

# Handheld 2D Image Reader



**User's Manual**

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### **General handling precautions**

- Do not dispose of 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.

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## **Introduction**

Featuring a powerful image sensor for powerful optical performance, the Handheld 2D Image Reader is ideal for both 1D and 2D scanning situations. The reader uses laser aiming and LED illumination, and LED illumination and can switch between two focus positions for extended working range or for more precise focusing in high-density bar code decoding or digital picture taking

With its sturdy ABS plastic construction, sleek, ergonomic styling, and light weight, the Handheld 2D Image Reader reduces user fatigue, making it easy to use even in high-volume scanning situations. The Handheld 2D Image Reader also features best-in-class decoding capabilities, boasting over 20 recognized 1D, postal, and 2D codes, including EAN-UCC composite codes and PDF 417 matrix codes.

The Handheld 2D Image Reader has advanced features and thoughtful design that make it ideally adapted to a wide variety of business, manufacturing, service, and scientific needs.

## **Unpacking**

The Handheld 2D Image Reader package should contain:

1 ea.            Handheld 2D Image Reader



1 ea.            Communication Cable



1 ea.            Power Adapter (optional)



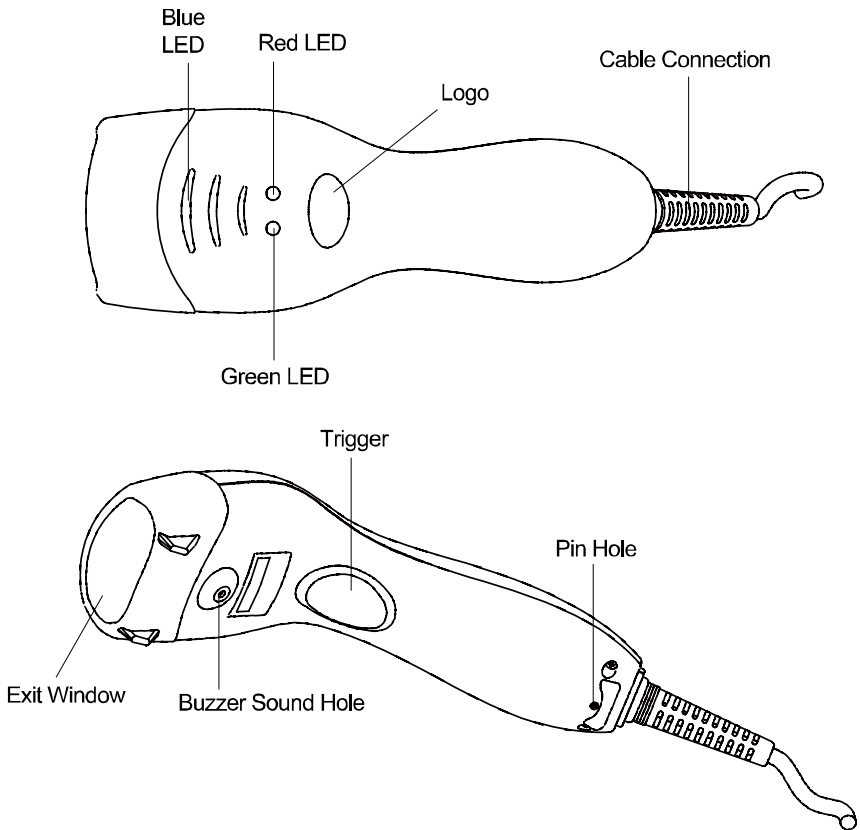
1 ea.            CD-ROM Support Disk



If any package contents are damaged or missing, please contact your dealer immediately.

Please leave this Users' Manual within easy access of person using the scanner.

## Scanner Outline

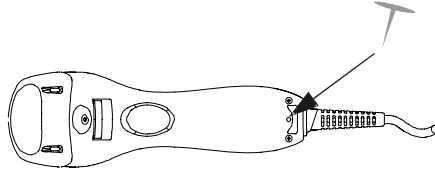


The LED indicator on the top of the scanner unit glows red when power is on. When a barcode is successfully decoded, the LED flashes green and blue LED and the buzzer sounds.

## **Disconnecting The Cable**

Prior to removing the cable from the scanner, it is highly advised that the power of the host system is turned off, and power supply disconnected from the cable.

1. Locate the small hole at the bottom of the scanner.



2. Use a metallic pin and insert into the hole.
3. Gently pull the strain-relief of the cable once a faint “click” is heard.

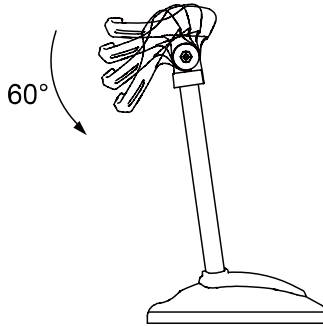
## **Connecting to a Host**

The Handheld 2D Image Reader supports both USB and RS-232 communications. Select a Communications Cable appropriate to your host.

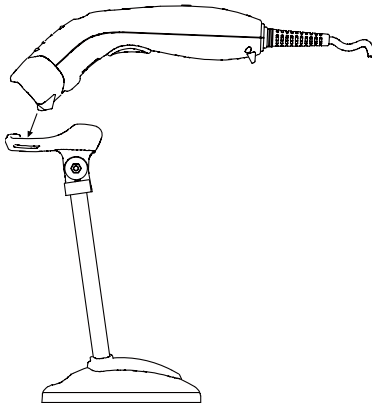
1. Insert the plug on the free end of the Communications Cable into the appropriate connector on the host.
2. Insert the small plug terminating the Power Adapter wire into the socket on the side of the Communications Cable. (Only applicable to RS-232 interface)
3. Plug the Power Adapter into an outlet

## Assembling the Optional Stand

The optional self-supporting stand is to facilitate the usage of your scanner. It moves freely and can be placed anywhere on countertops. It can be tilted to a maximum of 60 degrees.



To attach the scanner to the optional stand, hook the scanner on the two holes located at the front of the stand.



## Test Scanning

1. Ensure all connections are secure, power is connected, and the LED is red, indicating standby position.
2. Aim the scanner at a barcode within range. Assuming the scanner is in trigger mode (default), press the trigger.
3. On successful decode, the scanner beeps and the LED flashes green.



1. Do not hold the scanner directly over a barcode. At 90°, scanning light can bounce directly back into the scanner from the barcode area as specula reflection, creating a "dead zone" where decoding is, at best, difficult. Instead of a 90° head-on approach, tilt the scanner up to 65° forward or backward to achieve a successful decode. Practice a few times to find what range of angles works best.

## What's on the CD-ROM

The CD-ROM that accompanies the Handheld 2D Image Reader contains three directories:

- ◆ Drivers, which contains USB drivers for various versions of Windows,
- ◆ Docs, which contains documentation, primarily this manual in file form, and
- ◆ Two software applications: a setup program that makes for convenient setup of the parameters on the Handheld 2D Image Reader, and a keyboard emulator (keyboard wedge), for situations where you want scanned information to appear to the connected host as keyboard entries.

Install the USB drivers on the machine that will host the Handheld 2D Image Reader.

Install the configuration Setup utility on any PC that you want to use for configuring a Handheld 2D Image Reader.

## Scanner Setup

You can configure the scanner either via the Setup utility provided on the CD-ROM, or by scanning the setup codes provided in this manual under Settings and Programming. The setup utility is usually more convenient, but the printed setup codes are supplied for those times when a PC with the necessary utility is not immediately at hand.

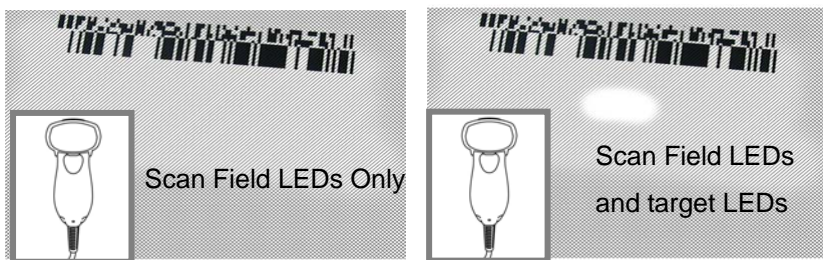
## Operation

Operation of the Handheld 2D Image Reader is pretty intuitive. Assuming that the necessary host and power adapter connections are made for standard operation, simply aim the scanner at the intended code patch and pull the trigger. As soon as the read is successful, the code is transmitted to the host, the LED lights green, the beeper beeps, and the scanner waits for the next scan.

These are all adjustable. In always on (presentation) mode, the scanning lights remain on, and no trigger pull is required.

The beeper can be disabled, or can be programmed to beep only after a set number of barcodes are read.

In addition to the broader scan field light, the Handheld 2D Image Reader has a target beam function that makes it clear exactly where the scanner is pointing.



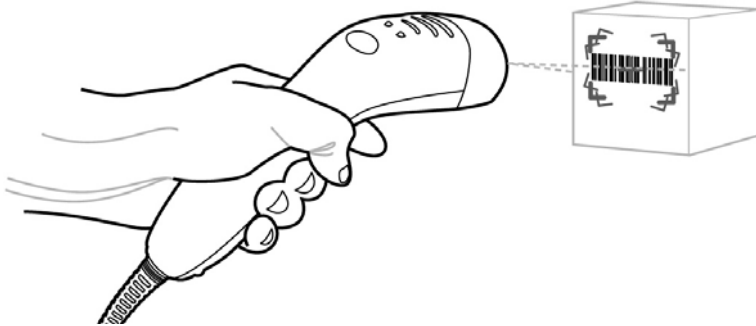
To use targeting, first enable the function by scanning the "Enable targeting LED" code found later in this manual. Then, when the target beam is desired, squeeze and hold the trigger for a couple seconds. The target beam turns on, showing the exactly where the scanner is pointing.

## Scanning in Hand-Held Mode

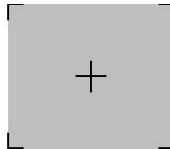
Install and program the digital scanner.

### Scanning with the Scanner

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

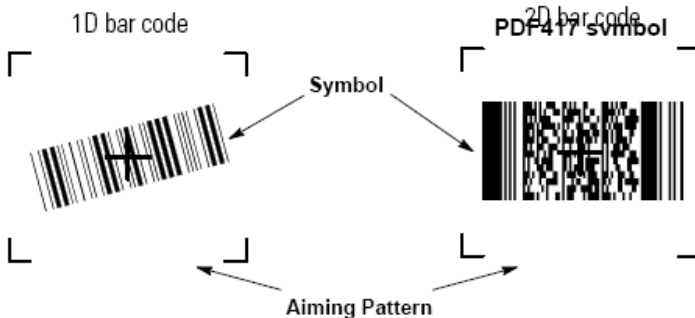


- 3 When the digital scanner senses movement, in its default **Auto Aim** trigger mode, it projects a red laser aiming pattern (shown as below) which allows positioning the bar code or object within the field of view. (To turn off the default **Auto Aim** trigger mode.



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

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



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

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

## Aiming

Hold the digital scanner between two and nine inches from the symbol, centering the aiming pattern cross hairs on the symbol.

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

The digital scanner can also read a bar code presented within the aiming pattern but not centered. The top examples show below acceptable aiming options, while the bottom examples can not be decoded.



## Settings and Programming

Scan a series of selected barcode patches printed 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.

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

## Programming Options

This section contains the following two divisions:

- ◆ Default factory device settings.
- ◆ Supported symbologies.

## Default factory device settings

User Preferences Default Table

Parameter	
User Preferences	
Set Default Parameter	All Defaults
Parameter Scanning	Enable
Beeper Tone	Medium
Beeper Volume	High
Trigger Modes	Level
Power Mode	Low Power
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

## User Preferences

### Set Default Parameter

Scan this bar code to return all parameters to the default values.



Set All Defaults

### **Parameter Scanning**

To disable decoding of parameter bar codes, scan the Disable Parameter Scanning bar code below. Note that the Set Defaults parameter bar code can still be decoded. To enable decoding of parameter bar codes, either scan Enable Parameter Scanning or Set All Defaults.



Enable Parameter Scanning



Disable Parameter Scanning

### **Beeper Tone**

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



Low Frequency



Medium Frequency (Optimum  
Setting)



High Frequency

## Beeper Volume

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



Low Volume



Medium Volume



High Volume

## Trigger Modes

- Level - A trigger event activates decode processing, which continues until the trigger event ends, a valid decode, or the decode session time-out is reached.
- Presentation Mode - When the device 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 its sleep state.
- Host - A host command issues the triggering signal. The device interprets a trigger pull as a level triggering option.



Level



Presentation Mode



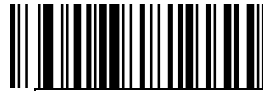
Host

## Power Mode

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



Continuous On



Low Power Mode

## Time Delay to Low Power Mode

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

Note: This parameter only applies when *Power Mode* is set to Low Power.



1 Second



5 Seconds



1 Minute



5 Minutes



15 Minutes



1 Hour

### **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 bar code below. Next, scan two numeric bar codes from *Appendix D, Numeric Barcodes* that correspond to the desired on time. Single digit numbers must have a leading zero. For example, to set a Decode Session Timeout of 0.5 seconds, scan the bar code below, then scan the 0 and 5 bar codes. To correct an error or change the selection, scan *Cancel barcode*.



Decode Session Timeout

### **Timeout Between Decodes, Same Symbol**

This option is used in presentation mode to prevent multiple reads of a symbol left in the Device's field of view. The timeout begins when the symbol is removed from the field of view. It is programmable in 0.1 second increments from 0.0 to 9.9 seconds. The default interval is 0.6 seconds.

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



Timeout Between Decodes, Same Symbol

### **Beep After Good Decode**

Scan a bar code 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 are issued during parameter menu scanning and to indicate error conditions.



Beep After Good Decode



Do Not Beep After Good Decode  
(Disable)

### **Presentation Mode Session Timeout**

To set the duration of the attempt to decode a bar code detected in presentation mode, scan the bar code below. Next, scan three numeric bar codes from *Appendix D, Numeric Bar Codes* to select a value between 1 and 255 that represents tenths of a second. Single digit numbers must have a leading zero. For example, to set 0.5 seconds, scan the bar code below, then scan the 0, 0, 5 bar codes. The default value is 2 seconds.



Presentation Mode Session Timeout

### **Imager Preferences**

Imager Preferences Default Table

<b>Parameter</b>	<b>Default</b>
Imaging Options	
Focus Mode	Far Focus
Decoding Auto exposure	Enable
Decoding Illumination	Enable
Decode Aiming Pattern	Enable
Image Capture Auto exposure	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

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

The decoder has three modes of operation:

Decode Mode

Snapshot Mode

- Snapshot with Viewfinder Mode

Video Mode.

## **Decode Mode**

---

By default, upon a trigger event, the decoder attempts to locate and decode enabled bar codes within its field of view. The decoder remains in this mode as long as the trigger is active or until a bar code is decoded.

## **Snapshot Mode**

---

Use Snapshot Mode to capture a high-quality image and transmit it to the host. To temporarily enter this mode scan the Snapshot Mode bar code. While in this mode the 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

## Video Mode

---

In this mode the decoder behaves as a video camera as long as the trigger is active. When the trigger is released, the decoder returns to Decode Mode. Scan this bar code to temporarily enter Video Capture Mode.



Video Mode

## Focus Mode

### Parameter # F0h, A6h

Select the Focus Mode to control the working range of the device. If Far Focus is selected, the device is optimized to read at its far position. With Near Focus, the device is optimized to read at its near position. Smart Focus toggles the focus position after every frame.



Far Focus



Near Focus



Smart Focus

### Decoding Auto Exposure

Select Enable Auto Exposure to allow the device to control gain settings and exposure (integration) time to best capture an image for the selected operation mode.

Select Disable Auto Exposure to manually adjust the gain and exposure time. This option is only recommended for advanced users with difficult image capture situations.



Enable Decoding Auto Exposure



Disable Decoding Auto Exposure

### Decoding Illumination

Selecting Enable Illumination causes the decoder to flash illumination on every image capture to aid decoding. Select Disable Illumination to prevent the decoder from using decoding illumination.

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



Enable Decoding Illumination



Disable Decoding Illumination

### Decode Aiming Pattern

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



Enable Decode Aiming Pattern



Disable Decode Aiming Pattern

### Image Capture Auto exposure

Select Enable Auto exposure to allow the decoder to control gain settings and exposure (integration) time to best capture an image for the selected operation mode.

Select Disable Auto exposure to manually adjust the gain and exposure time. This option is only recommended for advanced users with difficult image capture situations.



Enable Image Capture Auto  
exposure



Disable Image Capture Auto  
exposure

### Image Capture Illumination

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

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



Enable Image Capture Illumination



Disable Image Capture Illumination

### Gain

This parameter only applies when Decoding or Image Capture Auto exposure is disabled. Gain is a means of amplifying the raw image data before it is converted into 256 grayscale values. Increasing the 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 manual gain, scan the bar code below followed by 3 bar codes from *Appendix D, Numeric Bar Codes*, in the range of 79 to 127, representing the value. The default is 100.



Set Gain

## Exposure Time

This parameter is only available when Image Capture Auto Exposure is disabled. Exposure Time controls the amount of time the CCD is allowed to collect light, much like the shutter speed for a camera. Generally, the brighter the environment, the lower the exposure time. Set the manual exposure time to one of the following values: 5 ms, 10 ms, 15 ms, 20 ms, 25 ms, or 30 ms. Increasing the exposure time past 20 ms in a handheld application increases the risk of blurring the image due to hand jitter.



5 ms



10 ms



15 ms



20 ms



30 ms

## LED Illumination

### Parameter # F0h, ADh

Select whether to use internal LED illumination, external illumination, or both. This parameter only applies for decoding if *Decoding Illumination* is enabled, or for image capture if *Image Capture Illumination* is enabled. If Decoding Illumination or Image Capture Illumination is disabled, all illumination is off for that mode, regardless of this LED Illumination setting.



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 bar code below followed by a bar code from *Appendix D, Numeric Bar Codes*. The default value is 0 which represents 30 seconds; values increment by 30. For example, 1 = 60 seconds, 2 = 90 seconds, etc.



Snapshot Mode Timeout

### Snapshot Aiming Pattern

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. If Disable Image Cropping is selected, the full 640 x 480 pixels are presented. If Enable is selected, the decoder crops the image to the pixel addresses set in *Crop to Pixel Addresses*.



Enable Image Cropping



Disable Image Cropping

(Use Full 640 x 480 Pixels)

## Crop to Pixel Addresses

If Enable Image Cropping is selected, set the pixel addresses from (0,0) to (639,479) to crop to.

Columns are numbered from 0 to 639, 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. For example, for a 4 row x 8 column image in the extreme bottom-right section of the image, set the following values:

Top = 476, Bottom = 479, Left = 632, Right = 639

To set the pixel address to crop to, scan each Pixel Address bar code followed by three bar codes from *Appendix D, Numeric Bar Codes* which represent the value. Leading zeros are required, so to enter a value of 3, for example, scan 0, 0, 3.



Top Pixel Address  
(0 - 479 Decimal)



Left Pixel Address  
(0 - 639 Decimal)



Bottom Pixel Address  
(0 - 479 Decimal)



Right Pixel Address  
(0 - 639 Decimal)

## Image Resolution

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

Select one of the following values:

Resolution Value	Uncropped Image Size
Full	640 x 480
1/2	320 x 240
1/3	212 x 160
1/4	160 x 120



## JPEG Image Options

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



## JPEG Quality and Size Value

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



### 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

### Bits per Pixel

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



1 BPP



4 BPP



8 BPP

## Signature Capture

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

### Output File Format

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

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

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



Enable Signature Capture



Disable Signature Capture

### Signature Capture File Format Selector

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



BMP Signature Format



JPEG Signature Format



TIFF Signature Format

### Signature Capture Bits per Pixel

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



1 BPP



4 BPP



8 BPP

## Signature Capture Width

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

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



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

## Signature Capture Height

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



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

## Signature Capture JPEG Quality

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



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

## Video 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

## Target Video Frame Size

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

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



Target Video Frame Size

### **Video View Finder Image Size**

Select the number of 100-byte blocks. Values range from 800 to 3000 bytes.

Selecting a smaller value allows more frames to be transmitted per second; selecting a larger value increases video quality.

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



## **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).

If the host is not listed in Table 8-2, refer to the documentation for the host device to set communication parameters to match the host.

**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.

Throughout the programming bar code menus, default values are indicated with square.

The serial host type requires proper configuration of the sysconfig lines, and typically require scanning bar code menus as part of initial configuration. Most computer monitors allow scanning the bar codes directly on the screen. When scanning from the screen, be sure to set the document magnification to a level where the bar code can be seen clearly, and bars and/or spaces are not merging.

### **Serial Parameter Defaults**

Table 8-1 lists the defaults for serial host parameters. To change any option, scan the appropriate bar code(s) provided in the Serial Host Parameters section.

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

Serial Host Default Table

Parameter	Default
Serial Host Parameters	
Serial Host Types	Standard
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 Bar Code

## 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 bar codes.

\*\*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

	ICL	Fujitsu	Wincor- Nixdorf Mode A	Wincor- Nixdorf Mode B/ OPOS/J POS	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
Code 39	C <len>	None	M	M	M <len>	C <len>
Codabar	N <len>	None	N	N	N <len>	N <len>
Code 128	L <len>	None	K	K	K <len>	L <len>
I 2 of 5	I <len>	None	I	I	I <len>	I <len>
Code 93	None	None	L	L	L <len>	None
D 2 of 5	H <len>	None	H	H	H <len>	H <len>
UCC/EAN 128	L <len>	None	P	P	P <len>	L <len>
MSI	None	None	O	O	O <len>	None
Bookland EAN	F	F	A	A	A	F
Trioptic	None	None	None	None	None	None
Code 11	None	None	None	None	None	None
IATA	H<len >	None	H	H	None	None
Code 32	None	None	None	None	None	None

## Serial Host Types

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



Enable Serial Host (No Variant)



ICL Serial



Wincor-Nixdorf Serial Mode A



Wincor-Nixdorf Serial Mode B



Olivetti ORS4500



Omron

\*Scanning Enable Serial Host (No Variant) activates the serial driver, but does not change port settings (e.g., parity, data bits, handshaking). Selecting another serial host type bar code changes these settings.



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 600



Baud Rate 1200



Baud Rate 2400



Baud Rate 4800



Baud Rate 9600



Baud Rate 19,200



Baud Rate 38,400



Baud Rate 57,600



Baud Rate 115,200

## Parity

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

Select *Odd parity* 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 Bit Select

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



1 Stop Bit



2 Stop Bits

### Data Bits

This parameter allows the 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 the parity, framing, and overrun of received characters are checked. The parity value of received characters is verified against the parity parameter selected above.



Check For Received Errors



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 disserted 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 bar code below if no Hardware Handshaking is desired.
- Standard RTS/CTS: Scan the bar code below to select Standard RTS/CTS Hardware Handshaking.
- RTS/CTS Option 1: When RTS/CTS Option 1 is selected, the 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.



## 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.



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 has occurred. This only applies when in one of the ACK/NAK Software Handshaking modes, or RTS/CTS Hardware Handshaking option.



## RTS Line State

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



Host: Low RTS



Host: High RTS

## Beep on <BEL>

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



Beep On <BEL> Character  
(Enable)

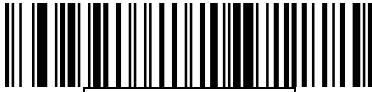


Do Not Beep On <BEL> Character  
(Disable)

Note: A NULL character must be sent to the decoder before BEL to ensure the BEL character is processed correctly.

## Inter Character Delay

This parameter specifies the intercharacter delay inserted between character transmissions.



Minimum: 0 msec



Low: 25 msec



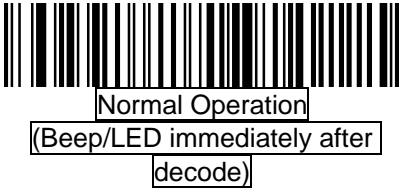
High: 75 msec



Maximum: 99 msec

## Nixdorf Beep/LED Options

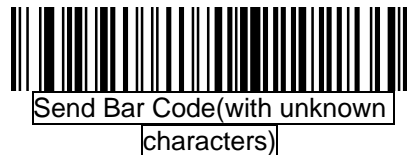
When Nixdorf Mode B is selected, this indicates when the decoder should beep and turn on its LED after decode.



## Ignore Unknown Characters

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

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



## ASCII Character Set for Serial Hosts

The values in the table below can be assigned as prefixes or suffixes for ASCII character data transmission.

### Prefix/Suffix Values

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

1022	\$V	SYN
1023	\$W	ETB
1024	\$X	CAN
1025	\$Y	EM
1026	\$Z	SUB
1027	%A	ESC
1028	%B	FS
1029	%C	GS
1030	%D	RS
1031	%E	US
1032	Space	Space
1033	/A	!
1034	/B	"
1035	/C	#
1036	/D	\$
1037	/E	%
1038	/F	&
1039	/G	'
1040	/H	(
1041	/I	)
1042	/J	*
1043	/K	+
1044	/L	,
1045	-	-
1046	.	.
1047	/O	/
1048	0	0
1049	1	1
1050	2	2

1051	3	3
1052	4	4
1053	5	5
1054	6	6
1055	7	7
1056	8	8
1057	9	9
1058	/Z	:
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	~
1127		Undefined
7013		ENTER

## **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.

Throughout the programming barcode menus, default values are indicated with square.

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

### **USB Parameter Defaults**

Table below lists the defaults for USB host parameters. To change any option, scan the appropriate barcode(s) provided in the Parameter Descriptions section.

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

USB Host Default Table

<b>Parameter</b>	<b>USB Host Parameters</b>
Symbol Native API (SNAPI) Status	Enable SNAPI with Imaging
Handshaking USB Device Type	
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	

## **USB Host Parameters**

### ***USB Device Type***

Select the desired USB device type.

Note: When changing USB Device Types, the decoder automatically resets.

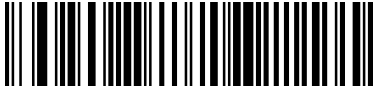
The decoder issues the standard startup beep sequences.



HID Keyboard Emulation



IBM Table Top USB



IBM Hand-Held USB



USB OPOS Handheld



Simple COM Port Emulation



Symbol Native API (SNAPI) with  
Imaging Interface



Symbol Native API (SNAPI) without  
Imaging Interface

### Symbol Native API (SNAPI) Status Handshaking

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



Enable SNAPI Status Handshaking



Disable SNAPI Status Handshaking

### USB Country Keyboard Types (Country Codes)

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

Note: When changing USB country keyboard types the decoder automatically resets. The decoder issues the standard startup beep sequences.



North American Standard USB

Keyboard



German Windows



French Windows



French Canadian Windows 2000/XP



French Canadian Windows 95/98



Spanish Windows



Italian Windows



Swedish Windows



UK English Windows



Japanese Windows (ASCII)



Portuguese-Brazilian Windows

### USB Keystroke Delay

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



### USB CAPS Lock Override

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



## USB Ignore Unknown Characters

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



## Emulate Keypad

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



### USB Keyboard FN 1 Substitution

This option applies only to the USB HID Keyboard Emulation device. When enabled, this allows replacement of any FN 1 characters in an EAN 128 bar code with a Key Category and value chosen by the user.



Enable



Disable

### Function Key Mapping

ASCII values under 32 are normally sent as a control-key sequence. When this parameter is enabled, the keys in bold are sent in place of the standard key mapping. Table entries that do not have a bold entry remain the same whether or not this parameter is enabled.



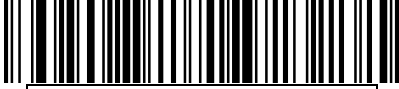
Disable Function Key Mapping



Enable Function Key Mapping

### **Simulated Caps Lock**

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



Disable Simulated Caps Lock



Enable Simulated Caps Lock

### **Convert Case**

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



No Case Conversion



Convert All to Upper Case



Convert All to Lower Case

## ASCII Character Set 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/BACKSPACE1
1009	\$I	CTRL I/HORIZONTAL TAB1
1010	\$J	CTRL J
1011	\$K	CTRL K
1012	\$L	CTRL L
1013	\$M	CTRL M/ENTER1
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 [/ESC1
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	~
<p>1The keystroke in bold is sent only if the “Function Key Mapping” is enabled. Otherwise, the unbolded keystroke is sent.</p>		

USB ALT Key Character Set

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

### USB GUI Key Character Set

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

## USB F Key Character Set

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

### USB Numeric Keypad Character Set

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

### USB Extended Keypad Character Set

<b>Extended Keypad</b>	<b>Keystroke</b>
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

# **Symbologies**

## **Introduction**

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

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 bar codes 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 bar codes. See the *Simple Serial Interface (SSI) Programmer’s Guide* for detailed instructions for changing parameter values using this method.

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

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

Option Hex Value for programming via SSI command

## Symbology Parameter Defaults

Table below lists the defaults for all symbologies parameters. To change any option, scan the appropriate barcode(s) provided in the Symbologies Parameters section beginning on 11-10.

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

Symbology Default Table

Parameter	Default
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
RSS (Reduced Space Symbology)	
RSS 14	Enable
RSS Limited	Enable
RSS Expanded	Enable
Convert RSS 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	
Abort Macro PDF Entry	

## **UPC/EAN**

### **Enable/Disable UPC-A**

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



### **Enable/Disable UPC-E**

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



### **Enable/Disable UPC-E1**

UPC-E1 is disabled by default. To enable or disable UPC-E1, scan the appropriate bar code below.

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



**Enable/Disable EAN-8/JAN-8**

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



**Enable/Disable EAN-13/JAN-13**

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



**Enable/Disable Bookland EAN**

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



## Decode UPC/EAN/JAN Supplemental

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

- If Decode UPC/EAN/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 bar code 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 bar codes starting with a '378' or '379' prefix by the supplemental search process. All other UPC/EAN/JAN bar codes are exempt from the search and are reported instantly upon decodes.
- Select Enable 978 Supplemental Mode to delay only EAN-13/JAN-13 bar codes starting with a '978' prefix by the supplemental search process. All other UPC/EAN/JAN bar codes are exempt from the search and are reported instantly upon decodes.
- Select Enable Smart Supplemental Mode to delay only EAN-13/JAN-13 bar codes starting with a '378', '379', or '978' prefix by the supplemental search process. All other UPC/EAN/JAN bar codes 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 Only  
With Supplemental



Ignore Supplemental



Auto discriminate UPC/EAN/JAN  
Supplemental



Enable 378/379 Supplemental Mode



Enable 978 Supplemental Mode



Enable Smart Supplemental Mode

### **UPC/EAN/JAN Supplemental Redundancy**

With Auto discriminate UPC/EAN/JAN Supplemental selected, this option adjusts the number of times a symbol without supplemental is decoded before transmission. The range is from two to thirty times. Five or above is recommended when decoding a mix of UPC/EAN/JAN symbols with and without supplemental, and the auto discriminate option is selected. The default is set at 10.

Scan the bar code below to set a decode redundancy value. Next, scan two numeric bar codes in *Appendix D, Numeric Bar Codes*. Single digit numbers must have a leading zero. To correct an error or change a selection, scan Cancel.



UPC/EAN/JAN Supplemental Redundancy

### **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 bar code below to transmit the bar code data with or without the UPC-A check digit. It is always verified to guarantee the integrity of the data.



Transmit UPC-A Check Digit



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 bar code below to transmit the bar code data with or without the UPC-E check digit. It is always verified to guarantee the integrity of the data.



Transmit UPC-E Check Digit



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 bar code below to transmit the bar code data with or without the UPC-E1 check digit. It is always verified to guarantee the integrity of the data.



Transmit UPC-E1 Check Digit



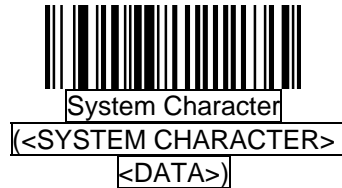
Do Not Transmit UPC-E1 Check Digit

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



Convert UPC-E to UPC-A (Enable)



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

### Convert UPC-E1 to UPC-A

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



Convert UPC-E1 to UPC-A (Enable)



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

### EAN-8/JAN-8 Extend

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



Enable EAN/JAN Zero Extend



Disable EAN/JAN Zero Extend

## UCC Coupon Extended Code

When enabled, this parameter decodes UPC-A bar codes starting with digit '5', EAN-13 bar codes starting with digit '99', and UPCA/EAN-128 Coupon Codes. UPCA, EAN-13, and EAN-128 must be enabled to scan all types of Coupon Codes.



Enable UCC Coupon Extended Code



Disable UCC Coupon Extended  
Code

Note: Use the *Decode UPC/EAN Supplemental Redundancy* parameter to control auto discrimination of the EAN128 (right half) of a coupon code.

## **Code 128**

### **Enable/Disable Code 128**

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



Enable Code 128



Disable Code 128

### **Enable/Disable UCC/EAN-128**

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



Enable UCC/EAN-128



Disable UCC/EAN-128

### **Enable/Disable ISBT 128**

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



## Code 39

### Enable/Disable Code 39

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



Enable Code 39



Disable Code 39

### Enable/Disable Trioptic Code 39

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



Enable Trioptic Code 39



Disable Trioptic Code 39

Note: Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously.

### Convert Code 39 to Code 32

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

Note: Code 39 must be enabled for this parameter to function.



Enable Convert Code 39 to Code 32



Disable Convert Code 39 to Code 32

### Code 32 Prefix

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

Note: Convert Code 39 to Code 32 must be enabled for this parameter to function.



Enable Code 32 Prefix



Disable Code 32 Prefix

## Set Lengths for Code 39

The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. 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 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 39 symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Code 39 symbols with 14 characters, scan Code 39 - One Discrete Length, then scan 1 followed by 4. To correct an error or change the selection, scan Cancel barcode.
- Two Discrete Lengths - Select this option to decode only Code 39 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select Code 39 - Two Discrete Lengths, then scan 0, 2, 1, and then 4. To correct an error or change the selection, scan Cancel barcode.
- Length Within Range - Select this option to decode a Code 39 symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan Code 39 - Length within Range. Then scan 0, 4, 1, and 2 (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

When this feature is enabled, the decoder checks 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 bar code below to transmit Code 39 data with or without the check digit.



Transmit Code 39 Check Digit  
(Enable)



Do Not Transmit Code 39 Check  
Digit (Disable)

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

### Code 39 Full ASCII Conversion

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



Enable Code 39 Full ASCII



Disable Code 39 Full ASCII

Note: Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously.

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

## 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 lo/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 bar code below, which contains only a start character, a dash (minus), and a stop character.

- The decoder issues a short hi/lo/hi beep.
- The decoder erases the transmission buffer.
- No transmission occurs.



Clear Buffer

Note: The Clear Buffer contains only the dash (minus) character. In order to scan this command, be sure Code 39 length is set to include length 1.

## Transmit Buffer

There are two methods to transmit the Code 39 buffer.

1. Scan the Transmit Buffer bar code 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 bar code 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 bar code below.



Enable Code 93



Disable Code 93

### Set Lengths for Code 93

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

- One Discrete Length - Select this option to decode only Code 93 symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Code 93 symbols with 14 characters, scan Code 93 - One Discrete Length, then scan 1 followed by 4. To correct an error or to change the selection, scan Cancel barcode.
- Two Discrete Lengths - Select this option to decode only Code 93 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only those Code 93 symbols containing either 2 or 14 characters, select Code 93 - Two Discrete Lengths, then scan 0, 2, 1, and then 4. To correct an error or to change the selection, scan Cancel barcode.
- Length Within Range - Select this option to decode a Code 93 symbol with a specific length range. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode Code 93 symbols containing between 4 and 12 characters, first scan Code 93 - Length within Range. Then scan 0, 4, 1, and 2 (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 93 symbols containing any number of characters within the decoder's 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 bar code below.



Enable Code 11



Disable Code 11

### Set Lengths for Code 11

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

- One Discrete Length - Select this option to decode only Code 11 symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Code 11 symbols with 14 characters, scan Code 11 - One Discrete Length, then scan 1 followed by 4. To correct an error or to change the selection, scan Cancel on barcode.
- Two Discrete Lengths - Select this option to decode only Code 11 symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only those Code 11 symbols containing either 2 or 14 characters, select Code 11 - Two Discrete Lengths, then scan 0, 2, 1, and then 4. To correct an error or to change the selection, scan Cancel barcode.
- Length Within Range - Select this option to decode a Code 11 symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode Code 11 symbols containing between 4 and 12 characters, first scan Code 11 - Length within Range. Then scan 0, 4, 1, and 2 (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 bar code. The options are to check for one check digit, check for two check digits, or disable the feature.

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



Disable



One Check Digit



Two Check Digits

### **Transmit Code 11 Check Digits**

#### **Parameter # 2Fh**

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 bar code below, and select an Interleaved 2 of 5 length from the following pages.



Enable Interleaved 2 of 5



Disable Interleaved 2 of 5

### **Set Lengths for Interleaved 2 of 5**

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

- One Discrete Length - Select this option to decode only I 2 of 5 symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only I 2 of 5 symbols with 14 characters, scan I 2 of 5 - One Discrete Length, then scan 1 followed by 4. To correct an error or to change the selection, scan Cancel 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 bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only those I 2 of 5 symbols containing either 2 or 14 characters, select I 2 of 5 - Two Discrete Lengths, then scan 0, 2, 1, and then 4. To correct an error or to change the selection, scan Cancel barcode.
- Length Within Range - Select this option to decode an I 2 of 5 symbol with a specific length range. Select lengths using numeric

bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode I 2 of 5 symbols containing between 4 and 12 characters, first scan I 2 of 5 - Length within Range. Then scan 0, 4, 1, and 2 (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 bar code. 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

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



Transmit I 2 of 5 Check Digit  
(Enable)



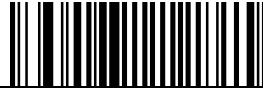
Do Not Transmit I 2 of 5 Check Digit  
(Disable)

### **Convert I 2 of 5 to EAN-13**

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 bar code below.



Enable Discrete 2 of 5



Disable Discrete 2 of 5

## Set Lengths for Discrete 2 of 5

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

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



Enable Codabar



Disable Codabar

### Set Lengths for Codabar

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

- One Discrete Length - Select this option to decode only Codabar symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Codabar symbols with 14 characters, scan Codabar - One Discrete Length, then scan 1 followed by 4. To correct an error or to change the selection, scan Cancel barcode.
- Two Discrete Lengths - Select this option to decode only Codabar symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only Codabar symbols containing either 2 or 14 characters, select Codabar - Two Discrete Lengths, then

scan 0, 2, 1, and then 4. To correct an error or to change the selection, scan Cancel barcode.

- Length Within Range - Select this option to decode a Codabar symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode Codabar symbols containing between 4 and 12 characters, first scan Codabar - Length within Range. Then scan 0, 4, 1, and 2 (single digit numbers must always be preceded by a leading zero). To correct an error or change the selection, scan Cancel 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

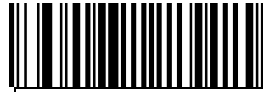
### **CLSI Editing**

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

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



Enable CLSI Editing



Disable CLSI Editing

### **NOTIS Editing**

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



Enable NOTIS Editing

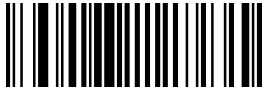


Disable NOTIS Editing

## MSI

### Enable/Disable MSI

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



Enable MSI



Disable MSI

### Set Lengths for MSI

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

- One Discrete Length - Select this option to decode only MSI symbols containing a selected length. Select the length using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only MSI symbols with 14 characters, scan MSI - One Discrete Length, then scan 1 followed by 4. To correct an error or to change the selection, scan Cancel barcode.
- Two Discrete Lengths - Select this option to decode only MSI symbols containing either of two selected lengths. Select lengths using the numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode only MSI symbols containing either 2 or 14 characters, select MSI - Two Discrete Lengths, then scan 0, 2, 1, and then 4. To correct an error or to change the selection, scan Cancel barcode.
- Length Within Range - Select this option to decode a MSI symbol with a specific length range. Select lengths using numeric bar codes in *Appendix D, Numeric Bar Codes*. For example, to decode MSI symbols containing between 4 and 12 characters, first scan MSI - Length within Range. Then scan 0, 4, 1, and 2 (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 bar code. 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 bar code to enable verification of the second check digit.

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



## Transmit MSI Check Digit(s)

### Parameter # 2Eh

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



### MSI Check Digit Algorithm

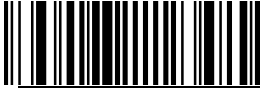
Two algorithms are possible for the verification of the second MSI check digit. Select the bar code below corresponding to the algorithm used to encode the check digit.



## ***Postal Codes***

### **US Postnet**

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



Enable US Postnet



Disable US Postnet

### **US Planet**

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



Enable US Planet



Disable US Planet

## UK Postal

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



## Transmit UK Postal Check Digit

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



## Japan Postal

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

## Dutch Postal

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



Enable Dutch Postal



Disable Dutch Postal

## 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

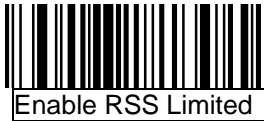
## ***RSS (Reduced Space Symbology)***

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

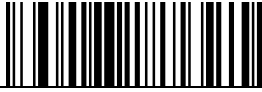
### **RSS-14**



### **RSS Limited**



## RSS Expanded



Enable RSS Expanded



Disable RSS Expanded

## Convert RSS to UPC/EAN

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

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



Enable Convert RSS to UPC/EAN



Disable Convert RSS to UPC/EAN

## **Composite**

### **Composite CC-C**

#### **Parameter # F0h 55h**

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



Enable CC-C



Disable CC-C

### **Composite CC-A/B**

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



Enable CC-A/B



Disable CC-A/B

### Composite TLC-39

Scan a bar code below to enable or disable Composite bar codes 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 bar codes regardless of whether a 2D symbol is detected.
- Select UPC Always Linked to transmit UPC bar codes and the 2D portion. If 2D is not present, the UPC bar code does not transmit.
- If 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 bar code is decoded, scan the appropriate bar code.



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



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

## 2D Symbologies

### Enable/Disable PDF417

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



### Enable/Disable MicroPDF417

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



## 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 bar code 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.



**Maxicode**

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



**QR Code**

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



**Redundancy Level**

The decoder offers four levels of decode redundancy. Select higher redundancy levels for decreasing levels of bar code quality. As redundancy levels increase, the decoder's aggressiveness decreases.

Select the redundancy level appropriate for the bar code quality.

**Redundancy Level 1**

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

<b>Code Type</b>	<b>Code Length</b>
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:

<b>Code Type</b>	<b>Code Length</b>
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:

<b>Code Type</b>	<b>Code Length</b>
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:

<b>Code Type</b>	<b>Code Length</b>
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 bar codes, which include the Code 128 family, UPC/EAN, and Code 93. Select increasing levels of security for decreasing levels of bar code quality. There is an inverse relationship between security and 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” bar codes.
- **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 bar codes. 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 bar codes.



Security Level 0



Security Level 1



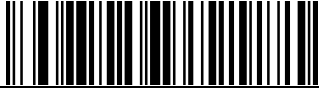
Security Level 2



Security Level 3

### Intercharacter Gap Size

The Code 39 and Codabar symbologies have an intercharacter gap that is typically quite small. Due to various bar code-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 bar codes.



Normal Intercharacter Gaps



Large Intercharacter Gaps

### Report Version

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



Report Software Version

## 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 bar codes from several Macro PDF sequences, even if they encode the same data. When scanning Macro PDF sequences, scan the entire Macro PDF sequence without interruption.*

### 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



### 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 bar code 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 bar codes 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 bar codes 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 bar codes.

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

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

## **Scanning Sequence Examples**

In most cases, scan one bar code to set a specific parameter value. Other parameters, such as Prefix Value, require scanning several bar codes. 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 Parameter*.

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> <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 bar code. 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 bar code below, then scan a four-digit number (i.e., four barcodes from *Appendix D, Numeric Bar Codes*) 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 bar codes 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 bar code 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 bar code menus:

1. Scan the bar code below.



Set FN1 Substitution Value

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

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

### Transmit “No Read” Message

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



Enable No Read



Disable No Read

## **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

Table A-1. Standard Default Parameters Table

<b>Parameter</b>	<b>Default</b>
User Preferences	
Set Default Parameter	All Defaults
Parameter Scanning	Enable
Beeper Tone	Medium
Beeper Volume	High
Trigger Modes	Level
Power Mode	Low Power
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 Auto exposure	Enable
Decoding Illumination	Enable
Decode Aiming Pattern	Enable
Image Capture Auto exposure	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	Standard
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 Bar Code
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
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
RSS (Reduced Space Symbology)	
RSS 14	Enable
RSS Limited	Enable
RSS Expanded	Enable
Convert RSS 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	
Abort Macro PDF Entry	
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> <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

<b>Code Character</b>	<b>Code Type</b>
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	RSS Family
T	UCC Composite, TLC 39
X	PDF417, Macro PDF417, Micro PDF417
P00	Data Matrix
P01	QR Code
P02	Maxicode

P03	US Postnet
P04	US Planet
P05	Japan Postal
P06	UK Postal
P08	Dutch Postal
P09	Australian Postal
P09	UK 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	RSS Family
F	Codabar
G	Code 93
H	Code 11
I	Interleaved 2 of 5
L	PDF417, Macro PDF417, Micro PDF417

M	MSI
Q	QR Code
S	Discrete 2 of 5, IATA 2 of 5
U	Maxicode
X	Bookland EAN, Trioptic Code 39, US Postnet, US Planet, UK Postal, Japan Postal, Australian Postal, Dutch 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 bar code with check character W, A+I+MI+DW, is transmitted as JA7AIMID where 7 = (3+4).	
Trioptic Code 39	0	No option specified at this time. Always transmit 0.
	Example: A Trioptic bar code 412356 is transmitted as JX0412356	
Code 128	0	Standard data packet, no Function code 1 in first symbol position.
	1	Function code 1 in first symbol character position.
	2	Function code 1 in second symbol character position.
	Example: A Code (EAN) 128 bar code with Function 1 character FNC1 in the first position, AIMID is transmitted as JC1AIMID	

I 2 of 5	0	No check digit processing.
	1	Reader has validated check digit.
	3	Reader has validated and stripped check digit.
	Example: An I 2 of 5 bar code without check digit, 4123, is transmitted as ]I04123	
Codabar	0	No check digit processing.
	1	Reader has checked check digit.
	3	Reader has stripped check digit before transmission.
	Example: A Codabar bar code without check digit, 4123, is transmitted as ]F04123	
Code 93	0	No options specified at this time. Always transmit 0.
	Example: A Code 93 bar code 012345678905 is transmitted as ]G0012345678905	
MSI	0	Check digits are sent.
	1	No check digit is sent.
	Example: An MSI bar code 4123, with a single check digit checked, is transmitted as ]M14123	
D 2 of 5	0	No options specified at this time. Always transmit 0.
	Example: A D 2 of 5 bar code 4123, is transmitted as ]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 bar code 012345678905 is transmitted as ]E00012345678905	
Bookland EAN	0	No options specified at this time. Always transmit 0.
	Example: A Bookland EAN bar code 123456789X is transmitted as ]X0123456789X	
Code 11	0	Single check digit
	1	Two check digits

	3	Check characters validated but not transmitted.
RSS Family		No option specified at this time. Always transmit 0. RSS-14 and RSS-Limited transmit with an Application Identifier "01". Note: In UCC/EAN-128 emulation mode, RSS is transmitted using Code 128 rules (i.e., JC1).
		Example: An RSS-14 bar code 100123456788902 is transmitted as Je001100123456788902.
EAN.UCC Composites (RSS, UCC/EAN-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.
		UCC/EAN-128 emulation 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 JJC1).
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 bar code contains a UCC/EAN-128 symbol, and the first codeword is 903-907, 912, 914, 915.

	4	The bar code contains a UCC/EAN-128 symbol, and the first codeword is in the range 908-909.
	5	The bar code contains a UCC/EAN-128 symbol, and the first codeword is in the range 910-911.
	Example: A PDF417 bar code ABCD, with no transmission protocol enabled, is transmitted as J̄L2ABCD.	
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.

## Appendix C

### Sample Bar Codes

#### Code 39



123ABC

123ABC

#### UPC/EAN UPC-A, 100%



0 12345 67890 5

#### EAN-13, 100%



3 456789 012340

#### Code 128



123456789012345678901234567890123456789012345678901234

123456789012345678901234567890123456789012345678901234

## Interleaved 2 of 5



12345678901231

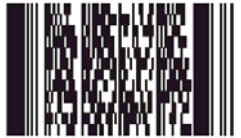
## RSS 14

Note: RSS 14 must be enabled to read the bar code below.



7612341562341

## PDF417



## Data Matrix



## Maxicode



## Appendix D

### **Numeric Bar Codes**

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





**Cancel**

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



## Appendix E

### ASCII Character Set

ASCII Value Table

<b>ASCII Value</b>	<b>Full ASCII Code 39 Encode Char</b>	<b>Keystroke</b>
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/BACKSPACE1
1009	\$I	CTRL I/HORIZONTAL TAB1
1010	\$J	CTRL J
1011	\$K	CTRL K
1012	\$L	CTRL L
1013	\$M	CTRL M/ENTER1
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	~
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

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

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

PF Key Standard Default Table

<b>PF Keys</b>	<b>Keystroke</b>
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

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

Extended Keypad Standard Default Table

<b>Extended Keypad</b>	<b>Keystroke</b>
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