS	Olivetti	Omron	CUTE
Transmit Code ID	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data Transmission Format	Data/Suffix	Data/Suffix	Data/Suffix	Data/Suffix	Prefix/Data/Suffix	Data/Suffix	Prefix/Data/Suffix
Suffix	CR (1013)	CR (1013)	CR (1013)	CR (1013)	ETX (1002)	CR (1013)	CR (1013) ETX (1002)
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 (1003)	None	STX (1003)

**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 scanner to the proper host, it may appear unable to scan. If this happens, scan a different RS-232 host type within 5 seconds of cycling power to the digital scanner. The CUTE host disables all parameter scanning, including Set Defaults. If you inadvertently select CUTE, scan \*Enable Parameter Bar Code Scanning (01h) on page 5-5, then change the host selection.**

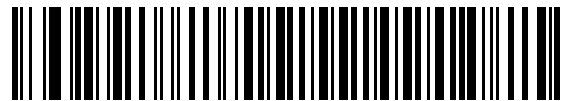


## RS-232 Host Types

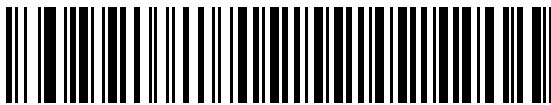
To select an RS-232 host interface, scan one of the following bar codes.



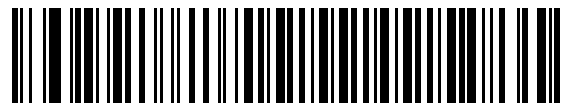
**\*Standard RS-232**



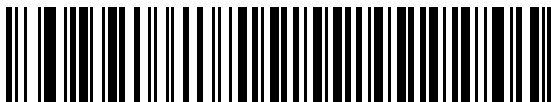
**ICL RS-232**



**Wincor-Nixdorf RS-232 Mode A**



**Wincor-Nixdorf RS-232 Mode B**



**Olivetti ORS4500**



Omron



OPOS/JPOS



Fujitsu RS-232



SITA/CUTE

## Baud Rate

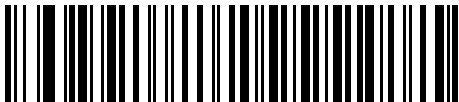
Baud rate is the number of bits of data transmitted per second. Set the digital scanner's baud rate to match the baud rate setting of the host device. Otherwise, data may not reach the host device or may reach it in distorted form.



**Baud Rate 600**



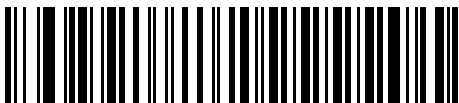
**Baud Rate 1200**



**Baud Rate 2400**



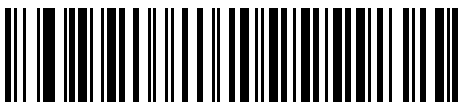
**Baud Rate 4800**



**\*Baud Rate 9600**



**Baud Rate 19,200**

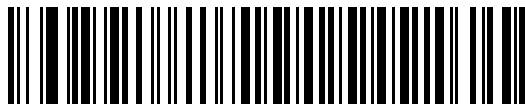


**Baud Rate 38,400**

## Parity

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

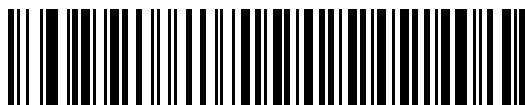
- Select **Odd** parity and the parity bit value is set to 0 or 1, based on data, to ensure that an odd number of 1 bits are contained in the coded character.
- Select **Even** parity and the parity bit value is set to 0 or 1, based on data, to ensure that an even number of 1 bits are contained in the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



**Odd**



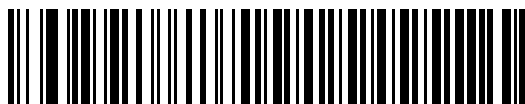
**Even**



**Mark**



**Space**



**\*None**

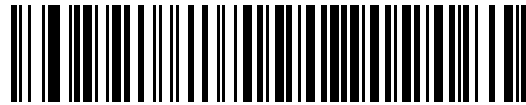
## Stop Bit Select

The stop bit(s) at the end of each transmitted character marks the end of transmission of one character and prepares the receiving device for the next character in the serial data stream. The number of stop bits selected

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



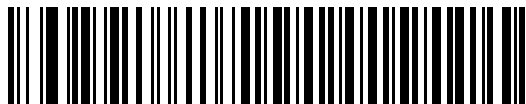
**\*1 Stop Bit**



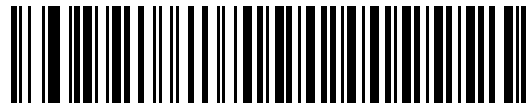
**2 Stop Bits**

### **Data Bits (ASCII Format)**

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



**7-Bit**

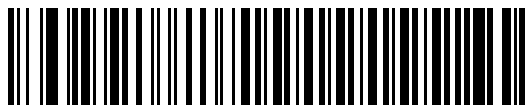


**\*8-Bit**



## Check Receive Errors

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



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



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

## Hardware Handshaking

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

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

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

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

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

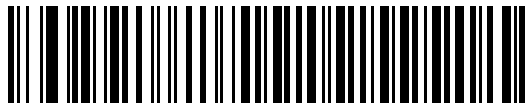
If Hardware Handshaking and Software Handshaking are both enabled, Hardware Handshaking takes precedence.



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

## Hardware Handshaking (continued)

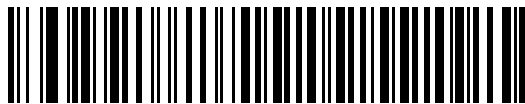
- **None:** Scan the bar code below if no Hardware Handshaking is desired.
- **Standard RTS/CTS:** Scan the bar code below to select Standard RTS/CTS Hardware Handshaking.
- **RTS/CTS Option 1:** When RTS/CTS Option 1 is selected, the digital scanner asserts RTS before transmitting and ignores the state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



**\*None**



**Standard RTS/CTS**



**RTS/CTS Option 1**



**RTS/CTS Option 2**



**RTS/CTS Option 3**

## Software Handshaking

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

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

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

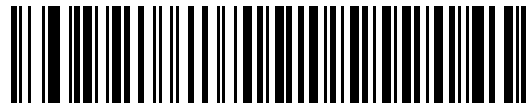
The digital scanner waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the digital scanner does not get a response in this time, it issues an error indication and discards the data. There are no retries when a time-out occurs.

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

### Software Handshaking (continued)



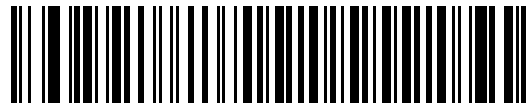
**\*None**



**ACK/NAK**



**ENQ**



**ACK/NAK with ENQ**



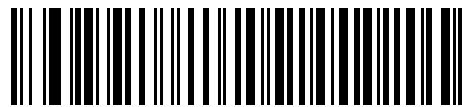
**XON/XOFF**

## Host Serial Response Time-out

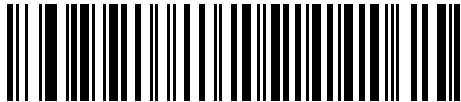
This parameter specifies how long the digital scanner waits for an ACK, NAK, ENQ, XON, or CTS before determining that a transmission error occurred.



**\*Minimum: 2 sec**



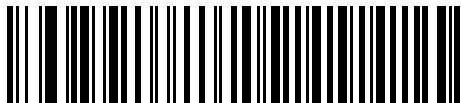
**Low: 2.5 sec**



**Medium: 5 sec**



**High: 7.5 sec**



**Maximum: 9.9 sec**

## RTS Line State

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



\*Host: Low RTS



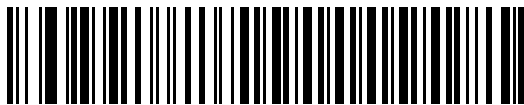
Host: High RTS

## Beep on <BEL>

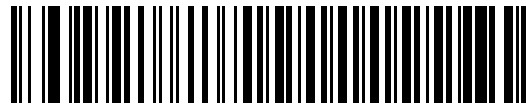
### Point-to-Point Mode Only

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

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



Beep On <BEL> Character  
(Enable)



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

## Intercharacter Delay

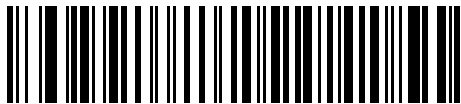
This parameter specifies the intercharacter delay inserted between character transmissions.



**\*Minimum: 0 msec**



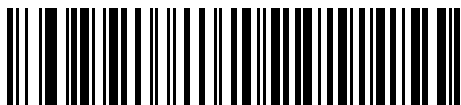
**Low: 25 msec**



**Medium: 50 msec**



**High: 75 msec**



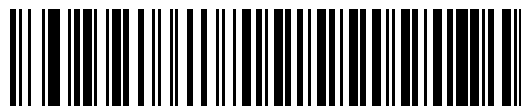
**Maximum: 99 msec**

## Nixdorf Beep/LED Options

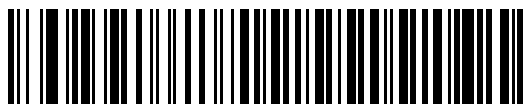
When Nixdorf Mode B is selected, this indicates when the digital scanner should beep and turn on its LED after a decode.



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



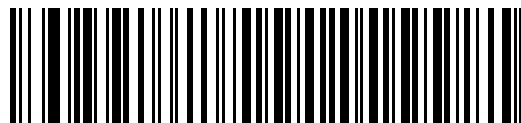
**Beep/LED After Transmission**



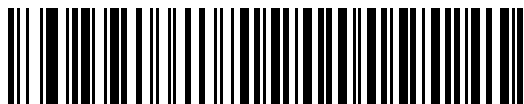
**Beep/LED After CTS Pulse**

## Ignore Unknown Characters

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



**\*Send Bar Code with Unknown Characters**



**Do Not Send Bar Codes with Unknown Characters**



## ASCII Character Set for RS-232

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

**Table 7-4** ASCII Character Set for RS-232

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

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

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

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

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

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

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

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

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



# Chapter 8 Keyboard Wedge Interface

---

## Introduction

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

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

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

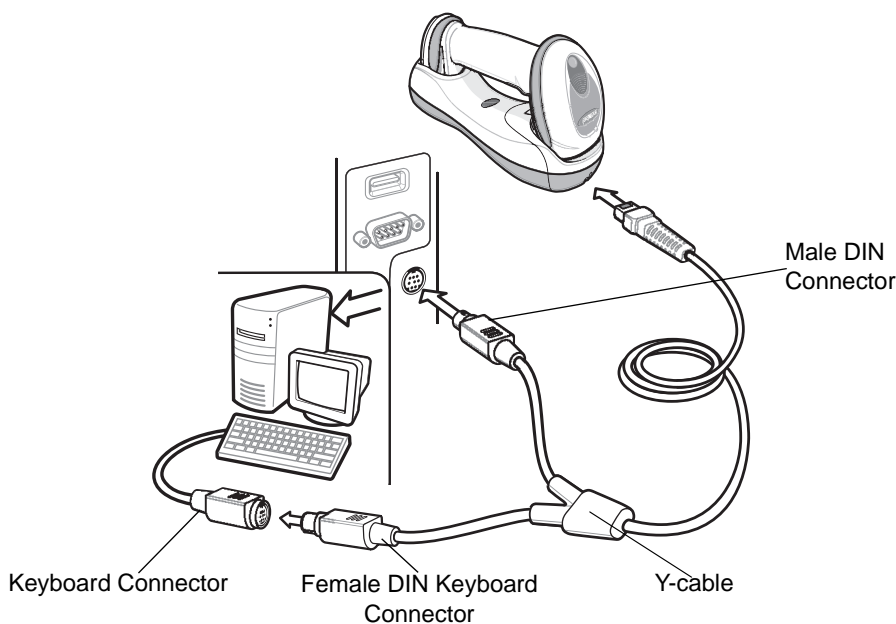


\* Indicates Default    **\*North American**    — Feature/Option

## Connecting a Keyboard Wedge Interface

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

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



**Figure 8-1** Keyboard Wedge Connection with Y-cable

To connect the Keyboard Wedge interface Y-cable:

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



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

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

## Keyboard Wedge Parameter Defaults

[Table 8-1](#) lists the defaults for Keyboard Wedge host parameters. To change any option, scan the appropriate bar code(s) in the Keyboard Wedge Host Parameters section beginning on [page 8-4](#).

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

**Table 8-1** Keyboard Wedge Host Default Table

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

<sup>1</sup>User selection is required to configure this interface and this is the most common selection.

---

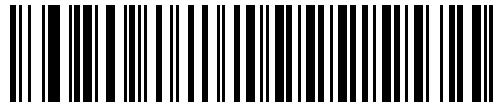
## Keyboard Wedge Host Parameters

### Keyboard Wedge Host Types

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



IBM PC/AT & IBM PC Compatibles<sup>1</sup>



IBM AT Notebook



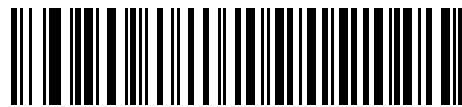
**NOTE** <sup>1</sup>User selection is required to configure this interface and this is the most common selection.

## Keyboard Wedge Country Types (Country Codes)

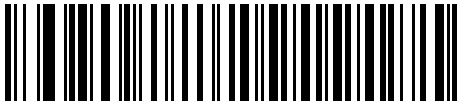
Scan the bar code corresponding to the keyboard type. If the keyboard type is not listed, see *Alternate Numeric Keypad Emulation on page 8-8*.



**\*North American**



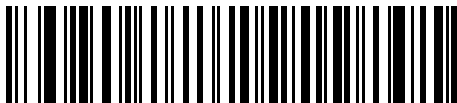
**German Windows**



**French Windows**



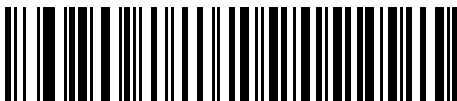
**French Canadian Windows 95/98**



**French Canadian Windows XP/2000**



**Spanish Windows**

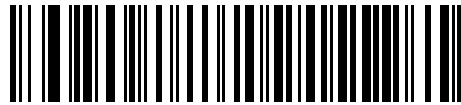


**Italian Windows**

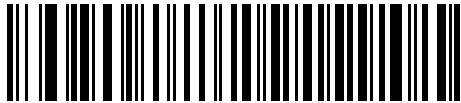
## Keyboard Wedge Country Types (Country Codes continued)



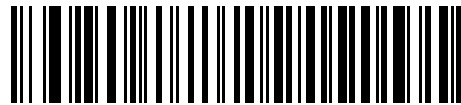
Swedish Windows



UK English Windows



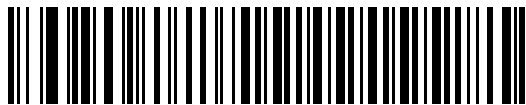
Japanese Windows



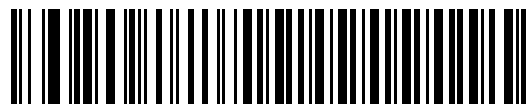
Portuguese-Brazilian Windows

## Ignore Unknown Characters

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



\*Send Bar Codes with Unknown Characters



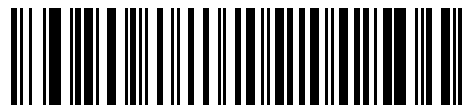
Do Not Send Bar Codes with Unknown Characters

## Keystroke Delay

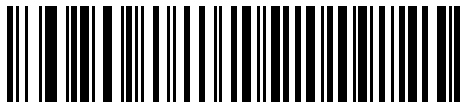
This is the delay in milliseconds between emulated keystrokes. Scan a bar code below to increase the delay when hosts require a slower transmission of data.



**\*No Delay**



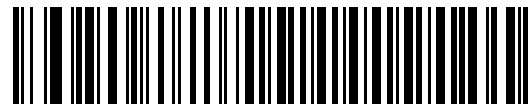
**Medium Delay (20 msec)**



**Long Delay (40 msec)**

## Intra-Keystroke Delay

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



**Enable Intra-Keystroke Delay**



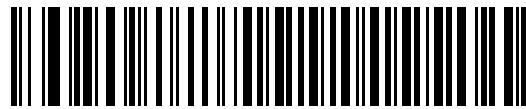
**\*Disable Intra-Keystroke Delay**

## Alternate Numeric Keypad Emulation

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



Enable Alternate Numeric Keypad



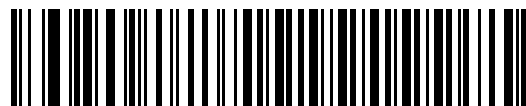
\*Disable Alternate Numeric Keypad

## Caps Lock On

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



Enable Caps Lock On

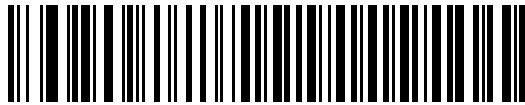


\*Disable Caps Lock On

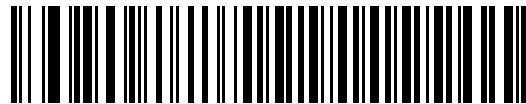
## Caps Lock Override

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

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



**Enable Caps Lock Override**



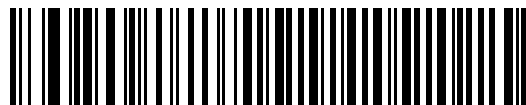
**\*Disable Caps Lock Override**

## Convert Wedge Data

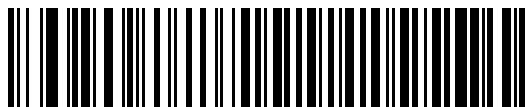
When enabled, the digital scanner converts all bar code data to the selected case.



**Convert to Upper Case**



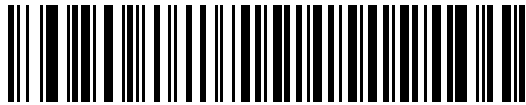
**Convert to Lower Case**



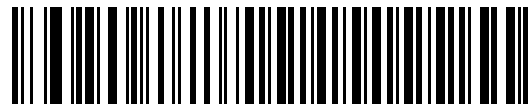
**\*No Convert**

## Function Key Mapping

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



**Enable Function Key Mapping**



**\*Disable Function Key Mapping**

## FN1 Substitution

When enabled, the digital scanner replaces FN1 characters in an EAN128 bar code with a keystroke chosen by the user (see [FN1 Substitution Values on page 5-36](#)).



**Enable FN1 Substitution**



**\*Disable FN1 Substitution**

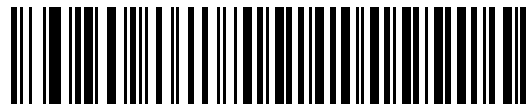


## Send Make and Break

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



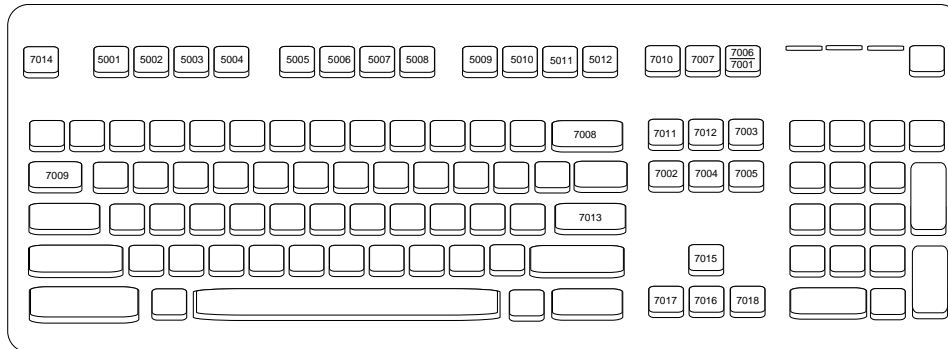
**\*Send Make and Break Scan Codes**



**Send Make Scan Code Only**

## Keyboard Maps

Refer to the following keyboard map for prefix/suffix keystroke parameters. To program the prefix/suffix values, see the bar codes on [page 5-34](#).



**Figure 8-2** IBM PS2 Type Keyboard

## ASCII Character Set for Keyboard Wedge

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

**Table 8-2** Keyboard Wedge ASCII Character Set

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1001	\$A	CTRL A
1002	\$B	CTRL B
1003	\$C	CTRL C
1004	\$D	CTRL D
1005	\$E	CTRL E
1006	\$F	CTRL F
1007	\$G	CTRL G
1008	\$H	CTRL H/ <b>BACKSPACE</b> <sup>1</sup>
1009	\$I	CTRL I/ <b>HORIZONTAL TAB</b> <sup>1</sup>
1010	\$J	CTRL J
1011	\$K	CTRL K
1012	\$L	CTRL L
1013	\$M	CTRL M/ <b>ENTER</b> <sup>1</sup>
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

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

**Table 8-2** Keyboard Wedge ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Character	Keystroke
1022	\$V	CTRL V
1023	\$W	CTRL W
1024	\$X	CTRL X
1025	\$Y	CTRL Y
1026	\$Z	CTRL Z
1027	%A	CTRL [ / <b>ESC</b> <sup>1</sup>
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

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

**Table 8-2** Keyboard Wedge ASCII Character Set (Continued)

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

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

**Table 8-2** Keyboard Wedge ASCII Character Set (Continued)

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

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

**Table 8-2** Keyboard Wedge ASCII Character Set (Continued)

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

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

**Table 8-3** Keyboard Wedge ALT Key Character Set

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

**Table 8-3** Keyboard Wedge ALT Key Character Set (Continued)

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

**Table 8-4** Keyboard Wedge GUI Key Character Set

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



**Table 8-4** Keyboard Wedge GIU Key Character Set (Continued)

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

**Table 8-5** *Keyboard Wedge F Key Character Set*

<b>F Keys</b>	<b>Keystroke</b>
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 8-6** *Keyboard Wedge Numeric Keypad Character Set*

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

**Table 8-7** *Keyboard Wedge Extended Keypad Character Set*

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