# Programming Guide

## Advanced 2D Image Reader

**Revision History**

Changes to the original manual are listed below:

| Version | Date | Description of Version |
|---|---|---|
| 1.0 | 2013/05/02 | Initial release |
| 1.1 | 2013/8/26 | Made correction to USB default (changed to HID) |
| 1.2 | 2014/4/16 | Deleted unnecessary factory default setting |

# Important Notice

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## General Handling Precautions

Do not dispose the scanner in fire.
Do not put the scanner directly in the sun or by any heat source.
Do not use or store the scanner in a very humid place.
Do not drop the scanner or allow it to collide violently with other objects.
Do not take the scanner apart without authorization

## Guidance for Printing

This manual is in A5 size. Please double check your printer setting before printing it out. When the barcodes are to be printed out for programming, the use of a high-resolution laser printer is strongly suggested for the best scan result.

# Table of Contents

# Settings and Programming

Scan a series of selected barcode patches in this manual to affect setup and programming of your handheld 2D Image Reader. Decoding options and interface protocols can be tailored to a specific application. Setup parameters are stored in non-volatile memory in the scanner and are retained even when power is off. Setup parameters change only when you reset them.

Throughout the programming guide, default values are indicated with square.

You may need to hide adjacent code patches with your hand when scanning.

## Programming Options

This section contains the following two divisions:

1. Default factory device settings.
2. Supported symbologies.

## Default Factory Device Settings

| User Preferences | |
|---|---|
| Parameter Scanning | Enable |
| Lock Parameter Scanning | Disable |
| Unlock Parameter Scanning | Disable |
| User Parameter Pass Through | Disable |
| Beep After Good Decode | Enable |
| Beeper Tone | Medium |
| Beeper Volume | High |
| Beeper Duration | Medium |
| Suppress Power-up Beeps | Do not suppress |
| Decode LED Behavior | Power down after LED shuts off |
| Decode Blinks | Disable |
| Decode Blink Duration | Timeout Between Decodes, Different Symbols value |
| Trigger Modes | Level |
| Power Mode | Low Power |
| Time Delay to Low Power Mode | 1.0 Sec |

| | |
|---|---|
| Picklist Mode | Disabled Always |
| Decode Session Timeout | 9.9 Sec |
| Timeout Between Decodes, Same Symbol | 0.6 Sec |
| Timeout Between Decodes, Different Symbols | 0.2 Sec |
| Continuous Barcode Read | Disable |
| Unique Barcode Reporting | Disable |
| Low Light Motion Detection | No Low Light Motion Detection |
| Clear Memory | Disable |
| Fuzzy 1D Processing | Enable |
| Mirrored Image | Disable |
| Mobile Phone/Display Mode | Disable |
| Validate Concatenated Parameter Barcodes | Disable |
| PDF Prioritization | Disable |
| PDF Prioritization Timeout | 200 ms |
| **Miscellaneous Scanning Parameters** | |
| Transmit Code ID Character | None |
| SSI Prefix Value | <CR> |
| SSI Suffix 1 Value SSI Suffix 2 Value | <CR> <CR> |
| Scan Data Transmission Format | Data as is |
| FN1 Substitution Values | Set |
| Transmit “No Read” Message | Disable |
| **Imaging Options** | |
| Decoding Autoexposure | Enable |
| Decoding Illumination | Enable |
| Decode Aiming Pattern | Enable |
| Aim Brightness | 0 |
| Illumination Brightness | 10 |
| Presentation Mode Field of View | Default (Reduced) |
| Frame Rate | Auto |

| | |
|---|---|
| Image Capture Autoexposure | Enable |
| Image Capture Illumination | Enable |
| Fixed Gain | 50 |
| Exposure Time | 100 (10 ms) |
| LED Illumination | Internal LED Illumination |
| Snapshot Mode Timeout | 0 (30 seconds) |
| Snapshot Aiming Pattern | Enable |
| Image Cropping | Disable |
| Crop to Pixel Addresses | 0 top, 0 left, 479 bottom, 751 right |
| Image Resolution | Full |
| Image Brightness (Target White) | 180 |
| Image File Format Selection | JPEG |
| JPEG Image Options | Quality |
| JPEG Quality Value | 65 |
| JPEG Size Value | 40 (41K) |
| Image File Meta Data | Disable |
| Image Enhancement | Low |
| Image Edge Sharpening | Low |
| Image Contrast Enhancement | Enable |
| Image Rotation | 0 |
| Bits per Pixel (BPP) | 8 BPP |
| Video View Finder | Disable |
| Video View Finder Image Size | 1700 bytes |
| **USB Host Parameters** | |
| USB Device Type | SNAPI with Imaging |
| Symbol Native API (SNAPI) Status Handshaking | Enable |
| USB Country Keyboard Types (Country Codes) | North American |
| USB Keystroke Delay | No Delay |

| | |
|---|---|
| Simulated Caps Lock | Disable |
| USB CAPS Lock Override | Disable |
| USB Ignore Unknown Characters | Enable |
| USB Convert Unknown to Code 39 | Disable |
| USB Ignore Beep Directive | Honor |
| USB Ignore Type Directive | Honor |
| Emulate Keypad | Disable |
| Emulate Keypad with Leading Zero | Disable |
| USB FN1 Substitution | Disable |
| Function Key Mapping | Disable |
| Convert Case | None |
| USB Static CDC | Enable |
| USB Polling Interval | 8 msec |
| Quick Keypad Emulation | Disable |
| **SSI Host Parameters** | |
| Select SSI Host | N/A |
| Baud Rate | 9600 |
| Parity | None |
| Check Parity | Disable |
| Stop Bits | 1 |
| Software Handshaking | ACK/NAK |
| Host RTS Line State | Low |
| Decode Data Packet Format | Send Raw Decode Data |
| Host Serial Response Time-out | 2 sec |
| Host Character Time-out | 200 msec |
| Multipacket Option | Option 1 |
| Interpacket Delay | 0 ms |
| Event Reporting | |
| Decode Event | Disable |

| | |
|---|---|
| Boot Up Event | Disable |
| Parameter Event | Disable |
| **Serial Host Parameters** | |
| Serial Host Types | Standard RS-232 |
| Baud Rate | 9600 |
| Parity Type | None |
| Stop Bits | 1 |
| Data Bits | 8-Bit |
| Check Receive Errors | Enable |
| Hardware Handshaking | None |
| Software Handshaking | None |
| Host Serial Response Time-out | 2 Sec |
| RTS Line State | Low RTS |
| Beep on <BEL> | Disable |
| Intercharacter Delay | 0 msec |
| Nixdorf Beep/LED Options | Normal Operation |
| Ignore Unknown Characters | Send Barcode |
| **Symbology Parameters** | |
| **UPC/EAN** | |
| UPC-A | Enable |
| UPC-E | Enable |
| UPC-E1 | Disable |
| EAN-8/JAN 8 | Enable |
| EAN-13/JAN 13 | Enable |
| Bookland EAN | Enable |
| Bookland ISBN Format | ISBN-10 |
| Decode UPC/EAN/JAN Supplementals (2 and 5 digits) | Ignore |
| User-Programmable Supplementals Supplemental 1: Supplemental 2: | N/A |

| | |
|---|---|
| UPC/EAN/JAN Supplemental Redundancy | 10 |
| Decode UPC/EAN/JAN Supplemental AIM ID | Combined |
| Transmit UPC-A Check Digit | Enable |
| Transmit UPC-E Check Digit | Enable |
| Transmit UPC-E1 Check Digit | Enable |
| UPC-A Preamble | System Character |
| UPC-E Preamble | System Character |
| UPC-E1 Preamble | System Character |
| Convert UPC-E to A | Disable |
| Convert UPC-E1 to A | Disable |
| EAN-8/JAN-8 Extend | Disable |
| UCC Coupon Extended Code | Disable |
| Coupon Report | New Coupon Symbols |
| ISSN EAN | Enable |
| **Code 128** | |
| EAN-13/JAN 13 | Enable |
| Bookland EAN | Enable |
| Bookland ISBN Format | ISBN-10 |
| Decode UPC/EAN/JAN Supplementals (2 and 5 digits) | Ignore |
| User-Programmable Supplementals Supplemental 1: Supplemental 2: | N/A |
| UPC/EAN/JAN Supplemental Redundancy | 10 |
| Decode UPC/EAN/JAN Supplemental AIM ID | Combined |
| Transmit UPC-A Check Digit | Enable |
| Transmit UPC-E Check Digit | Enable |
| Transmit UPC-E1 Check Digit | Enable |
| UPC-A Preamble | System Character |
| UPC-E Preamble | System Character |
| UPC-E1 Preamble | System Character |

| | |
|---|---|
| Convert UPC-E to A | Disable |
| Convert UPC-E1 to A | Disable |
| EAN-8/JAN-8 Extend | Disable |
| UCC Coupon Extended Code | Disable |
| Coupon Report | New Coupon Symbols |
| ISSN EAN | Enable |
| Code 128 | |
| Code 128 | Enable |
| Set Length(s) for Code 128 | Any Length |
| GS1-128 (formerly UCC/EAN-128) | Enable |
| ISBT 128 | Enable |
| ISBT Concatenation | Disable |
| Check ISBT Table | Enable |
| ISBT Concatenation Redundancy | 10 |
| **Code 39** | |
| Code 39 | Enable |
| Trioptic Code 39 | Disable |
| Convert Code 39 to Code 32 (Italian Pharmacy Code) | Disable |
| Code 32 Prefix | Disable |
| Set Length(s) for Code 39 | Length Within Range: 2 to 55 |
| Code 39 Check Digit Verification | Disable |
| Transmit Code 39 Check Digit | Disable |
| Code 39 Full ASCII Conversion | Disable |
| Buffer Code 39 | Disable |
| **Code 93** | |
| Code 93 | Disable |
| Set Length(s) for Code 93 | Length Within Range: 4 to 55 |
| **Code 11** | |
| Code 11 | Disable |

| | |
|---|---|
| Set Lengths for Code 11 | Length Within Range: 4 to 55 |
| Code 11 Check Digit Verification | Disable |
| Transmit Code 11 Check Digit(s) | Disable |
| Interleaved 2 of 5 (ITF) | |
| Interleaved 2 of 5 (ITF) | Disable |
| Set Lengths for I 2 of 5 | 1 Length; Length = 14 |
| I 2 of 5 Check Digit Verification | Disable |
| Transmit I 2 of 5 Check Digit | Disable |
| Convert I 2 of 5 to EAN 13 | Disable |
| **Discrete 2 of 5 (DTF)** | |
| Discrete 2 of 5 | Disable |
| Set Length(s) for D 2 of 5 | 1 Length; Length = 12 |
| **Codabar (NW - 7)** | |
| Codabar | Disable |
| Set Lengths for Codabar | Length Within Range: 5 to 55 |
| CLSI Editing | Disable |
| NOTIS Editing | Disable |
| Codabar Upper or Lower Case Start /Stop Characters Detection | Upper Case |
| **MSI** | |
| MSI | Disable |
| Set Length(s) for MSI | Length Within Range: 4 to 55 |
| MSI Check Digits | One |
| Transmit MSI Check Digit | Disable |
| MSI Check Digit Algorithm | Mod 10/Mod 10 |
| **Chinese 2 of 5** | |
| Chinese 2 of 5 | Disable |
| **Matrix 2 of 5** | |
| Matrix 2 of 5 | Disable |
| Matrix 2 of 5 Lengths | Length; Length = 14 |

| | |
|---|---|
| Matrix 2 of 5 Check Digit | Disable |
| Transmit Matrix 2 of 5 Check Digit | Disable |
| **Korean 3 of 5** | |
| Korean 3 of 5 | Disable |
| Inverse 1D | Regular |
| Postal Codes | |
| US Postnet | Disable |
| US Planet | Disable |
| Transmit US Postal Check Digit | Enable |
| UK Postal | Disable |
| Transmit UK Postal Check Digit | Enable |
| Japan Postal | Disable |
| Australia Post | Disable |
| Australia Post Format | Autodiscriminate |
| Netherlands KIX Code | Disable |
| USPS 4CB/One Code/Intelligent Mail | Disable |
| UPU FICS Postal | Disable |
| **GS1 DataBar** | |
| GS1 DataBar (GS1 DataBar Omnidirectional, GS1 DataBar Truncated, GS1 DataBar Stacked, GS1 DataBar Stacked Omnidirectional) | Enable |
| GS1 DataBar Limited | Disable |
| GS1 DataBar Limited Security Level | 3 |
| GS1 DataBar Expanded (GS1 DataBar Expanded, GS1 DataBar Expanded Stacked) | Enable |
| Convert GS1 DataBar to UPC/EAN | Disable |
| **Composite** | |
| Composite CC-C | Disable |
| Composite CC-A/B | Disable |
| Composite TLC-39 | Disable |
| UPC Composite Mode | UPC Always Linked |

| | |
|---|---|
| Composite Beep Mode | Beep As Each Code Type is Decoded |
| GS1-128 Emulation Mode for UCC/EAN Composite Codes | Disable |
| **2D Symbologies** | |
| PDF417 | Enable |
| MicroPDF417 | Disable |
| Code 128 Emulation | Disable |
| Data Matrix | Enable |
| Data Matrix Inverse | Regular |
| Decode Mirror Images (Data Matrix Only) | Auto |
| Maxicode | Disable |
| QR Code | Enable |
| QR Inverse | Regular |
| MicroQR | Enable |
| Aztec | Enable |
| Aztec Inverse | Inverse Autodetect |
| Symbology-Specific Security Levels | |
| Redundancy Level | 1 |
| Security Level (UPC/EAN and Code 93) | 1 |
| Intercharacter Gap Size | Normal |
| Macro PDF | |
| Macro PDF Transmit/Decode Mode Symbols | Passthrough Mode |
| Transmit Macro PDF Control Header | Disable |
| Escape Characters | None |
| Flush Macro PDF Buffer | |
| Abort Macro PDF Entry | |

# User Preferences

## Set Default Parameter

You can reset the device to factory defaults or custom defaults.

Restore Defaults

Write to Custom Defaults

Parameter Scanning

To disable decoding of parameter barcodes, including the Set All Defaults parameter barcode, scan the Disable Parameter Scanning barcode below. To enable decoding of parameter barcodes, scan Enable Parameter Scanning.

Enable Parameter Scanning

Disable Parameter Scanning

Lock/Unlock Parameter Scanning

This feature prevents the decoder from scanning parameter barcodes and provides an added level of security not offered via Disable Parameter Scanning.
After locking the decoder, the only parameter barcode that can decode is Unlock. Scanning any other parameter barcode including the Enable or Disable Parameter Scanning barcode results in a parameter error beep.

To lock the decoder:

1. Scan the Lock barcode.
2. Scan four barcodes from Appendix D, Numeric Barcodes that represent the desired PIN. Enter leading zeros for numbers below 1000, e.g., to program a PIN of 29, enter 0, 0, 2, 9. A "lock" beep sounds.

To unlock the decoder:

1. Scan the Unlock barcode.
2. Scan four barcodes from Appendix D, Numeric Barcodes that represent the correct PIN. An "unlock" beep sounds. Entering an incorrect pin results in a parameter error beep.

Lock

Unlock

User Parameter Pass Through

Enable this to send user-defined parameter barcodes as normal decode data in decode data packets for SSI and SNAPI hosts.

Enable this to send user-defined parameter barcodes (see User-Defined Parameter Barcode Format below) as normal decode data in decode data packets for SSI and SNAPI hosts.

**User-Defined Parameter Barcode Format**

Code 128 barcodes with:
<FNC3><L><data>
or
<FNC3><B><12 bytes of data>
Decode Data Format
<0xf3><L><data>
or
<0xf3><B><12 bytes of data>
Note that the B type only works with 12 bytes of data.
A normal decode beep sounds upon a successful decode of a user-defined parameter barcode.

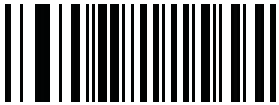
Enable User Parameter Pass Through

Disable User Parameter Pass Through

Beep After Good Decode

Scan a barcode below to select whether or not the decoder issues a beep signal after a good decode. If selecting Do Not Beep After Good Decode, beeper signals still occur during parameter menu scanning and to indicate error conditions.

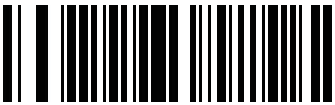
Enable Beep After Good Decode



Disable Beep After Good Decode

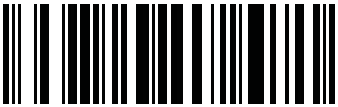
Beeper Tone

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



Low Frequency

Medium Frequency



High Frequency

Beeper Volume

To select a beeper volume, scan the Low Volume, Medium Volume, or High Volume barcode.

Low Volume

Medium Volume

High Volume

Beeper Duration

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

Short

Medium

Long

Suppress Power-up Beeps

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

Do not Suppress Power-up Beeps

Suppress Power-up Beeps

Decode LED Behavior

Select one of the following options to control decode LED behavior.

Power Down After LED Shuts Off

Decode LED Off on Power-Down

Disable Decode LED

Decode Blinks

In Presentation Mode, this feature specifies how many times to blink the illumination to indicate a successful decode.

Disable Decode Blinks

1 Decode Blink

2 Decode Blink

3 Decode Blink

Decode Blink Duration

To set the duration of the decode blinks, scan the barcode below, then scan two numeric barcodes from Appendix D that correspond to the desired duration in 100 msec increments.

To return the Decode Blink Duration to the value specified by Timeout Between Decodes, Different Symbols, scan Set Decode Blink Duration to Timeout Between Decodes, Different Symbols.

Decode Blink Duration

Set Decode Blink Duration to Timeout Between Decodes, Different Symbols

Trigger Modes

- Level - A trigger event activates decode processing, which continues until the trigger event ends, a valid decode, or the Decode Session Timeout occurs.
- Presentation Mode - When the decoder detects an object in its field of view, it triggers and attempt to decode. The range of object detection does not vary under normal lighting conditions. This applies to decode mode only. In this mode the unit does not enter Low Power mode.
- Host - A host command issues the triggering signal. The decoder interprets an actual trigger pull as a Level triggering option.
- Auto Aim - This trigger mode turns on the aiming pattern when the decoder senses motion. A trigger pull activates decode processing. After 2 seconds of inactivity the aiming pattern automatically shuts off.
- Auto Aim with Illumination - This trigger mode turns on the aiming pattern and internal illumination LEDs when the decoder senses motion. A trigger pull activates decode processing. After 2 seconds of inactivity the aiming pattern and internal illumination LEDs automatically shut off.

Level

Presentation Mode

Host

Auto Aim

Auto Aim with Illumination

Power Mode (Serial Hosts Only)

Select whether or not the decoder enters Low Power consumption mode after a decode attempt. In Continuous On mode, the decoder does not enter this low power state.

Continuous On

Low Power Mode

Time Delay to Low Power Mode

This parameter sets the time the decoder remains active after decoding. After a scan session, the decoder waits this amount of time before entering Low Power Mode.

1 Second

5 Seconds

1 Minute

5 Minutes

15 Minutes

1 Hour

Picklist Mode

Picklist mode enables the decoder to decode only barcodes aligned under the center of the aiming pattern.

Disabled Always

Enabled Always

Decode Session Timeout

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 barcode below. Next, scan two numeric barcodes from Appendix D, Numeric Barcodes that correspond to the desired on time. Provide a leading zero for single digit numbers and scan cancel to make corrections.

Decode Session Timeout

Timeout Between Decodes, Same Symbol

Use this option in Presentation Mode to prevent multiple reads of a symbol left in the decoder's field of view. The timeout begins when you remove the symbol from the field of view.

To select the timeout between decodes for the same symbol, available in 0.1 second increments from 0.0 to 9.9 seconds, scan the barcode below, then scan two Numeric Barcodes from Appendix D, Numeric Barcodes that correspond to the desired interval. The default interval is 0.6 seconds.

Timeout Between Decodes, Same Symbol

Timeout Between Decodes, Different Symbol

Use this option in Presentation Mode or Continuous Barcode Read to control the time the decoder is inactive between decoding different symbols.

Timeout Between Decodes, Different Symbols

Continuous Barcode Read

Select Enable to allow decode processing to continue until the trigger event ends or the Decode Session Timeout occurs. User indications occur upon decoding each barcode. Select Disable to end decode processing upon a valid decode as well. This mode does not apply to Presentation Mode.

Disable Continuous Barcode Read

Enable Continuous Barcode Read

Unique Barcode Reporting

Enable this to report only unique barcodes while the trigger is pressed. This option only applies when Continuous Barcode Read is enabled.

Disable Continuous Barcode Read

Enable Continuous Barcode Read

Low Light Motion Detection

In Presentation Mode, this feature allows motion detection in dim to dark illumination environments by using the aiming dot or dim illumination to assist in the detection of motion.

No Low Light Motion Detection

Aiming Dot Low Light Motion Detection

Dim Illumination Low Light Motion Detection

Clear Memory

Enable this to prevent the decoder from sending the last acquired image in order to protect sensitive data from unwanted access.

Enable Clear Memory

Disable Clear Memory

Fuzzy 1D Processing

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

Enable Fuzzy 1D Processing

Disable Fuzzy 1D Processing

Mirrored Image

Enable this to scan images in reverse, or mirrored, as if seen through a mirror. This mode is useful in applications requiring scanning through a mirror and using symbologies that do not decode in reverse.

Enabling this mode when using snapshot or video viewfinder mode transmits images as mirrored images.

Disable Mirrored Image

Enable Mirrored Image

Mobile Phone/Display Mode

This mode improves barcode reading performance with target barcodes displayed on mobile phones and electronic displays.

Disable Mobile Phone/Display Mode

Enable Mobile Phone/Display Mode

Validate Concatenated Parameter Barcodes

The decoder can encounter invalid parameters when using concatenated parameter barcodes intended for different scanner models or different versions of a scanner. This parameter determines how to process concatenated parameter barcodes when the decoder encounters an invalid parameter setting in the barcode.
Disable this to ignore invalid parameters and configure valid parameters. Enable this to ignore all parameters if one or more are invalid.

Disable Validate Concatenated Parameter Barcode

Enable Validate Concatenated Parameter Barcodes

PDF Prioritization

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

Disable PDF Prioritization

Enable PDF Prioritization

PDF Prioritization Timeout

When PDF Prioritization is enabled, this timeout specifies how long the decoder attempts to decode a PDF417 symbol before reporting the 1D barcode in the field of view.

PDF Prioritization Timeout

Miscellaneous Scanning Parameters

A Code ID character identifies the code type of a scanned barcode. 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.

Symbol Code ID Character

AIM Code ID Character

None

Prefix/Suffix Values

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 the prefix or suffix barcode below, then scan a four-digit number from Appendix D, Numeric Barcodes that corresponds to that value. The first digit defines the key category (type of character to send) and is stored in the key category parameter. The remaining three digits define the value of the character and are stored in the decimal value parameter. Be sure to use both key category and decimal value parameters to define the prefix/suffix value.

When using host commands to set the prefix or suffix, set the key category parameter to 1, then set the 3-digit decimal value. To correct an error or change a selection, scan Cancel.

Scan Prefix

Scan Suffix 1

Scan Suffix 2

Scan Data Transmission Format

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

Data As Is

<Data><Suffix 1>

<Data><Suffix 2>

<Data><Suffix 1><Suffix 2>

<Prefix><Data>

Scan Data Transmission Format (continued)

<Prefix><Data><Suffix 1>

<Prefix><Data><Suffix 2>

<Prefix><Data><Suffix 1><Suffix 2>

FN1 Substitution Values

The USB HID keyboard host supports a FN1 Substitution feature. Enabling this substitutes any FN1 character (0x1b) in an EAN128 barcode 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, scan the barcode below. Next, scan four Numeric Barcodes from Appendix D, Numeric Barcodes that correspond to the desired value. Scan cancel to make corrections.

Set FN1 Substitution Value

Transmit “No Read” Message

Scan a barcode 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. Disable this to send nothing to the host if a symbol does not decode.

Enable No Read

Disable No Read

Report Version

Scan the barcode below to report the version of software currently installed in the decoder.

Report Software Version

Diagnostic Testing and Reporting

Use the ATT_DIAGNOSTIC_REPORT command to retrieve system information.
The following are reported to the host for each test case. The result consists of 2 bytes: an 8 bit test number and an 8 bit test result.

Diagnostic Report Format

| **Byte Offset** | **Test Name** | **Results** |
|---|---|---|
| Data byte 0 | $I^2C$ interface | Pass / Fail |
| Data byte 2 | Laser current | Pass / High / Low |
| Data byte 4 | Laser MDIop current | Pass / High / Low |
| Data byte 6 | Operating temperature | Pass / Warning / Critical |
| Data byte 8 | Laser current stored | Pass / High / Low |
| Data byte 10 | Laser MDIop current stored | Pass / High / Low |
| Data byte 12 | Operating temperature stored | Pass / Warning / Critical |

| | |
|---|---|
| 0 | Pass |
| 1 | Fail |
| 2 | Not tested |
| 3 | NA |
| 4 | High |
| 5 | Low |
| 6 | Warning |
| 7 | Critical |
| 8 | Fatal |

# Imaging Preferences

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

The decoder has two modes of operation:

- Decode Mode
- Snapshot Mode
- Snapshot with Viewfinder Mode.

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

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

If a trigger event is not activated within the Snapshot Mode Timeout period, the device returns to Decode Mode. Use *Snapshot Mode Timeout* to adjust this timeout period. The default timeout period is 30 seconds.
To disable the laser aiming pattern during Snapshot Mode, see Snapshot Aiming Pattern.

Use Video View Finder to enable Snapshot with Viewfinder Mode. In this mode the decoder behaves as a video camera until the trigger is active, at which time a Snapshot is performed as described above.


Snapshot Mode

Decoding Autoexposure

Select Enable Decoding Autoexposure to allow the imager engine to control gain settings and exposure (integration) time to best capture an image for decode mode.
Select Disable Decoding Autoexposure to manually adjust the gain and exposure time.

Enable Decoding Autoexposure

Disable Decoding Autoexposure

Decoding Illumination

Selecting Enable Decoding Illumination causes the decoder to turn on illumination every image capture to aid decoding. Select Disable Decoding Illumination to prevent the decoder from using decoding illumination.
Enabling illumination usually results in superior images. The effectiveness of illumination decreases as the distance to the target increases.

Enable Decoding Illumination

Disable Decoding Illumination

Decode Aiming Pattern

Select Enable Decode Aiming Pattern to project the aiming pattern during barcode capture, Disable Decode Aiming Pattern to turn the aiming pattern off, or Enable Decode Aiming Pattern on PDF to project the aiming pattern when the decoder detects a 2D barcode.

Enable Decoding Aiming Pattern

Disable Decoding Aiming Pattern

Aim Brightness

This feature sets the brightness of the aim pattern. The default is 0, which indicates that the aim pattern is always on in between camera exposures. For values above 0, each increment of the brightness value increments the aim duration 0.5 ms.

To program Aim Brightness, scan this barcode followed by three numeric barcodes in Appendix D, Numeric Barcodes that correspond to the value representing brightness. Settings range from 0 to 255. The maximum aim duration is limited by the frame time, so the recommended range is 0 to 30 when the frame rate is set to 60 fps.

Aim Brightness

Illumination Brightness

This feature sets the brightness of the illumination by altering LED power. The default is 10, which is maximum LED brightness. For values from 1 to 10, LED brightness varies from lowest to highest level of brightness.

Illumination Brightness

Presentation Mode Field of View

In Presentation Mode, by default the decoder searches for a barcode in a smaller region around the aiming pattern's center to speed search time.

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

Presentation Mode Default Field of View

Presentation Mode Full Field of View

Frame Rate

Select an option to control the rate at which frames are captured and transmitted. When capturing images, using lower frame rates can improve image brightness.
Settings for frame rate are:

- Auto - The scanner controls the frame rate and changes dynamically based on the mode of operation to provide optimal performance.
- 60 fps - The frame rate is fixed at 60 frames per second
- 55 fps - The frame rate is fixed at 55 frames per second
- 50 fps - The frame rate is fixed at 50 frames per second
- 45 fps - The frame rate is fixed at 45 frames per second
- 40 fps - The frame rate is fixed at 40 frames per second
- 30 fps - The frame rate is fixed at 30 frames per second
- 20 fps - The frame rate is fixed at 20 frames per second
- 15 fps - The frame rate is fixed at 15 frames per second
- 10 fps - The frame rate is fixed at 10 frames per second

Auto

60 fps

55 fps

50 fps

Frame Rate (continued)

45 fps

40 fps

30 fps

20 fps

15 fps

10 fps

Image Capture Autoexposure

Select Enable Image Capture Autoexposure to allow the decoder to control gain settings and exposure (integration) time to best capture an image for snapshot mode.

Select Disable Image Capture Autoexposure to manually adjust the gain and exposure time (see Fixed Gain and Exposure Time).

Enable Image Capture Autoexposure

Disable Image Capture Autoexposure

Image Capture Illumination

Selecting Enable Image Capture Illumination causes illumination to turn on during every image capture.

Disable illumination to prevent the decoder from using illumination.

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

Enable Image Capture Illumination

Disable Image Capture Illumination

Fixed Gain

This parameter only applies when Decoding or Image Capture Autoexposure is disabled. Gain is a means of amplifying the raw image data before it is converted into 8-bit grayscale values. Increasing the fixed gain increases brightness and contrast, but also increases noise (undesired electrical fluctuations in the image) which makes the image less attractive and/or harder to decode.

To set the fixed gain, scan the barcode below followed by 3 barcodes from Appendix D, Numeric Barcodes, in the range of 1 to 100, representing the value. The default is 50.

Fixed Gain

Exposure Time

This parameter only applies when Decoding or Image Capture Autoexposure is disabled. It configures the exposure for both Decode and Snapshot modes.

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

Note: The maximum exposure time is based on the configured Frame Rate. For example, for a frame rate of 60 fps, the maximum exposure time allowed is 15 ms. Setting exposure time to a larger value than the frame rate allows sets the value to the maximum allowed exposure time.

As exposure time lengthens, aim brightness decreases.

To set the Exposure Time parameter, scan Fixed Exposure followed by four numeric bar codes representing the value in the range of 1 - 1000. Insert leading zeros if necessary. For example, to set a Fixed Exposure value of 9.9 ms, scan 0, 0, 9, 9.

Exposure Time
(4 digits)

LED Illumination

- Internal Illumination - use the engine's illumination.
- External Illumination - assert the ILLUM_EN_OUT signal continuously during a decode session, and do not use the engine's illumination.
- Internal and External Illumination - use the engine's illumination and assert the ILLUM_EN_OUT signal continuously during a decode session.

Internal Illumination

External Illumination

Internal and External Illumination

Snapshot Mode Timeout

This parameter sets the amount of time the decoder remains in Snapshot Mode. The decoder exits Snapshot Mode upon a trigger event, or when the Snapshot Mode Timeout elapses. To set this timeout value, scan the barcode below followed by a barcode from Appendix D, Numeric Barcodes. The default value is 0 which represents 30 seconds; values increment by 30. For example, 1 = 60 seconds, 2 = 90 seconds, etc.

Snapshot Mode Timeout

Snapshot Aiming Pattern

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

Enable Snapshot Aiming Pattern

Disable Snapshot Aiming Pattern

Image Cropping

This parameter crops a captured image. Select Disable Image Cropping to present the full 742 x 480 pixels. Select Enable to crop the image to the pixel addresses set in Crop to Pixel Addresses.

Note: The decoder has a cropping resolution of 4 pixels. Setting the cropping area to less than 3 pixels transfers the entire image.

Enable Image Cropping

Disable Image Cropping

Crop to Pixel Addresses

If Enable Image Cropping is selected, set the pixel addresses from (0,0) to (751,479) to crop to.

Columns are numbered from 0 to 751, rows from 0 to 479. Specify four values for Top, Left, Bottom, and Right, where Top and Bottom correspond to row pixel addresses, and Left and Right correspond to column pixel addresses.

To set the pixel address to crop to, scan each Pixel Address bar code followed by three bar codes from Appendix D, Numeric Barcodes which represent the value. Include leading zeros, so to enter a value of 3, for example, scan 0, 0, 3.

Note: The decoder has a minimum cropping resolution of four pixels; increment and decrement cropping addresses in multiples of four. Other values are rounded up. For example, choosing to crop from the top at addresses 0, 1, or 2 (removing 1, 2, or 3 pixels) has the same result as cropping at address 3; this removes four rows from the top.

Top Pixel Address
(0-479 Decimal)

Left Pixel Address
(0-751 Decimal)

Bottom Pixel Address
(0-479 Decimal)

Right Pixel Address
(0-751 Decimal)

Image Resolution

This option alters image resolution before compression. Rows and columns are removed from the image, resulting in a smaller image containing the original content with reduced resolution.

Select one of the following values:

| Resolution Value | Uncropped Image Size |
|---|---|
| Full | 752x480 |
| 1/2 | 376x240 |
| 1/4 | 188x120 |

Full Resolution

1/2 Resolution

1/4 Resolution

Image Brightness (Target White)

This parameter sets the Target White value used in Snapshot mode when using autoexposure. White and black are defined as 255 decimal and 0, respectively. Setting the value to the default of 180 results in a white level of ~180 for the image.

180

Image Brightness
(3 digits)

Image File Format Selector

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

BMP File Format

JPEG File Format

TIFF File Format

JPEG Image Options

JPEG images can be optimized for either size or for quality. Scan the Quality Selector barcode to enter a quality value; the decoder then selects the corresponding image size. Scan the Size Selector barcode to enter a size value; the decoder then selects the best image quality.

JPEG Quality Selector

JPEG Size Selector

JPEG Quality and Size Value

If you select JPEG Quality Selector, scan the JPEG Quality Value barcode followed by 3 barcodes from Appendix D, Numeric Barcodes corresponding to a value from 5 to 100, where 100 represents the highest quality image.

If you select JPEG Size Selector, scan JPEG Size Value followed by 3 barcodes from Appendix D, Numeric Barcodes corresponding to a value from 5 to 150 which represents the file size in multiples of 1024 bytes (1K). For example, setting this value to 8 (008) permits the file size to be as large as 8192 bytes.

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

JPEG Size Value
(Default: 040)
(5 - 150 Decimal)

Image File Meta Data

Enable this option to tag images transmitted in JPEG format with the following EXIF 2.2 standard data fields:

- Time (since power up)
- Sensor used
- Device name
- Manufacturer
- Frame rate
- Host type
- Image number (since power up)
- Image Enhancement parameter setting
- Image Edge Sharpness parameter setting
- Image Contract Enhancement parameter setting.

This parameter has no effect on images transmitted in TIFF or BMP format.

Enable Image File Meta Data

Disable Image File Meta Data

Image Enhancement

This feature uses a combination of edge sharpening and contrast enhancement to produce an image that is visually pleasing.
The levels of image enhancement are:

- Off (0)
- Low (1) - Default
- Med (2)
- High (3)
- User (4)

Off

Low

Medium

High

User

Image Edge Sharpening

This feature uses an edge sharpening technique, and only applies if you set the Image Enhancement parameter to User.
Recommended settings are:

- Off (0)
- Low (30) - Default
- Med (75)
- High (100)

Image Edge Sharpening

Off

Low

Medium

High

Image Contrast Enhancement

Enable this feature to enhance the contrast of an image. This parameter only applies if you set the Image Enhancement parameter to User.

Disable

Enable

Image Rotation

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

Rotate 0°

Rotate 90°

Rotate 180°

Rotate 270°

Bits per Pixel

Select the number of significant bits per pixel (BPP) to use when capturing an image. Select 1 BPP for a black and white image, 4 BPP to assign 1 of 16 levels of grey to each pixel, or 8 BPP to assign 1 of 256 levels of grey to each pixel. The decoder ignores these settings for JPEG files, which always use 8 BPP.

1 BPP

4 BPP

8 BPP

Video View Finder

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

Disable Video View Finder

Enable Video View Finder

Video View Finder Image Size

Select the number of 100-byte blocks. Values range from 800 to 12,000 bytes. Selecting a smaller value transmits more frames per second; selecting a larger value increases video quality.

To set the Video View Finder Image Size, scan the barcode below followed by two bar codes from Appendix D, Numeric Barcodes corresponding to the 100-byte value from 800 to 12,000 bytes. For example, to select1500 bytes, enter 1, 5. To select 900 bytes, enter 0, 9. The default is 1700 bytes.

Video View Finder Image Size

# USB Interface

## Introduction

This chapter describes how to set up the decoder with a USB host. The decoder connects directly to a USB host, or a powered USB hub, and is powered by it. No additional power supply is required.

Note: Most computer monitors allow scanning the barcodes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the barcode can be seen clearly, and bars and/or spaces are not merging.

USB Device Type

Select the desired USB device type.

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

Symbol Native API (SNAPI) with Imaging Interface

Symbol Native API (SNAPI) without Imaging Interface

USB Device Type (continued)

HID Keyboard Emulation

IBM Table Top USB

IBM Hand-Held USB

USB OPOS Hand-Held

Simple COM Port Emulation

USB CDC Host

SSI over USB CDC

Symbol Native API (SNAPI) Status Handshaking

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

Enable SNAPI Status Handshaking

Disable SNAPI Status Handshaking

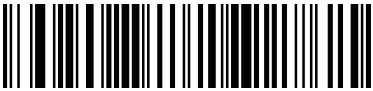
USB Country Keyboard Types - Country Codes

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

North America Standard USB Keyboard

German Windows

French Windows



French Canadian Windows 95/98

French Canadian Windows 2000/XP

USB Country Keyboard Types - Country Codes (continued)


French Belgian Windows


Spanish Windows


Italian Windows


Swedish Windows


UK English Windows


Japanese Windows (ASCII)


Portuguese-Brazilian Windows

USB Keystroke Delay

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

No Delay

Medium Delay

Long Delay

Simulated Caps Lock

Enable this to invert upper and lower case characters on the barcode as if the Caps Lock state is enabled on the keyboard. This inversion occurs regardless of the keyboard's Caps Lock state. Note that this only applies to alpha characters.

Disable Simulated Caps Lock

Enable Simulated Caps Lock

USB CAPS Lock Override

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

Enable Override Caps Lock Key

Disable Override Caps Lock Key

USB Ignore Unknown Characters

This option applies only to the HID Keyboard Emulation device and IBM device. Unknown characters are characters the host does not recognize. Select Send Barcodes With Unknown Characters to send all barcode data except for unknown characters. The decoder issues no error beeps.

Select Do Not Send Barcodes With Unknown Characters, for IBM devices, to prevent sending barcodes containing at least one unknown character are to the host, or for HID Keyboard Emulation devices, this sends the barcode characters up to the unknown character. The decoder issues an error beep.

Send Barcodes with Unknown Characters

Disable Send Barcodes with Unknown Characters

USB Convert Unknown to Code 39

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

Disable Convert Unknown to Code 39

Enable Convert Unknown to Code 39

USB Ignore Beep Directive

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

Honor USB Beep Directive

Ignore USB Beep Directive

USB Ignore Type Directive

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

Honor USB Ignore Type Directive

Ignore USB Ignore Type Directive

Emulate Keypad

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

Disable Keypad Emulation

Enable Keypad Emulation

Emulate Keypad with Leading Zero

Enable this to send character sequences sent over the numeric keypad as ISO characters which have a leading zero.

Disable Keypad Emulation with Leading Zero

Enable Keypad Emulation with Leading Zero

USB Keyboard FN 1 Substitution

This option applies only to the USB HID Keyboard Emulation device. Enable this to replace any FN 1 characters in an EAN 128 barcode with a user-selected Key Category and value.

Enable

Disable

Function Key Mapping

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

Disable Function Key Mapping

Enable Function Key Mapping

Convert Case

Enable this to convert all barcode data to the selected case.

No Case Conversion

Convert All to Upper Case

Convert All to Lower Case

USB Static CDC

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

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

Enable USB Static CDC

Disable USB Static CDC

USB Polling Interval

This option speeds up the USB HID Keyboard Emulation Device. Scan a barcode below to set the polling interval. The polling interval determines the rate at which data can be sent between the decoder and the host computer. A lower number indicates a faster data rate. The default value is 8 msec. When the polling interval is changed the decoder re-initializes. Ensure your host machine can handle the selected data rate. Selecting a data rate that is too fast for your host machine may result in lost data.

1 msec

2 msec

3 msec

4 msec

USB Polling Interval (continued)

5 msec

6 msec

7 msec

8 msec

9 msec

Quick Keypad Emulation

This option applies only to the HID Keyboard Emulation Device when Emulate Keypad is enabled. This parameter enables a quicker method of emulation utilizing the numeric keypad. The default value is Disable.

Enable

Disable

# ASCII Character Set for USB

USB Prefix/Suffix Values

| Prefix/ Suffix Value | Full ASCII Code 39 Encode Character | Keystroke |
|---|---|---|
| 1000 | %U | CTRL 2 |
| 1001 | $A | CTRL A |
| 1002 | $B | CTRL B |
| 1003 | $C | CTRL C |
| 1004 | $D | CTRL D |
| 1005 | $E | CTRL E |
| 1006 | $F | CTRL F |
| 1007 | $G | CTRL G |
| 1008 | $H | CTRL H/**BACKSPACE**[1] |
| 1009 | $I | CTRL I/**HORIZONTAL TAB**[1] |
| 1010 | $J | CTRL J |
| 1011 | $K | CTRL K |
| 1012 | $L | CTRL L |
| 1013 | $M | CTRL M/**ENTER**[1] |
| 1014 | $N | CTRL N |
| 1015 | $O | CTRL O |
| 1016 | $P | CTRL P |
| 1017 | $Q | CTRL Q |
| 1018 | $R | CTRL R |
| 1019 | $S | CTRL S |
| 1020 | $T | CTRL T |
| 1021 | $U | CTRL U |
| 1022 | $V | CTRL V |
| 1023 | $W | CTRL W |

| | | |
|---|---|---|
| 1024 | $X | CTRL X |
| 1025 | $Y | CTRL Y |
| 1026 | $Z | CTRL Z |
| 1027 | %A | CTRL [/**ESC**[1] |
| 1028 | %B | CTRL \ |
| 1029 | %C | CTRL ] |
| 1030 | %D | CTRL 6 |
| 1031 | %E | CTRL |
| 1032 | Space | Space |
| 1033 | /A | ! |
| 1034 | /B | “ |
| 1035 | /C | # |
| 1036 | /D | $ |
| 1037 | /E | % |
| 1038 | /F | & |
| 1039 | /G | ‘ |
| 1040 | /H | ( |
| 1041 | /I | ) |
| 1042 | /J | * |
| 1043 | /K | + |
| 1044 | /L | , |
| 1045 | - | - |
| 1046 | . | . |
| 1047 | /O | / |
| 1048 | 0 | 0 |
| 1049 | 1 | 1 |
| 1050 | 2 | 2 |
| 1051 | 3 | 3 |
| 1052 | 4 | 4 |

| | | |
|---|---|---|
| 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 |
| 1081 | Q | Q |

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

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

USB ALT Key Character Set

| ALT Keys | Keystroke |
|---|---|
| 2064 | ALT 2 |
| 2065 | ALT A |
| 2066 | ALT B |
| 2067 | ALT C |
| 2068 | ALT D |
| 2069 | ALT E |
| 2070 | ALT F |
| 2071 | ALT G |
| 2072 | ALT H |
| 2073 | ALT I |
| 2074 | ALT J |
| 2075 | ALT K |
| 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 |

USB GUI Key Character Set

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

| | |
|---|---|
| 3081 | GUI Q |
| 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. | |

USB F Key Character Set

| F Keys | Keystroke |
|---|---|
| 5001 | F1 |
| 5002 | F2 |
| 5003 | F3 |
| 5004 | F4 |
| 5005 | F5 |
| 5006 | F6 |
| 5007 | F7 |
| 5008 | F8 |
| 5009 | F9 |
| 5010 | F10 |
| 5011 | F11 |
| 5012 | F12 |
| 5013 | F13 |
| 5014 | F14 |
| 5015 | F15 |
| 5016 | F16 |
| 5017 | F17 |
| 5018 | F18 |
| 5019 | F19 |
| 5020 | F20 |
| 5021 | F21 |
| 5022 | F22 |
| 5023 | F23 |
| 5024 | F24 |

USB Numeric Keypad Character Set

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

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 |

# SSI Interface

## Introduction

This chapter describes the system requirements of the Simple Serial Interface (SSI), which provides a communications link between scanners and a serial host. It provides the means for the host to control the decoder or scanner.

## Communications

All communication between the decoder and host occurs over the hardware interface lines using the SSI protocol. The host and the decoder exchange messages in packets. A packet is a collection of bytes framed by the proper SSI protocol formatting bytes. The maximum number of bytes per packet that the SSI protocol allows for any transaction is 257 (255 bytes + 2 byte checksum).
Decode data can be sent as ASCII data (unpacketed), or as part of a larger message (packeted), depending on the decoder configuration.
SSI performs the following functions for the host device:

- Maintains a bi-directional interface with the decoder
- Allows the host to send commands that control the decoder
- Passes data from the decoder to a host device in SSI packet format or straight decode message.

The working environment of the SSI consists of a decoder, a serial cable which attaches to the host device, and in some instances, a power supply.
SSI transmits all decode data including special formatting (e.g., AIM ID). Parameter settings can control the format of the transmitted data.
The decoder can also send parameter information, product identification information, or event codes to the host.

All commands sent between the decoder and host must use the format described in the SSI Message Formats section.

SSI Commands

This table identifies the SSI partner allowed to send a message of each type. The host transmits opcodes designated type H. The decoder transmits type D opcodes, and either partner can transmit Host/Decoder (H/D) types.

| Name | Type | Opcode | Description |
|---|---|---|---|
| AIM_OFF | H | 0xC4 | Deactivate aim pattern. |
| AIM_ON | H | 0xC5 | Activate aim pattern. |
| BEEP | H | 0xE6 | Sound the beeper. |
| CAPABILITIES_REPLY | D | 0xD4 | Reply to CAPABILITIES_REQUEST; contains a list of the capabilities and commands the decoder supports. |
| CAPABILITIES_REQUEST | H | 0xD3 | Request capabilities report from the decoder. |
| CMD_ACK | H/D | 0xD0 | Positive acknowledgment of received packet. |
| CMD_NAK | H/D | 0xD1 | Negative acknowledgment of received packet. |
| DECODE_DATA | D | 0xF3 | Decode data in SSI packet format. |
| EVENT | D | 0xF6 | Event indicated by associated event code. |
| LED_OFF | H | 0xE8 | De-activate LED output. |
| LED_ON | H | 0xE7 | Activate LED output. |
| PARAM_DEFAULTS | H | 0xC8 | Set parameter default values. |
| PARAM_REQUEST | H | 0xC7 | Request values of certain parameters. |
| PARAM_SEND | H/D | 0xC6 | Send parameter values. |
| REPLY_ID | D | 0xA6 | Reply to REQUEST_ID; contains decoder's serial number. |
| REPLY_REVISION | D | 0xA4 | Reply to REQUEST_REVISION contains decoder's software/hardware configuration. |
| REQUEST_ID | H | 0xA3 | Request the decoder's serial number. |
| REQUEST_REVISION | H | 0xA3 | Request the decoder's configuration. |
| SCAN_DISABLE | H | 0xEA | Prevent the operator from scanning bar codes. |
| SCAN_ENABLE | H | 0xE9 | Permit bar code scanning. |
| SLEEP | H | 0xEB | Request to place the decoder into low power. |
| START_DECODE | H | 0xE4 | Tell decoder to attempt to decode a bar code. |
| STOP_DECODE | H | 0xE5 | Tell decoder to abort a decode attempt. |
| WAKEUP | H | N/A | Wakeup decoder after it has entered low power mode. |

## SSI Transactions

General Data Transactions
ACK/NAK Handshaking
If you enable ACK/NAK handshaking, all packeted messages must have a CMD_ACK or CMD_NAK response,
unless the command description states otherwise. This parameter is enabled by default. Motorola
recommends leaving this handshaking enabled to provide feedback to the host. Raw decode data and
WAKEUP do not use ACK/NAK handshaking since they are not packeted data.

Following is an example of a problem which can occur if you disable ACK/NAK handshaking:

- The host sends a PARAM_SEND message to the decoder to change the baud rate from 9600 to 19200.
- The decoder cannot interpret the message.
- The decoder does not implement the change the host requested.
- The host assumes that the parameter change occurred and acts accordingly.
- Communication is lost because the change did not occur on both sides.

If you enable ACK/NAK handshaking, the following occurs:

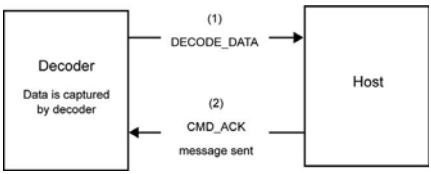
- The host sends a PARAM_SEND message.
- The decoder cannot interpret the message.
- The decoder CMD_NAKs the message.
- The host resends the message.
- The decoder receives the message successfully, responds with CMD_ACK, and implements parameter changes.

# Transfer of Decode Data

The Decode Data Packet Format parameter controls how decode data is sent to the host. Set this parameter to send the data in a DECODE_DATA packet. Clear this parameter to transmit the data as raw ASCII data.
Note: When transmitting decode data as raw ASCII data, ACK/NAK handshaking does not apply regardless of the state of the ACK/NAK handshaking parameter.

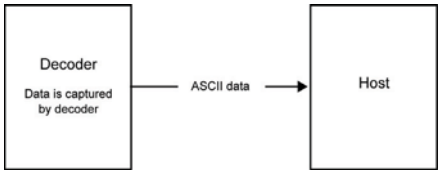
ACK/NAK Enabled and Packeted Data

The decoder sends a DECODE_DATA message after a successful decode. The decoder waits for a programmable time-out for a CMD_ACK response. If it does not receive the response, the decoder tries to send two more times before issuing a host transmission error. If the decoder receives a CMD_NAK from the host, it may attempt a retry depending on the cause field of the CMD_NAK message.



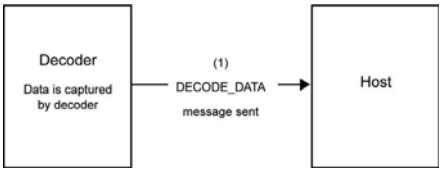

ACK/NAK Enabled and Unpacketed ASCII Data

Even though the ACK/NAK handshaking is enabled, no handshaking occurs because the handshaking applies only to packeted data. In this example the packeted_decode parameter is disabled.

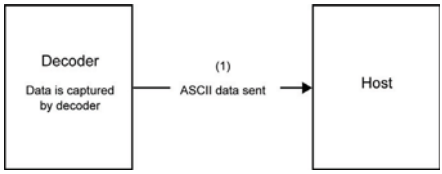



ACK/NAK Disabled and Packeted DECODE_DATA

In this example ACK/NAK does not occur even though packeted_decode is enabled because the ACK/NAK handshaking parameter is disabled.



ACK/NAK Disabled and Unpacketed ASCII Data
Data captured by the decoder is sent to the host.




## Communication Summary

RTS/CTS Lines
All communication must use RTS/CTS handshaking. If hardware handshaking is disabled or bypassed, the WAKEUP command must be sent prior to all other communications, or the first byte of a communication message may be lost during the decoder wakeup sequence.

ACK/NAK Option
Enable or disable ACK/NAK handshaking. This handshaking is enabled by default and Motorola recommends leaving it enabled. Disabling this handshaking can cause communication problems, as handshaking is the only acknowledgment that a message was received, and if it was received correctly. ACK/NAK is not used with unpacketed decode data regardless of whether or not it is enabled.

Number of Data Bits
All communication with the decoder must use 8-bit data.

Serial Response Time-out
The Serial Response Time-out parameter determines how long to wait for a handshaking response before trying again, or aborting any further attempts. Set the same value for both the host and decoder.

Retries
When sending data, the host should resend twice after the initial send if the decoder does not respond with an ACK or NAK (if ACK/NAK handshaking is enabled), or response data (e.g., PARAM_SEND, REPLY_REVISION). If the decoder replies with a NAK RESEND, the host resends the data. All resent messages must have the resend bit set in the Status byte.
The decoder resends data two times after the initial send if the host fails to reply with an ACK or NAK (if ACK/NAK handshaking is enabled).

Baud Rate, Stop Bits, Parity, Response Time-out, ACK/NAK Handshake
If you use PARAM_SEND to change these serial parameters, the ACK response to the PARAM_SEND uses the previous values for these parameters. The new values then take effect for the next transaction.

Errors
The decoder issues a communication error when:

- The CTS line is asserted when the decoder tries to transmit, and is still asserted on each of 2 successive retries
- Failure to receive an ACK or NAK after initial transmit and two resends.

## Things to Remember When Using SSI Communication

When not using hardware handshaking, space messages sufficiently apart. The host must not communicate with the decoder if the decoder is transmitting.
When using hardware handshaking, frame each message properly with the handshaking signals. Do not try to send two commands within the same handshaking frame.
There is a permanent/temporary bit in the PARAM_SEND message. Removing power from the decoder discards temporary changes. Permanent changes are written to non-volatile memory. Frequent changes shorten the life of the non-volatile memory.

# Using Time Delay to Low Power Mode with SSI

| Value | Timeout | Value | Timeout | Value | Timeout | Value | Timeout |
|---|---|---|---|---|---|---|---|
| 0x00 | 15 Mins | 0x10 | 1 Sec | 0x20 | 1 Min | 0x30 | 1 Hour |
| 0x01 | 30 Mins | 0x11 | 1 Sec | 0x21 | 1 Min | 0x31 | 1 Hour |
| 0x02 | 60 Mins | 0x12 | 2 Secs | 0x22 | 2 Mins | 0x32 | 2 Hours |
| 0x03 | 90 Mins | 0x13 | 3 Secs | 0x23 | 3 Mins | 0x33 | 3 Hours |
| N/A | N/A | 0x14 | 4 Secs | 0x24 | 4 Mins | 0x34 | 4 Hours |
| N/A | N/A | 0x15 | 5 Secs | 0x25 | 5 Mins | 0x35 | 5 Hours |
| N/A | N/A | 0x16 | 6 Secs | 0x26 | 6 Mins | 0x36 | 6 Hours |
| N/A | N/A | 0x17 | 7 Secs | 0x27 | 7 Mins | 0x37 | 7 Hours |
| N/A | N/A | 0x18 | 8 Secs | 0x28 | 8 Mins | 0x38 | 8 Hours |
| N/A | N/A | 0x19 | 9 Secs | 0x29 | 9 Mins | 0x39 | 9 Hours |
| N/A | N/A | 0x1A | 10 Secs | 0x2A | 10 Mins | 0x3A | 10 Hours |
| N/A | N/A | 0x1B | 15 Secs | 0x2B | 15 Mins | 0x3B | 15 Hours |
| N/A | N/A | 0x1C | 20 Secs | 0x2C | 20 Mins | 0x3C | 20 Hours |
| N/A | N/A | 0x1D | 30 Secs | 0x2D | 30 Mins | 0x3D | 30 Hours |
| N/A | N/A | 0x1E | 45 Secs | 0x2E | 45 Mins | 0x3E | 45 Hours |
| N/A | N/A | 0x1F | 60 Secs | 0x2F | 60 Mins | 0x3F | 60 Hours |

SSI Host Parameters

To select SSI as the host interface, scan the following barcode.

SSI Host

Baud Rate

Baud rate is the number of bits of data transmitted per second. Set the decoder'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 9600

Baud Rate 19,200

Baud Rate 38,400

Baud Rate 57,600

Baud Rate 115,200

Baud Rate 230,400

Baud Rate (continued)

Baud Rate 460,800

Baud Rate 921,600

Parity

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

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

Odd

Even

None

Check Parity

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

Do Not Check Parity

Check Parity

Stop Bits

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

1 Stop Bit

2 Stop Bits

Software Handshaking

This parameter offers control of data transmission in addition to the control hardware handshaking offers.

Hardware handshaking is always enabled; you cannot disable it.

- Disable ACK/NAK Handshaking: When this option is selected, the decoder neither generates nor expects ACK/NAK handshaking packets.
- Enable ACK/NAK Handshaking: When this option is selected, after transmitting data, the decoder expects either an ACK or NAK response from the host. The decoder also ACKs or NAKs messages from the host.

The decoder waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the decoder does not get a response in this time, it resends its data up to two times before discarding the data and declaring a transmit error.

Disable ACK/NAK

Enable ACK/NAK

Host RTS Line State

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

Host RTS Low

Host RTS High

Decode Data Packet Format

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

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

Send Raw Decode Data

Send Packeted Decode Data

Host Serial Response Time-out

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

To set the delay period (options are 2, 5, 7.5, or 9,9 seconds), scan one of the following barcodes.

Low - 2 Seconds

Medium - 5 Seconds

High - 7.5 Seconds

Maximum - 9.9 Seconds

Host Character Time-out

This parameter determines the maximum time the decoder waits between characters transmitted by the host before discarding the received data and declaring an error.
To set the delay period (options are 200, 500, 750, or 990 ms), scan one of the following barcodes.

Low – 200 ms

Medium - 500 ms

High - 750 ms

Maximum - 990 ms

Multipacket Option

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

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

Multipacket Option 1

Multipacket Option 2

Multipacket Option 3

Interpacket Delay

This parameter specifies the interpacket delay if you selected Multipacket Option 3. To set the delay period (options are 0, 25, 50, 75, or 99 ms), scan one of the following barcodes.

Minimum - 0 ms

Low - 25 ms

Medium - 50 ms

High - 75 ms

Maximum - 99 ms

## Event Reporting

The host can request the decoder to provide certain information (events) relative to the decoder's behavior. Enable or disable the events listed in table below and on the following pages by scanning the appropriate barcodes.

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

Decode Event

When enabled, the decoder generates a message to the host upon a successful barcode decode. When disabled, no notification is sent.

Enable Decode Event

Disable Decode Event

Boot Up Event

When enabled, the decoder generates a message to the host whenever power is applied. When disabled, no notification is sent.

Enable Boot Up Event

Disable Boot Up Event

Parameter Event

When enabled, the decoder generates a message to the host when one of the events occurs. When disabled, no notification is sent.

Enable Parameter Event

Disable Parameter Event

# Serial Interface

## Introduction

This chapter describes how to set up the decoder with a serial host. The serial interface is used to connect the decoder to point-of sale devices, host computers, or other devices with an available serial port (e.g. com port).

Note: The decoder uses TTL signal levels, which interface with most system architectures. System architectures that use RS-232C signal levels require a conversion circuitry.

The serial host type requires proper configuration of the sysconfig lines, and typically require scanning barcode menus as part of initial configuration.

Most computer monitors allow scanning the barcodes directly on the screen. When scanning from the screen is sure to set the document magnification to a level where the barcode can be seen clearly, and bars and/or spaces are not merging.

# Serial Host Parameters

Various serial hosts are set up with their own parameter default settings as indicated in table below. Selecting standard, ICL, Fujitsu, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, OPOS/JPOS, Olivetti, or Omron sets the defaults listed below.

Terminal Specific Serial

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

*In the Nixdorf Mode B, if CTS is Low, scanning is disabled. When CTS is High, the user can scan barcodes.

**If Nixdorf Mode B is scanned without the decoder connected to the proper host, it may appear unable to scan. If this happens, scan a different serial host type within 5 seconds of cycling power to the decoder.

Selecting ICL, Fujitsu, Wincor-Nixdorf Mode A, Wincor-Nixdorf Mode B, OPOS/JPOS, Olivetti, or Omron enables the transmission of code ID characters listed in table below. These code ID characters are not programmable and are separate from the Transmit Code ID feature. Do not enable the Transmit Code ID feature for these terminals.

Terminal Specific Code ID Characters

| Barcode Type | ICL | Fujitsu | Wincor-Nixdorf Mode A | Wincor-Nixdorf Mode B/ POS/JPOS | Olivetti | Omron |
|---|---|---|---|---|---|---|
| UPC-A | A | A | A | A | A | A |
| UPC-E | E | E | C | C | C | E |
| EAN-8/JAN-8 | FF | FF | B | B | B | FF |
| EAN-13/JAN-13 | F | F | A | A | A | F |
| Bookland EAN | F | F | A | A | A | F |
| Code 39 | C <len> | None | M | M | M <len> | C <len> |
| Code 39 Full ASCII | None | None | M | M | None | None |
| Trioptic | None | None | None | None | None | None |
| Code 32 | None | None | None | None | None | None |
| Codabar | N <len> | None | N | N | N <len> | N <len> |
| Code 128 | L <len> | None | K | K | K <len> | L <len> |
| GS1-128 | L <len> | None | P | P | P <len> | L <len> |
| Code 93 | None | None | L | L | L <len> | None |
| I 2 of 5 | I <len> | None | I | I | I <len> | I <len> |
| D 2 of 5 | H <len> | None | H | H | H <len> | H <len> |
| MSI | None | None | O | O | O <len> | None |
| Code 11 | None | None | None | None | None | None |
| IATA | H<len> | None | H | H | H<len> | H<len> |
| GS1 Databar Variants | None | None | E | E | None | None |
| PDF417 | None | None | Q | Q | None | None |
| MicroPDF417 | None | None | S | S | None | None |
| Data Matrix | None | None | R | R | None | None |
| Maxicode | None | None | T | T | None | None |
| QR Codes | None | None | U | U | None | None |
| Aztec/Aztec Rune | None | None | V | V | None | None |

To select a serial host interface, scan one of the following barcodes.

Standard RS-232

ICL Serial

Wincor-Nixdorf Serial Mode A

Wincor-Nixdorf Serial Mode B

Olivetti ORS4500

Omron

Serial Host Types (continued)

To disable decoding of parameter barcodes, including the Set All Defaults parameter barcode, scan the Disable Parameter Scanning barcode below. To enable decoding of parameter barcodes, scan Enable Parameter Scanning.

OPOS/JPOS

Fujitsu Serial

Baud Rate

Baud rate is the number of bits of data transmitted per second. Set the decoder'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 9600

Baud Rate 19,200

Baud Rate 38,400

Baud Rate 57,600

Baud Rate 115,200

Baud Rate 230,400

Baud Rate 460,800

Baud Rate 921,600

Parity

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

Select Odd parity 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 None when no parity bit is required.

Odd

Even

None

Stop Bits

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

1 Stop Bit

2 Stop Bits

Data Bits

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

7-Bit

8 Bit

Check Receive Errors

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

Check For Received Errors

Do Not Check For Received Errors

## Hardware Handshaking

The data interface consists of a serial 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 decoder reads the CTS line for activity. If CTS is asserted, the decoder waits up to Host Serial Response Time-out for the host to de-assert the CTS line. If, after Host Serial Response Time-out (default), the CTS line is still asserted, the decoder sounds a transmit error, and any scanned data is lost.
- When the CTS line is de-asserted, the decoder 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 (default), the CTS line is not asserted, the decoder sounds a transmit error, and discards the data.
- When data transmission is complete, the decoder de-asserts RTS 10 msec after sending the last character.
- The host should respond by negating CTS. The decoder 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 deasserted for more than 50 ms between characters, the transmission is aborted, the decoder sounds a transmission error, and the data is discarded. If the above communication sequence fails, the decoder issues an error indication. In this case, the data is lost and must be rescanned. If Hardware Handshaking and Software Handshaking are both enabled, Hardware Handshaking takes precedence.

Note: The DTR signal is jumpered to the active state.

- None: Scan the barcode below if no Hardware Handshaking is desired.
- Standard RTS/CTS: Scan the barcode below to select Standard RTS/CTS Hardware Handshaking.
- RTS/CTS Option 1: When RTS/CTS Option 1 is selected, the decoder asserts RTS before transmitting and ignores the state of CTS. The decoder 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 decoder waits for CTS to be asserted before transmitting data. If CTS is not asserted within Host Serial Response Time-out (default), the decoder issues an error indication and discards the data.
- RTS/CTS Option 3: When Option 3 is selected, the decoder asserts RTS prior to any data transmission, regardless of the state of CTS. The decoder waits up to Host Serial Response Time-out (default) for CTS to be asserted. If CTS is not asserted during this time, the decoder issues an error indication and discards the data. The decoder de-asserts RTS when transmission is complete.

Hardware Handshaking

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 decoder expects either an ACK or NAK response from the host. When a NAK is received, the decoder 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 decoder issues an error indication and discards the data.
- The decoder waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the decoder 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 decoder 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 decoder 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 decoder transmission off until the decoder receives an XON character. There are two situations for XON/XOFF:
- XOFF is received before the decoder has data to send. When the decoder 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 decoder 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 decoder receives an XON character, it sends the rest of the data message. The decoder waits indefinitely for the XON.

Software Handshaking

None

ACK/NAK

ENQ

ACK/NAK with ENQ

XON/XOFF

Host Serial Response Time-out

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

Minimum: 2 Sec

Low: 2.5 Sec

Medium: 5 Sec

High: 7.5 Sec

Maximum: 9.9 Sec

RTS Line State

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

Host: Low RTS

Host: High RTS

Beep on <BEL>

When this parameter is enabled, the decoder issues a beep when it detects a <BEL> character on the serial line. <BEL> gains a user's attention to an illegal entry or other important event.

Beep On <BEL> Character
(Enable)

Do Not Beep On <BEL> Character
(Disable)

Intercharacter Delay

This parameter specifies the intercharacter delay inserted between character transmissions.

Minimum: 0 msec

Low: 25 msec

Medium: 50 msec

High: 75 msec

Maximum: 99 msec

Nixdorf Beep/LED Options

Select Nixdorf Mode B to indicate when the decoder beeps and turns on its LED after a decode.

Normal Operation

(Beep/LED immediately after decode)

Beep/LED After Transmission

Beep/LED After CTS Pulse

Ignore Unknown Characters

Unknown characters are characters the host does not recognize. When Send Barcodes with Unknown Characters is selected, all barcode data is sent except for unknown characters, and no error beeps sound on the decoder.

When Do Not Send Barcodes With Unknown Characters is selected, barcode data is sent up to the first unknown character and then an error beep will sound on the decoder.

Send Barcode(with unknown characters)

Do Not Send Barcodes (with unknown characters)

# Symbologies

## Introduction

This chapter describes symbology features and provides the programming barcodes for selecting these features.

The device is shipped with the settings shown in the Symbology Default Table If the default values suit requirements, programming is not necessary.

There are two ways to change a parameter value:

- Scan the appropriate barcodes in this guide. These new values replace the standard default values in memory.
- For SSI and USB SNAPI hosts, send a “parameter send” command from the host system. Hexadecimal parameter numbers are shown in this chapter below the parameter title, and options are shown in parenthesis beneath the accompanying barcodes.

Note: Most computer monitors allow scanning the barcodes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the barcode can be seen clearly, and bars and/or spaces are not merging.

To return all features to default values, scan the *Set Default Parameter* barcode. Throughout the programming barcode menus, default values are framed.

Disable All Code Types

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

Disable All Code Types

# UPC/EAN

Enable/Disable UPC-A

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

Enable UPC-A

Disable UPC-A

Enable/Disable UPC-E

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

Enable UPC-E

Disable UPC-E

Enable/Disable UPC-E1

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

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

Enable UPC-E1

Disable UPC-E1

Enable/Disable EAN-8/JAN-8

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

Enable EAN-8/JAN-8

Disable EAN-8/JAN-8

Enable/Disable EAN-13/JAN-13

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

Enable EAN-13/JAN-13

Disable EAN-13/JAN-13

Enable/Disable Bookland EAN

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

Enable Bookland EAN

Disable Bookland EAN

Bookland ISBN Format

If Bookland EAN is enabled, select one of the following formats for Bookland data:

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

Bookland ISBN-10

Bookland ISBN-13

## Decode UPC/EAN/JAN Supplementals

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

- If Decode UPC/EAN/JAN Only With Supplemental is selected, UPC/EAN/JAN symbols without supplemental are not decoded.
- If Ignore Supplemental is selected, and the decoder is presented with a UPC/EAN/JAN with a supplemental, the UPC/EAN/JAN is decoded and the supplemental barcode is ignored.
- An Auto discriminate Option is also available. If this option is selected, choose an appropriate UPC/EAN/JAN
  Supplemental Redundancy value from the next page. A value of 5 or more is recommended.
- Enable 378/379 Supplemental Mode to delay only EAN-13/JAN-13 barcodes starting with a '378' or '379' prefix by the supplemental search process. All other UPC/EAN/JAN barcodes are exempt from the search and are reported instantly upon decodes.
- Select Enable 978 Supplemental Mode to delay only EAN-13/JAN-13 barcodes starting with a '978' prefix by the supplemental search process. All other UPC/EAN/JAN barcodes are exempt from the search and are reported instantly upon decodes.
- Select Enable Smart Supplemental Mode to delay only EAN-13/JAN-13 barcodes starting with a '378', '379', or '978' prefix by the supplemental search process. All other UPC/EAN/JAN barcodes are exempt from the search and are reported instantly upon decodes.

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

Decode UPC/EAN/JAN Supplementals

Supplementals are barcodes appended according to specific format conventions.

Decode UPC/EAN/JAN Only With Supplementals

Ignore Supplementals

Auto discriminate UPC/EAN/JAN Supplementals

Enable 378/379 Supplemental Mode

Enable 978/979 Supplemental Mode

Enable 977 Supplemental Mode

Decode UPC/EAN/JAN Supplementals (continued)

Enable 414/419/434/439 Supplemental Mode

Enable 491 Supplemental Mode

Enable Smart Supplemental Mode

Supplemental User-Programmable Type 1

Supplemental User-Programmable Type 1 and 2

Smart Supplemental Plus User-Programmable 1

Smart Supplemental Plus User-Programmable 1 and 2

User-Programmable Supplementals

If you selected a Supplemental User-Programmable option from Decode UPC/EAN/JAN Supplementals on, select User-Programmable Supplemental 1 to set the 3-digit prefix. Then select the 3 digits using the numeric barcodes. Select User-Programmable Supplemental 2 to set a second 3-digit prefix. Then select the 3 digits using the numeric barcodes.

User-Programmable Supplemental 1

User-Programmable Supplemental 2

UPC/EAN/JAN Supplemental Redundancy

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

UPC/EAN/JAN Supplemental Redundancy

UPC/EAN/JAN Supplemental AIM ID Format

Select an output format when reporting UPC/EAN/JAN barcodes with Supplementals with Transmit Code ID Character set to AIM Code ID Character.

- Separate - transmit UPC/EAN with supplementals with separate AIM IDs but one transmission, i.e.:
  ]E<0 or 4><data>]E<1 or 2>[supplemental data]

- Combined – transmit UPC/EAN with supplementals with one AIM ID and one transmission, i.e.:
  ]E3<data+supplemental data>

- Separate Transmissions - transmit UPC/EAN with supplementals with separate AIM IDs and separate transmissions, i.e.:
  ]E<0 or 4><data>
  ]E<1 or 2>[supplemental data]

Separate

Combined

Separate Transmissions

Transmit UPC-A Check Digit

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

Transmit UPC-A Check Digit

Do Not Transmit UPC-A Check Digit

Transmit UPC-E Check Digit

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

Transmit UPC-E Check Digit

Do Not Transmit UPC-E Check Digit

Transmit UPC-E1 Check Digit

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

Transmit UPC-E1 Check Digit

Do Not Transmit UPC-E1 Check Digit

UPC-A Preamble

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

No Preamble (<DATA>)

System Character (<SYSTEM CHARACTER> <DATA>)

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

UPC-E Preamble

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

No Preamble (<DATA>)

System Character (<SYSTEM CHARACTER> <DATA>)

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

UPC-E1 Preamble

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

No Preamble (<DATA>)

System Character (<SYSTEM CHARACTER> <DATA>)

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

Convert UPC-E to UPC-A

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

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

Convert UPC-E to UPC-A (Enable)

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

Convert UPC-E1 to UPC-A

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

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

Convert UPC-E1 to UPC-A (Enable)

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

EAN-8/JAN-8 Extend

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

Disable this to transmit EAN-8 symbols as is.

Enable EAN/JAN Zero Extend

Disable EAN/JAN Zero Extend

UCC Coupon Extended Code

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

Enable UCC Coupon Extended Code

Disable UCC Coupon Extended Code

Coupon Report

Traditional coupon symbols (old coupon symbols) are composed of two barcodes: UPC/EAN and Code128. A new coupon symbol is composed of a single Databar Expanded barcode.

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

- Old Coupon Symbols - Scanning an old coupon symbol reports both UPC and Code 128, scanning an interim coupon symbol reports UPC, and scanning a new coupon symbol reports nothing (no decode).
- New Coupon Symbols - Scanning an old coupon symbol reports either UPC or Code 128, and scanning an interim coupon symbol or a new coupon symbol reports Databar Expanded.
- Both Coupon Formats - Scanning an old coupon symbol reports both UPC and Code 128, and scanning an interim coupon symbol or a new coupon symbol reports Databar Expanded.

Old Coupon Symbols

New Coupon Symbols

Both Coupon Formats

ISSN EAN

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

Enable ISSN EAN

Disable ISSN EAN

# Code 128

Enable/Disable Code 128

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

Enable Code 128

Disable Code 128

Set Lengths for Code 128

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

Note: When setting lengths for different bar code types by scanning single digit numbers, single digit numbers must always be preceded by a leading zero.

- One Discrete Length - Select this option to decode only Code 128 symbols containing a selected length. Select the length using the numeric barcodes in Appendix D, Numeric Barcodes. For example, to decode only Code 128 symbols with 14 characters, scan Code 128 - One Discrete Length, then scan 1 followed by 4. To correct an error or change the selection, scan Cancel in Appendix D.
- Two Discrete Lengths - Select this option to decode only Code 128 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in Appendix D, Numeric Bar Codes. For example, to decode only those Code 128 symbols containing either 2 or 14 characters, select Code 128 -Two Discrete Lengths, then scan 0, 2, 1, and then 4. To correct an error or change the selection, scan Cancel in Appendix D.
- Length Within Range - Select this option to decode a Code 128 symbol with a specific length range. Select lengths using numeric barcodes in Appendix D, Numeric Bar Codes. For example, to decode Code 128 symbols containing between 4 and 12 characters, first scan Code 128 - Length Within Range. Then scan 0, 4, 1, and 2 (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan Cancel in Appendix D.

- Any Length - Select this option to decode Code 128 symbols containing any number of characters within the digital scanner capability.

Code 128 - One Discrete Length

Code 128 - Two Discrete Lengths

Code 128 - Length Within Range

Code 128 - Any Length

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

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

Enable GS1-128

Disable GS1-128

Enable/Disable ISBT 128

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

Enable ISBT 128

Disable ISBT 128

ISBT Concatenation

Select an option for concatenating pairs of ISBT code types.

- If you select Disable ISBT Concatenation, the decoder does not concatenate pairs of ISBT codes it encounters.
- If you select Enable ISBT Concatenation, there must be two ISBT codes in order for the decoder to decode and perform concatenation. The decoder does not decode single ISBT symbols.
- If you select Autodiscriminate ISBT Concatenation, the decoder decodes and concatenates pairs of ISBT codes immediately. If only a single ISBT symbol is present, the decoder must decode the symbol the number of times set via ISBT Concatenation Redundancy on page 9-30 before transmitting its data to confirm that there is no additional ISBT symbol.

Disable ISBT Concatenation

Enable ISBT Concatenation

Autodiscriminate ISBT Concatenation

Check ISBT Table

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

Enable Check ISBT Table

Disable Check ISBT Table

ISBT Concatenation Redundancy

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

Scan the barcode below, then scan two numeric barcodes in Appendix D, numeric barcodes to set a value between 2 and 20. Enter a leading zero for single digit numbers. To correct an error or change a selection, scan Cancel in Appendix D. The default is 10.

ISBT Concatenation Redundancy

# Code 39

Enable/Disable Code 39
To enable or disable Code 39, scan the appropriate barcode below.

Enable Code 39

Disable Code 39

Enable/Disable Trioptic Code 39
To enable or disable Trioptic Code 39, scan the appropriate barcode below.

Enable Trioptic Code 39

Disable Trioptic Code 39

Convert Code 39 to Code 32

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

Enable Convert Code 39 to Code 32

Disable Convert Code 39 to Code 32

Code 32 Prefix

Scan the appropriate barcode below to enable or disable adding the prefix character “A” to all Code 32 barcodes.

Enable Code 32 Prefix

Disable Code 32 Prefix

Set Lengths for Code 39

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

Note: When setting lengths for different barcode types by scanning single digit numbers, single digit numbers must always be preceded by a leading zero.

- One Discrete Length - Select this option to decode only Code 39 symbols containing a selected length. Select the length using the numeric barcodes in Appendix D, Numeric Barcodes. For example, to decode only Code 39 symbols with 14 characters, scan Code 39 - One Discrete Length, then scan 1 followed by 4. To correct an error or change the selection, scan Cancel barcode.
- Two Discrete Lengths - Select this option to decode only Code 39 symbols containing either of two selected lengths. Select lengths using the numeric barcodes in Appendix D, Numeric Barcodes. For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select Code 39 - Two Discrete Lengths, then scan 0, 2, 1, and then 4. To correct an error or change the selection, scan Cancel barcode.
- Length Within Range - Select this option to decode a Code 39 symbol with a specific length range. Select lengths using numeric barcodes in Appendix D, Numeric Barcodes. For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan Code 39 - Length Within Range. Then scan 0, 4, 1, and 2 (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan Cancel barcode.
- Any Length - Select this option to decode Code 39 symbols containing any number of characters within the decoder capability.

Code 39 - One Discrete Length

Code 39 - Two Discrete Lengths

Code 39 - Length Within Range

Code 39 - Any Length

Code 39 Check Digit Verification

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

Enable Code 39 Check Digit

Disable Code 39 Check Digit

Transmit Code 39 Check Digit

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

Transmit Code 39 Check Digit (Enable)

Do Not Transmit Code 39 Check Digit (Disable)

Code 39 Full ASCII Conversion

To enable or disable Code 39 Full ASCII, scan the appropriate barcode below.

Enable Code 39 Full ASCII

Disable Code 39 Full ASCII

Code 39 Buffering - Scan & Store

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

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

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

When the Do Not Buffer Code 39 option is selected, all decoded Code 39 symbols are transmitted immediately without being stored in the buffer.

This feature affects Code 39 only. If selecting Buffer Code 39, we recommend configuring the decoder to decode Code 39 symbology only.

Buffer Code 39 (Enable)

Do Not Buffer Code 39 (Disable)

While there is data in the transmission buffer, selecting Do Not Buffer Code 39 is not allowed. The buffer holds 200 bytes of information.

To disable Code 39 buffering when there is data in the transmission buffer, first force the buffer transmission or clear the buffer.

Buffer Data

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

- Unless the data overflows the transmission buffer, the decoder issues a low/hi beep to indicate successful decode and buffering. (For overflow conditions, see Overfilling Transmission Buffer).
- The decoder adds the decoded data excluding the leading space to the transmission buffer.
- No transmission occurs.

Clear Transmission Buffer

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

Clear Buffer

Transmit Buffer

1. To transmit the transmission buffer, scan the Transmit Buffer barcode below. Only a start character, a plus (+), and a stop character.

   - The decoder transmits and clears the buffer.
   - The decoder issues a Lo/Hi beep.

Transmit Buffer

2. Scan a Code 39 barcode with a leading character other than a space.

   - The decoder appends new decode data to buffered data.
   - The decoder transmits and clears the buffer.
   - The decoder signals that the buffer was transmitted with a lo/hi beep.
   - The decoder transmits and clears the buffer.

Note: The Transmit Buffer contains only a plus (+) character. In order to scan this command, be sure Code 39 length is set to include length 1.

Overfilling Transmission Buffer

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

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

Attempt to Transmit an Empty Buffer

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

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

# Code 93

Enable/Disable Code 93

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

Enable Code 93

Disable Code 93

Set Lengths for Code 93

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

Note: When setting lengths for different barcode types by scanning single digit numbers, single digit numbers must always be preceded by a leading zero.

- One Discrete Length - Select this option to decode only Code 39 symbols containing a selected length. Select the length using the numeric barcodes in Appendix D, Numeric Barcodes. For example, to decode only Code 39 symbols with 14 characters, scan Code 39 - One Discrete Length, then scan 1 followed by 4. To correct an error or change the selection, scan Cancel barcode.
- Two Discrete Lengths - Select this option to decode only Code 39 symbols containing either of two selected lengths. Select lengths using the numeric barcodes in Appendix D, Numeric Barcodes. For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select Code 39 - Two Discrete Lengths, then scan 0, 2, 1, and then 4. To correct an error or change the selection, scan Cancel barcode.
- Length Within Range - Select this option to decode a Code 39 symbol with a specific length range. Select lengths using numeric barcodes in Appendix D, Numeric Barcodes. For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan Code 39 - Length Within Range. Then scan 0, 4, 1, and 2 (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan Cancel barcode.
- Any Length - Select this option to decode Code 39 symbols containing any number of characters within the decoder capability.

Code 93 - One Discrete Length

Code 93 - Two Discrete Lengths

Code 93 - Length Within Range

Code 93 - Any Length

# Code 11

Code 11

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

Enable Code 11

Disable Code 11

Set Lengths for Code 11

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

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

Code 11 - One Discrete Length

Code 11 - Two Discrete Lengths

Code 11 - Length Within Range

Code 11 - Any Length

Code 11 Check Digit Verification

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

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

Disable

One Check Digit

Two Check Digits

Transmit Code 11 Check Digits

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

Transmit Code 11 Check Digit(s) (Enable)

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

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

# Interleaved 2 of 5 (ITF)

Enable/Disable Interleaved 2 of 5

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

Enable Interleaved 2 of 5

Disable Interleaved 2 of 5

**Set Lengths for Interleaved 2 of 5**

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

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

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

I 2 of 5 - One Discrete Length

I 2 of 5 - Two Discrete Lengths

I 2 of 5 - Length Within Range

I 2 of 5 - Any Length

I 2 of 5 Check Digit Verification

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

Disable

USS Check Digit

OPCC Check Digit

Transmit I 2 of 5 Check Digit

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

Transmit I 2 of 5 Check Digit (Enable)

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

I 2 of 5 Check Digit Verification

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

Disable

USS Check Digit

OPCC Check Digit

Transmit I 2 of 5 Check Digit

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

Transmit I 2 of 5 Check Digit (Enable)

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

Convert I 2 of 5 to EAN-13

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

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

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

# Discrete 2 of 5 (DTF)

Enable/Disable Discrete 2 of 5

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

Enable Discrete 2 of 5

Disable Discrete 2 of 5

## Set Lengths for Discrete 2 of 5

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

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

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

D 2 of 5 -One Discrete Length

D 2 of 5 -Two Discrete Lengths

D 2 of 5 – Lengths Within Range

D 2 of 5 -Any Length

# Codabar (NW - 7)

Enable/Disable Codabar

To enable or disable Codabar, scan the appropriate barcode below.

Enable Codabar

Disable Codabar

Set Lengths for Codabar

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

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

Codabar - One Discrete Length

Codabar - Two Discrete Lengths

Codabar - Length Within Range

Codabar - Any Length

CLSI Editing

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

Note: Symbol length does not include start and stop characters.

Enable CLSI Editing

Disable CLSI Editing

NOTIS Editing

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

Enable NOTIS Editing

Disable NOTIS Editing

Codabar Upper or Lower Case Start/Stop Characters Detection

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

Lower Case

Upper Case

# MSI

Enable/Disable MSI

To enable or disable MSI, scan the appropriate barcode below.

Enable MSI

Disable MSI

Set Lengths for MSI

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

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

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

MSI - One Discrete Length

MSI - Two Discrete Lengths

MSI - Length Within Range

MSI - Any Length

MSI Check Digits

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

See MSI Check Digit Algorithm for the selection of second digit algorithms.

One MSI Check Digit

Two MSI Check Digits

Transmit MSI Check Digit(s)

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

Transmit MSI Check Digit(s) (Enable)

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

MSI Check Digit Algorithm

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

MOD 10/MOD 11

MOD 10/MOD 10

## Chinese 2 of 5

Enable/Disable Chinese 2 of 5

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

Enable Chinese 2 of 5

Disable Chinese 2 of 5

# Matrix 2 of 5

Enable/Disable Matrix 2 of 5

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

Enable Matrix 2 of 5

Disable Matrix 2 of 5

Set Lengths for Matrix 2 of 5

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

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

Matrix 2 of 5 - One Discrete Length

Matrix 2 of 5 - Two Discrete Lengths

Matrix 2 of 5 - Length Within Range

Matrix 2 of 5 - Any Length

Matrix 2 of 5 Check Digit

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

Enable Matrix 2 of 5 Check Digit

Disable Matrix 2 of 5 Check Digit

Transmit Matrix 2 of 5 Check Digit

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

Transmit Matrix 2 of 5 Check Digit

Do Not Transmit Matrix 2 of 5 Check Digit

## Inverse 1D

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

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

Regular

Inverse Only

Inverse Autodetect

# Korean 3 of 5

Enable/Disable Korean 3 of 5

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

Enable Korean 3 of 5

Disable Korean 3 of 5

# Postal Codes

US Postnet

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

Enable US Postnet

Disable US Postnet

US Planet

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

Enable US Planet

Disable US Planet

Transmit US Postal Check Digit

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

Transmit US Postal Check Digit

Do not Transmit US Postal Check Digit

## UK Postal

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

Enable UK Postal

Disable UK Postal

Transmit UK Postal Check Digit

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

Transmit UK PostalCheck Digit

Do Not Transmit UK Postal Check Digit

## Japan Postal

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

Enable Japan Postal

Disable Japan Postal

## Australian Postal

To enable or disable Australia Postal, scan the appropriate barcode below.

Enable Australian Postal

Disable Australian Postal

## Australia Post Format

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

- Autodiscriminate (or Smart mode) - Attempt to decode the Customer Information Field using the N and C Encoding Tables.
- Raw Format - Output raw bar patterns as a series of numbers 0 through 3.
- Alphanumeric Encoding - Decode the Customer Information Field using the C Encoding Table.
- Numeric Encoding - Decode the Customer Information Field using the N Encoding Table.

Autodiscriminate

Raw Format

Alphanumeric Encoding

Numeric Encoding

## Netherlands KIX Code

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

Enable Netherlands KIX Code

Disable Netherlands KIX Code

## USPS 4CB/One Code/Intelligent Mail

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

Enable USPS 4CB/One Code/Intelligent Mail

Disable USPS 4CB/One Code/Intelligent Mail

## UPU FICS Postal

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

Enable UPU FICS Postal

Disable UPU FICS Postal

## GS1 DataBar

GS1 DataBar types are:

- GS1 DataBar Omnidirectional
- GS1 DataBar Truncated
- GS1 DataBar Stacked
- GS1 DataBar Stacked Omnidirectional
- GS1 DataBar Limited
- GS1 DataBar Expanded
- GS1 DataBar Expanded Stacked

Scan the appropriate barcodes to enable or disable each type of GS1 DataBar.

GS1 DataBar
Scan the appropriate barcode below to enable or disable the following code types:

- GS1 DataBar Omnidirectional
- GS1 DataBar Truncated
- GS1 DataBar Stacked
- GS1 DataBar Stacked Omnidirectional

Enable GS1 DataBar

Disable GS1 DataBar

GS1 DataBar Limited

Enable GS1 DataBar Limited

Disable GS1 DataBar Limited

GS1 DataBar Limited Security Level

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

- Level 1 – No clear margin required. This complies with the original GS1 standard, yet might result in erroneous1 decoding of the DataBar Limited barcode when scanning some UPC symbols that start with the digits “9” and “7”.
- Level 2 – Automatic risk detection. This level of security may result in erroneous decoding of DataBar Limited barcodes when scanning some UPC symbols. If a misdecode is detected, the decoder operates in Level 3 or Level 1.
- Level 3 – Security level reflects newly proposed GS1 standard that requires a 5X trailing clear margin.
- Level 4 – Security level extends beyond the standard required by GS1. This level of security requires a 5X leading and trailing clear margin.

Security Level 1

Security Level 2

Security Level 3

Security Level 4

GS1 DataBar Expanded

Scan the appropriate barcode below to enable or disable the following code types:

- GS1 DataBar Expanded
- GS1 DataBar Expanded Stacked

Enable GS1 DataBar Expanded

Disable GS1 DataBar Expanded

Convert GS1 DataBar to UPC/EAN

This parameter only applies to GS1 DataBar and GS1 DataBar Limited symbols not decoded as part of a Composite symbol. Enable this to strip the leading '010' from DataBar and DataBar Limited symbols encoding a single zero as the first digit, and report the barcode as EAN-13.

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

Enable Convert GS1 DataBar to UPC/EAN

Disable Convert GS1 DataBar to UPC/EAN

## Composite

Composite CC-C

Scan a barcode below to enable or disable Composite barcodes of type CC-C.

Enable CC-C

Disable CC-C )

Composite CC-A/B

Scan a barcode below to enable or disable Composite barcodes of type CC-A/B.

Enable CC-A/B

Disable CC-A/B

Composite TLC-39

Scan a barcode below to enable or disable Composite barcodes of type TLC-39.

Enable TLC39

Disable TLC39

UPC Composite Mode

UPC symbols can be “linked” with a 2D symbol during transmission as if they were one symbol. There are three options for these symbols:

- Select UPC Never Linked to transmit UPC barcodes regardless of whether a 2D symbol is detected.
- Select UPC Always Linked to transmit UPC barcodes and the 2D portion. If 2D is not present, the UPC barcode does not transmit.
- If Auto discriminate UPC Composites is selected, the device determines if there is a 2D portion, and then transmits the UPC, as well as the 2D portion if present.

UPC Never Linked

UPC Always Linked

Auto discriminate UPC Composites

Composite Beep Mode

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

Single Beep after both are decoded

Beep as each code type is decoded

Double Beep after both are decoded

UCC/EAN Code 128 Emulation Mode for UCC/EAN Composite Codes

Select whether to enable or disable this mode.

Enable GS1-128 Emulation Mode for UCC/EAN Composite Codes

Disable GS1-128 Emulation Mode for UCC/EAN Composite Codes

## 2D Symbologies

Enable/Disable PDF417

To enable or disable PDF417, scan the appropriate barcode below.

Enable PDF417

Disable PDF417

## Enable/Disable MicroPDF417

To enable or disable MicroPDF417, scan the appropriate barcode below.

Enable MicroPDF417

Disable MicroPDF417

## Code 128 Emulation

When this parameter is enabled, the device transmits data from certain MicroPDF417 symbols as if it was encoded in Code 128 symbols. Transmit AIM Symbology Identifiers must be enabled for this parameter to work. If Code 128 Emulation is enabled, these MicroPDF417 symbols are transmitted with one of the following prefixes:

]C1 if the first codeword is 903-907, 912, 914, 915
]C2 if the first codeword is 908 or 909
]C0 if the first codeword is 910 or 911

If disabled, they are transmitted with one of the following prefixes:

]L3 if the first codeword is 903-907, 912, 914, 915
]L4 if the first codeword is 908 or 909
]L5 if the first codeword is 910 or 911

Scan a barcode below to enable or disable Code 128 Emulation.

Enable Code 128 Emulation

Disable Code 128 Emulation

## Data Matrix

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

Enable Data Matrix

Disable Data Matrix

## Data Matrix Inverse

Regular

Inverse Only

Inverse Autodetect

# Data Mirror Images (Data Matrix Only)

Select an option for decoding mirror image Data Matrix barcodes:

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

Never

Always

Auto

## Maxicode

To enable or disable Maxicode, scan the appropriate barcode below.

Enable Maxicode

Disable Maxicode

## QR Code

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

Enable QR Code

Disable QR Code

## QR Inverse

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

- Regular Only - the decoder decodes regular QR barcodes only
- Inverse Only - the decoder decodes inverse QR barcodes only
- Inverse Autodetect - the decoder decodes both regular and inverse QR barcodes

Regular

Inverse Only

Inverse Autodetect

## MicroQR

To enable or disable MicroQR, scan the appropriate barcode below.

Enable MicroQR

Disable MicroQR

## Aztec

To enable or disable Aztec, scan the appropriate barcode below.

Enable Aztec

Disable Aztec

## Aztec Inverse

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

- Regular Only - the decoder decodes regular Aztec barcodes only
- Inverse Only - the decoder decodes inverse Aztec barcodes only
- Inverse Autodetect - the decoder decodes both regular and inverse Aztec barcodes

Regular

Inverse Only

Inverse Autodetect

## Redundancy Level

The decoder offers four levels of decodes redundancy. Select higher redundancy levels for decreasing levels of barcode quality. As redundancy levels increase, the decoder's aggressiveness decreases.
Select the redundancy level appropriate for the barcode quality.

Redundancy Level 1
The following code types must be successfully read twice before being decoded:

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

Redundancy Level 2
The following code types must be successfully read twice before being decoded:

| Code Type | Code Length |
|---|---|
| All | All |

Redundancy Level 3
Code types other than the following must be successfully read twice before being decoded. The following codes must be read three times:

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

Redundancy Level 4
The following code types must be successfully read three times before being decoded:

| Code Type | Code Length |
|---|---|
| All | All |


Redundancy Level 1


Redundancy Level 2


Redundancy Level 3


Redundancy Level 4

## Security Level

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

- Security Level 0: This setting allows the decoder to operate in its most aggressive state, while providing sufficient security in decoding most “in-spec” barcodes.
- Security Level 1: Select this option if misdecodes occur. This default setting should eliminate most misdecodes.
- Security Level 2: Select this option if Security level 1 fails to eliminate misdecodes.
- Security Level 3: If Security Level 2 was selected and misdecodes still occur, select this security level. Be advised, selecting this option is an extreme measure against miss-decoding severely out of spec barcodes. Selecting this level of security significantly impairs the decoding ability of the decoder. If this level of security is necessary, try to improve the quality of the barcodes.


Security Level 0


Security Level 1


Security Level 2


Security Level 3

## Intercharacter Gap Size

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


Normal Intercharacter Gaps


Large Intercharacter Gaps

# Macro PDF Features

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

Caution: *When printing, keep each Macro PDF sequence separate, as each sequence has unique identifiers. Do not mix barcodes from several Macro PDF sequences, even if they encode the same data. When scanning Macro PDF sequences, scan the entire Macro PDF sequence without interruption.*

**Macro PDF User Indications**

In this mode the decoder provides the following feedback.

Macro PDF User Indications

| User Scans | Pass through All Symbols | | Transmit Any Symbol in Set | | Buffer All Symbols | |
|---|---|---|---|---|---|---|
| | Beep | T | Beep | T | Beep | T |
| Last Macro PDF in set | Decode Beep | Y | Decode Beep | Y | Decode Beep | Y |
| Any Macro PDF in set except last | Decode Beep | Y | Decode Beep | Y | 2 Short Low | N |
| Macro PDF is not in current Set | Decode Beep | Y | 2 Long Low | N | 2 Long Low | N |
| Invalid formatted Macro PDF | Decode Beep | Y | 2 Long Low | N | 2 Long Low | N |
| Macro PDF from a set has already been scanned | Decode Beep | Y | 4 Long Low | N | 4 Long Low | N |
| Out of Macro PDF memory | N/A | - | 3 Long Low | N | 3 Long Low | N |
| Any non-Macro PDF scanned during a set | N/A | - | 4 Long Low | N | 4 Long Low | N |
| Flush Macro PDF | Low Hi | N | 5 Long Low | N | 5 Long Low | Y |
| Abort Macro PDF | High Low High Low | N | High Low High Low | N | High Low High Low | N |

Notes:
1. The beep only sounds if the *BEEPER_ON signal is connected.
2. The column marked T indicates whether the symbol is transmitted to the host. N = No transmission.

## Macro PDF Transmit / Decode Mode Symbols

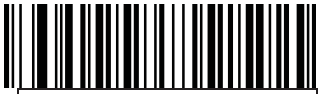
Select one of the options below for handling Macro PDF decoding. In Buffer All Symbols the decoder can handle sets of up to 50 maximum-sized Macro PDF symbols. In all other modes there is no limit to the size of the Macro PDF set.

- Buffer All Symbols / Transmit Macro PDF When Complete: This transmits all decode data from an entire Macro PDF sequence only when the entire sequence is scanned and decoded. Use the beeper and LED signals when using this mode to ensure proper user feedback.
- If the decode data exceeds the limit of 50 symbols, there is no transmission because the entire sequence was not scanned. Use the parameter Flush Macro Buffer to purge the buffer.
- Transmit Any Symbol in Set / No Particular Order: This transmits data from each Macro PDF symbol as decoded, regardless of the sequence (although some error handling is performed). When selecting this mode, enable Transmit Macro PDF Control Header. Also use the beeper and LED signals provided to ensure proper user feedback.
- Pass through All Symbols: This transmits and decodes all Macro PDF symbols and performs no processing. In this mode the host is responsible for detecting and parsing the Macro PDF sequences.

Use this mode when the decoder's BEEPER_ON signal is not used to drive a beeper. In the other modes, some Macro PDF scanning sequences provide audible feedback only, so if BEEPER_ON is not used no user feedback is provided. All actions marked No Transmission provide no feedback unless the BEEPER_ON signal is used. By using Pass through All Symbols mode every user decode is transmitted to the host where the host software can provide the appropriate feedback.

Buffer All Symbols / Transmit Macro PDF When Complete

Transmit Any Symbol in Set / No Particular Order



Pass through All Symbols

## Transmit Macro PDF Control Header

When enabled, this activates transmission of the control header, which contains the segment index and the file ID, in Macro PDF symbols. For example, the field may be: \92800000\725\120\343. The five digits after the \928 are the segment index (or block index), and \725\120\343 is the file ID.

Enable this when selecting Transmit Any Symbol in Set / No Particular Order for the Macro PDF Transmit / Decode Mode Symbols, and disable this when selecting Buffer All Symbols / Transmit Macro PDF When Complete. This parameter has no effect when Pass through All Symbols is selected.

Enable Macro PDF Control Header Transmit

Disable Macro PDF Control Header Transmit

## Escape Characters

This enables the backslash (\) character as an Escape character for systems that can process transmissions containing special data sequences. Scan a barcode below to either format special data according to the GLI (Global Label Identifier) protocol, or to disable this parameter. This parameter only affects the data portion of a Macro PDF symbol transmission; the Macro PDF Control Header (if enabled) is always sent with GLI formatting.

GLI Protocol

None

## Flush Macro Buffer

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

Flush Macro PDF Buffer

## Abort Macro PDF Entry

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

Abort Macro PDF Entry

# Miscellaneous Scanner Options

## Introduction

This chapter includes commonly used barcodes to customize how data is transmitted to the host device.

See *Appendix A*, Standard Default Parameters for all host device and miscellaneous scanner defaults. If the default values suit requirements, programming is not necessary.

There are two ways to change a parameter value:

- Scan the appropriate barcodes in this guide. These new values replace the standard default values in memory.
- For SSI and USB SNAPI hosts, send a "parameter send" command from the host system. Hexadecimal parameter numbers are shown in this chapter below the parameter title, and options are shown in parenthesis beneath the accompanying barcodes.

Note: Most computer monitors allow scanning the barcodes directly on the screen. When scanning from the screen, make sure to set the document magnification to a level where the barcode can be seen clearly, and bars and/or spaces are not merging.

To return all features to default values, scan the *Set Default Parameter* barcode. Throughout the programming barcode menus, default values are framed.

## Scanning Sequence Examples

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

## Errors While Scanning

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

# Miscellaneous Scanner Parameter Defaults

Table below lists the defaults for miscellaneous scanner options parameters. To change any option, scan the appropriate barcode(s) provided in the Miscellaneous Scanner Parameters.

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

Miscellaneous Scanner Options Default Table

| Parameter | Default |
|---|---|
| Transmit Code ID Character | None |
| SSI Prefix Value | <CR> |
| SSI Suffix 1 Value SSI Suffix 2 Value | <CR> <CR> |
| Non-SSI Prefix Value | <CR><LF> |
| Non-SSI Suffix 1 Value Non-SSI Suffix 2 Value | <CR><LF><br><CR><LF> |
| Scan Data Transmission Format | Data as is |
| FN1 Substitution Values | Set |
| Transmit “No Read” Message | Disable |

# Miscellaneous Scanner Parameters

**Transmit Code ID Character**

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

Select no Code ID character, a Symbol Code ID character, or an AIM Code ID character. For Code ID Characters, see Symbol Code Identifiers and AIM Code Identifiers.

Symbol Code ID Character

AIM Code ID Character

None

# Prefix/Suffix Values

A prefix and/or one or two suffixes can be appended to scan data for use in data editing. To set a value for a prefix or suffix, scan a prefix or suffix barcode below, then scan a four-digit number (i.e., four barcodes from Appendix D, Numeric Barcodes) that corresponds to that value. To correct an error or change a selection, scan *Cancel barcode*.

Note: To use Prefix/Suffix values, first set the *Scan Data Transmission Format*.

For non-SSI hosts, when using host commands to set the prefix or suffix, set the key category parameter to 1, then set the 3-digit decimal value.

Scan Prefix

Scan Suffix 1

Scan Suffix 2

## Scan Data Transmission Format

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

Data As Is

<DATA> <SUFFIX 1>

<DATA> <SUFFIX 2>

<DATA> <SUFFIX 1> <SUFFIX 2>

<PREFIX> <DATA >

<PREFIX> <DATA> <SUFFIX 1>

<PREFIX> <DATA> <SUFFIX 2>

<PREFIX> <DATA> <SUFFIX 1>
<SUFFIX 2>

## FN1 Substitution Values

The Wedge and USB HID Keyboard hosts support a FN1 Substitution feature. When enabled any FN1 character (0x1b) in an EAN128 barcode is substituted 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 currently installed host interface for the desired value.

To select a FN1 substitution value via barcode menus:

1. Scan the barcode below.

Set FN1 Substitution Value

2. Look up the keystroke desired for FN1 Substitution in the ASCII Character Set table for the currently installed host interface. Enter the 4-digit ASCII Value by scanning each digit in Appendix D, Numeric Barcodes.

To correct an error or change the selection, scan Cancel. To enable FN1 substitution for USB HID keyboard, scan the Enable FN1 Substitution barcode.

## Transmit “No Read” Message

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

Enable No Read

Disable No Read

# Maintenance

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

Never use any abrasive material or solvents on the window. Do not spray water or other cleaning liquids directly onto the window.

Remove dirt by wiping gently with a damp cloth or tissue moistened with water and/or ammonia.

# Appendix A

## Standard Default Parameters

## Default Parameters

Standard Default Parameters Table

| Parameter | | Default |
|---|---|---|
| **User Preferences** | | |
| Set Default Parameter | | All Defaults |
| Parameter Scanning | | Enable |
| Beeper Tone | | Medium |
| Beeper Volume | | High |
| Trigger Modes | Handheld/hands-free scanner | Level |
| | Scan module | Presentation |
| Power Mode | Handheld/hands-free scanner | Low Power |
| | Scan module | Continuous On |
| Time Delay to Low Power Mode | | 1.0 Sec |
| Decode Session Timeout | | 9.9 Sec |
| Timeout Between Decodes, Same Symbol | | 0.6 Sec |
| Beep After Good Decode | | Enable |
| Presentation Mode Session Timeout | | 2 Seconds |
| **Imager Preferences** | | |
| Focus Mode | | Far Focus |
| Decoding Autoexposure | | Enable |

| | |
|---|---|
| Decoding Illumination | Enable |
| Decode Aiming Pattern | Enable |
| Image Capture Autoexposure | Enable |
| Image Capture Illumination | Enable |
| Gain | 100 |
| Exposure Time | 10 ms |
| LED Illumination | Internal LED Illumination |
| Snapshot Mode Timeout | 0 (30 seconds) |
| Snapshot Aiming Pattern | Enable |
| Image Cropping | Disable |
| Crop to Pixel Addresses | 0 top, 0 left, 479 bottom, 639 right |
| Image Resolution | Full |
| JPEG Image Options | Quality |
| JPEG Quality Value | 65 |
| JPEG Size Value | 40 (41K) |
| Image File Format Selection | JPEG |
| Bits per Pixel (BPP) | 8 BPP |
| Signature Capture | Disable |
| Signature Capture Image File Format Selection | JPEG |
| Signature Capture Bits per Pixel (BPP) | 8 BPP |
| Signature Capture Width | 400 |
| Signature Capture Height | 100 |
| Signature Capture JPEG Quality | 65 |

| | |
|---|---|
| Video View Finder | Disable |
| Target Video Frame Size | 2200 bytes |
| Video View Finder Image Size | 1700 bytes |
| Event Reporting | |
| Decode Event | Disable |
| Boot Up Event | Disable |
| Parameter Event | Disable |
| **Serial Host Parameters** | |
| Serial Host Types | SSI Host |
| Baud Rate | 9600 |
| Parity Type | None |
| Stop Bit Select | 1 Stop Bit |
| Data Bits | 8-Bit |
| Check Receive Errors | Enable |
| Hardware Handshaking | None |
| Software Handshaking | None |
| Host Serial Response Time-out | 2 Sec |
| RTS Line State | Low RTS |
| Beep on <BEL> | Disable |
| Intercharacter Delay | 0 msec |
| Nixdorf Beep/LED Options | Normal Operation |
| Ignore Unknown Characters | Send Barcode |
| **USB Host Parameters** | |

| | |
|---|---|
| USB Device Type | HID Keyboard Emulation |
| Symbol Native API (SNAPI) Status Handshaking | Enable |
| USB Country Keyboard Types (Country Codes) | North American |
| USB Keystroke Delay | No Delay |
| USB CAPS Lock Override | Disable |
| USB Ignore Unknown Characters | Enable |
| Emulate Keypad | Disable |
| USB FN1 Substitution | Disable |
| Function Key Mapping | Disable |
| Simulated Caps Lock | Disable |
| Convert Case | None |
| **UPC/EAN** | |
| UPC-A | Enable |
| UPC-E | Enable |
| UPC-E1 | Disable |
| EAN-8/JAN 8 | Enable |
| EAN-13/JAN 13 | Enable |
| Bookland EAN | Disable |
| Decode UPC/EAN/JAN Supplemental (2 and 5 digits) | Ignore |
| UPC/EAN/JAN Supplemental Redundancy | 10 |
| Transmit UPC-A Check Digit | Enable |
| Transmit UPC-E Check Digit | Enable |
| Transmit UPC-E1 Check Digit | Enable |

| | |
|---|---|
| UPC-A Preamble | System Character |
| UPC-E Preamble | System Character |
| UPC-E1 Preamble | System Character |
| Convert UPC-E to A | Disable |
| Convert UPC-E1 to A | Disable |
| EAN-8/JAN-8 Extend | Disable |
| UCC Coupon Extended Code | Disable |
| **Code 128** | |
| Code 128 | Enable |
| UCC/EAN-128 | Enable |
| ISBT 128 | Enable |
| **Code 39** | |
| Code 39 | Enable |
| Trioptic Code 39 | Disable |
| Convert Code 39 to Code 32 (Italian Pharmacy Code) | Disable |
| Code 32 Prefix | Disable |
| Set Length(s) for Code 39 | 2 to 55 |
| Code 39 Check Digit Verification | Disable |
| Transmit Code 39 Check Digit | Disable |
| Code 39 Full ASCII Conversion | Disable |
| Buffer Code 39 | Disable |
| **Code 93** | |
| Code 93 | Disable |

| | |
|---|---|
| Set Length(s) for Code 93 | 4 to 55 |
| **Code 11** | |
| Code 11 | Disable |
| Set Lengths for Code 11 | 4 to 55 |
| Code 11 Check Digit Verification | Disable |
| Transmit Code 11 Check Digit(s) | Disable |
| **Interleaved 2 of 5 (ITF)** | |
| Interleaved 2 of 5 (ITF) | Enable |
| Set Lengths for I 2 of 5 | 14 |
| I 2 of 5 Check Digit Verification | Disable |
| Transmit I 2 of 5 Check Digit | Disable |
| Convert I 2 of 5 to EAN 13 | Disable |
| **Discrete 2 of 5 (DTF)** | |
| Discrete 2 of 5 | Disable |
| Set Length(s) for D 2 of 5 | 12 |
| **Codabar (NW - 7)** | |
| Codabar | Disable |
| Set Lengths for Codabar | 5 to 55 |
| CLSI Editing | Disable |
| NOTIS Editing | Disable |
| **MSI** | |
| MSI | Disable |
| Set Length(s) for MSI | 4 to 55 |

| | |
|---|---|
| MSI Check Digits | One |
| Transmit MSI Check Digit | Disable |
| MSI Check Digit Algorithm | Mod 10/Mod 10 |
| **Postal Codes** | |
| US Postnet | Enable |
| US Planet | Enable |
| UK Postal | Enable |
| Transmit UK Postal Check Digit | Enable |
| Japan Postal | Enable |
| Australian Postal | Enable |
| Dutch Postal | Enable |
| Transmit US Postal Check Digit | Enable |
| **GS1 (Reduced Space Symbology)** | |
| GS1 14 | Enable |
| GS1 Limited | Enable |
| GS1 Expanded | Enable |
| Convert GS1 to UPC/EAN | Disable |
| **Composite** | |
| Composite CC-C | Disable |
| Composite CC-A/B | Disable |
| Composite TLC-39 | Disable |
| UPC Composite Mode | Always Linked |
| Composite Beep Mode | Beep As Each Code Type is Decoded |

| | |
|---|---|
| UCC/EAN Code 128 Emulation Mode for UCC/EAN Composite Codes | Disable |
| **2D Symbologies** | |
| PDF417 | Enable |
| MicroPDF417 | Disable |
| Code 128 Emulation | Disable |
| Data Matrix | Enable |
| Maxicode | Enable |
| QR Code | Enable |
| **Symbology-Specific Security Levels** | |
| Redundancy Level | 1 |
| Security Level | 1 |
| Intercharacter Gap Size | Normal |
| **Report Version** | |
| **Macro PDF** | |
| Macro PDF Transmit/Decode Mode Symbols | Pass through Mode |
| Transmit Macro PDF Control Header | Disable |
| Escape Characters | None |
| Flush Macro PDF Buffer | Page 134 |
| Abort Macro PDF Entry | Page 134 |
| **Miscellaneous Scanner Options** | |
| Transmit Code ID Character | None |
| SSI Prefix Value | <CR> |

| | |
|---|---|
| SSI Suffix 1 Value SSI Suffix 2 Value | <CR> <CR> |
| Non-SSI Prefix Value | <CR><LF> |
| Non-SSI Suffix 1 Value Non-SSI Suffix 2 Value | <CR><LF><br><CR><LF> |
| Scan Data Transmission Format | Data as is |
| FN1 Substitution Values | Set |
| Transmit “No Read” Message | Disable |

# Appendix B

## Symbol Code Identifiers

Symbol Code Characters

| Code Character | Code Type |
|---|---|
| A | UPC-A, UPC-E, UPC-E1, EAN-8, EAN-13 |
| B | Code 39, Code 32 |
| C | Codabar |
| D | Code 128 |
| E | Code 93 |
| F | Interleaved 2 of 5 |
| G | Discrete 2 of 5, or Discrete 2 of 5 IATA |
| H | Code 11 |
| J | MSI |
| K | UCC/EAN-128 |
| L | Bookland EAN |
| M | Trioptic Code 39 |
| N | Coupon Code |
| R | GS1 DataBar Family |
| S | Matrix 2 of 5 |
| T | UCC Composite, TLC 39 |
| U | Chinese 2 of 5 |
| V | Korea 3 of 5 |
| X | ISSN EAN, PDF417, Macro PDF417, Micro PDF417 |

| | |
|---|---|
| z | Aztec, Aztec Rune |
| P00 | Data Matrix |
| P01 | QR Code, MicroQR |
| P02 | Maxicode |
| P03 | US Postnet |
| P04 | US Planet |
| P05 | Japan Postal |
| P06 | UK Postal |
| P08 | Netherlands KIX Code |
| P09 | Australian Postal |
| P09 | UK Postal |
| P0A | USPS 4CB/One Code/Intelligent Mail |
| P0B | UPU FICS Postal |

# AIM Code Identifiers

Each AIM Code Identifier contains the three-character string ]cm where:

] = Flag Character (ASCII 93)
c = Code Character
m = Modifier Character

Aim Code Characters

| Code Character | Code Type |
|---|---|
| A | Code 39, Code 39 Full ASCII, Code 32 |
| C | Code 128, Coupon (Code 128 portion) |
| d | Data Matrix |
| E | UPC/EAN, Coupon (UPC portion) |
| e | GS1 DataBar Family |
| F | Codabar |
| G | Code 93 |
| H | Code 11 |
| I | Interleaved 2 of 5 |
| L | PDF417, Macro PDF417, Micro PDF417 |
| L2 | TLC 39 |
| M | MSI |
| Q | QR Code, MicroQR |
| S | Discrete 2 of 5, IATA 2 of 5 |
| U | Maxicode |
| X | Bookland EAN, ISSN EAN, Trioptic Code 39, Chinese 2 of 5, Matrix 2 of 5, Korean 3 of 5, US Postnet, US Planet, UK Postal, Japan Postal, Australia Post, Netherlands KIX Code, USPS 4CB/One Code/Intelligent Mail, UPU FICS Postal |

The modifier character is the sum of the applicable option values based on Table B-3.

Modifier Characters

| Code Type | Option Value | Option |
|---|---|---|
| Code 39 | 0 | No check character or Full ASCII processing. |
| | 1 | Reader has checked one check character. |
| | 3 | Reader has checked and stripped check character. |
| | 4 | Reader has performed Full ASCII character conversion. |
| | 5 | Reader has performed Full ASCII character conversion and checked one check character. |
| | 7 | Reader has performed Full ASCII character conversion and checked and stripped check character. |
| | Example: A Full ASCII barcode with check character W, A+I+MI+DW, is transmitted as ]A7AIMID where 7 = (3+4). | |
| Trioptic Code 39 | 0 | No option specified at this time. Always transmit 0. |
| | Example: A Trioptic barcode 412356 is transmitted as ]X0412356 | |
| Code 128 | 0 | Standard data packet, no Function code 1 in first symbol position. |
| | 1 | Function code 1 in first symbol character position. |
| | 2 | Function code 1 in second symbol character position. |
| | Example: A Code (EAN) 128 barcode with Function 1 character FNC1 in the first position, AIMID is transmitted as ]C1AIMID | |
| I 2 of 5 | 0 | No check digit processing. |
| | 1 | Reader has validated check digit. |
| | 3 | Reader has validated and stripped check digit. |
| | Example: An I 2 of 5 barcode without check digit, 4123, is transmitted as ]I04123 | |
| Codabar | 0 | No check digit processing. |
| | 1 | Reader has checked check digit. |
| | 3 | Reader has stripped check digit before transmission. |
| | Example: A Codabar barcode without check digit, 4123, is transmitted as ]F04123 | |

| | | |
|---|---|---|
| Code 93 | 0 | No options specified at this time. Always transmit 0. |
| | Example: A Code 93 barcode 012345678905 is transmitted as ]G0012345678905 | |
| MSI | 0 | Check digits are sent. |
| | 1 | No check digit is sent. |
| | Example: An MSI barcode 4123, with a single check digit checked, is transmitted as ]M14123 | |
| D 2 of 5 | 0 | No options specified at this time. Always transmit 0. |
| | Example: A D 2 of 5 barcode 4123, is transmitted as ]S04123 | |
| UPC/EAN | 0 | Standard packet in full EAN country code format, which is 13 digits for UPC-A and UPC-E (not including supplemental data). |
| | 1 | Two-digit supplement data only. |
| | 2 | Five-digit supplement data only. |
| | 4 | EAN-8 data packet. |
| | Example: A UPC-A barcode 012345678905 is transmitted as ]E00012345678905 | |
| Bookland EAN | 0 | No options specified at this time. Always transmit 0. |
| | Example: A Bookland EAN barcode 123456789X is transmitted as ]X0123456789X | |
| Code 11 | 0 | Single check digit |
| | 1 | Two check digits |
| | 3 | Check characters validated but not transmitted. |
| GS1 DataBar Family | | No option specified at this time. Always transmit 0. GS1-14 and GS1-Limited transmit with an Application Identifier “01”. Note: In UCC/EAN-128 emulation mode, GS1 is transmitted using Code 128 rules (i.e., ]C1). |
| | Example: An GS1-14 barcode 100123456788902 is transmitted as ]e001100123456788902. | |

| | | |
|---|---|---|
| EAN.UCC Composites (GS1 DataBar, GS1-128, 2D portion of UPC composite) | | Native mode transmission. Note: UPC portion of composite is transmitted using UPC rules. |
| | 0 | Standard data packet. |
| | 1 | Data packet containing the data following an encoded symbol separator character. |
| | 2 | Data packet containing the data following an escape mechanism character. The data packet does not support the ECI protocol. |
| | 3 | Data packet containing the data following an escape mechanism character. The data packet supports the ECI protocol. |
| | | GS1-128 emulation<br>Note: UPC portion of composite is transmitted using UPC rules. |
| | 1 | Data packet is a UCC/EAN-128 symbol (i.e., data is preceded with ]JC1). |
| PDF417, Micro PDF417 | 0 | Reader set to conform to protocol defined in 1994 PDF417 symbology specifications. Note: When this option is transmitted, the receiver cannot reliably determine whether ECIs have been invoked or whether data byte 92DEC has been doubled in transmission. |
| | 1 | Reader set to follow the ECI protocol (Extended Channel Interpretation). All data characters 92DEC are doubled. |
| | 2 | Reader set for Basic Channel operation (no escape character transmission protocol). Data characters 92DEC are not doubled. Note: When decoders are set to this mode, unbuffered Macro symbols and symbols requiring the decoder to convey ECI escape sequences cannot be transmitted. |
| | 3 | The barcode contains a UCC/EAN-128 symbol, and the first codeword is 903-907, 912, 914, 915. |
| | 4 | The barcode contains a UCC/EAN-128 symbol, and the first codeword is in the range 908-909. |
| | 5 | The barcode contains a UCC/EAN-128 symbol, and the first codeword is in the range 910-911. |
| | Example: A PDF417 barcode ABCD, with no transmission protocol enabled, is transmitted as ]L2ABCD. | |

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

# Appendix C

## Sample Barcodes

Code 39


123ABC

UPC/EAN UPC-A, 100%


1234567890

EAN-13, 100%


456789012340

Code 128


12345678901234567890123456789012345678901234

Interleaved 2 of 5


12345678901231

GS1 DataBar 14

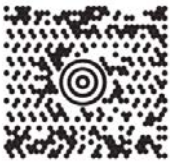
Note: DataBar 14 must be enabled to read the barcode below.

7612341562341

PDF417

Data Matrix

Maxicode



# Appendix D

## Numeric Barcodes

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


0


1


2


3


4


5


6


7


8


9

## Cancel

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


Cancel

# Appendix E

## ASCII Character Set

ASCII Value Table

| ASCII Value | Full ASCII Code 39 Encode Char | Keystroke |
|---|---|---|
| 1000 | %U | CTRL 2 |
| 1001 | $A | CTRL A |
| 1002 | $B | CTRL B |
| 1003 | $C | CTRL C |
| 1004 | $D | CTRL D |
| 1005 | $E | CTRL E |
| 1006 | $F | CTRL F |
| 1007 | $G | CTRL G |
| 1008 | $H | CTRL H/**BACKSPACE**[1] |
| 1009 | $I | CTRL I/**HORIZONTAL TAB**[1] |
| 1010 | $J | CTRL J |
| 1011 | $K | CTRL K |
| 1012 | $L | CTRL L |
| 1013 | $M | CTRL M/**ENTER**[1] |
| 1014 | $N | CTRL N |
| 1015 | $O | CTRL O |
| 1016 | $P | CTRL P |
| 1017 | $Q | CTRL Q |

| | | |
|---|---|---|
| 1018 | $R | CTRL R |
| 1019 | $S | CTRL S |
| 1020 | $T | CTRL T |
| 1021 | $U | CTRL U |
| 1022 | $V | CTRL V |
| 1023 | $W | CTRL W |
| 1024 | $X | CTRL X |
| 1025 | $Y | CTRL Y |
| 1026 | $Z | CTRL Z |
| 1027 | %A | CTRL [ |
| 1028 | %B | CTRL \ |
| 1029 | %C | CTRL ] |
| 1030 | %D | CTRL 6 |
| 1031 | %E | CTRL |
| 1032 | Space | Space |
| 1033 | /A | ! |
| 1034 | /B | “ |
| 1035 | /C | # |
| 1036 | /D | $ |
| 1037 | /E | % |
| 1038 | /F | & |
| 1039 | /G | ‘ |
| 1040 | /H | ( |
| 1041 | /I | ) |

| | | |
|---|---|---|
| 1042 | /J | * |
| 1043 | /K | + |
| 1044 | /L | , |
| 1045 | - | - |
| 1046 | . | . |
| 1047 | /o | / |
| 1048 | 0 | 0 |
| 1049 | 1 | 1 |
| 1050 | 2 | 2 |
| 1051 | 3 | 3 |
| 1052 | 4 | 4 |
| 1053 | 5 | 5 |
| 1054 | 6 | 6 |
| 1055 | 7 | 7 |
| 1056 | 8 | 8 |
| 1057 | 9 | 9 |
| 1058 | /Z | : |
| 1059 | %F | ; |
| 1060 | %G | < |
| 1061 | %H | = |
| 1062 | %I | > |
| 1063 | %J | ? |
| 1064 | %V | @ |
| 1065 | A | A |

| | | |
|---|---|---|
| 1066 | B | B |
| 1067 | C | C |
| 1068 | D | D |
| 1069 | E | E |
| 1070 | F | F |
| 1071 | G | G |
| 1072 | H | H |
| 1073 | I | I |
| 1074 | J | J |
| 1075 | K | K |
| 1076 | L | L |
| 1077 | M | M |
| 1078 | N | N |
| 1079 | O | O |
| 1080 | P | P |
| 1081 | Q | Q |
| 1082 | R | R |
| 1083 | S | S |
| 1084 | T | T |
| 1085 | U | U |
| 1086 | V | V |
| 1087 | W | W |
| 1088 | X | X |
| 1089 | Y | Y |

| | | |
|---|---|---|
| 1090 | Z | Z |
| 1091 | %K | [ |
| 1092 | %L | \ |
| 1093 | %M | ] |
| 1094 | %N | ^ |
| 1095 | %O | – |
| 1096 | %W | ‘ |
| 1097 | +A | a |
| 1098 | +B | b |
| 1099 | +C | c |
| 1100 | +D | d |
| 11 | +E | e |
| 11 | +F | f |
| 11 | +G | g |
| 11 | +H | h |
| 11 | +I | i |
| 1106 | +J | j |
| 1107 | +K | k |
| 1108 | +L | l |
| 1109 | +M | m |
| 1110 | +N | n |
| 1111 | +O | o |
| 1112 | +P | p |
| 1113 | +Q | q |

| | | |
|---|---|---|
| 1114 | +R | r |
| 1115 | +S | s |
| 1116 | +T | t |
| 1117 | +U | u |
| 1118 | +V | v |
| 1119 | +W | w |
| 1120 | +X | x |
| 1121 | +Y | y |
| 1122 | +Z | z |
| 1123 | %P | { |
| 1124 | %Q | \| |
| 1125 | %R | } |
| 1126 | %S | ~ |

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

ALT Key Standard Default Tables

| ALT Keys | Keystroke |
|---|---|
| 2064 | ALT 2 |
| 2065 | ALT A |
| 2066 | ALT B |
| 2067 | ALT C |
| 2068 | ALT D |
| 2069 | ALT E |
| 2070 | ALT F |
| 2071 | ALT G |
| 2072 | ALT H |
| 2073 | ALT I |
| 2074 | ALT J |
| 2075 | ALT K |
| 2076 | ALT L |
| 2077 | ALT M |
| 2078 | ALT N |
| 2079 | ALT O |
| 2080 | ALT P |
| 2081 | ALT Q |
| 2082 | ALT R |
| 2083 | ALT S |
| 2084 | ALT T |
| 2085 | ALT U |
| 2086 | ALT V |
| 2087 | ALT W |
| 2088 | ALT X |
| 2089 | ALT Y |
| 2090 | ALT Z |

USB GUI Key Character Set

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

| | |
|---|---|
| 3081 | GUI Q |
| 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. | |

PF Key Standard Default Table

| PF Keys | Keystroke |
|---|---|
| 40 | PF 1 |
| 40 | PF 2 |
| 40 | PF 3 |
| 40 | PF 4 |
| 40 | PF 5 |
| 40 | PF 6 |
| 40 | PF 7 |
| 40 | PF 8 |
| 40 | PF 9 |
| 40 | PF 10 |
| 40 | PF 11 |
| 40 | PF 12 |
| 40 | PF 13 |
| 40 | PF 14 |
| 40 | PF 15 |
| 40 | PF 16 |

F key Standard Default Table

| F Keys | Keystroke |
|---|---|
| 5001 | F 1 |
| 5002 | F 2 |
| 5003 | F 3 |
| 5004 | F 4 |
| 5005 | F 5 |
| 5006 | F 6 |
| 5007 | F 7 |
| 5008 | F 8 |
| 5009 | F 9 |
| 5010 | F 10 |
| 5011 | F 11 |
| 5012 | F 12 |
| 5013 | F 13 |
| 5014 | F 14 |
| 5015 | F 15 |
| 5016 | F 16 |
| 5017 | F 17 |
| 5018 | F 18 |
| 5019 | F 19 |
| 5020 | F 20 |
| 5021 | F 21 |
| 5022 | F 22 |
| 5023 | F 23 |
| 5024 | F 24 |

Numeric Key Standard Default Table

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

Extended Keypad Standard Default Table

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