



PowerScan[®] PDF and 2D Imagers



Product Reference Guide



PSC Inc

959 Terry Street

Eugene, Oregon 97402

Telephone: (541) 683-5700

Fax: (541) 345-7140

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Chapter 1

Getting Started

The PowerScan[®] PDF and 2D imager marks a new performance level for handheld area imagers. They deliver aggressive read rates and depths of field on 1D, stacked linear, and matrix codes. This aggressiveness applies even in challenging reading environments where low lighting conditions and poor quality might make it difficult to read bar codes. You can rest assured your investment will continue to supply years of use by reading any bar codes you require, now or in the future.

Designed for today's demanding commercial and industrial environments, the scanner offers superior image quality, speed, durability, and the ability to read poor quality bar codes. The unit is comfortable to hold, easy to use, rugged, and excellent for the most demanding applications.

About This Manual

This Product Reference Guide (PRG) provides programming instructions for the imager, plus product specifications and dimensions. For installation, maintenance, troubleshooting and warranty information, see the Quick Reference Guide (QRG). Copies of other publications for this product are available on the CD included with the product, or downloadable free of charge from the PSC website listed on the back cover of this manual.

The imager is factory programmed for the most common terminal and communications settings. If you need to change these settings, programming is accomplished by scanning the bar codes in this guide.

An asterisk (*) next to an option indicates the default setting.

Manual Conventions

The symbols listed below are used in this manual to notify the reader of key issues or procedures that must be observed when using the PDA:



NOTE

Notes contain information necessary for properly diagnosing, repairing and operating the PDA.



CAUTION

The CAUTION symbol advises you of actions that could damage equipment or property.

Resetting the Standard Product Defaults

If you aren't sure what programming options are in your imager, or you've changed some options and want the factory settings restored, scan the *Standard Product Default Settings* bar code below.



Standard Product Default Settings

The chart [Menu Commands, starting on page 11-6](#) lists the factory default settings for each of the menu commands (indicated by an asterisk (*) on the following programming pages).

Plug and Play

Plug and Play bar codes provide instant Imager set up for commonly used interfaces.



After you scan one of the codes, power cycle the host terminal to have the interface in effect.

NOTE

Connecting the Imager with an RS-232 Serial Port



These instructions are for use with the RS-232 cable. This includes both Power Off the Terminal (P.O.T.) and external power.

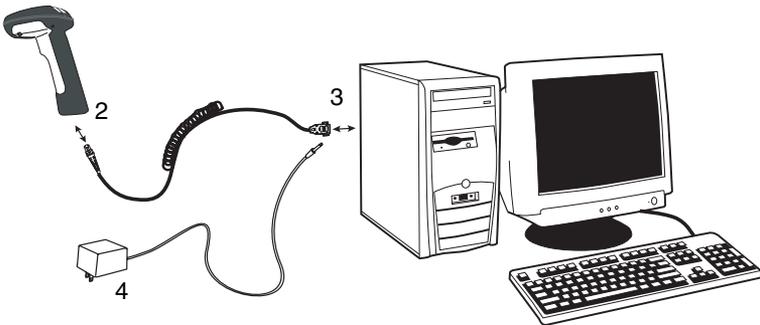
NOTE

1. Turn off power to the terminal/computer.
2. Connect the appropriate interface cable to the imager.



For the imager to work properly, you must have the correct cable for your type of terminal/computer.

NOTE



Getting Started

3. Plug the serial connector into the serial port on your computer. Tighten the two screws to secure the connector to the port.
4. If the terminal does not support Power Off the Terminal (P.O.T.) connections plug the power supply into the host connector and the AC outlet.
5. Once the imager has been fully connected, power up the computer.

All communication parameters between the imager and terminal must match for correct data transfer through the serial port using RS-232 protocol. Scanning the RS-232 interface bar code, programs the imager for an RS-232 interface at 115,200 baud, parity–none, 8 data bits, 1 stop bit, and adds a suffix of a CR LF.



RS-232 Interface

Connecting the Imager with USB

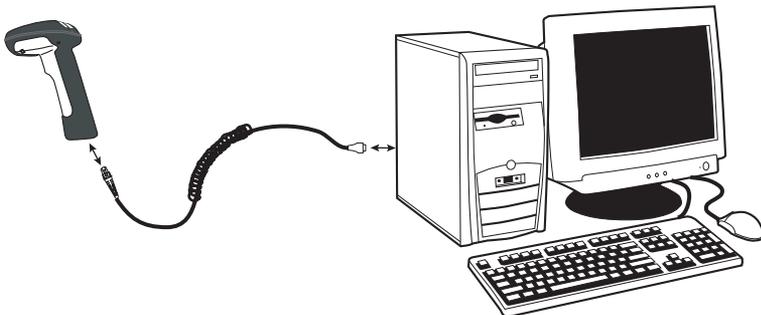


This interface applies to USB compatible models only.

NOTE

An Imager can be connected to the USB port of a computer.

1. Connect the appropriate interface cable to the Imager and to the computer.



2. The Imager beeps.
3. Verify Imager operation by scanning the part number bar code from the back cover of this manual.



NOTE

The following USB “Plug and Play” codes are supported on specific models. Refer to the Product Reference Guide to determine if this interface applies to your unit.

For additional USB programming and technical information, visit the PSC website listed on the back cover of this manual.

IBM SurePos

Scan one of the following “Plug and Play” codes to program the Imager for IBM SurePos (USB Hand Held Imager) or IBM SurePos (USB Tabletop Imager).



NOTE

After scanning one of these codes, you must power cycle the cash register



IBM SurePos
(USB Hand Held Imager) Interface



IBM SurePos
(USB Tabletop Imager) Interface

Getting Started

Each bar code above also programs the following suffixes for each symbology:

Symbology	Suffix
EAN-8	0C
EAN-13	16
UPC-A	0D
UPC-E	0A
Code 39	00 0A 0B
Interleaved 2 of 5	00 0D 0B
Code 128	00 18 0B



NOTE

The following USB “Plug and Play” codes (USB Keyboard - PC, USB Keyboard - Mac, and USB HID) are supported on specific Imager models. Check your model type to determine if this interface applies to your unit.

USB PC or Macintosh® Keyboard

Scan one of the following codes to program the Imager for USB PC Keyboard or USB Macintosh Keyboard. Scanning these codes adds a CR and selects the terminal ID (USB PC Keyboard - 124, USB Macintosh Keyboard - 125).



USB Keyboard (PC)



USB Keyboard (Mac)

USB HID

Scan the following code to program the Imager for USB HID bar code Imagers. Scanning this code changes the terminal ID to 131.



USB HID Bar Code Imager

USB COM Port Emulation

Scan the following code to program the Imager to emulate a regular RS-232-based COM port. If you are using a Microsoft® Windows® PC, you will need to download a driver from the PSC website (www.psc.com). The driver will use the next available COM port number. Apple® Macintosh computers recognize the Imager as a USB CDC class device and automatically use a class driver. Scanning the code below changes the terminal ID to 130.



NOTE

No extra configuration (e.g., baud rate) is necessary.

CTS/RTS Emulation



ACK/NAK Mode



NOTES

Chapter 2

Terminal Interfaces

Terminal ID

If your interface is not a standard PC AT, refer to [Supported Terminals on page 2-2](#), and locate the Terminal ID number for your PC. Scan the **Terminal ID** bar code below, then scan the numeric bar code(s) on the [Programming Chart on page B-5](#) of this manual to program the Imager for your terminal ID. Scan **Save** to save your selection.

For example, an IBM AT terminal has a Terminal ID of 003. You would scan the **Terminal ID** bar code, then **0, 0, 3** from the [Programming Chart on page B-5](#) of this manual, then **Save**. If you make an error while scanning the digits (before scanning Save), scan the **Discard** code marked [Discard on page B-4](#), scan the **Terminal ID** bar code, scan the digits, and the **Save** code again.



Terminal ID



Save



NOTE

After scanning one of these codes, you must power cycle your computer.

Supported Terminals

Terminal	Model(s)	Terminal ID
IBM SurePOS	USB Hand Held Imager	128 ^a
IBM SurePOS	USB Tabletop Imager	129 ^a
RS-232 True		000 ^b
RS-232 TTL		000
Serial Wedge		050
USB COM Port Emulation		130 ^a
USB PC Keyboard		124 ^a
USB Mac Keyboard		125 ^a
USB HID POS		131 ^a

- a. Applies to USB models only. It is best to use the Plug and Play bar codes located in the Quick Reference Guide, to program these interfaces, rather than scanning the terminal ID listed in this table.
- b. Default for RS-232 models

Keyboard Country

Scan the appropriate country code below to program the keyboard for your country. As a general rule, the following characters are supported, but need special care for countries other than the United States:

@ | \$ # { } [] = / ' \ < > ~



* United States



Brazil



Czechoslovakia



Finland (Sweden)



Germany/Austria



Hungary



Belgium



Canada (French)



Denmark



France



Greece



Israel (Hebrew)

Keyboard Country (continued)



Italy



Latin America



Netherlands (Dutch)



Norway



Poland



Portugal



Romania



Russia



SCS



Slovakia



Spain



Sweden



Switzerland (German)

Keyboard Country (continued)



Turkey F



Turkey Q



U.K.

Keyboard Style

This programs keyboard styles, such as Caps Lock and Shift Lock.

Default = Regular.

Regular is used when you normally have the Caps Lock key off.



* Regular

Caps Lock is used when you normally have the Caps Lock key on.



Caps Lock

Shift Lock is used when you normally have the Shift Lock key on (not common to U.S. keyboards).



Shift Lock

Terminal Interfaces

Automatic Caps Lock is used if you change the Caps Lock key on and off. The software tracks and reflects if you have Caps Lock on or off (AT and PS/2 only). This selection can only be used with systems that have an LED which notes the Caps Lock status.



Automatic Caps Lock

Autocaps via NumLock bar code should be scanned in countries (e.g., Germany, France) where the Caps Lock key cannot be used to toggle Caps Lock. The NumLock option works similarly to the regular Autocaps, but uses the NumLock key to retrieve the current state of the Caps Lock.



Autocaps via NumLock

Emulate External Keyboard should be scanned if you do not have an external keyboard (IBM AT or equivalent).



Emulate External Keyboard



After scanning the Emulate External Keyboard bar code, you must power cycle your computer.

NOTE

Keyboard Modifiers

This modifies special keyboard features, such as CTRL+ ASCII codes and Turbo Mode.

Control + ASCII Mode On

The Imager sends key combinations for ASCII control characters for values 00-1F. Refer to [Keyboard Function Relationships on page 9-1](#) for CTRL+ ASCII Values. *Default = Off*



Control + ASCII Mode On



* Control + ASCII Mode Off

Turbo Mode— The imager sends characters to a terminal faster. If the terminal drops characters, do not use Turbo Mode. *Default = Off*



Turbo Mode On



* Turbo Mode Off

Numeric Keypad Mode— Sends numeric characters as if entered from a numeric keypad. *Default = Off*



Numeric Keypad Mode On



* Numeric Keypad Mode Off

RS-232 Modifiers

RS-232 Baud Rate

Baud Rate sends the data from the imager to the terminal at the specified rate. The host terminal must be set for the same baud rate as the imager. Default = 38,400.



300



600



1200



2400



4800



9600



19200



38400



57,600



*115,200

RS-232 Word Length: Data Bits, Stop Bits, and Parity

Data Bits sets the word length at 7 or 8 bits of data per character. If an application requires only ASCII Hex characters 0 through 7F decimal (text, digits, and punctuation), select 7 data bits. For applications which require use of the full ASCII set, select 8 data bits per character. *Default* = 8.

Stop Bits sets the stop bits at 1 or 2. *Default* = 1.

Parity provides a means of checking character bit patterns for validity. *Default* = None.



7 Data, 1 Stop, Parity Even



7 Data, 1 Stop, Parity Odd



7 Data, 2 Stop Parity None



8 Data, 1 Stop, Parity Even



8 Data, 1 Stop, Parity Odd



7 Data, 1 Stop, Parity None



7 Data, 2 Stop, Parity Even



7 Data, 2 Stop, Parity Odd



* 8 Data, 1 Stop, Parity None

RS-232 Receiver Time-Out

The unit stays awake to receive data until the RS-232 Receiver Time-Out expires. A manual or serial trigger resets the time-out. When an RS-232 receiver is sleeping, a character may be sent to wake up the receiver and reset the time-out. A transaction on the CTS line will also wake up the receiver. The receiver takes 300 milliseconds to completely come up. Change the RS-232 receiver time-out by scanning the bar code below, then scanning digits from the [Programming Chart on page B-5](#) of this manual, then scanning *Save*. The range is 0 to 300 seconds. *Default = 0 seconds (no time-out - always on).*



RS-232 Receiver Time-Out

RS-232 Handshaking

RS-232 handshaking is a set of rules concerning the exchange of data between serially communicating devices.

If using RTS/CTS handshaking, the imager issues an active RTS signal to the receiving device. The imager waits to send its data until it detects an active CTS signal from the receiving device. The imager then sends its data while checking the CTS signal before the transmission of each data character. If an inactive CTS signal is detected at any time, the imager halts transmission until it detects another active CTS signal. When the imager has finished transmitting data, it issues an inactive RTS signal to the receiving device. *Default = RTS/CTS Off, XON/XOFF Off, and ACK/NAK Off.*



RTS/CTS On



XON/XOFF On



ACK/NAK On



* RTS/CTS Off



* XON/XOFF Off



* ACK/NAK Off

NOTES

Chapter 3

Output

Good Read Indicators

Beeper – Good Read

The beeper may be programmed *On* or *Off* in response to a good read. Turning this option off, only turns off the beeper response to a good read indication. All error and menu beeps are still audible. *Default = On.*



* On



Off

Beeper Volume – Good Read

The beeper volume codes modify the volume of the beep the imager emits on a good read. *Default = High.*



Low



Medium



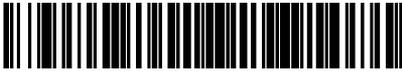
*High



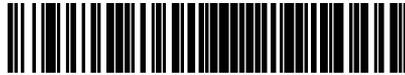
Off

Beeper Pitch – Good Read

The beeper pitch codes modify the pitch (frequency) of the beep the imager emits on a good read. *Default = Medium.*



Low (1250 Hz)



Medium (2300 Hz)



* High (2900 Hz)

Beeper Duration – Good Read

The beeper duration codes modify the length of the beep the imager emits on a good read. *Default = Normal.*



* Normal Beep



Short Beep

LED – Good Read

The LED indicator can be programmed *On* or *Off* in response to a good read. *Default = On.*



* On



Off

Number of Beeps – Good Read

The number of beeps of a good read can be programmed from 1 - 9. The same number of beeps will be applied to the beeper and LED in response to a good read. For example, if you program this option to have five beeps, there will be five beeps and five LED flashes in response to a good read. The beeps and LED flashes are in sync with one another. To change the number of beeps, scan the bar code below and then scan a digit (1-9) bar code and the *Save* bar code on the [Programming Chart](#) on [page B-5](#) of this manual. *Default = One.*



Number of Pulses

Good Read Delay

This sets the minimum amount of time before the imager can read another bar code. *Default = No Delay.*



* No Delay



Short Delay (500 ms)



Medium Delay (1,000 ms)



Long Delay (1,500 ms)

User-Specified Good Read Delay

If you want to set your own length for the good read delay, scan the bar code below, then set the delay (from 0-30,000 milliseconds) by scanning digits from the [Programming Chart on page B-5](#), then scanning *Save*.



User-Specified Good Read Delay

Trigger Modes

Manual/Serial Trigger

You can activate the imager either by pressing the trigger, or using a serial trigger command (see [Trigger Commands on page 11-5](#)). When in manual trigger mode, the imager scans until a bar code is read, or until the trigger is released.

When in serial mode, the imager scans until a bar code has been read or until the deactivate command is sent. In serial mode, the imager can also be set to turn itself off after a specified time has elapsed (see [Read Time-Out](#), which follows).



* Manual/Serial Trigger

Read Time-Out

Use this selection to set a time-out (in milliseconds) of the imager's trigger when using serial commands to trigger the imager, or if the imager is in manual trigger mode. Once the imager has timed out, you can activate the imager either by pressing the trigger or using a serial trigger command. After scanning the *Read Time-Out* bar code, set the time-out duration (from 0-300,000 milliseconds) by scanning digits from the [Programming Chart on page B-5](#), then scanning *Save*. *Default = 0 (infinite, or no time-out)*.



Read Time-Out

Manual Trigger, Low Power

The imager powers down until the trigger is pulled. When the trigger is pulled, the imager powers up and operates until there is no triggering for the time set with the *Low Power Time-Out* bar code below. There is a delay of up to one second in operation when the imager is first triggered, but there is no delay when operating in low power time-out mode.



Manual Trigger, Low Power

Low Power Time-Out Timer

Scan the Low Power Time-Out bar code to change the time-out duration (in seconds). Then scan the time-out duration (from 0-300 seconds) from the [Programming Chart on page B-5](#), and *Save*. *Default = 120 seconds*.

If the unit remains idle during the low power time-out interval, the unit goes into low power mode. Whenever the trigger is enabled, the low power time-out timer is reset.



Low Power Time-Out



NOTE

This time-out does not begin until the imager time-out setting has expired.

Scan Stand Mode

When a unit is in Scan Stand mode, it remains idle as long as it sees the Scan Stand symbol. (See [Scan Stand Symbol](#) that follows.) When a different code is presented, the Imager is triggered to read the new code.

Note: The imager automatically adjusts the illumination LEDs to the lowest light level possible to maintain a good lock on the Scan Stand symbol. When a symbol is presented, the imager's light levels adjust to the saved setting (see [LED Power Level](#) on page 3-9).



Scan Stand Mode

Scan Stand Symbol

When a unit is in Scan Stand mode, the LEDs shine at the Scan Stand symbol on the base of the stand which tells it to remain idle. When the Scan Stand symbol is covered, the imager turns the LEDs on at the configured power level (Default High) and attempts to find and decode bar codes in its field of view.



Scan Stand Symbol

Presentation Mode

This programs the imager to work in Presentation Mode.



Presentation Mode

Presentation LED Timer

When an imager is in presentation mode, the LEDs turn off immediately after a bar code is decoded. The imager can be programmed to continue scanning and to keep the LEDs on for a short time after by scanning the LEDs On bar code below. *Default = LEDs On.*



* LEDs On



LEDs Off

Presentation Sensitivity

Presentation Sensitivity is a numeric range that increases or decreases the imager's reaction time to bar code presentation. To set the sensitivity, scan the *Sensitivity* bar code, then scan the degree of sensitivity (from 0-20) from the [Programming Chart on page B-5](#), and *Save*. 0 is the most sensitive setting, and 20 is the least sensitive. *Default = 1.*



Sensitivity

Hands Free Time-Out

The Scan Stand and Presentation Modes are referred to as “hands free” modes. If the imager's trigger is pulled when using a hands free mode, the imager changes to manual trigger mode. You can set the time the imager should remain in manual trigger mode by setting the Hands Free Time-Out. Once the time-out value is reached, (if there have been no further trigger pulls) the imager reverts to the original hands free mode.

Output

Scan the *Hands Free Time-Out* bar code, then scan the time-out duration (from 0-300,000 milliseconds) from the [Programming Chart](#) on page B-5, and *Save*. *Default = 5,000 ms*.



Hands Free Time-Out

Double Read Timeout

This sets the time period before the imager can read the *same* bar code a second time. Setting a reread delay protects against accidental rereads of the same bar code. Longer delays are effective in minimizing accidental rereads at POS (point of sale). Use shorter delays in applications where repetitive bar code scanning is required. *Default = Medium*.

Reread Delay only works when in Presentation Mode (see [Presentation Mode](#) on page 3-6).



Short (500 ms)



* Medium (750 ms)



Long (1000 ms)



Extra Long (2000 ms)

User-Specified Double Read Timeout

If you want to set your own length for the reread delay, scan the bar code below, then set the delay (from 0-30,000 milliseconds) by scanning digits from the [Programming Chart](#) on page B-5, then scanning *Save*.



User-Specified Double Read Timeout

LED Power Level

This selection allows you to adjust LED and aimer brightness. *Off* is used when no illumination is needed. *Low* is used if low illumination is sufficient. *High* (the default) is the brightest setting.

If you have an aimer delay programmed (see [Aimer Delay](#) on page 3-11), the aimer will be at 100% power during the delay, regardless of the LED Power Level.



NOTE

If you scan the Off bar code, both the aimer and illumination lights turn off, making it impossible to scan bar codes in low light. To turn the LED Power Level back on, move to a brightly lit area and scan either the Low or the High bar code below.



Off



Low (50%)



* High (100%)

Illumination Lights

If you want the illumination lights on while reading a bar code, scan the Lights On bar code, below. However, if you want to turn just the lights off, scan the Lights Off bar code.



NOTE

This setting does not affect the aimer light. The aiming light can be set using Aimer Mode (see [Aimer Mode](#) on page 3-12).



* Lights On



Lights Off

Imager Time-Out

Imager Time-Out powers down the imager after the unit has been idle for the specified time. To prevent the imager from powering down, set this time-out to 0. Scan the bar code below, then set the time-out by scanning digits (from 0 - 999,999 ms) from the [Programming Chart](#) on page B-5, then scanning *Save*. *Default = 120,000 ms*.



Imager Time-Out

Aimer Delay

The aimer delay allows a delay time for the operator to aim the imager before the picture is taken. Use these codes to set the time between when the trigger is pulled and when the picture is taken. During the delay time, the aiming light will appear, but the LEDs won't turn on until the delay time is over.



200 milliseconds



400 milliseconds



* Off (no delay)

User-Specified Aimer Delay

If you want to set your own length for the duration of the delay, scan the bar code below, then set the time-out by scanning digits (0 - 4,000 ms) from the [Programming Chart](#) on page B-5 of this manual, then scan Save.



Delay Duration

Aimer Mode

This feature allows you to lower peak current during scanning by alternating the aimer and illumination LEDs. When the *Interlaced* bar code is scanned, the aimer and illumination LEDs are not allowed to be on at the same time. While this does limit peak current during scanning, the scanner performance may be slower. When the *Concurrent* bar code is scanned, the aimer and illumination LEDs are allowed to light at the same time. Select *Off* if you don't want to use either aimer mode.



Off



* Concurrent

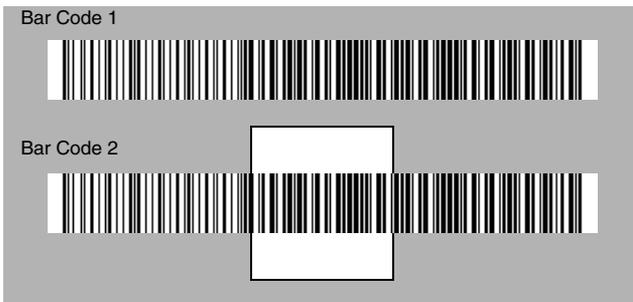


Interlaced

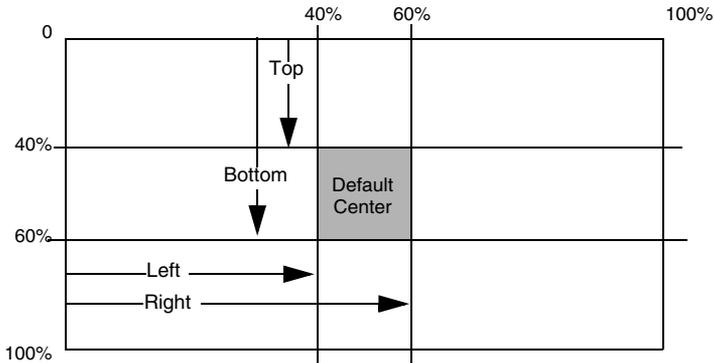
Centering

Use Centering to narrow the imager's field of view to make sure the imager reads only those bar codes intended by the user. For instance, if multiple codes are placed closely together, centering will insure that only the desired codes are read. (Centering can be used in conjunction with [Aimer Delay on page 3-11](#), for the most error-free operation in applications where multiple codes are spaced closely together. Using the Aimer Delay and Centering features, the imager can emulate the operation of older systems, such as linear laser bar code imagers.)

Figure 3-1. Centering Example



In the example in Figure 3-1, the gray area is the full imager field of view and the white area is the centering window. Bar Code 1 will not be read, while Bar Code 2 will be. The default centering window is a 128x96 pixel area in the center of the imager's field of view. The following diagram illustrates the default top, bottom, left, and right pixel positions, measured from the top and the left side of the imager's field of view, which is 640 by 480 pixels.



If a bar code is not within the predefined window, it will not be decoded or output by the imager. If centering is turned on by scanning *Centering On*, the imager only reads codes that intersect the centering window you specify using the *Top*, *Bottom*, *Left*, or *Right* bar codes.

Output

Scan *Centering On*, then scan one of the following bar codes to change the top, bottom, left, or right of the centering window. Then scan the percent you want to shift the centering window using digits on the [Programming Chart on page B-5](#). Scan *Save*. *Default Centering = 40% for Top and Left, 60% for Bottom and Right.*



Centering On



* Centering Off



Top of Centering Window



Bottom of Centering Window



Left of Centering Window



Right of Centering Window

Decode Search Mode

There are three selectable decode (scanning) modes:

Full Omnidirectional - Searches for bar code features beginning at the center of an image, and searches to the image's limits. This mode reads all symbologies (including OCR), in any orientation. The Full Omnidirectional search is very thorough which may slow performance time.



This search mode is the default setting.

NOTE



Full Omnidirectional

Quick Omnidirectional - This is an abbreviated search for bar code features around the center region of an image. This mode quickly reads all symbologies in any orientation. The Quick Omnidirectional mode may miss some off-center symbols, as well as larger Data Matrix and QR Code symbols.



Quick Omnidirectional

Advanced Linear Decoding - Performs quick horizontal linear scans in a center band of the image. This mode is *not* omnidirectional, but does quickly read linear and stacked bar codes. Advanced Linear Decoding cannot read 2D, OCR, or Postal symbols.

This search mode is the default setting for point-and-shoot PDF imagers.



Advanced Linear Decoding

Output Sequence Overview

Require Output Sequence

When turned off, the bar code data will be output to the host as the Imager decodes it. When turned on, all output data must conform to an edited sequence or the Imager will not transmit the output data to the host device.



NOTE

This selection is unavailable when the Multiple Symbols Selection is turned on.

Output Sequence Editor

This programming selection allows you to program the Imager to output data (when scanning more than one symbol) in whatever order your application requires, regardless of the order in which the bar codes are scanned. Reading the *Default Sequence* symbol programs the Imager to the Universal values, shown below. These are the defaults. Be certain you want to delete or clear all formats before you read the *Default Sequence* symbol.



NOTE

To make Output Sequence Editor selections, you'll need to know the code I.D., code length, and character match(es) your application requires. Use the Alphanumeric symbols from the Programming Chart on page B-5 to read these options.

To Add an Output Sequence

1. Scan the *Enter Sequence* symbol (see [Multiple Symbols](#) on page 3-20).
2. Code I.D.
On the [Symbology Chart](#) on page A-1, find the symbology to which you want to apply the output sequence format. Locate the Hex value for that symbology and scan the 2 digit hex value from the [Programming Chart](#) on page B-5.
3. Length
Specify what length (up to 9999 characters) of data output will be acceptable for this symbology. Scan the four digit data length from the Programming Chart. (Note: 50 characters is entered as 0050. 9999 is a universal number, indicating all lengths.) When calculating the length, you must count any programmed prefixes, suffixes, or formatted characters as part of the length (unless using 9999).
4. Character Match Sequences
On the "ASCII Conversion Chart (Code Page 1252)" on page A-4, find the Hex value that represents the character(s) you want to match. Use the Programming Chart to read the alphanumeric combination that represents the ASCII characters. (99 is the Universal number, indicating all characters.)

5. End Output Sequence Editor
Scan *FF* to enter an Output Sequence for an additional symbol-
ogy, or *Save* to save your entries.

Other Programming Selections

Discard

This exits without saving any Output Sequence changes.

Output Sequence Examples

In this example, you are scanning Code 93, Code 128, and Code 39 bar codes, but you want the imager to output Code 39 1st, Code 128 2nd, and Code 93 3rd, as shown below.



Code 93 must be enabled to use this example.

NOTE



A - Code 39



B - Code 128



C - Code 93

You would set up the sequence editor with the following command line:
`SEQBLK62999941FF6A999942FF69999943FF`

Output

The breakdown of the command line is shown below:

SEQBLK	sequence editor start command
62	code identifier for Code 39
9999	code length that must match for Code 39, 9999 = all lengths
41	start character match for Code 39, 41h = "A"
FF	termination string for first code
6A	code identifier for Code 128
9999	code length that must match for Code 128, 9999 = all lengths
42	start character match for Code 128, 42h = "B"
FF	termination string for second code
69	code identifier for Code 93
9999	code length that must match for Code 93, 9999 = all lengths
43	start character match for Code 93, 43h = "C"
FF	termination string for third code

To program the previous example using specific lengths, you would have to count any programmed prefixes, suffixes, or formatted characters as part of the length. If you use the example on page 3-17, but assume a <CR> suffix and specific code lengths, you would use the following command line:

```
SEQBLK62001141FF6A001242FF69001143FF
```

The breakdown of the command line is shown below:

SEQBLK	sequence editor start command
62	code identifier for Code 39
0011	Code 39 code length (9) plus CR suffix (2) = 11
41	start character match for Code 39, 41h = "A"
FF	termination string for first code
6A	code identifier for Code 128
0012	Code 128 code length (10) plus CR suffix (2) = 12
42	start character match for Code 128, 42h = "B"
FF	termination string for second code
69	code identifier for Code 93
0011	Code 93 code length (9) plus CR suffix (2) = 11
43	start character match for Code 93, 43h = "C"
FF	termination string for third code

Output Sequence Editor



Enter Sequence



Default Sequence

Require Output Sequence

When an output sequence is *Required*, all output data must conform to an edited sequence or the imager will not transmit the output data to the host device. When it's *On/Not Required*, the imager will attempt to get the output data to conform to an edited sequence, but if it cannot, the imager transmits all output data to the host device as is.

When the output sequence is *Off*, the bar code data is output to the host as the imager decodes it.



This selection is unavailable when the Multiple Symbols Selection is turned on.

NOTE



Required



On/Not Required



*Off

Multiple Symbols



This feature does not work when the Imager is in Low Power mode.

NOTE

When this programming selection is turned *On*, it allows you to read multiple symbols with a single pull of the Imager's trigger. If you press and hold the trigger, aiming the Imager at a series of symbols, it reads unique symbols once, beeping (if turned on) for each read. The imager attempts to find and decode new symbols as long as the trigger is pulled. When this programming selection is turned *Off*, the Imager will only read the symbol closest to the aiming beam.



No Read

With No Read turned *On*, the Imager notifies you if a code cannot be read. If using a PowerView Scan Data Window, an "NR" appears when a code cannot be read. If No Read is turned *Off*, the "NR" will not appear.



If you want a different notation than "NR," for example, "Error," or "Bad Code," you can edit the output message using the [Data Formatter](#) on page 5-5. The hex code for the No Read symbol is 9C.

Print Weight

Print Weight is used to adjust the way the imager reads Matrix symbols. If an imager will be seeing consistently heavily printed matrix symbols, then a print weight of 6 may improve the reading performance. For consistently light printing, a print weight of 2 may help. After scanning the *Set Print Weight* bar code, set the print weight (from 1-7) by scanning digits from the [Programming Chart](#) on page B-5, then scanning *Save*.
Default = 4.



Set Print Weight



* Default

Video Reverse

Video Reverse is used to allow the imager to read bar codes that are inverted. The “Off” bar code below is an example of this type of bar code. If additional menuing is required, Video Reverse must be disabled to read the menu bar codes and then re-enabled after menuing is completed.



Images downloaded from the unit will not be reversed. This is a setting for decoding only.

NOTE



On



* Off

Working Orientation

Some bar codes are direction-sensitive. For example, KIX codes and OCR can misread when scanned sideways or upside down. Use the working orientation settings if your direction-sensitive codes will not usually be presented upright to the scanner. *Default = Upright.*

Upright:



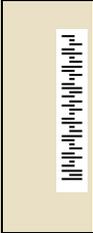
Upside Down:



Rotate Clockwise 90°:



Rotate Counterclockwise 90°:



* Upright



Rotate Clockwise 90°



Upside Down



Rotate Counterclockwise 90°

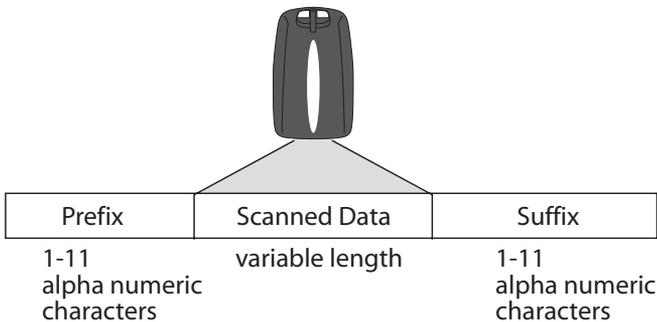
Chapter 4

Data Editing

Prefix/Suffix Overview

When a bar code is scanned, additional information is sent to the host computer along with the bar code data. This group of bar code data and additional, user-defined data is called a “message string.” The selections in this section are used to build the user-defined data into the message string.

Prefix and Suffix characters are data characters that can be sent before and after scanned data. You can specify if they should be sent with all symbologies, or only with specific symbologies. The following illustration shows the breakdown of a message string:



Points to Keep In Mind

- It is not necessary to build a message string. The selections in this chapter are only used if you wish to alter the default settings. *Default prefix = None. Default suffix = None.*
- A prefix or suffix may be added or cleared from one symbology or all symbologies.

- You can add any prefix or suffix from the [ASCII Conversion Chart \(Code Page 1252\) on page A-4](#), plus Code I.D. and AIM I.D.
- You can string together several entries for several symbologies at one time.
- Enter prefixes and suffixes in the order in which you want them to appear on the output.

To Add a Prefix or Suffix:

- Step 1.** Scan the **Add Prefix** or **Add Suffix** symbol ([page 4-4](#)).
- Step 2.** Determine the 2 digit Hex value from the Symbology Chart (included in "Symbologies" on page A-1) for the symbology to which you want to apply the prefix or suffix. For example, for Code 128, Code ID is "j" and Hex ID is "6A".
- Step 3.** Scan the 2 hex digits from the [Programming Chart on page B-5](#) of this manual or scan **9, 9** for all symbologies.
- Step 4.** Determine the hex value from the [ASCII Conversion Chart \(Code Page 1252\) on page A-4](#), for the prefix or suffix you wish to enter.
- Step 5.** Scan the 2 digit hex value from the [Programming Chart on page B-5](#) of this manual.
- Step 6.** Repeat Steps 4 and 5 for every prefix or suffix character.
- Step 7.** To add the Code I.D., scan **5, C, 8, 0**.
To add AIM I.D., scan **5, C, 8, 1**.
To add a backslash (\), scan **5, C, 5, C**.



NOTE

To add a backslash (\) as in Step 7, you must scan **5C** twice – once to create the leading backslash and then to create the backslash itself.

- Step 8.** Scan **Save** to exit and save, or scan **Discard** to exit without saving.
Repeat Steps 1-6 to add a prefix or suffix for another symbology.

Example: Add a Suffix to a specific symbology

To send a CR (carriage return) Suffix for UPC only:

Step 1. Scan **Add Suffix**.

Step 2. Determine the 2 digit hex value from the Symbology Chart (included in [ASCII Conversion Chart \(Code Page 1252\)](#) on page A-4) for UPC.

Step 3. Scan **6, 3** from the [Programming Chart](#) on page B-5 of this manual.

Step 4. Determine the hex value from the [ASCII Conversion Chart \(Code Page 1252\)](#) on page A-4, for the CR (carriage return).

Step 5. Scan **0, D** from the [Programming Chart](#) on page B-5 of this manual.

Step 6. Scan **Save**, or scan **Discard** to exit without saving.

To Clear One or All Prefixes or Suffixes:

You can clear a single prefix or suffix, or clear all prefixes/suffixes for a symbology. When you Clear One Prefix (Suffix), the specific character you select is deleted from the symbology you want. When you Clear All Prefixes (Suffixes), all the prefixes or suffixes for a symbology are deleted.

Step 1. Scan the **Clear One Prefix** or **Clear One Suffix** symbol.

Step 2. Determine the 2 digit Hex value from the Symbology Chart (included in [ASCII Conversion Chart \(Code Page 1252\)](#) on page A-4) for the symbology from which you want to clear the prefix or suffix.

Step 3. Scan the 2 digit hex value from the [Programming Chart](#) on page B-5 of this manual or scan **9, 9** for all symbologies.

Your change is automatically saved.

To Add a Carriage Return Suffix to all Symbologies

Scan the following bar code if you wish to add a carriage return suffix to all symbologies at once. This action first clears all current suffixes, then programs a carriage return suffix for all symbologies.



Add CR Suffix
All Symbologies

Prefix Selections



Add Prefix



Clear One Prefix



Clear All Prefixes

Suffix Selections



Add Suffix



Clear One Suffix



Clear All Suffixes

Function Code Transmit

When this selection is enabled and function codes are contained within the scanned data, the imager transmits the function code to the terminal. Charts of these function codes are provided in [Supported Interface Keys on page 9-3](#). *Default = Enable.*



* Enable



Disable

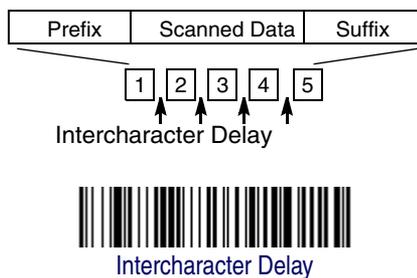
Intercharacter, Interfunction, and Intermessage Delays

Some terminals drop information (characters) if data comes through too quickly. Intercharacter, interfunction, and intermessage delays slow the transmission of data, increasing data integrity.

Each delay is composed of a 5 millisecond step. You can program up to 99 steps (of 5 ms each) for a range of 0-495 ms.

Intercharacter Delay

An intercharacter delay of up to 495 milliseconds may be placed between the transmission of each character of scanned data. Scan the Intercharacter Delay bar code below, then scan the number of milliseconds and the SAVE bar code using the [Programming Chart on page B-5](#) of this manual.



To remove this delay, scan the Intercharacter Delay bar code, then set the number of steps to 0. Scan the SAVE bar code using the [Programming Chart on page B-5](#) of this manual.



NOTE

Intercharacter delays are not supported in USB serial emulation.

User Specified Intercharacter Delay

An intercharacter delay of up to 495 milliseconds may be placed after the transmission of a particular character of scanned data. Scan the Delay Length bar code below, then scan the number of milliseconds and the SAVE bar code using the [Programming Chart on page B-5](#) of this manual.

Next, scan the Character to Trigger Delay bar code, then the 2-digit hex value for the ASCII character that will trigger the delay [ASCII Conversion Chart \(Code Page 1252\)](#) on page A-4.



Delay Length

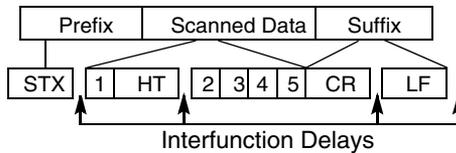


Character to Trigger Delay

To remove this delay, scan the Delay Length bar code, and set the number of steps to 0. Scan the SAVE bar code using the [Programming Chart on page B-5](#) of this manual.

Interfunction Delay

An interfunction delay of up to 495 milliseconds may be placed between the transmission of each segment of the message string. Scan the Interfunction Delay bar code below, then scan the number of milliseconds and the SAVE bar code using the [Programming Chart on page B-5](#) of this manual.

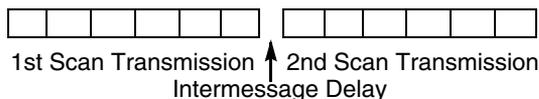


Interfunction Delay

To remove this delay, scan the Interfunction Delay bar code, then set the number of steps to 0. Scan the SAVE bar code using the [Programming Chart on page B-5](#) of this manual.

Intermessage Delay

An intermessage delay of up to 495 milliseconds may be placed between each scan transmission. Scan the Intermessage Delay bar code below, then scan the number of milliseconds and the SAVE bar code using the [Programming Chart on page B-5](#) of this manual.



To remove this delay, scan the Intermessage Delay bar code, then set the number of steps to 0. Scan the SAVE bar code using the [Programming Chart on page B-5](#) of this manual.

NOTES

Chapter 5

Data Formatting

Data Format Editor Introduction

You may use the Data Format Editor to change the imager's output. For example, you can use the Data Format Editor to insert characters at certain points in bar code data as it is scanned. The selections in the following pages are used only if you wish to alter the output. *Default Data Format setting = None.*

Normally, when you scan a bar code, it gets outputted automatically; however when you do a format, you must use a “send” command (see [Send Commands on page 5-3](#)) within the format program to output data.

Multiple formats may be programmed into the imager. They are stacked in the order in which they are entered. However, the following list presents the order in which formats are applied:

1. Specific Term ID, Actual Code ID, Actual Length
2. Specific Term ID, Actual Code ID, Universal Length
3. Specific Term ID, Universal Code ID, Actual Length
4. Specific Term ID, Universal Code ID, Universal Length
5. Universal Term ID, Actual Code ID, Actual Length
6. Universal Term ID, Actual Code ID, Universal Length
7. Universal Term ID, Universal Code ID, Actual Length
8. Universal Term ID, Universal Code ID, Universal Length

If you have changed data format settings, and wish to clear all formats and return to the factory defaults, scan the Default Data Format code on * [Default Data Format on page 5-5](#).

To Add a Data Format

Step 1. Scan the **Enter Data Format** symbol ([page 5-5](#)).

Step 2. Primary/Alternate Format

Determine if this will be your primary data format, or one of 3 alternate formats. (Alternate formats allow you “single shot” capability to scan one bar code using a different data format. After the one bar code has been read, the imager reverts to the primary data format. See [page 5-6](#).) If you are programming the primary format, scan **0** using the [Programming Chart on page B-5](#) of this manual. If you are programming an alternate format, scan **1**, **2**, or **3**, depending on the alternate format you are programming.

Step 3. Terminal Type

Refer to [Supported Terminals on page 2-2](#) and locate the Terminal ID number for your PC. Scan three numeric bar codes on the [Programming Chart on page B-5](#) to program the imager for your terminal ID (you must enter 3 digits). For example, scan **124** for a USB keyboard.



The wildcard for all terminal types is **099**.

NOTE

Step 4. Code I.D.

In [Symbologies](#), find the symbology to which you want to apply the data format. Locate the Hex value for that symbology and scan the 2 digit hex value from the [Programming Chart on page B-5](#) of this manual.

Step 5. Length

Specify what length (up to 9999 characters) of data will be acceptable for this symbology. Scan the four digit data length from the [Programming Chart on page B-5](#) of this manual. (Note: 50 characters is entered as 0050. 9999 is a universal number, indicating all lengths.)

Step 6. Editor Commands

Refer to [Data Format Editor Introduction on page 5-1](#). Scan the sym-

bols that represent the command you want to enter. 94 alphanumeric characters may be entered for each symbology data format.

Step 7. Scan **Save** from the [Programming Chart on page B-5](#) of this manual to save your entries.

Other Programming Selections

Clear One Data Format — This deletes one data format for one symbology. If you are clearing the primary format, scan 0 from the [Programming Chart on page B-5](#) of this manual. If you are clearing an alternate format, scan 1, 2, or 3, depending on the alternate format you are clearing. Scan the Terminal Type and Code I.D. (see [Supported Terminals on page 2-2](#)), and the bar code data length for the specific data format that you want to delete. All other formats remain unaffected.

Save— from the [Programming Chart on page B-5](#) of this manual. This exits, saving any Data Format changes.

Discard— from the [Programming Chart on page B-5](#) of this manual. This exits without saving any Data Format changes.

Data Format Editor Commands

Send Commands

- F1 Send all characters followed by “xx” key or function code, starting from current cursor position. **Syntax = F1xx** (xx stands for the hex value for an ASCII code, see [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#))
- F2 Send “nn” characters followed by “xx” key or function code, starting from current cursor position. **Syntax = F2nnxx** (nn stands for the numeric value (00-99) for the number of characters and xx stands for the hex value for an ASCII code. See [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#))
- F3 Send up to but not including “ss” character (Search and Send) starting from current cursor position, leaving cursor pointing to “ss” character followed by “xx” key or function code. **Syntax = F3ssxx** (ss and xx both stand for the hex values for ASCII codes, see [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#))
- F4 Send “xx” character “nn” times (Insert) leaving cursor in current cursor position. **Syntax = F4xxnn** (xx stands for the hex value for an ASCII code, see [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#), and nn is the numeric value (00-99) for the number of times it should be sent.)
- E9 Send all but the last “nn” characters, starting from the current cursor position. **Syntax = E9nn** (nn is the numeric value (00-99) for the number of characters that will not be sent at the end of the message.)

Move Commands

- F5 Move the cursor ahead “nn” characters from current cursor position. **Syntax = F5nn** (nn stands for the numeric value (00-99) for the number of characters the cursor should be moved ahead.)
- F6 Move the cursor back “nn” characters from current cursor position. **Syntax = F6nn** (nn stands for the numeric value (00-99) for the number of characters the cursor should be moved back.)
- F7 Move the cursor to the beginning of the data string. **Syntax = F7.**
- EA Move the cursor to the end of the data string. **Syntax = EA**

Search Commands

- F8 Search ahead for “xx” character from current cursor position, leaving cursor pointing to “xx” character. **Syntax = F8xx** (xx stands for the hex value for an ASCII code, see [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#))
- F9 Search back for “xx” character from current cursor position, leaving cursor pointing to “xx” character. **Syntax = F9xx** (xx stands for the hex value for an ASCII code, see [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#))
- E6 Search ahead for the first non “xx” character from the current cursor position, leaving cursor pointing to non “xx” character. **Syntax = E6xx** (xx stands for the hex value for an ASCII code, see [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#))
- E7 Search back for the first non “xx” character from the current cursor position, leaving cursor pointing to non “xx” character. **Syntax = E7xx** (xx stands for the hex value for an ASCII code, see [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#))

Miscellaneous Commands

- FB Suppress all occurrences of up to 15 different characters, starting at the current cursor position, as the cursor is advanced by other commands. When the FC command is encountered, the suppress function is terminated. The cursor is not moved by the FB command. **Syntax = FBn-*xxxxyy* .*zz*** where nn is a count of the number of suppressed characters in the list and *xyyy* .. *zz* is the list of characters to be suppressed. (xx stands for the hex value for an ASCII code, see [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#))
- FC Disables suppress filter and clear all suppressed characters. **Syntax = FC.**
- E4 Replaces up to 15 characters in the data string with user specified characters. Replacement continues until the E5 command is encountered. **Syntax = E4nnxx₁xx₂yy₁yy₂...zz₁zz₂** where nn is the total count of both characters to be replaced plus replacement characters; xx₁ defines characters to be replaced and xx₂ defines replacement characters, continuing through zz₁ and zz₂.
- E5 Terminates character replacement. **Syntax = E5.**
- FE Compare character in current cursor position to the character “xx.” If characters are equal, increment cursor. If characters are not equal, no format match. **Syntax = FExx** (xx stands for the hex value for an ASCII code, see [ASCII Conversion Chart \(Code Page 1252\) on page A-4.](#))
- EC Check to make sure there is an ASCII number at the current cursor position. If character is not numeric, format is aborted. **Syntax = EC.**

ED Check to make sure there is a non-numeric ASCII character at the current cursor position. If character is numeric, format is aborted. **Syntax = ED.**

Data Format Editor



Enter Data Format



* Default Data Format



Clear One Data Format



Clear All Data Formats



Save



Discard

Data Formatter

When Data Formatter is turned off, the bar code data is output to the host as read (including prefixes and suffixes). Choose one of the following options. *Default = Data Formatter On, but Not Required.*



* Data Formatter On,
but Not Required



Data Formatter Off

When Data Formatter is required, all input data must conform to an edited format or the imager does not transmit the input data to the host device.



Data Format On, Format Required

Alternate Data Formats

Alternate formats allow you “single shot” capability to scan one bar code using a different data format than your primary format. When data formats are programmed (see [page 5-2](#)), you must input whether you are programming the primary format, or an alternate format numbered 1, 2, or 3.

An alternate format is initiated by scanning one of the 3 alternate format bar codes below. The imager will scan the next bar code, formatting the data with the selected alternate format, then revert immediately to the primary format.



Alternate Data Format 1



Alternate Data Format 2



Alternate Data Format 3

Chapter 6

Symbologies

This programming section contains the following menu selections. Refer to [Chapter 11](#) for settings and defaults.

- Linear Symbologies
- Australian Post
- Aztec Code Enable
- British Post
- Canadian Post
- China Post Enable
- Codabar Enable
- Codablock F Enable
- Code 11 Enable
- Code 128 Enable
- Code 16K Enable
- Code 2 of 5 Enable
- Code 39 Enable
- Code 49 Enable
- Code 93 Enable
- Data Matrix Enable
- EAN/JAN-13 Enable
- EAN/JAN-8 Enable
- EAN•UCC Composite Codes
- IATA Code 2 of 5 Enable
- Interleaved 2 of 5 Enable
- Japanese Post
- Kix (Netherlands) Post
- Korea Post
- Matrix 2 of 5 Enable
- MaxiCode Enable
- MicroPDF417 Enable
- MSI Enable
- PDF417 Enable
- Planet Code
- Plessey Code Enable
- PosiCode A and B Enable
- Postnet
- QR Code
- Micro QR Code
- RSS Expanded Enable
- RSS Limited Enable
- RSS-14 Enable
- TCIF Linked Code 39 (TLC39)
- Telepen
- UPC-A Enable
- UPC-A/EAN-13 with
Extended Coupon Code

Linear Symbologies

All Symbologies

If you want to decode all the symbologies allowable for your imager, scan the *All Symbologies On* code. If on the other hand, you want to decode only a particular symbology, scan All Symbologies Off followed by the On symbol for that particular symbology.



All Symbologies On



All Symbologies Off

Message Length Description

You are able to set the valid reading length of some of the bar code symbologies. If the data length of the scanned bar code doesn't match the valid reading length, the imager will issue an error beep. You may wish to set the same value for minimum and maximum length to force the imager to read fixed length bar code data. This helps reduce the chances of a misread.

EXAMPLE: Decode only those bar codes with a count of 9-20 characters.

Min. length = 09Max. length = 20

EXAMPLE: Decode only those bar codes with a count of 15 characters.

Min. length = 15Max. length = 15

For a value other than the minimum and maximum message length defaults, scan the bar codes included in the explanation of the symbology, then scan the digit value of the message length and **Save** bar codes on the [Programming Chart on page B-5](#) of this manual. The minimum and maximum lengths and the defaults are included with the respective symbologies.

Codabar

<Default All Codabar Settings>

**Codabar Enable**

* On



Off

Codabar Start / Stop Characters

Start/Stop characters identify the leading and trailing ends of the bar code. You may either transmit, or not transmit Start/Stop characters. *Default = Don't Transmit.*



Transmit



* Don't Transmit

Codabar Check Character

Codabar check characters are created using different “modulos.” You can program the imager to read only Codabar bar codes with Modulo 16 check characters. *Default = No Check Character.*

No Check Character indicates that the imager reads and transmits bar code data with or without a check character.

When Check Character is set to *Validate and Transmit*, the imager will only read Codabar bar codes printed with a check character, and will transmit this character at the end of the scanned data.

Symbologies

When Check Character is set to *Validate, but Don't Transmit*, the unit will only read Codabar bar codes printed *with* a check character, but will not transmit the check character with the scanned data.



* No Check Character



Validate Modulo 16, but
Don't Transmit



Validate Modulo 16
and Transmit

Codabar Concatenation

Codabar supports symbol concatenation. When you enable concatenation, the imager looks for a Codabar symbol having a “D” start character, adjacent to a symbol having a “D” stop character. In this case the two messages are concatenated into one with the “D” characters omitted.

Default = On.



Select Require to prevent the imager from decoding a single “D” Codabar symbol without its companion. This selection has no effect on Codabar symbols without Stop/Start D characters.



On



* Off



Require

Codabar Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 2-60. Minimum Default = 4, Maximum Default = 60.



Minimum Message Length



Maximum Message Length

Code 39

< Default All Code 39 Settings >



Code 39 Enable



* On



Off

Code 39 Start/Stop Characters

Start/Stop characters identify the leading and trailing ends of the bar code. You may either transmit, or not transmit Start/Stop characters. *Default = Don't Transmit.*



Transmit



* Don't Transmit

Code 39 Check Character

No Check Character indicates that the imager reads and transmits bar code data with or without a check character.

When Check Character is set to **Validate, but Don't Transmit**, the unit only reads Code 39 bar codes printed with a check character, but will not transmit the check character with the scanned data.

When Check Character is set to **Validate and Transmit**, the imager only reads Code 39 bar codes printed with a check character, and will transmit this character at the end of the scanned data. *Default = No Check Character.*



* No Check Character



Validate, but Don't Transmit



Validate and Transmit

Code 39 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 0-48. Minimum Default = 0, Maximum Default = 48.



Minimum Message Length



Maximum Message Length

Code 39 Append

This function allows the imager to append the data from several Code 39 bar codes together before transmitting them to the host computer. When this function is enabled, the imager stores those Code 39 bar codes that start with a space (excluding the start and stop symbols), and does not immediately transmit the data. The imager stores the data in the order in which the bar codes are read, deleting the first space from each. The imager transmits the appended data when it reads a Code 39 bar code that starts with a character other than a space. *Default = Off.*



On



* Off

Code 32 Pharmaceutical (PARAF or Pharmacode)

Code 32 Pharmaceutical is a form of the Code 39 symbology used by Italian pharmacies. This symbology is also known as PARAF.



Trioptic Code (page 6-33) must be turned off while scanning Code 32 Pharmaceutical codes.

NOTE



On



* Off

Full ASCII

If Full ASCII Code 39 decoding is enabled, certain character pairs within the bar code symbol will be interpreted as a single character. For example: \$V will be decoded as the ASCII character SYN, and /C will be decoded as the ASCII character #. *Default = Off.*

NUL %U	DLE \$P	SP SPACE	0 0	@ %V	P P	' %W	p +P	
SOH \$A	DC1 \$Q	! /A	1 1	A A	Q Q	a +A	q +Q	
STX \$B	DC2 \$R	" /B	2 2	B B	R R	b +B	r +R	
ETX \$C	DC3 \$S	# /C	3 3	C C	S S	c +C	s +S	
EOT \$D	DC4 \$T	\$ /D	4 4	D D	T T	d +D	t +T	
ENQ \$E	NAK \$U	% /E	5 5	E E	U U	e +E	u +U	
ACK \$F	SYN \$V	& /F	6 6	F F	V V	f +F	v +V	
BEL \$G	ETB \$W	' /G	7 7	G G	W W	g +G	w +W	
BS \$H	CAN \$X	(/H	8 8	H H	X X	h +H	x +X	
HT \$I	EM \$Y	) /I	9 9	I I	Y Y	i +I	y +Y
LF \$J	SUB \$Z	* /J	:	/Z	J J	Z Z	j +J	z +Z
VT \$K	ESC %A	+ /K	;	%F	K K	[%K	k +K	{ %P
FF \$L	FS %B	, /L	<	%G	L L	\ %L	l +L	| %Q
CR \$M	GS %C	- -	=	%H	M M] %M	m +M	} %R
SO \$N	RS %D	. .	>	%I	N N	^ %N	n +N	~ %S
SI \$O	US %E	/ /O	?	%J	O O	_ %O	o +O	DEL %T

Character pairs /M and /N decode as a minus sign and period respectively.

Character pairs /P through /Y decode as 0 through 9.



Full ASCII On



* Full ASCII Off

Code 39 Code Page

Code pages define the mapping of character codes to characters. If the data received does not display with the proper characters, it may be because the bar code being scanned was created using a code page that is different from the one the host program is expecting. If this is the case, scan the bar code below, select the code page with which the bar codes were created (see [Code Page Mapping of Printed Bar Codes on page A-7](#)) and scan the value and the **Save** bar code from the [Programming Chart on page B-5](#) of this manual. The data characters should then appear properly.



Code 39 Code Page

Interleaved 2 of 5

< Default All Interleaved 2 of 5 Settings >



Interleaved 2 of 5 Enable



* On



Off

Check Digit

No Check Digit indicates that the imager reads and transmits bar code data with or without a check digit.

When Check Digit is set to **Validate, but Don't Transmit**, the unit only reads Interleaved 2 of 5 bar codes printed with a check digit, but will not transmit the check digit with the scanned data.

Symbologies

When Check Digit is set to **Validate and Transmit**, the imager only reads Interleaved 2 of 5 bar codes printed with a check digit, and will transmit this digit at the end of the scanned data. *Default = No Check Digit.*



* No Check Digit



Validate, but Don't Transmit



Validate and Transmit

Interleaved 2 of 5 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 2-80. Minimum Default = 4, Maximum Default = 80.



Minimum Message Length



Maximum Message Length

Code 93

< Default All Code 93 Settings >



Code 93 Enable



* On



Off

Code 93 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 0-80. Minimum Default = 0, Maximum Default = 80.



Minimum Message Length



Maximum Message Length

Code 93 Code Page

Code pages define the mapping of character codes to characters. If the data received does not display with the proper characters, it may be because the bar code being scanned was created using a code page that is different from the one the host program is expecting. If this is the case, scan the bar code below, select the code page with which the bar codes were created (see [Code Page Mapping of Printed Bar Codes on page A-7](#)) and scan the value and the **Save** bar code from the [Programming Chart on page B-5](#) of this manual. The data characters should then appear properly.



Code 93 Code Page

Code 2 of 5

<Default All Code 2 of 5 Settings>



Code 2 of 5 Enable



On



* Off

Code 2 of 5 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-48. Minimum Default = 4, Maximum Default = 48.



Minimum Message Length



Maximum Message Length

IATA Code 2 of 5

<Default All Code IATA 2 of 5 Settings>



IATA Code 2 of 5 Enable



On



* Off

IATA Code 2 of 5 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-48. Minimum Default = 4, Maximum Default = 48.



Minimum Message Length



Maximum Message Length

Matrix 2 of 5

<Default All Matrix 2 of 5 Settings>



Matrix 2 of 5 Enable



On



* Off

Matrix 2 of 5 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-80. Minimum Default = 4, Maximum Default = 80.



Minimum Message Length



Maximum Message Length

Code 11

<Default All Code 11 Settings>



Code 11 Enable



On



* Off

Check Digits Required

This option sets whether 1 or 2 check digits are required with Code 11 bar codes. *Default = Two Check Digits.*



One Check Digit



* Two Check Digits

Code 11 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-80. Minimum Default = 4, Maximum Default = 80.



Minimum Message Length



Maximum Message Length

Code 128

<Default All Code 128 Settings>



Code 128 Enable



* On



Off

ISBT 128 Concatenation

In 1994 the International Society of Blood Transfusion (ISBT) ratified a standard for communicating critical blood information in a uniform manner. The use of ISBT formats requires a paid license. The ISBT 128 Application Specification describes 1) the critical data elements for labeling blood products, 2) the current recommendation to use Code 128 due to its high degree of security and its space-efficient design, 3) a variation of Code 128 that supports concatenation of neighboring symbols, and 4) the standard layout for bar codes on a blood product label. Use the bar codes below to turn concatenation on or off. *Default = Off.*



On



* Off

Code 128 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 0-80. Minimum Default = 0, Maximum Default = 80.



Minimum Message Length



Maximum Message Length

Code 128 Code Page

Code pages define the mapping of character codes to characters. If the data received does not display with the proper characters, it may be because the bar code being scanned was created using a code page that is different from the one the host program is expecting. If this is the case, scan the bar code below, select the code page with which the bar codes were created (see [Code Page Mapping of Printed Bar Codes on page A-7](#)) and scan the value and the **Save** bar code from the [Programming Chart on page B-5](#) of this manual. The data characters should then appear properly.



Code 128 Code Page

Telepen

<Default All Telepen Settings>



Telepen



On



* Off

Telepen Output

Using AIM Telepen Output, the imager reads symbols with start/stop pattern 1 and decodes them as standard full ASCII (start/stop pattern 1). When Original Telepen Output is selected, the imager reads symbols with start/stop pattern 1 and decodes them as compressed numeric with optional full ASCII (start/stop pattern 2). *Default = AIM Telepen Output.*



* AIM Telepen Output



Original Telepen Output

Telepen Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-60. Minimum Default = 1, Maximum Default = 60.



Minimum Message Length



Maximum Message Length

UPC-A

<Default All UPC-A Settings>



UPC-A Enable



* On



Off

UPC-A Check Digit Transmit

This selection allows you to specify whether the check digit should be transmitted at the end of the scanned data or not. *Default = On.*



* On



Off

UPC-A Number System

The numeric system digit of a U.P.C. symbol is normally transmitted at the beginning of the scanned data, but the unit can be programmed so it will not transmit it. *Default = On.*



* On



Off

UPC-A Addenda

This selection adds 2 or 5 digits to the end of all scanned UPC-A data.
Default = Off for both 2 Digit and 5 Digit Addenda.



2 Digit Addenda On



* 2 Digit Addenda Off



5 Digit Addenda On



* 5 Digit Addenda Off

UPC-A Addenda Required

When *Required* is scanned, the imager will only read UPC-A bar codes that have addenda. You must then turn on a 2 or 5 digit addenda listed on page 6-20. *Default = Not Required.*



Required



* Not Required

UPC-A Addenda Separator

When this feature is on, there is a space between the data from the bar code and the data from the addenda. When turned off, there is no space.
Default = On.



* On



Off

UPC-A/EAN-13 with Extended Coupon Code

Use the following codes to enable or disable UPC-A and EAN-13 with Extended Coupon Code. *Default = On.*



* On



Off

UPC-E0

<Default All UPC-E Settings>



UPC-E0

Most U.P.C. bar codes lead with the 0 number system. For these codes, use the UPC-E0 selection. If you need to read codes that lead with the 1 number system, use [UPC-E1 on page 6-23](#). *Default = On.*



* UPC-E0 On



UPC-E0 Off

UPC-E0 Expand

UPC-E Expand expands the UPC-E code to the 12 digit, UPC-A format. *Default = Off.*



On



* Off

UPC-E0 Addenda Required

When Addenda Required is set to on, the imager will only read UPC-E bar codes that have addenda. *Default = Not Required.*



Required



* Not Required

UPC-E0 Addenda Separator

When this feature is on, there is a space between the data from the bar code and the data from the addenda. When turned off, there is no space. *Default = On.*



* On



Off

UPC-E0 Check Digit Transmit

Check Digit specifies whether the check digit should be transmitted at the end of the scanned data or not. *Default = On.*



* On



Off

UPC-E0 Number System

The numeric system digit of a U.P.C. symbol is normally transmitted at the beginning of the scanned data, but the unit can be programmed so it will not transmit it. *Default = On.*



* On



Off

UPC-E0 Addenda

This selection adds 2 or 5 digits to the end of all scanned UPC-E data. *Default = Off for both 2 Digit and 5 Digit Addenda.*



2 Digit Addenda On



* 2 Digit Addenda Off



5 Digit Addenda On



* 5 Digit Addenda Off

UPC-E1

Most U.P.C. bar codes lead with the 0 number system. For these codes, use UPC-E0 (page 6-21). If you need to read codes that lead with the 1 number system, use the UPC-E1 selection. *Default = Off.*



UPC-E1 On



* UPC-E1 Off

EAN/JAN-13

<Default All EAN/JAN Settings>



EAN/JAN-13 Enable



* On



Off

EAN/JAN-13 Check Digit Transmit

This selection allows you to specify whether the check digit should be transmitted at the end of the scanned data or not. *Default = On.*



* On



Off

EAN/JAN-13 Addenda

This selection adds 2 or 5 digits to the end of all scanned EAN/JAN-13 data.

Default = Off for both 2 Digit and 5 Digit Addenda.



2 Digit Addenda On



* 2 Digit Addenda Off



5 Digit Addenda On



* 5 Digit Addenda Off

EAN/JAN-13 Addenda Required

When Addenda Required is set to on, the imager will only read EAN/JAN-13 bar codes that have addenda. *Default = Not Required.*



Required



* Not Required

EAN/JAN-13 Addenda Separator

When this feature is on, there is a space between the data from the bar code and the data from the addenda. When turned off, there is no space. *Default = On.*



* On



Off



If you want to enable or disable EAN13 with Extended Coupon Code, refer to [UPC-A/EAN-13 with Extended Coupon Code](#) on page 6-21.

NOTE

ISBN Translate

This selection causes EAN-13 Bookland symbols to be translated into their equivalent ISBN number format. *Default = Off.*



On



* Off

EAN/JAN-8

<Default All EAN/JAN-8 Settings>



EAN/JAN-8 Enable



* On



Off

EAN/JAN-8 Check Digit Transmit

This selection allows you to specify whether the check digit should be transmitted at the end of the scanned data or not. *Default = On.*



* On



Off

EAN/JAN-8 Addenda

This selection adds 2 or 5 digits to the end of all scanned EAN/JAN-8 data.

Default = Off for both 2 Digit and 5 Digit Addenda.



2 Digit Addenda On



* 2 Digit Addenda Off



5 Digit Addenda On



* 5 Digit Addenda Off

EAN/JAN-8 Addenda Required

When Addenda Required is set to on, the imager will only read EAN/JAN-8 bar codes that have addenda. *Default = Not Required.*



Required



* Not Required

EAN/JAN-8 Addenda Separator

When this feature is on, there is a space between the data from the bar code and the data from the addenda. When turned off, there is no space. *Default = On.*



* On



Off

MSI

<Default All MSI Settings>



MSI Enable



On



* Off

MSI Check Character

Different types of check characters are used with MSI bar codes. You can program the imager to read MSI bar codes with Type 10 check characters. *Default = Validate Type 10, but Don't Transmit.*

When Check Character is set to *Validate and Transmit*, the imager will only read MSI bar codes printed with the specified type check character, and will transmit this character at the end of the scanned data.

When Check Character is set to *Validate, but Don't Transmit*, the unit will only read MSI bar codes printed with the specified type check character, but will not transmit the check character with the scanned data.



* Validate Type 10, but Don't
Transmit



Validate Type 10 and Transmit

MSI Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 4-48. Minimum Default = 4, Maximum Default = 48.



Minimum Message Length



Maximum Message Length

Plessey Code

<Default All Plessey Code Settings>



Plessey Code Enable



On



* Off

Plessey Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 4-48. Minimum Default = 4, Maximum Default = 48.



Minimum Message Length



Maximum Message Length

RSS-14

< Default All RSS-14 Settings >



RSS-14 Enable



* On



Off

RSS Limited

< Default All RSS Limited Settings >



RSS Limited Enable



* On



Off

RSS Expanded

< Default All RSS Expanded Settings >



RSS Expanded Enable



* On



Off

RSS Expanded Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 4-74. Minimum Default = 4, Maximum Default = 74.



Minimum Message Length



Maximum Message Length

PosiCode

<Default All PosiCode Settings>



PosiCode A and B Enable



* On



Off

You have to have PosiCode A and B on to read any of the PosiCode symbologies.



A and B On
(No Limited)



A and B and Limited A On
(Limited B Off)



* A and B and Limited B On
(Limited A Off)

PosiCode Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 2-80. Minimum Default = 4, Maximum Default = 48.



Minimum Message Length



Maximum Message Length

Trioptic Code



NOTE

If you are going to scan Code 32 Pharmaceutical codes (page 6-7), Trioptic Code must be off.

Trioptic Code is used for labeling magnetic storage media.



On



* Off

Stacked Symbolologies

Codablock F

<Default All Codablock F Settings>



Codablock F Enable



On



* Off

Codablock F Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-2048. Minimum Default = 1, Maximum Default = 2048.



Minimum Message Length



Maximum Message Length

Code 16K

<Default All Code 16K Settings>



Code 16K Enable



On



* Off

Code 16K Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 0-160. Minimum Default = 1, Maximum Default = 160.



Minimum Message Length



Maximum Message Length

Code 49

<Default All Code 49 Settings>



Code 49 Enable



* On



Off

Code 49 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-81. Minimum Default = 1, Maximum Default = 81.



Minimum Message Length



Maximum Message Length

PDF417

< Default All PDF417 Settings >



PDF417 Enable



* On



Off

PDF417 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-2750. Minimum Default = 1, Maximum Default = 2750.



Minimum Message Length



Maximum Message Length

MicroPDF417

< Default All MicroPDF417 Settings >

**MicroPDF417 Enable**

On



* Off

MicroPDF417 Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-366. Minimum Default = 1, Maximum Default = 366.



Minimum Message Length



Maximum Message Length

EAN•UCC Composite Codes

Linear codes are combined with a unique 2D composite component to form a new class called EAN•UCC Composite symbology. EAN•UCC Composite symbologies allow for the co-existence of symbologies already in use.



On



* Off

UPC/EAN Version

Scan the *UPC/EAN Version On* bar code to decode EAN•UCC Composite symbols that have a UPC or EAN linear component. (This does not affect EAN•UCC Composite symbols with a UCC/EAN-128 or RSS linear component.)



UPC/EAN Version On



* UPC/EAN Version Off

EAN•UCC Composite Code Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-2435. Minimum Default = 1, Maximum Default = 2435.



Minimum Message Length



Maximum Message Length

EAN•UCC Emulation

The imager can automatically format the output from any EAN•UCC data carrier to emulate what would be encoded in an equivalent UCC/EAN-128 or RSS and Composite symbol. EAN•UCC data carriers include UPC-A and UPC-E, EAN-13 and EAN-8, ITF-14, UCC/EAN-128, and EAN•UCC RSS and Composites. Data from 2D symbols such as Aztec Code, Data Matrix, or QR Code, which encode a leading FNC1, also invoke EAN•UCC emulation. If UCC/EAN-128 Emula-

tion is selected, the AIM Symbology Identifier is reported as “]C1”. If RSS Emulation is selected, the AIM Symbology Identifier is reported as “]e0.” Any application that accepts EAN•UCC data can be simplified since it only needs to recognize one data carrier type. *Default = No Emulation.*



RSS Emulation



128 Emulation



* EAN•UCC Emulation Off

TCIF Linked Code 39 (TLC39)

This code is a composite code since it has a Code 39 linear component and a MicroPDF417 stacked code component. All bar code readers are capable of reading the Code 39 linear component. The MicroPDF417 component can only be decoded if **TLC39 On** is selected. The linear component may be decoded as Code 39 even if TLC39 is off.



On



* Off

Postal Codes



NOTE

For best performance when reading a postal symbology, all other postal symbologies should be turned off. The following postal codes can only be read by a full 2D Imager.

Postnet



On



* Off

Postnet Check Digit Transmit

This selection allows you to specify whether the check digit should be transmitted at the end of the scanned data.



Transmit Check Digit



* Don't Transmit Check Digit

Planet Code



On



* Off

Planet Code Check Digit Transmit

This selection allows you to specify whether the check digit should be transmitted at the end of the scanned data.



Transmit Check Digit



* Don't Transmit Check Digit

British Post



On



* Off

Canadian Post



On



* Off

Kix (Netherlands) Post



NOTE

Kix code can misread when scanned sideways or upside down. Use Working Orientation, page 3-19, if your Kix codes will not usually be presented upright to the scanner.



On



* Off

Australian Post



On



* Off

Japanese Post



On



* Off

China Post

<Default All China Post Settings>



China Post Enable



On



* Off

China Post Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 2-80. Minimum Default = 4, Maximum Default = 80.



Minimum Message Length



Maximum Message Length

Korea Post

<Default All Korea Post Settings>



Korea Post



On



* Off

Korea Post Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 2-80. Minimum Default = 4, Maximum Default = 48.



Minimum Message Length



Maximum Message Length

QR Code



QR Code can only be read by full 2D imager models.

NOTE

< Default All QR Code Settings >



QR Code

This selection applies to both QR Code and Micro QR Code.



On



* Off

QR Code Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-3500. Minimum Default = 1, Maximum Default = 3500.



Minimum Message Length



Maximum Message Length

Data Matrix



Data Matrix can only be read by full 2D imager models.

NOTE

< Default All Data Matrix Settings >



Data Matrix Enable



* On



Off

Data Matrix Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-1500. Minimum Default = 1, Maximum Default = 1500.



Minimum Message Length



Maximum Message Length

MaxiCode



MaxiCode can only be read by full 2D imager models.

NOTE

< Default All MaxiCode Settings >



MaxiCode Enable



* On



Off

MaxiCode Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-150. Minimum Default = 1, Maximum Default = 150.



Minimum Message Length



Maximum Message Length

Aztec Code



Aztec Code can only be read by full 2D imager models.

NOTE

< Default All Aztec Code Settings >



Aztec Code Enable



* On



Off

Aztec Code Message Length

Scan the bar codes below to change the message length. Refer to [Message Length Description on page 6-2](#) for additional information. Minimum and Maximum lengths = 1-3750. Minimum Default = 1, Maximum Default = 3750.



Minimum Message Length



Maximum Message Length

Aztec Runes

Select *Enable Runes* if you are scanning Aztec runes, which are the smallest type of Aztec Code symbol with the ability to encode a very short license plate message.



Enable Runes



* Disable Runes

NOTES

Chapter 7

Imaging Commands

The imager can be used as a digital camera for capturing, manipulating, and transferring images.

Imaging Commands with their modifiers send imaging commands to the imager on a single-use basis, and take effect for the next subsequent image capture. Once that capture is complete, the imager reverts to its imaging default settings. If you wish to change a default setting, you must use the serial default command (see *Imaging Default Commands* on page 11-24). When the serial default command is used, that selection becomes the new default setting for the imager.

Image Snap - IMGSNP

An image is taken whenever the trigger of the imager is pressed, or when the Image Snap (IMGSNP) command is processed. Image Snap is the command processor for image capture, or taking a picture.

The image snap command has many different modifiers that can be used to change the look of the image in memory. Modifiers always begin with numbers and end with a letter (case insensitive). Any number of modifiers may be appended to the IMGSNP command. For example, you can use the following command to snap an image, increase the gain, and have the beeper sound once the snap is complete:

```
IMGSNP2G1B
```

IMGSNP Modifiers

P - Imaging Style: Sets the Image Snap style.

0P Decoding Style. This is similar to the current format for decoding, however, this processing allows a few frames to be taken until the exposure parameters are met. Then the last frame is available for further use.

1P Photo Style (*default*). This attempts to mimic a simple digital camera, and results in a visually optimized image.

2P Manual Style. This is an advanced style, and should not normally be used. It allows you the most freedom to set up the imager, and has no auto-exposure.

B - Beeper: Causes a beep to sound after an image is snapped.

0B No beep (*default*)

1B Sounds a beep when the image is captured, notifying the user that the imager can be moved.

E - Exposure: This allows you to set the exposure time. Units are 127 microseconds. Exposure is used in Manual Style only. (*Default = 7874*)

nE Range: 0 - 7874

G - Gain: This modifier boosts the signal and multiplies the pixel value.

1G No gain (*default*)

2G Medium gain

4G Heavy gain

8G Maximum gain

D - Delta for Acceptance: This sets the allowable range for the white value setting (see W - Target White Value). Delta is only available when using Photo Style. (*Default = 25*)

nD Range: 0 - 255

L - LED State: Determines if the LEDs should be on or off, and when. Ambient illumination (0L) is preferred for taking pictures of color documents, such as ID cards, especially when the imager is in a stand. LED illumination (1L) is preferred when the imager is hand held. LED State is not available when using Decoding Style.

0L LEDs off (*default*)

1L LEDs on

T - Wait for Trigger: Waits for a hardware trigger pull before taking the image.

0T Takes image immediately (*default*)

1T Waits for a trigger pull, then takes the image

U - Update Tries: The maximum number of frames the imager should take to reach the Delta for Acceptance. Update Tries is only available when using Photo Style. (*Default = 6*)

nU Range: 0 - 10

W - Target White Value: Sets the target for the median grayscale value in the captured image. For capturing close-up images of high contrast documents, a lower setting, such as 75, is recommended. Higher settings result in longer exposure times and brighter images, but if the setting is too high, the image may be overexposed. Target White Value is only available when using Photo Style. (*Default = 125*)

nW Range: 0 - 255

% - Target Set Point Percentage: Sets the target point for the light and dark values in the captured image. A setting of 75% means 75% of the pixels are at or below the target white value, and 25% of the pixels are above the target white value. Altering this setting from the default is not recommended under normal circumstances. To alter grayscale values, Target White Value should be used. (*Default = 50*)

n% Range: 1 - 99

Image Ship - IMGSHIP

An image is taken whenever the trigger of the unit is pressed, or when the Image Snap (IMGSNP) command is processed. The last image is always stored in memory. You may “ship” the image by using the IMG-SHP command.

The image ship command has many different modifiers that can be used to change the look of the image output by the scanner. Modifiers affect the image that is transmitted, but do not affect the image in memory. Modifiers always begin with numbers and end with a letter (case insensitive). Any number of modifiers may be appended to the IMGSHIP command. For example, you can use the following command to ship a bitmap image with gamma correction and document image filtering:

IMGSHIP8F75K26U

IMGSHIP Modifiers

A - Infinity Filter: Enhances pictures taken from very long distances (greater than 10 feet or 3 m).

0A Infinity filter off (*default*)

1A Infinity filter on

C - Compensation: Flattens the image to account for variations in illumination across the image.

0C Compensation disabled (*default*)

1C Compensation enabled

D - Pixel Depth: Indicates the number of bits per pixel in the transmitted image (KIM or BMP format only).

8D 8 bits per pixel, grayscale image (*default*)

1D 1 bit per pixel, black and white image

E - Edge Sharpen: Causes the transmitted image to be convolved with an edge sharpening filter. Entering a 23E gives the sharpest edges, but also increases noise in the image.

0E Don't sharpen image (*default*)

14E Apply edge sharpen for typical image

ne Apply edge sharpen using strength *n* ($n = 1-24$)

F - File Format: Indicates the desired format for the image.

0F KIM format

1F TIFF binary

2F TIFF binary group 4, compressed

3F TIFF grayscale

4F Uncompressed binary (upper left to lower right, 1 pixel/bit, 0 padded end of line)

5F Uncompressed grayscale (upper left to lower right, bitmap format)

6F JPEG image (*default*)

8F BMP format (lower right to upper left, uncompressed)

H - Histogram Stretch: Increases the contrast of the transmitted image.
Not available with some image formats.

0H No stretch (*default*)

1H Histogram stretch

I - Invert Image: Used to rotate the image around the X or Y axis in fixed mount applications where the imager is mounted upside down.

1 IXInvert around the X axis (flips picture upside down)

1 IYInvert around the Y axis (flips picture left to right)

Imaging Commands

IR - Image Rotate:

1IR Rotate image 90 degrees to the right

2IR Rotate image 180 degrees (upside down)

3IR Rotate image 90 degrees to the left

J - JPEG Image Quality: Sets the desired quality when the JPEG image format is selected. Higher numbers result in higher quality, but larger files. Smaller numbers result in greater amounts of lossy compression, faster transmission times, lower quality, but smaller files. (*Default = 50*)

nJ Image is compressed as much as possible while preserving quality factor of *n* (*n* = 0 - 100)

0J worst quality (smallest file)

100J best quality (largest file)

K - Gamma Correction: Gamma measures the brightness of midtone values produced by the image. You can brighten or darken an image using gamma correction. A higher gamma correction yields an overall brighter image. The lower the setting, the darker the image. A setting of 100 results in no adjustment to the image. The optimal setting for text images is 50K.

0K Gamma correction off (*default*)

50K Apply gamma correction for brightening typical document image

nK Apply gamma correction factor *n* (*n* = 1-255)

L, R, T, B, M - Image Cropping: Ships a window of the image by specifying the left, right, top, and bottom pixel coordinates. Device columns are numbered 0 through 640, and device rows are numbered 0 through 480.

nL The left edge of the shipped image corresponds to column *n* of the image in memory. Range: 000 - 640. (*Default = 0*)

nR The right edge of the shipped image corresponds to column $n - 1$ of the image in memory. Range: 000 - 640. (*Default = all columns, or 639 for VGA imager*)

nT The top edge of the shipped image corresponds to row n of the image in memory. Range: 000 - 480. (*Default = 0*)

nB The bottom edge of the shipped image corresponds to row $n - 1$ of the image in memory. Range: 000 - 480. (*Default = all rows, or 479 for VGA imager*)

Alternately, specify the number of pixels to cut from the outside margin of the image; thus only the center pixels are transmitted.

nM Margin: cut n columns from the left, $n + 1$ columns from the right, n rows from the top, and $n + 1$ rows from the bottom of the image. Ship the remaining center pixels. Range: 1 - 238. (*Default = 0, or full image*)

P - Protocol: Used for shipping an image. Protocol covers two features of the image data being sent to the host. It addresses the protocol used to send the data (Hmodem, which is an Xmodem 1K variant that has additional header information), and the format of the image data that is sent.

0*P* None (raw data)

2*P* None (*default for USB*)

3*P* Hmodem uncompressed

4*P* Hmodem uncompressed (*default for RS-232*)

S - Pixel Ship: Can be used to decimate the image by shipping only certain, regularly spaced pixels. For example, 4*S* would transmit every fourth pixel from every fourth line. The smaller number of pixels shipped, the smaller the image. However, after a certain point, the image becomes unusable.

1*S* ship every pixel (*default*)

2*S* ship every 2nd pixel, both horizontally and vertically (*default*)

Imaging Commands

3S ship every 3rd pixel, both horizontally and vertically

U - Document Image Filter: Sharpens the edges and smooths the area between the edges of the transmitted text image. The Document Image Filter enhances images of documents such as ID cards and prescriptions. This filter should be used with gamma correction (see page 7-6), with the imager in a stand, and the image captured using the command:

IMGSNP1P0L168W90%32D

This filter typically provides better JPEG compression than the standard E - Edge Sharpen command (see page 7-8). This filter also works well when shipping pure black and white images (1 bit per pixel). The optimal setting is 26U.

0U Document image filter off (*default*)

26U Apply document image filter for typical document image

*n*U Apply document image filter using grayscale threshold *n*. Use lower numbers when the image contrast is lower. 1U will have a similar effect to 22e. Range: 0-255.

V - Blur Image: Smooths transitions by averaging the pixels next to the hard edges of defined lines and shaded areas in an image.

0V Don't blur (*default*)

1V Blur

W - Histogram Ship: A histogram gives a quick picture of the tonal range of an image, or key type. A low-key image has detail concentrated in the shadows; a high-key image has detail concentrated in the highlights; and an average-key image has detail concentrated in the midtones. This modifier ships the histogram for an image.

0W Don't ship histogram (*default*)

1W Ship histogram

Intelligent Signature Capture - IMGBOX

Intelligent signature capture ships only part of an image to the host application. This method reduces transfer time and file size, while simplifying signature capture.

Below is an example of an intelligent signature capture application. In this example, the operator reads the bar code, which is then transmitted to the host application. Upon the receipt of the bar code data, the host application sends the IMGBOX command, which tells the scanner to output only the area of the image corresponding to the signature capture box. The scanner also automatically adjusts for aspect ratio and distortion, issues that arise due to scanner skew with respect to the bar code.

Align the aimers with the signature area (not with the bar code), then pull the trigger. Send the IMGBOX command string after the trigger pull.



An important aspect of intelligent signature capture is that all dimensions used in the application are measured as multiples of the minimum element size of the bar code. Using this method, intelligent signature capture always outputs the correct image size and resolution, no matter the distance at which the scanner is held from the bar code, assuming that the entire signature capture area is within the scanner's field of view.

The intelligent signature capture command string for this application is:
IMGBOX40S0X70Y190W100H1R0F

IMGBOX Modifiers

D - Pixel Depth: Indicates the number of bits per pixel in the transmitted image.

8D 8 bits per pixel, grayscale image

1D 1 bit per pixel, black and white image

F - File Format: Indicates the type of file format in which to save the image.

0F KIM format (*default*)

1F TIFF binary

2F TIFF binary group 4, compressed

3F TIFF grayscale

4F Uncompressed Binary

5F Uncompressed grayscale

6F JPEG image

7F Outlined image

8F BMP format

H - Height of Signature Capture Area: In the example, the height of the area to be captured is 1 inch, resulting in a value of $H = 1/0.01 = 100$. The value for H is slightly larger, to accommodate some extra image capture area outside of the signature capture box.

K - Gamma Correction: Gamma measures the brightness of midtone values produced by the image. You can brighten or darken an image using gamma correction. A higher gamma correction yields an overall brighter image. The lower the setting, the darker the image. A setting of 100 results in no adjustment to the image. (*Default = 50K*)

0K Gamma correction off

50K Apply gamma correction for brightening typical document image

nK Apply gamma correction factor n ($n = 1-255$)

R - Resolution of Signature Capture Area: The number of pixels that the imager outputs per each minimum bar width. The higher the value for R, the higher the quality of the image, but also the larger the file size.

S - Bar Code Aspect Ratio: The ratio of the bar code height to the narrow element width. In the example, the narrow element width is .010 inches and the bar code height is 0.400 inches, resulting in a value of $S = 0.4/0.01 = 40$.

W - Width of Signature Capture Area: In the example, the width of the area to be captured is 1.90 inches, resulting in a value of $W = 1.9/0.01 = 190$. The value for W is slightly larger, to accommodate some extra image capture area outside of the signature capture box.

X - Horizontal Bar Code Offset: The horizontal ratio offset of the center of the signature capture area, in multiples of the minimum bar width. In the example, the horizontal offset is 0.

Y - Vertical Bar Code Offset: The vertical offset of the center of the signature capture area, in multiples of the minimum bar width. Negative numbers indicate that the signature capture is above the bar code, and positive numbers indicate that the area is below the bar code. In the example, the horizontal offset is 0.70 inches, resulting in a value for $Y = 0.7/0.01 = 70$.

NOTES

Chapter 8

OCR Programming

Use this section to program the Imager for optical character recognition (OCR). PowerScan 2D models read 6 to 60 point OCR typeface.



NOTE

OCR is not as secure as bar codes. To enhance security in OCR applications, create an OCR template to match the data, and print an OCR check character.

The 2D imager will read the following fonts:

OCR-A

0123456789ABCDEF GHIJKLMNOPQRSTUVWXYZ
() < > / \ + - * \$

OCR-B

0123456789ABCDEF GHIJKLMNOPQRSTUVWXYZ
() < > / \ + - * \$

U.S. Currency Serial Number (Money)

I07700277 F
*

MICR E-13B

0 1 2 3 4 5 6 7 8 9 * ' " #

SEMI Font

ABCDEF GHIJKLMNOPQRSTUVWXYZ - . 0123456789

You can either select an OCR default, or create your own custom template for the type of OCR format you intend to read. See [OCR on page 8-2](#) for programming codes that will enable your imager to read OCR-A, OCR-B, U.S. Currency, MICR E 13 B, or SEMI fonts. See [OCR Templates on page 8-5](#) if you want to create a custom “template,” or character string that defines the length and content of OCR strings that will be read with your imager.



Setting the template and check character options are essential for OCR reading

NOTE

OCR Fonts

Default All OCR Settings turns off all OCR capability in the imager, so the imager will be able to scan linear, stacked, matrix, and composite bar codes, but not OCR fonts. In addition, any OCR templates you have created are erased. The eight digit default templates are reinstated for any future use of the **OCR On** codes listed below.

< Default All OCR Settings >



OCR



NOTE

OCR symbols can misread when scanned sideways or upside down. Use [Working Orientation on page 3-22](#), if your OCR symbols will not usually be presented upright to the scanner.

Only one OCR symbology can be read at a time.

OCR-A On allows you to scan characters in the OCR-A font. The default setting allows you to scan any eight digit combination. If you have created an OCR template, character combinations that fit the template can be scanned (see [Creating an OCR Template on page 8-5](#)).



OCR-A On

OCR-B On allows you to scan characters in the OCR-B font. The default setting allows you to scan any eight digit combination. If you have created an OCR template, character combinations that fit the template can be scanned (see [Creating an OCR Template on page 8-5](#)).



OCR-B On

U.S. Currency Font

U.S. Currency On allows you to scan characters in the font used on U.S. currency. The default setting allows you to scan any eight digit combination. If you have created an OCR template, character combinations that fit the template can be scanned (see [Creating an OCR Template on page 8-5](#)).



U.S. Currency On

MICR E13 B Font

MICR E13 B On allows you to scan MICR characters on a bank check. The default setting allows you to scan any eight digit combination. If you have created an OCR template, character combinations that fit the template can be scanned (see [Creating an OCR Template on page 8-5](#)).



MICR E 13 B On



NOTE

TOAD characters (Transit, On Us, Amount and Dash) are output in the following manner:

- The Transit character is output as T
- The On Us character is output as O
- The Amount character is output as A
- The Dash character is output as D

SEMI Font

SEMI Font On allows you to scan the SEMI font used in the semiconductor industry.



SEMI Font On

All OCR Off turns off all OCR capability in the imager, so the imager will be able to scan linear, stacked, matrix, and composite bar codes, but not OCR fonts. However, any OCR templates you have created will be retained in memory.



* All OCR Off

OCR Templates

You can create a custom “template,” or character string that defines the length and content of OCR strings that will be read with your imager. There are several choices when creating a custom template for your application. You can create a template for a single format, you can string together several formats, and you can create a template for a user-defined variable. These choices are described in detail below.

Creating an OCR Template

A single template allows you to program the imager to read any combination of characters in the order you specify. Refer to examples that follow the Template Characters table below.

Template Characters

Table 8-1. Template Characters

a	represents any alphanumeric character (digit or letter)
c	represents a check character position
d	represents any digit
e	represents any available OCR character
g	represents character from user-defined variable "g"
h	represents character from user-defined variable "h"
l	represents any uppercase letter
t	marks the start of a new template
r	multi row indicator
* All other characters (except capital letters T, O, A and D) represent themselves. Spaces can be used.	



In MICR E13 B templates, TOAD characters (capital letters T, O, A, and D), represent Transit, On Us, Amount, and Dash.

NOTE

OCR templates default to eight digits, no check character.

To Add an OCR Template...

1. Turn on the OCR font you want to read ([page 8-2](#)).
2. *Begin building the template.*
Scan the **Enter OCR Template** symbol ([page 8-16](#)).
3. Scan the characters for the string.
Use the Template Characters chart above to determine what characters you need to create your format. Use the [OCR Programming Chart on page B-4](#) to scan the characters for your template.

You need to read any combination of eight digits. The template would be:

dddddddd

To create this template, you would enable the OCR-A font. Scan the **Enter OCR Template** symbol (page 8-16), then scan the **d** from the **OCR Programming Chart on page B-4** eight times. Scan **Save OCR Template** (page 8-17). This would let you read any string of eight digits, for example:

37680981

Character Match Sequences

On the **ASCII Conversion Chart (Code Page 1252) on page A-4**, find the Hex value that represents the character(s) you want to match. Use the **Programming Chart on page B-5** to scan the numbers that represent these characters.

Example: You need to read three digits, three specific characters (ABC), three digits. The template would be:

ddd414243ddd


 hex codes for letters
 A, B, and C

To create this template, you would enable the OCR-A font. Scan the **Enter OCR Template** symbol (page 8-16). Scan the **d** from the **OCR Programming Chart on page B-4** three times. Then scan **414243** from the **Programming Chart on page B-5** (the hex characters for “A,” “B,” and “C”), and scan the **d** three more times. Scan **Save OCR Template, page 8-17**. This would let you read any string of three digits, “ABC,” then any string of three digits, for example:

551ABC983

Adding Spaces

You may also need to put spaces in your template.

Example: You need to read three digits, space, three specific characters (ABC), space, three digits. The template would be:

ddd2041424320ddd


 hex code for a space

To create this template, you would enable the OCR-A font. Scan the **Enter OCR Template** symbol (page 8-16). Scan the **d** from the **OCR Programming Chart on page B-4** in the back of this manual three times, then scan **2041424320** from the **Programming Chart on page B-5** (the hex characters for “space,” “A,” “B,” “C,” “space”). Scan the **d** three more times, then scan **Save OCR Template** (page 8-17). This would let you read any string of three digits, space, “ABC,” space, then any string of three digits. For example:

551 ABC 983



NOTE

If using PowerView to program, use the space bar to designate a space and not the hex value of 20.

4. Exit OCR Template Editor

Scan **Save OCR Template** to save your entries. **Discard OCR Template** exits without saving any OCR Template changes.

Stringing Together Multiple Formats (Creating “Or” Statements)

You may want to program the imager to accept many OCR formats. To do this, you would string together each format with a “t.” This tells the imager to read optical characters that match any one of the formats in the template.

Example: You need to read any combination of eight digits, *or* a combination of four digits, two uppercase letters, and two digits. The template would be:

dddddddtdddlldd

To create this template, you would enable the OCR-A font. Scan the **Enter OCR Template** symbol (page 8-16). Scan the **d** from the **OCR Programming Chart on page B-4** eight times, then scan the **t** to create the “or” statement. Then you would scan the characters for the second template. Scan **d** four times, scan **I two times**, then scan **d** two more times. Scan **Save OCR Template** (page 8-17). This would let you read either type of format, for example:

99028650

or

9902XZ50

You can string together as many templates as you need.

OCR User-Defined Variables

You can create up to two of your own user variables for an OCR template. These variables will represent any OCR readable characters. The user-defined variables are stored under the letters “g” and “h.” Creating a user variable follows the same steps as creating a template, but instead of scanning the **Enter OCR Template** symbol, you scan the **Enter User-Defined Variable** symbol (page 8-16). The letters g and h can then be used in an OCR template to define the variable you specified.

Example: You need a variable to represent the letters “A,” “B,” or “C.” The template for this variable would be:

414243

To create this template, you would enable the OCR-A font. Scan the **Enter User-Defined Variable g** symbol (page 8-16). Scan **414243** from the [Programming Chart](#) (the hex characters for “A,” “B,” and “C”). Scan **Save OCR Template** (page 8-17). This will let you read either A or B or C in any position where you place the g. For example, you could create the following template:

ddddddggg

This template would then let you read data that began with six digits, and had an A, B, or C trailing. So you would be able to read:

654321ABC

or

654321BAC

or

654321CCC

Reading Multi-Row OCR

The PowerScan 2D is capable of decoding multi-row OCR text.



Reading rows longer than sixteen characters is not recommended.

NOTE

Consider the following example. This example shows serial commands as they would be entered using PowerView.

Example: You need to read multiple rows of OCR-A data as shown below:

12345678

ABCDEFGH

First, enable the OCR-A font. To read the first row of OCR data, you would program the following template:

OCRTEMP"ddddddd".

This template is the default OCR template. If you wanted to read the second line of data, you would use the following template:

OCRTEMP"|||||||".

To read both lines of OCR at one time, use the variable *r* to indicate the start of a new row. All the other templating variables for the individual rows work the same as previously described. For instance, in the above example, you would use the following template to read both rows:

OCRTEMP"dddddddrr|||||||".

To read the three rows below, you would use the template command "OCRTEMP"dddddddrr|||||||rrlll|ddd".

12345678

ABCDEFGH

ABCD1234.

OCR Check Character

You may want to print and verify a check character in order to enhance the security of your OCR application. The imager can be programmed for almost any type of check character. A number of presets are provided for common check character uses (e.g., modulo 10 and modulo 36).

Scan the **OCR Modulo 10** or **OCR Modulo 36 Check Character** bar code to specify the type of check character used in the OCR strings you're scanning. The imager will then only read OCR character strings with a valid check character. The imager transmits the OCR data without the check character data. You must specify the location of the check character in the template with a *c*.

Example: You need to read any combination of seven digits, with a modulo 10 check character in the eighth position. The template would be:

ddddddc

To create this template, you would enable the OCR-A font. Scan the **Modulo 10 Check Character** symbol. Then scan the **Enter OCR Template** symbol, and scan the **d** from the [OCR Programming Chart](#) seven times, and scan the **c** once. Scan **Save OCR Template** (page 8-17). This template will let you read any combination of six digits with a correct check character after. (If the check character is invalid, the imager will issue an error beep.) For example, the following string could be scanned:

01234569

and the output would be: 0123456

OCR Modulo 10 Check Character

Scan this symbol to program the OCR template for a simple modulo 10 checksum of the digits 0 through 9.



OCR Modulo 10 Check Character

OCR Modulo 36 Check Character

Scan this symbol to program the OCR template for a simple modulo 36 checksum of the digits 0 through 9 and the letters A through Z.



OCR Modulo 36 Check Character

OCR User-Defined Check Character

You can customize the check character calculation to suit your application. Each character of the check character alphabet can be programmed in its proper order. The number of characters you enter determines the modulo value for the calculation. By default, the check character computation is unweighted, but the imager also supports two weighted modulo 10 checking schemes.

Example: To program a modulo 11 check character, you would enter the following 11 characters in order:

0123456789X

Also enter the OCR template:

dddddddc

Enable the OCR-A font, then scan the following string:

6512351X

The imager performs the following check character computation:

$$(6 + 5 + 1 + 2 + 3 + 5 + 1 + X) \text{ modulo } 11 = 0$$

Since the result is zero, the message is considered to be valid, so the reader outputs the message: 6512351

Programming a User-Defined Check Character

1. Scan the Enter OCR Check Character bar code, below.



Enter OCR Check Character

2. Enter the characters in order. For each character, look up the corresponding hex value from the [ASCII Conversion Chart \(Code Page 1252\)](#) on [page A-4](#). Use the [Programming Chart](#) on [page B-5](#) of this manual to scan the two symbols for each hex value.
3. Scan the Save bar code on the [Programming Chart](#) on [page B-5](#).

Example: To program the modulo 11 check character from example #8 on [page 8-12](#), enable the OCR-A font. Scan the Enter OCR Check Character bar code on [page 8-12](#), then scan the following hex values in order:

3031323334353637383958

After you enter all the desired hex values, scan the Save bar code on the [Programming Chart on page B-5](#) of this manual.

Weighting Options

By default, the check character computation is unweighted. It is possible to use one of two weighted modulo 10 schemes. Weighting is often used to detect if two neighboring characters are transposed, a common error when an operator keys in data.

3-1-3-1 Weighted Modulo 10 Check Character

Starting with the check character and working backward through the message, the imager applies a multiplier of 1, then 3, then 1, then 3, and so on. This is the checking scheme used in many EAN•UCC symbologies, including U.P.C. and Interleaved 2 of 5 (when a check digit is invoked). To apply this weighting scheme, set the OCR check character to “0123456789x3x1” or scan the following symbol:



3-1-3-1 Weighted Modulo 10
Check Character

Example: Scan the 3-1-3-1 Weighted Modulo 10 Check Character symbol. Also enter the OCR template:

ddddddc

Then scan the string below:

01234565

The reader performs the check character computation below:

$$(0 \times 3 + 1 \times 1 + 2 \times 3 + 3 \times 1 + 4 \times 3 + 5 \times 1 + 6 \times 3 + 5 \times 1) \text{ modulo } 10 = 0$$

Since the result is zero, the message is considered to be valid, so the reader outputs the message: 0123456

2-1-2-1 Weighted Modulo 10 Check Character

Starting with the check character and working backward through the message, the imager applies a multiplier of 1, then 2, then 1, then 2, and so on. When the result of the multiplication is greater than 9, add both digits to the running sum. This is often referred to as the LUHN formula. One common application of the LUHN formula is validate credit card numbers. This is the modulo 10 checking scheme used in MSI Code and in Code 32 Pharmaceutical (PARAF). To apply this weighting scheme, set the OCR check character to "0123456789x2x1" or scan the following symbol:



2-1-2-1 Weighted Modulo 10
Check Character

Example: Scan the 2-1-2-1 Weighted Modulo 10 Check Character symbol. Also enter the OCR template:

dddddc

Then scan the string below:

0128454

The reader performs the check character computation below:

$$\begin{aligned} & (0 \times 1 + 1 \times 2 + 2 \times 1 + 8 \times 2 + 4 \times 1 + 5 \times 2 + 4 \times 1) \text{ modulo } 10 \\ &= (0 + 2 + 2 + (1 + 6) + 4 + (1 + 0) + 4) \text{ modulo } 10 \\ &= 0 \end{aligned}$$

Since the result is zero, the message is considered to be valid, so the reader outputs the message: 012845

OCR ISBN Application Example

One application of OCR is to read the ISBN characters typically encoded using the OCR-A or OCR-B font. This is especially useful when the ISBN number is not encoded in an EAN-13 bar code. The following example shows how to configure the imager to read the ISBN strings on books in Japan. After you have followed the steps below, you will be able to scan the following ISBN number or the additional data below it, depending on the line of text at which the imager is aimed.

ISBN4-594-03019-X

c0097 ¥838E

1. Scan the [OCR-B On](#) bar code on [page 8-3](#).
2. Program the user-defined variable “g” to comprise the ten digits plus the dash:

0123456789-

3. In Japan, it is common for two fields to follow the ISBN number, the three digit price field, and the four digit price field. The first field typically starts with a “C” (uppercase c), followed by four digits. The second field typically starts with a “P” or a yen symbol, followed by three or four digits, followed by an “E.” Program the user-defined variable “h” to comprise the “P” and the yen symbol (represented by a backslash).

P\

4. Scan the symbol below to set up three templates to handle the ISBN number, the three digit price field, and the four digit price field.



5. Finally, set up the ISBN check digit, which is a special position-weighted modulo 11 checksum. The imager automatically invokes the ISBN checksum for template rows that are:
 - 1.) at least fourteen characters long,
 - 2.) whose first four characters are the letters “ISBN,”
 - 3.) whose last character is a check character, and

4.) when the modulo 11 check character “0123456789X” is programmed.

Please note that all these commands can be combined into a single serial programming command:

```
OCRENA2,TMP"ISBNgggggggggggctCdddd hdddEtCdddd  
hdddE",GPG"0123456789-",GPH"P",CHK"0123456789X".
```

These commands can be encoded into the following Aztec Code symbol:



OCR Template Codes



NOTE

Reading more than three rows of OCR is not recommended. Contact the factory if you have an application that requires reading four or more rows of OCR.



Enter OCR Template †



Enter User-Defined
Variable “g” †



Enter User-Defined
Variable “h” †

† One or more two-digit numbers and **Save** are required after reading this programming symbol. Refer to the [Programming Chart on page B-5](#) of this manual.

Exit Selections



Save OCR Template



Discard OCR Template

NOTES

Chapter 9

Interface Keys

Keyboard Function Relationships

The following Keyboard Function Code, Hex/ASCII Value, and Full ASCII “CTRL”+ relationships apply to all terminals that can be used with the imager. Refer to [page 2-7](#) enable Control + ASCII mode.

Function Code	HEX/ASCII Value	Full ASCII “CTRL” +
NUL	00	2
SOH	01	A
STX	02	B
ETX	03	C
EOT	04	D
ENQ	05	E
ACK	06	F
BEL	07	G
BS	08	H
HT	09	I
LF	0A	J
VT	0B	K
FF	0C	L
CR	0D	M
SO	0E	N
SI	0F	O
DLE	10	P
DC1	11	Q
DC2	12	R
DC3	13	S
DC4	14	T
NAK	15	U
SYN	16	V

Interface Keys

Function Code	HEX/ASCII Value	Full ASCII "CTRL" +
ETB	17	W
CAN	18	X
EM	19	Y
SUB	1A	Z
ESC	1B	[
FS	1C	\
GS	1D]
RS	1E	6
US	1F	-

The last five characters in the Full ASCII "CTRL" + column ([\] 6 -), apply to US only. The following chart indicates the equivalents of these five characters for different countries.

Country	Codes				
United States	[	\	\]	6	-
Belgium	[	<	]	6	-
Scandinavia	8	<	9	6	-
France	^	8	\$	6	=
Germany		Ã	+	6	-
Italy		\	+	6	-
Switzerland		<	..	6	-
United Kingdom	[	¢	]	6	-
Denmark	8	\	9	6	-
Norway	8	\	9	6	-
Spain	[	\	\]	6	-

Supported Interface Keys

ASCII	HEX	IBM AT/XT and PS/2 Compatibles, WYSE PC/AT Supported Keys	IBM XTs and Compatibles Supported Keys	IBM, DDC, Memorex Telex, Harris* Supported Keys
NUL	00	Reserved	Reserved	Reserved
SOH	01	Enter (KP)	CR/Enter	Enter
STX	02	Cap Lock	Caps Lock	F11
ETX	03	ALT make	Reserved	F12
EOT	04	ALT break	Reserved	F13
ENQ	05	CTRL make	Reserved	F14
ACK	06	CTRL break	Reserved	F15
BEL	07	CR/Enter	CR/Enter	New Line
BS	08	Reserved	Reserved	F16
HT	09	Tab	Tab	F17
LF	0A	Reserved	Reserved	F18
VT	0B	Tab	Tab	Tab/Field Forward
FF	0C	Delete	Delete	Delete
CR	0D	CR/Enter	CR/Enter	Field Exit/New Line
SO	0E	Insert	Insert	Insert
SI	0F	Escape	Escape	F19
DLE	10	F11	Reserved	Error Reset
DC1	11	Home	Home	Home
DC2	12	Print	Print	F20
DC3	13	Back Space	Back Space	Back Space
DC4	14	Back Tab	Back Tab	Backfield/Back Tab
NAK	15	F12	Reserved	F21
SYN	16	F1	F1	F1
ETB	17	F2	F2	F2
CAN	18	F3	F3	F3
EM	19	F4	F4	F4
SUB	1A	F5	F5	F5
ESC	1B	F6	F6	F6
FS	1C	F7	F7	F7
GS	1D	F8	F8	F8
RS	1E	F9	F9	F9
US	1F	F10	F10	F10

* IBM 3191/92, 3471/72, 3196/97, 3476/77, Telex (all models)

Supported Interface Keys

ASCII	HEX	IBM, Memorex Telex (102)* Supported Keys	Memorex Telex (88)** Supported Keys
NUL	00	Reserved	Reserved
SOH	01	Enter	Enter
STX	02	F11	PF10
ETX	03	F12	PF11
EOT	04	F13	PF12
ENQ	05	F14	Reserved
ACK	06	F15	Reserved
BEL	07	New Line	New Line
BS	08	F16	Field Forward
HT	09	F17	Field Forward
LF	0A	F18	Reserved
VT	0B	Tab/Field Forward	Field Forward
FF	0C	Delete	Delete
CR	0D	Field Exit	New Line
SO	0E	Insert	Insert
SI	0F	Clear	Erase
DLE	10	Error Reset	Error Reset
DC1	11	Home	Reserved
DC2	12	Print	Print
DC3	13	Back Space	Back Space
DC4	14	Back Tab	Back Field
NAK	15	F19	Reserved
SYN	16	F1	PF1
ETB	17	F2	PF2
CAN	18	F3	PF3
EM	19	F4	PF4
SUB	1A	F5	PF5
ESC	1B	F6	PF6
FS	1C	F7	PF7
GS	1D	F8	PF8
RS	1E	F9	PF9
US	1F	F10	Home

* IBM 3196/97, 3476/77, 3191/92, 3471/72, Memorex Telex (all models) with 102 key keyboards

** Memorex Telex with 88 key keyboards

Supported Interface Keys

ASCII	HEX	Esprit 200, 400 ANSI Supported Keys	Esprit 200, 400 ASCII Supported Keys	Esprit 200, 400 PC Supported Keys
NUL	00	Reserved	Reserved	Reserved
SOH	01	New Line	New Line	New Line
STX	02	N/A	N/A	N/A
ETX	03	N/A	N/A	N/A
EOT	04	N/A	N/A	N/A
ENQ	05	N/A	N/A	N/A
ACK	06	N/A	N/A	N/A
BEL	07	New Line	New Line	New Line
BS	08	N/A	N/A	N/A
HT	09	Tab	Tab	Tab
LF	0A	N/A	N/A	N/A
VT	0B	Tab	Tab	Tab
FF	0C	N/A	N/A	Delete
CR	0D	New Line	New Line	New Line
SO	0E	N/A	N/A	Insert
SI	0F	Escape	Escape	Escape
DLE	10	F11	F11	F11
DC1	11	Insert	Insert	Home
DC2	12	F13	F13	Print
DC3	13	Back Space	Back Space	Back Space
DC4	14	Back Tab	Back Tab	Back Tab
NAK	15	F12	F12	F12
SYN	16	F1	F1	F1
ETB	17	F2	F2	F2
CAN	18	F3	F3	F3
EM	19	F4	F4	F4
SUB	1A	F5	F5	F5
ESC	1B	F6	F6	F6
FS	1C	F7	F7	F7
GS	1D	F8	F8	F8
RS	1E	F9	F9	F9
US	1F	F10	F10	F10

Supported Interface Keys

ASCII	HEX	Apple Mac/iMac Supported Keys
NUL	00	Reserved
SOH	01	Enter/Numpad Enter
STX	02	CAPS
ETX	03	ALT make
EOT	04	ALT break
ENQ	05	CNTRL make
ACK	06	CNTRL break
BEL	07	RETURN
BS	08	APPLE make
HT	09	TAB
LF	0A	APPLE break
VT	0B	TAB
FF	0C	Del
CR	0D	RETURN
SO	0E	Ins Help
SI	0F	ESC
DLE	10	F11
DC1	11	Home
DC2	12	Prnt Scrn
DC3	13	BACKSPACE
DC4	14	LSHIFT TAB
NAK	15	F12
SYN	16	F1
ETB	17	F2
CAN	18	F3
EM	19	F4
SUB	1A	F5
ESC	1B	F6
FS	1C	F7
GS	1D	F8
RS	1E	F9
US	1F	F10
DEL	7F	BACKSPACE

Chapter 10

Utilities

To Add a Test Code I.D. Prefix to All Symbologies

This selection allows you to turn on transmission of a Code I.D. before the decoded symbology. (See the [Symbology Chart on page A-1](#)) for the single character code that identifies each symbology.) This action first clears all current prefixes, then programs a Code I.D. prefix for all symbologies. This is a temporary setting that will be removed when the unit is power cycled.



Add Code I.D. Prefix to
All Symbologies (Temporary)

Show Software Revision

Scan the bar code below to output the current software revision, unit serial number, and other product information.



Show Revision

Show Data Format

Scan the bar code below to show current data format settings.



Data Format Settings

Resetting the Standard Product Defaults

If you aren't sure what programming options are in your imager, or you've changed some options and want the standard product default settings restored, scan the *Standard Product Default Settings* bar code below.



Standard Product Default Settings

[Menu Commands on page 11-6](#) lists the standard product default settings for each of the commands (indicated by an asterisk (*) on the programming pages).

Test Menu

When you scan the Test Menu *On* code, then scan a programming code in this manual, the imager displays the content of a programming code. The programming function will still occur, but in addition, the content of that programming code is output to the terminal.



This feature should not be used during normal imager operation.

NOTE



On



* Off

2D PQA (Print Quality Assessment)

Two-dimensional Print Quality Assessment (2D PQA) is a feature of the imager where the data from the successful read of a 2D bar code symbol is augmented with lines of text that both identify the symbol, and also report graded measurement parameters obtained from it.

To see displayed results, Microsoft® Notepad, a word processor/editing program, or PowerView (page 10-6) is recommended. For additional information on interpreting your read results, please contact PSC using the website address listed on the back page of this manual.

Power Image Configurator

Power Image Configurator provides the ability to configure an imaging device by connecting the imager to the COM port of a PC. Power Image Configurator allows you to download updates to a imager's firmware, change programmed parameters, and create and print programming bar codes. Using Power Image Configurator, you can even set up the configuration for a imager which is not attached to your PC. This enables one expert user to establish the configuration settings for all the devices your company uses, then save these configuration files for others. A configuration file can be e-mailed or, if you prefer, an expert user can create a bar code (or series of bar codes) which contains all the customized programming parameters, and mail or fax the bar code(s) to any location. Users in other locations can scan the bar code(s) to load in the customized parameters.

To communicate with an imager, Power Image Configurator requires that the PC have at least one available serial communication port and an RS-232 cable to connect the port to the device. A power supply, which plugs into the cable, is also required.

Power Image Configurator Operations

The Power Image Configurator program performs the following operations:

- Displays all configuration data, and saves the information to a file on your PC.
- Configures the device to meet your specific requirements. Power Image Configurator has all the programming parameters that are available via programming bar codes in this Product Reference Guide.
- Creates and prints a clone bar code which contains the program and configuration data from one device. This bar code can then be used to program additional devices with the same parameters.

- Selects a device from a list, then performs offline or online file configuration for that device.

Temporary Configuration Using Configurator

For quick download communication configuration, scan the appropriate Power Image Configurator bar code for your interface below to temporarily configure the imager for Power Image Configurator settings.



Power Image Configurator
for RS-232



Power Image Configurator
for USB



NOTE

If you download new software into a unit, the user-programmed parameters are retained. If you need to discard user-programmed settings, see [Resetting the Standard Product Defaults](#) on page 10-2.

Installing Power Image Configurator from the Web

1. Access the PSC web site at the address shown on the back cover of this manual and select the language option for your country.
2. Select “Software Updates” from the Quick Links menu on the home page.
3. Locate PowerScan Imager in the Product column.
4. Click on the link “Power Image Configurator.”
5. When prompted, select Save File, and save the files to a location on your computer.
6. Once you have finished downloading the file, exit the web site.

7. Using Explorer, locate your saved file.
8. Unzip and extract the .exe file. Double-click the .exe to install the software. Follow the screen prompts to install the Power Image Configurator program.
9. To start Power Image Configurator, from the Start Menu click on Programs, Power Image Configurator, Power Image Configurator.



If you wish, you can create a shortcut to the Power Image Configurator executable on your desktop.

NOTE

NOTES

Chapter 11

Serial Programming Commands

The serial programming commands can be used in place of the programming bar codes. Both the serial commands and the programming bar codes will program the PowerScan PDF and 2D. For complete descriptions and examples of each serial programming command, refer to the corresponding programming bar code in this manual.

The device must be set to an RS-232 interface (see the Quick Reference Guide). The following commands can be sent via a PC COM port using terminal emulation software.

Conventions

The following conventions are used for menu and query command descriptions:

*parameter*A label representing the actual value you should send as part of a command.

[*option*]An optional part of a command.

{Data}Alternatives in a command.

bold Names of menus, menu commands, buttons, dialog boxes, and windows that appear on the screen.

Menu Command Syntax

Menu commands have the following syntax (spaces have been used for clarity only):

*Prefix Tag SubTag {Data} [, SubTag {Data}] [; Tag SubTag {Data}] [...]
Storage*

Prefix Three ASCII characters: **SYN M CR** (ASCII 22,77,13).

Tag A 3 character case-insensitive field that identifies the desired menu command group. For example, all RS-232 configuration settings are identified with a Tag of 232.

SubTag A 3 character case-insensitive field that identifies the desired menu command within the tag group. For example, the SubTag for the RS-232 baud rate is BAD.

Data The new value for a menu setting, identified by the Tag and Sub-Tag.

Storage A single character that specifies the storage table to which the command is applied. An exclamation point (!) performs the command's operation on the device's volatile menu configuration table. A period (.) performs the command's operation on the device's non-volatile menu configuration table. Use the non-volatile table only for semi-permanent changes you want saved through a power cycle.

Query Commands

Several special characters can be used to query the device about its settings.

- ^ What is the default value for the setting(s).
- ? What is the device's current value for the setting(s).
- * What is the range of possible values for the setting(s). (The device's response uses a dash (-) to indicate a continuous range of values. A pipe (|) separates items in a list of non-continuous values.)

Tag Field Usage

When a query is used in place of a Tag field, the query applies to the *entire* set of commands available for the particular storage table indicated by the Storage field of the command. In this case, the SubTag and Data fields should not be used because they are ignored by the device.

SubTag Field Usage

When a query is used in place of a SubTag field, the query applies only to the subset of commands available that match the Tag field. In this case, the Data field should not be used because it is ignored by the device.

Data Field Usage

When a query is used in place of the Data field, the query applies only to the specific command identified by the Tag and SubTag fields.

Concatenation of Multiple Commands

Multiple commands can be issued within one Prefix/Storage sequence. Only the Tag, SubTag, and Data fields must be repeated for each command in the sequence. If additional commands are to be applied to the same Tag, then the new command sequence is separated with a comma (,) and only the SubTag and Data fields of the additional command are issued. If the additional command requires a different Tag field, the command is separated from previous commands by a semicolon (;).

Responses

The device responds to serial commands with one of three responses:

ACK Indicates a good command which has been processed.

ENQ Indicates an invalid Tag or SubTag command.

NAK Indicates the command was good, but the Data field entry was out of the allowable range for this Tag and SubTag combination, e.g., an entry for a minimum message length of 100 when the field will only accept 2 characters.

When responding, the device echoes back the command sequence with the status character inserted directly before each of the punctuation marks (the period, exclamation point, comma, or semicolon) in the command.

Examples of Query Commands

In the following examples, a bracketed notation [] depicts a non-displayable response.

Example #1: What is the range of possible values for Codabar Coding Enable?

Enter:cbrena*.

Response:CBRENA0-1[ACK]

This response indicates that Codabar Coding Enable (CBRENA) has a range of values from 0 to 1 (off and on).

Example #2: What is the default value for Codabar Coding Enable?

Enter:cbrena^.

Response:CBRENA1[ACK]

This response indicates that the default setting for Codabar Coding Enable (CBRENA) is 1, or on.

Example #3: What is the device's current setting for Codabar Coding Enable?

Enter:cbrena?.

Response:CBRENA1[ACK]

This response indicates that the device's Codabar Coding Enable (CBRENA) is set to 1, or on.

Example #4: What are the device's settings for all Codabar selections?

Enter:cbr?.

Response:CBRENA1[ACK],
SSX0[ACK],
CK20[ACK],
CCT1[ACK],
MIN2[ACK],
MAX60[ACK],
DFT[ACK].

This response indicates that the device's Codabar Coding Enable (CBRENA) is set to 1, or on;
the Start/Stop Character (SSX) is set to 0, or Don't Transmit;
the Check Character (CK2) is set to 0, or Not Required;
concatenation (CCT) is set to 1, or Enabled;
the Minimum Message Length (MIN) is set to 2 characters;
the Maximum Message Length (MAX) is set to 60 characters;
and the Default setting (DFT) has no value.

Trigger Commands

You can activate and deactivate the imager with serial trigger commands. First, the imager must be put in Manual/Serial Trigger Mode either by scanning the Manual/Serial Trigger Mode bar code ([page 3-4](#)), or by sending the Manual/Serial Menu Command ([page 11-10](#)). Once the imager is in serial trigger mode, the trigger is activated and deactivated by sending the following commands:

Activate: **SYN T CR**

Deactivate: **SYN U CR**

The imager scans until a bar code has been read, until the deactivate command is sent, or until the serial time-out has been reached (see [Read Time-Out on page 3-4](#) for a description) and the serial command on [page 11-10](#)).

Menu Commands

Selection	Setting * Indicates default	Serial Command <i># Indicates a numeric entry</i>	Page
Factory Default Settings	Default	DEFAULT	11-6
Terminal Interfaces			
Terminal ID	003 (PowerScan PDF and 2D/010 and 050 models) 000 (PowerScan PDF and 2D/030 models)	TERMID###	2-1

Selection	Setting * Indicates default	Serial Command # Indicates a numeric entry	Page
Program Keyboard Country	*U.S.A.	KBDCTY0	2-3
	Belgium	KBDCTY1	2-3
	Brazil	KBDCTY16	2-3
	Canada (French)	KBDCTY18	2-3
	Czechoslovakia	KBDCTY15	2-3
	Denmark	KBDCTY8	2-3
	Finland (Sweden)	KBDCTY2	2-3
	France	KBDCTY3	2-3
	Germany/Austria	KBDCTY4	2-3
	Greece	KBDCTY17	2-3
	Hungary	KBDCTY19	2-3
	Israel (Hebrew)	KBDCTY12	2-3
	Italy	KBDCTY5	2-4
	Latin America	KBDCTY14	2-4
	Netherlands (Dutch)	KBDCTY11	2-4
	Norway	KBDCTY9	2-4
	Poland	KBDCTY20	2-4
	Portugal	KBDCTY13	2-4
	Romania	KBDCTY25	2-4
	Russia	KBDCTY26	2-4
	SCS	KBDCTY21	2-4
	Slovakia	KBDCTY22	2-4
	Spain	KBDCTY10	2-4
	Sweden	KBDCTY23	2-4
	Switzerland (German)	KBDCTY6	2-4
	Turkey F	KBDCTY27	2-5
Turkey Q	KBDCTY24	2-5	
U.K.	KBDCTY7	2-5	

Serial Programming Commands

Selection	Setting * Indicates default	Serial Command # Indicates a numeric entry	Page
Keyboard Style	*Regular	KBDSTY0	2-5
	Caps Lock	KBDSTY1	2-5
	Shift Lock	KBDSTY2	2-5
	Automatic Caps Lock	KBDSTY6	2-6
	Auto Caps via Num Lock	KBDSTY7	2-6
	Emulate External Keyboard	KBDSTY5	2-6
Keyboard Modifiers	*Control + ASCII Off	KBDCAS0	2-7
	Control + ASCII On	KBDCAS1	2-7
	*Turbo Mode Off	KBDTMD0	2-7
	Turbo Mode On	KBDTMD1	2-7
	*Numeric Keypad Off	KBDNPS0	2-7
	Numeric Keypad On	KBDNPS1	2-7
Serial Port Connection	RS-232	PAP232	QRG ^a
Baud Rate	300 BPS	232BAD0	2-8
	600 BPS	232BAD1	2-8
	1200 BPS	232BAD2	2-8
	2400 BPS	232BAD3	2-8
	4800 BPS	232BAD4	2-8
	9600 BPS	232BAD5	2-8
	19200 BPS	232BAD6	2-8
	38400 BPS	232BAD7	2-8
	57600 BPS	232BAD8	2-8
*115200 BPS	232BAD9	2-8	

Selection	Setting * Indicates default	Serial Command # Indicates a numeric entry	Page
Word Length: Data Bits, Stop Bits, and Parity	7 Data, 1 Stop, Parity Even	232WRD3	2-9
	7 Data, 1 Stop, Parity None	232WRD0	2-9
	7 Data, 1 Stop, Parity Odd	232WRD6	2-9
	7 Data, 2 Stop, Parity Even	232WRD4	2-9
	7 Data, 2 Stop, Parity None	232WRD1	2-9
	7 Data, 2 Stop, Parity Odd	232WRD7	2-9
	8 Data, 1 Stop, Parity Even	232WRD5	2-9
	*8 Data, 1 Stop, Parity None	232WRD2	2-9
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	File Format - TIFF grayscale	IMGFMT3	7-5
	File Format - Uncompressed binary	IMGFMT4	7-5
	File Format - Uncompressed grayscale	IMGFMT5	7-5
	File Format - BMP	IMGFMT8	7-5
	*Histogram Stretch Off	IMGHIS0	7-5
	Histogram Stretch On	IMGHIS1	7-5
	Invert Image around X axis	IMGNVX1	7-5
	Invert Image around Y axis	IMGNVY1	7-5
	Rotate Image 90° right	IMGROT1	7-6
	Rotate Image 180° right	IMGROT2	7-6
	Rotate Image 90° left	IMGROT3	7-6
	JPEG Image Quality (0-100) *50	IMGJQF###	7-6
	*Gamma Correction Off	IMGGAM0	7-6
Gamma Correction On (1- 255)	IMGGAM###		

Serial Programming Commands

Selection	Setting * Indicates default	Serial Command # Indicates a numeric entry	Page
Image Ship (continued)	Image Crop - Bottom (0-480) *479	IMGWNB###	7-7
	Image Crop - Margin (1-238) *0	IMGMAR###	7-7
	Protocol - None (raw)	IMGXFR0	7-7
	Protocol - None (default USB)	IMGXFR2	7-7
	Protocol - Hmodem Uncompressed	IMGXFR3	7-7
	Protocol - Hmodem Uncompressed (default RS-232)	IMGXFR4	7-7
	Ship Every Pixel	IMGSUB1	7-7
	Ship Every 2nd Pixel	IMGSUB2	7-7
	Ship Every 3rd Pixel	IMGSUB3	7-8
	*Document Image Filter Off	IMGUSH0	7-8
	Document Image Filter On (0-255)	IMGUSH###	7-8
	*Don't Ship Histogram	IMGHST0	7-8
	Ship Histogram	IMGHST1	7-8
OCR Selections			
OCR	Default All OCR Settings	OCRDFT	8-2
	OCR-A On	OCRENA1	8-3
	OCR-B On	OCRENA2	8-3
	U.S. Currency On	OCRENA3	8-3
	MICR E 13 B On	OCRENA4	8-4
	SEMI Font	OCRENA5	8-4
	* All OCR Off	OCRENA0	8-4

Selection	Setting * Indicates default	Serial Command # Indicates a numeric entry	Page
OCR Check Character	OCR Mod. 10 Check Char.	"OCRCHK0123456789"	8-11
	OCR Mod. 36 Check Char.	"OCRCHK0123456789ABCDEFGHIJKLM-NOPQRSTU-VWXYZ"	8-11
	OCR User-Defined Check Char.	OCRCHK	8-12
	3-1-3-1 Weighted Mod. 10 Check Char.	OCRCHK3-1-3-1	8-13
	2-1-2-1 Weighted Mod. 10 Check Char.	OCRCHK2-1-2-1	8-14
OCR Templates	Enter OCR Template	OCRTMP	8-16
	Enter User-Defined Variable g	OCRGPG	8-16
	Enter User-Defined Variable h	OCRGPH	8-16

a. Quick Reference Guide (QRG)

NOTES

Chapter 12

Product Specifications

Imager Product Specifications

Parameter	Specification
Dimensions (Typical):	
Height	7.2 inches (18.3 cm)
Length	4.4 inches (11.2 cm)
Width	2.7 inches (6.9 cm)
Weight	9.6 ounces (272 g)
Aimer:	
Illumination LEDs	626nm \pm 30nm
Aiming LEDs	526nm \pm 30nm
Image	VGA, 640x480. Binary, TIFF, or JPEG output.
Skew Angle	\pm 40 degrees
Pitch Angle	\pm 40 degrees
Horizontal Velocity	2 inches (5 cm) per second
Scan Contrast	45% minimum for Matrix codes, 37.5% minimum for all others
Voltage Requirements	4 - 14 VDC at imager
Operating Current (Maximum)	Interlaced aiming mode: 275mA@5V Concurrent aiming mode: 450mA@5V
Standby Current (Maximum)	Normal mode: 60mA@5.5V Low power mode: 30mA@5.5V

Product Specifications

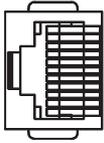
Power Supply: Noise Rejection	Maximum 100mV peak to peak, 10 to 100 kHz
Temperature Ranges: Operating Storage	14° F to +122° F (-10° C to +50° C) -40° F to +158° F (-40° C to +70° C)
Humidity	0 to 95% non-condensing
Mechanical Drop	Operational after 50 drops from 6.5 feet (2.0M) to concrete
Vibration	Meets MIL-STD-810E
Water & Dust	IEC rating IP54DW
MTBF	per MIL-HDBK-217F Ground Benign exceeds 85,000 hours

Standard Cable Pinouts (Primary Interface Cables)

Serial Output

10 Pin RJ41 Modular Plug

connects to the imager handle

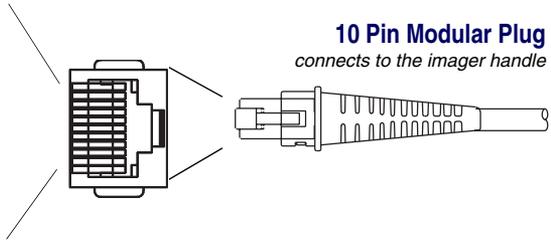


- 1
- 2 CTS
- 3
- 4 RTS
- 5 RXD
- 6 TXD
- 7
- 8 VCC_IN
- 9 GND
- 10 CABLE SELECT

Standard Cable Pinouts

USB

- 1
- 2
- 3
- 4 D-
- 5
- 6 D+
- 7
- 8 VBUS_VIN
- 9 GND
- 10



Appendix A

Symbologies

Symbology Chart

Symbology	AIM ID	Possible AIM ID Modifiers (<i>m</i>)	Code ID (hex)
<i>All Symbologies</i>			(0x99)
Australian Post	]X0		A (0x41)
Aztec Code	]zm	0-9, A-C	z (0x7A)
British Post	]X0		B (0x42)
Canadian Post	]X0		C (0x43)
China Post	]X0		Q (0x51)
Codabar	]Fm	0-1	a (0x61)
Codablock F	]Om	0, 1, 4, 5, 6	q (0x71)
Code 11	]H3		h (0x68)
Code 128	]Cm	0, 1, 2, 4	j (0x6A)
Code 16K	]Km	0, 1, 2, 4	o (0x6F)
Code 32 Pharmaceutical (PARAF)	]X0		< (0x3C)
Code 39	]Am	0, 1, 3, 4, 5, 7	b (0x62)
Code 49	]Tm	0, 1, 2, 4	l (0x6C)
Code 93 and 93i	]Gm	0-9, A-Z, a-m	i (0x69)
Data Matrix	]dm	0-6	w (0x77)

Symbology	AIM ID	Possible AIM ID Modifiers (<i>m</i>)	Code ID (hex)
EAN-13	]E0		d (0x64)
EAN-8	]E4		D (0x44)
EAN•UCC Composite	]em	0-3	y (0x79)
EAN-13 with Extended Coupon Code	]E3		d (0x64)
Interleaved 2 of 5	]lm	0, 1, 3	e (0x65)
Japanese Post	]X0		J (0x4A)
KIX (Netherlands) Post	]X0		K (0x4B)
Korea Post	]X0		? (0x3F)
Matrix 2 of 5	]X0		m (0x6D)
MaxiCode	]Um	0-3	x (0x78)
MicroPDF417	]Lm	3-5	R (0x52)
MSI	]Mm	0	g (0x67)
No Read			(0x9C)
OCR-A	]o1		O (0x4F)
OCR-B	]o2		O (0x4F)
OCR MICR E-13B	]ZE		O (0x4F)
OCR SEMI Font	]o3		O (0x4F)
OCR US Money Font	]o3		O (0x4F)
SEMI Font	]o3		O (0x4F)
PDF417	]Lm	0-2	r (0x72)
Planet Code	]X0		L (0x4C)
Plessey Code	]P0		n (0x6E)
PosiCode	]pm	0, 1, 2	W (0x57)

Symbology	AIM ID	Possible AIM ID Modifiers (m)	Code ID (hex)
Postnet	]X0		P (0x50)
QR/Micro QR Code	]Qm	0-6	s (0x73)
Reduced Space Symbology (RSS-14, RSS Limited, RSS Expanded)	]em	0	y (0x79)
Straight 2 of 5 IATA (two-bar start/stop)	]Rm	0, 1, 3	f (0x66)
TCIF Linked Code 39 (TLC39)	]L2		T (0x54)
Telepen	]Bm	0, 1, 2, 4	t (0x74)
Trioptic Code	]X0		= (0x3D)
UCC/EAN-128	]C1		l (0x49)
UPC-A	]E0		c (0x63)
UPC-A with Extended Coupon Code	]E3		c (0x63)
UPC-E	]E0		E (0x45)
VeriCode*	]X0		v (0x76)

* Only available by special order.



NOTE

“m” represents the AIM modifier character. Refer to *International Technical Specification, Symbology Identifiers*, for AIM modifier character details.

Prefix/Suffix entries for specific symbologies override the universal (All Symbologies, 99) entry.

Refer to [Data Editing on page 4-1](#) and [Data Formatting on page 5-1](#) for information about using Code ID and AIM ID.

ASCII Conversion Chart (Code Page 1252)

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	NUL	1	20		2	40	@	3	60	'
4	01	SOH	5	21	!	6	41	A	7	61	a
8	02	STX	9	22	"	10	42	B	11	62	b
12	03	ETX	13	23	#	14	43	C	15	63	c
16	04	EOT	17	24	\$	18	44	D	19	64	d
20	05	ENQ	21	25	%	22	45	E	23	65	e
24	06	ACK	25	26	&	26	46	F	27	66	f
28	07	BEL	29	27	'	30	47	G	31	67	g
32	08	BS	33	28	(	34	48	H	35	68	h
36	09	HT	37	29	)	38	49	I	39	69	i
40	0A	LF	41	2A	*	42	4A	J	43	6A	j
44	0B	VT	45	2B	+	46	4B	K	47	6B	k
48	0C	FF	49	2C	,	50	4C	L	51	6C	l
52	0D	CR	53	2D	-	54	4D	M	55	6D	m
56	0E	SO	57	2E	.	58	4E	N	59	6E	n
60	0F	SI	61	2F	/	62	4F	O	63	6F	o
64	10	DLE	65	30	0	66	50	P	67	70	p
68	11	DC1	69	31	1	70	51	Q	71	71	q
72	12	DC2	73	32	2	74	52	R	75	72	r
76	13	DC3	77	33	3	78	53	S	79	73	s
80	14	DC4	81	34	4	82	54	T	83	74	t

ASCII Conversion Chart (Code Page 1252)

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
84	15	NAK	85	35	5	86	55	U	87	75	u
88	16	SYN	89	36	6	90	56	V	91	76	v
92	17	ETB	93	37	7	94	57	W	95	77	w
96	18	CAN	97	38	8	98	58	X	99	78	x
100	19	EM	101	39	9	102	59	Y	103	79	y
104	1A	SUB	105	3A	:	106	5A	Z	107	7A	z
108	1B	ESC	109	3B	;	110	5B	[	111	7B	{
112	1C	FS	113	3C	<	114	5C	\	115	7C	|
116	1D	GS	117	3D	=	118	5D	]	119	7D	}
120	1E	RS	121	3E	>	122	5E	^	123	7E	~
124	1F	US	125	3F	?	126	5F	_	127	7F	

Dec.	Hex	Char	Dec.	Hex	Char	Dec.	Hex	Char	Dec.	Hex	Char
128	80	€	129	A0		130	C0	À	131	E0	à
132	81	□	133	A1	¡	134	C1	Á	135	E1	á
136	82	,	137	A2	¢	138	C2	Â	139	E2	â
140	83	f	141	A3	£	142	C3	Ã	143	E3	ã
144	84	„	145	A4	¤	146	C4	Ä	147	E4	ä
148	85	...	149	A5	¥	150	C5	Å	151	E5	å
152	86	†	153	A6	¦	154	C6	Æ	155	E6	æ
156	87	‡	157	A7	§	158	C7	Ç	159	E7	ç
160	88	^	161	A8	¨	162	C8	È	163	E8	è
164	89	‰	165	A9	©	166	C9	É	167	E9	é

Dec.	Hex	Char	Dec.	Hex	Char	Dec.	Hex	Char	Dec.	Hex	Char
168	8A	Š	169	AA	ₐ	170	CA	Ê	171	EA	ê
172	8B	‹	173	AB	«	174	CB	Ë	175	EB	ë
176	8C	Œ	177	AC	¬	178	CC	ì	179	EC	ì
180	8D	□	181	AD	-	182	CD	í	183	ED	í
184	8E	Ž	185	AE	®	186	CE	î	187	EE	î
188	8F	□	189	AF	—	190	CF	ï	191	EF	ï
192	90	□	193	B0	°	194	D0	Ð	195	F0	ð
196	91	´	197	B1	±	198	D1	Ñ	199	F1	ñ
200	92	’	201	B2	²	202	D2	Ò	203	F2	ò
204	93	“	205	B3	³	206	D3	Ó	207	F3	ó
208	94	”	209	B4	´	210	D4	Ô	211	F4	ô
212	95	•	213	B5	µ	214	D5	Õ	215	F5	õ
216	96	–	217	B6	¶	218	D6	Ö	219	F6	ö
220	97	—	221	B7	·	222	D7	×	223	F7	÷
224	98	˜	225	B8	¸	226	D8	Ø	227	F8	ø
228	99	™	229	B9	¹	230	D9	Ù	231	F9	ù
232	9A	š	233	BA	⊖	234	DA	Ú	235	FA	ú
236	9B	›	237	BB	»	238	DB	Û	239	FB	û
240	9C	œ	241	BC	¼	242	DC	Ü	243	FC	ü
244	9D	□	245	BD	½	246	DD	Ý	247	FD	ý
248	9E	ž	249	BE	¾	250	DE	Þ	251	FE	þ
252	9F	ÿ	253	BF	¿	254	DF	ß	255	FF	ÿ

Code Page Mapping of Printed Bar Codes

Code pages define the mapping of character codes to characters. If the data received does not display with the proper characters, it may be because the bar code being scanned was created using a code page that is different from the one the host program is expecting. If this is the case, select the code page with which the bar codes were created. The data characters should then appear properly.



The Code Page option is available for Code 39, Code 93, and Code 128.

NOTE

Code Page	Standard	Description
1	CP ISO646	
2 (Default)	ISO 2022	Automatic National Replacement Characters
3	CP Binary	
82	ISO 2022 11 Swe	Swedish Replacement Characters
83	ISO 2022 69 Fra	French/Belgium Replacement Characters
81	ISO 2022 25 Fra	French/Belgium Replacement Characters
84	ISO 2022 11 Ger	German Replacement Characters
85	ISO 2022 11 Ita	Italian Replacement Characters
86	ISO 2022 11 Swi	Swiss Replacement Characters
87	ISO 2022 11 UK	British Replacement Characters
88	ISO 2022 11 Dan	Danish Replacement Characters
89	ISO 2022 11 Nor	Norwegian Replacement Characters
90	ISO 2022 11 Spa	Spanish Replacement Characters

NOTES

Appendix B

Sample Symbols

UPC-A



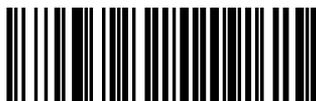
0 123456 7890

Interleaved 2 of 5



1234567890

Code 128



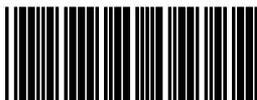
Code 128

EAN-13



9 780330 290951

Code 39



BC321

Codabar



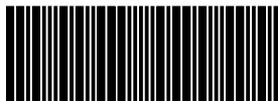
A13579B

Code 93



123456-9\$

Code 2 of 5



123456

Sample Symbols

Matrix 2 of 5



6543210

PDF417



Car Registration

Code 49



1234567890

QR Code



Numbers

RSS-14



(01)00123456789012

Postnet



Zip Code

Data Matrix



Test Symbol

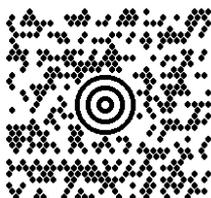
Sample Symbols

Aztec



Package Label

MaxiCode



Test Message

Micro PDF417



Test Message

OCR-A with Modulo
10 check character

5324277

OCR-A with Modulo
36 check character

532427D

OCR Programming Chart



a



c



d



e



g



h



l



r



t



Save



Discard

Programming Chart



A



B



C



D



E



F



0



1



2



3

Programming Chart



4



5



6



7



8



9



Save



Discard



NOTE

If you make an error while scanning the letters or digits (before scanning Save), scan Discard, scan the correct letters or digits, and Save again.

Asia Pacific

PSC Hong Kong
Hong Kong
Telephone: [852]-2-584-6210
Fax: [852]-2-521-0291

Australia

PSC Asia Pacific Pty Ltd.
North Ryde, Australia
Telephone: [61] 0 (2) 9878 8999
Fax: [61] 0 (2) 9878 8688

France

PSC S.A.R.L.
LES ULIS Cedex, France
Telephone: [33].01.64.86.71.00
Fax: [33].01.64 46.72.44

Germany

PSC GmbH
Darmstadt, Germany
Telephone: 49 (0) 61 51/93 58-0
Fax: 49 (0) 61 51/93 58 58

Italy

PSC S.p.A.
Vimercate (MI), Italy
Telephone: [39] (0) 39/62903.1
Fax: [39] (0) 39/6859496

Japan

PSC Japan K.K.
Shinagawa-ku, Tokyo, Japan
Telephone: 81 (0)3 3491 6761
Fax: 81 (0)3 3491 6656

Latin America

PSC S.A., INC.
Miami, Florida, USA
Telephone: (305) 539-0111
Fax: (305) 539-0206

United Kingdom

PSC Bar Code Ltd.
Watford, England
Telephone: 44 (0) 1923 809500
Fax: 44 (0) 1923 809 505



www.psc.com

PSC Inc.

959 Terry Street
Eugene, OR
Telephone: (541) 683-5700
Fax: (541) 345-7140

