2020/4820/4820 i

2D Cordless Imaging System

powered by
Adaptus 5.0

Hand Held
PRODUCTS

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The 2020/4820/4820i system meets or exceeds the requirements of all applicable standards organizations for safe operation. However, as with any electrical equipment, the best way to ensure safe operation is to operate them according to the agency guidelines that follow. Please read these guidelines carefully before using your 2020/4820/4820i system.

FCC Class B Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio or television technician for help.

If necessary, the user should consult the dealer or an experienced radio/ television technician for additional suggestions. The user may find the following booklet helpful: "Something About Interference." This is available at FCC local regional offices. Hand Held Products, Inc. is not responsible for any radio or television interference caused by unauthorized modifications of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Hand Held Products, Inc. The correction is the responsibility of the user. Use only shielded data cables with this system.

Caution: Any changes or modifications made to this equipment not expressly approved by Hand Held Products, Inc. may void the FCC authorization to operate this equipment.

⚠ **This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter. To maintain compliance with FCC RF exposure guidelines, use only the accessories specified by the manufacturer.**

Agency Compliance Statements

This device meets or exceeds the requirements of all applicable standards organizations for safe operation. However, as with any electrical equipment, the best way to ensure safe operation is to operate them according to the agency guidelines that follow. Please read these guidelines carefully before using your device.	
	Regulatory and Safety Approvals
USA:	FCC Part 15, Class B
Canada:	ICES-003
Regulatory Approvals for Bluetooth Radio Devices RF devices are designed to comply with the most current applicable standards on safe levels of RF energy developed by the Institute of Electrical and Electronics Engineers (IEEE) and the American National Standards Institute (ANSI) and have been recommended for adoption by the Federal Communications Commission (FCC).	
	RF Approvals
USA:	FCC Part 15.247
Canada:	RSS 210

Canadian Compliance

This Class B digital apparatus complies with Canadian ICES-003. Operation is subject to the following conditions:

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation.

3. To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing.

Conformité à la règlementation canadienne

Cet appareil numérique de la Classe B est conforme à la norme ICES-003 du Canada. Son fonctionnement est assujetti aux conditions suivantes :

1. Cet appareil ne doit pas causer de brouillage préjudiciable.

2. Cet appareil doit pouvoir accepter tout brouillage reçu, y compris le brouillage pouvant causer un fonctionnement indésirable.

3. Pour éviter toute interférence radio avec le service concédé, cet appareil doit être utilisé en intérieur et à l'écart des fenêtres pour pouvoir fournir une protection maximale.L'équipement (ou son antenne de transmission) installé à l'extérieur est soumis à licence.

CE Compliance

The CE mark on the product indicates that the system has been tested to and conforms with the provisions noted within the 89/336/EEC Electromagnetic Compatibility Directive and the 73/23/EEC Low Voltage Directive.

For CE-related inquiries, please contact:
    Hand Held Products
    Nijverheidsweg 9-13
    5627 BT Eindhoven
    The Netherlands

Hand Held Products shall not be liable for use of our product with equipment (i.e., power supplies, personal computers, etc.) that is not CE marked and does not comply with the Low Voltage Directive.

European Regulatory and Safety Approvals

EN 55022 (CISPR 22) Class B

EN60950

EN60825-1

EN55024:1998

This product is marked with $C\epsilon0682$ in accordance with the Class II product requirements specified in the R&TTE Directive, 1999/5/EC. The equipment is intended for use throughout the European Community.

Bluetooth Qualified Product

Bluetooth Qualified Body approved as a Bluetooth Class II radio.

Bluetooth Radio Device R&TTE Compliance

This device is in conformity with all essential requirements of the R&TTE Directive (1999/5/EC). This equipment has been assessed to the following standards:

    EN 300 328-2:2000

    EN 301 489-1 (2002-08)

    EN 301 489-17 (2002-08)

    EN 60950:2000

This product is marked with $C\epsilon0682$ in accordance with the product requirements specified in the R&TTE Directive, 1999/5/EC.

The equipment is intended for use throughout the European Community.

⚠ CAUTION: RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. The battery should be disposed of by a qualified recycler or hazardous materials handler. Do not incinerate the battery or dispose of the battery with general waste materials.

NOTE: Any modifications to this device not expressly approved by Hand Held Products may void your authority to operate it.

Patents

Please refer to product packaging for patent information.

LED Safety Statement

This device has been tested in accordance with IEC60825-1 LED safety, and has been certified to be under the limits of a Class 1 LED device.

GS Mark

If your product is marked with the GS symbol, then the product has been issued a GS certificate.

UL and cUL Statement

UL and cUL listed: UL60950-1 and CSA C22.2 No.60950-1-03.

C-Tick Statement

Conforms to AS/NZS 3548. C-Tick number: N10410.

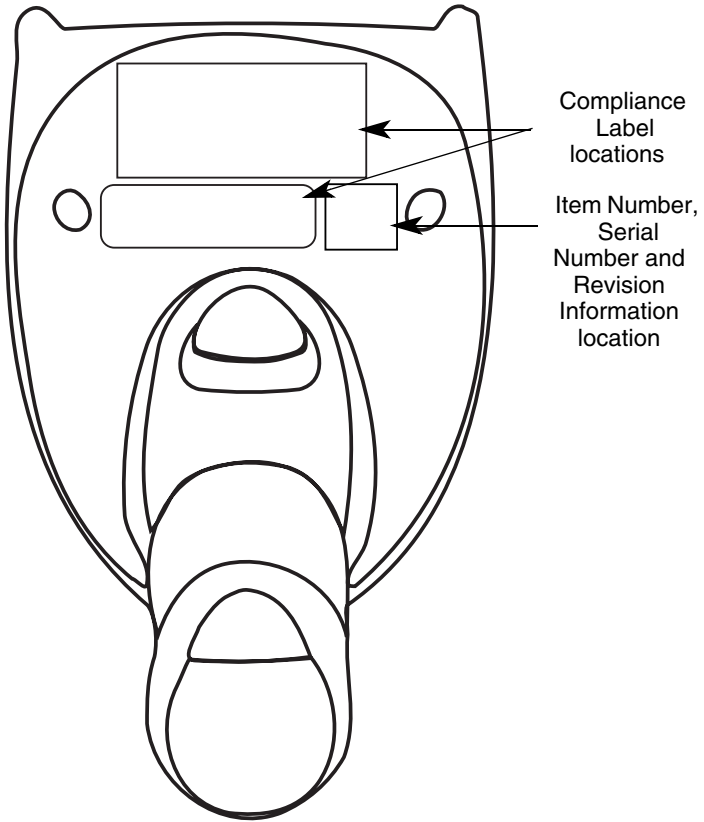## *Mexico*

Comision Federal de Telecomunicaciones

Solids and Water Protection

The 2020 and 4820 have ratings of IP41, immunity of foreign particles and dripping water.
The 4820i has a rating of IP54, immunity of foreign particles and sprayed water.
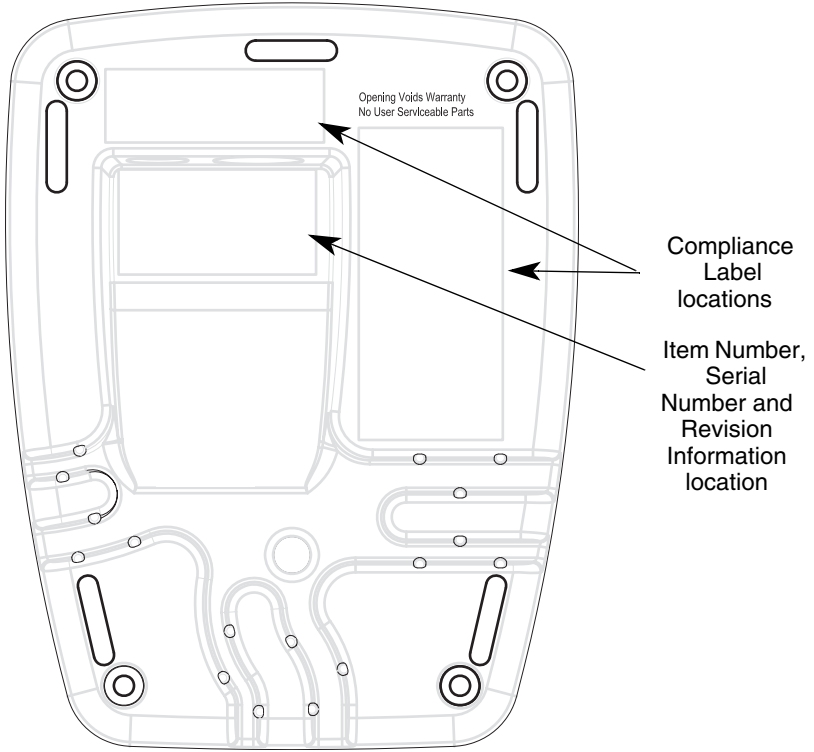
Required Safety Labels

Scanner

Compliance Label locations

Item Number, Serial Number and Revision Information location

Base

Opening Voids Warranty
No User Serviceable Parts

Compliance Label locations

Item Number, Serial Number and Revision Information location

Table of Contents

Chapter 1 - Getting Started

Chapter 2 - Programming the Interface

Chapter 3 - Basic System Operation

Chapter 4 - Output

Chapter 5 - Data Editing

Chapter 6 - Data Formatting

Chapter 7 - Symbologies

Chapter 8 - *Imaging Commands*

Chapter 9 - OCR Programming

Chapter 10 - Interface Keys

Chapter 11 - Utilities

Chapter 12 - Serial Programming Commands

Chapter 13 - Product Specifications

Chapter 14 - Maintenance

Chapter 15 - Customer Support

Appendix A - Reference Charts

Appendix B - Minimizing Bluetooth/ISM Band Network Activity

1

Getting Started

About This Manual

This User's Guide provides installation and programming instructions for the 4820/4820i. Product specifications, dimensions, warranty, and customer support information are also included.

Hand Held Products barcode image scanners are factory programmed for the most common terminal and communications settings. If you need to change these settings, programming is accomplished by scanning the barcodes in this guide.

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

Unpacking the System

After you open the shipping carton containing the product, take the following steps:

• Check for damage during shipment. Report damage immediately to the carrier who delivered the carton.
• Make sure the items in the carton match your order.
• Save the shipping container for later storage or shipping.

Image Scanner Models

Models	Description
4820SF0C1CBE	Cordless Area Image Scanner, Green aimer, Special Focus
4820SR0C1CBE	Cordless Area Image Scanner, Green aimer, Standard Range
4820ISFE	Industrial Cordless Area Image Scanner, Green aimer, Special Focus
4820ISRE	Industrial Cordless Area Image Scanner, Green aimer, Standard Range
2020-5BE	Cordless Base that supports the following interfaces: Keyboard wedge, TTL level 232, TTL level 232 serial wedge, IBM 4683, wand emulation, USB keyboard, USB HID, USB retail (IBM Sure-POS)
2020-CBE	Charge-Only Base

Cordless System: Main Components

Battery Contained
in Handle

Image Scanner

**2020
Cordless Base**

About the Battery

⚠ Use only the Li-ion battery packs provided by Hand Held Products. The use of any battery pack not sold by Hand Held Products will void your warranty and may result in damage to your unit.

Power is supplied to the cordless image scanner by a rechargeable battery that is integrated in the image scanner handle. Each image scanner is shipped with a battery. (See Product Specifications beginning on page 13-1.)

Charging Information

The battery is designed to charge while the image scanner is positioned in the cordless base unit. Refer to "2020 LED Sequences and Meaning" on page 3-4 for an interpretation of the Charge Status indicators.

• Place the image scanner in the base that is connected to an appropriate power supply.

Battery Recommendations

• Batteries are shipped approximately 30% to 60% charged and should be fully charged for maximum charge capacity.

- The battery is a lithium ion cell and can be used without a full charge, and can also be charged without fully discharging, without impacting the battery life. There is no need to perform any charge/discharge conditioning on this type of battery.
- Do not disassemble the battery. There are no user-serviceable parts in the battery.
- Keep the base connected to power when the host is not in use.
- Replace a defective battery immediately since it could damage the image scanner.
- Don't short-circuit a battery or throw it into a fire. It can explode and cause severe personal injury.
- Although your battery can be recharged many times, it will eventually be depleted. Replace it after the battery is unable to hold an adequate charge.
- If you are not sure if the battery or charger is working properly, send it to Hand Held Products or an authorized Hand Held Products service center for inspection.

Proper Disposal of the Battery

When the battery has reached the end of its useful life, the battery should be disposed of by a qualified recycler or hazardous materials handler. Do not incinerate the battery or dispose of the battery with general waste materials. You may send batteries to Hand Held Products (postage paid). The shipper is responsible for complying with all federal, state, and local laws and regulations related to the packing, labeling, manifesting, and shipping of spent batteries. Contact the Product Service Department (page 15-1) for recycling or disposal information. Since you may find that your cost of returning the batteries significant, it may be more cost effective to locate a local recycle/disposal company.

Connecting the Base

A base can be connected between the keyboard and PC as a "keyboard wedge," plugged into the serial port, plugged into a USB port, or connected to a portable data terminal in wand emulation or non decoded output mode.

Turn off power before connecting the base, then power up the computer once the base is fully connected. When the base is connected and powered up, put the image scanner in the base to establish a link. The green LED on the base flashes to indicate the image scanner's battery is charging.

Connecting the Base with USB

A base can be connected to the USB port of a computer.

1. Connect the appropriate interface cable to the base first and then to the computer. Make sure the cables are secured in the wireways in the bottom of the base and that the base sits flat on a horizontal surface.
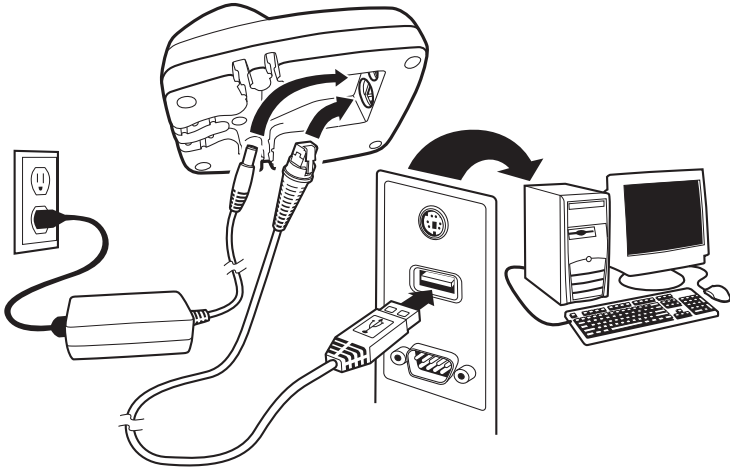
2. Program the base for the USB interface by scanning the appropriate programming barcode See page 2-5.

3. Verify the base operation by scanning a barcode from the Sample Symbols in the back of this manual.

For additional USB programming and technical information, refer to the Hand Held Products "USB Application Note," available at www.handheld.com.

Connecting the Base with Keyboard Wedge

1. Turn off power and disconnect the keyboard cable from the back of the terminal/computer.

2. Connect the appropriate interface cable to the base and to the terminal/
    computer and keyboard. Make sure the cables are secured in the wireways
    in the bottom of the base and that the base sits flat on a horizontal surface.
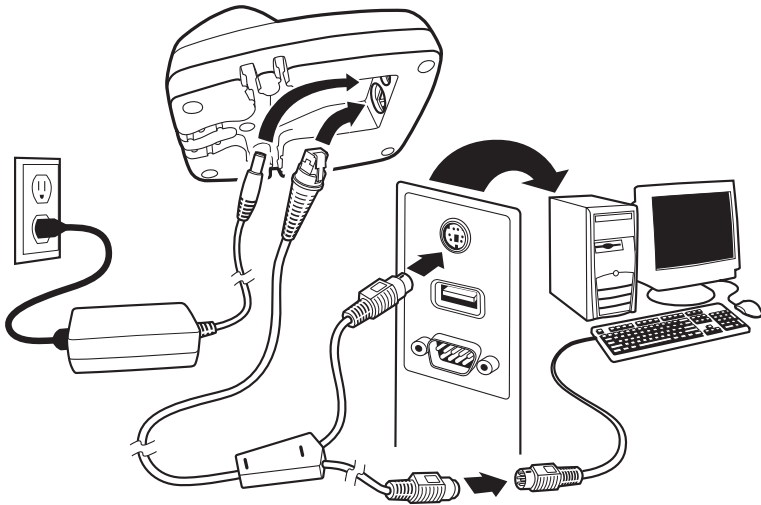
3. Turn the terminal/computer power back on.

4. Program the base for the keyboard wedge interface. See "Keyboard Wedge
    Connection" on page 2-1.

5. Verify the base operation by scanning a barcode from the Sample Symbols
    in the back of this manual.

Connecting the Base with RS-232 Serial Port

1. Turn off power to the terminal/computer.

2. Connect the appropriate interface cable to the base. Make sure the cables are secured in the wireways in the bottom of the base and that the base sits flat on a horizontal surface.

Note: For the base to work properly, you must have the correct cable for your type of terminal/computer.
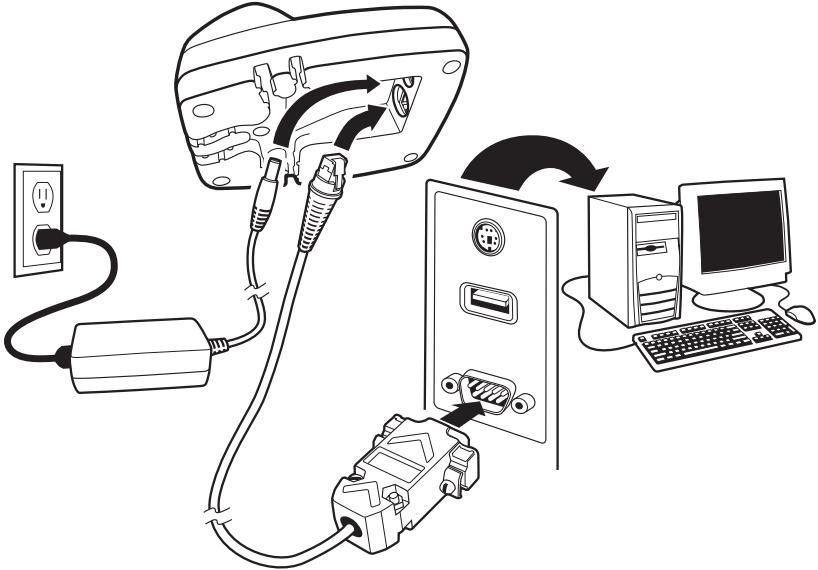
3. Plug the serial connector into the serial port on your computer. Tighten the two screws to secure the connector to the port.

4. Once the image scanner has been fully connected, power up the computer.

Connecting the Base with RS-232 Wedge

The 2020 uses TTL signal levels to wedge into an RS-232 serial network. Use only 2020 serial wedge cables to prevent damage to the base. Refer to RS-232 Baud Rate on page 2-15 to set the baud rate and communications protocol.

1. Turn off power to the computer.

2. Disconnect the existing serial cable from the computer.

3. Connect the appropriate interface cable to the base. Make sure the cables are secured in the wireways in the bottom of the base and that the base sits flat on a horizontal surface.

Note: For the base to work properly, you must have the correct cable for your type of computer.
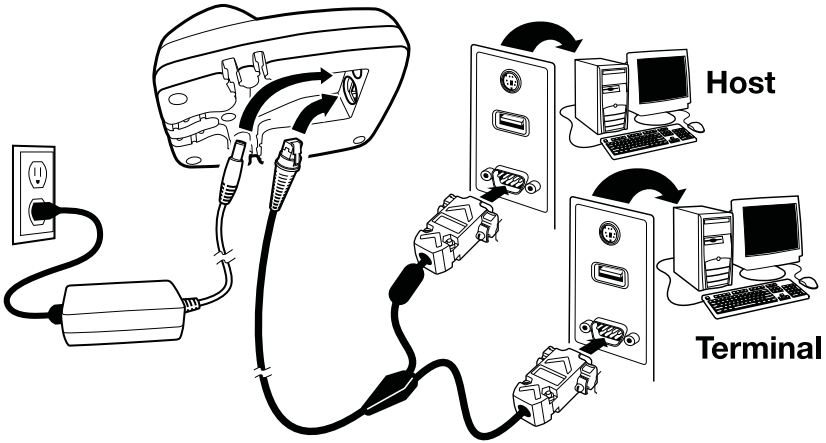
4. Plug the serial connector into the serial port on your computer. Tighten the two screws to secure the connector to the port.

5. Plug the other serial connector into the host connection and tighten the two screws.

6. Plug the power supply to the base and plug into the AC source.

7. Once the base has been fully connected, power up the computer.

Linking Image Scanner to Base

When newly shipped or defaulted to factory settings, the base and image scanner are not linked. Once the image scanner is placed into the base, the software automatically links the image scanner and the base. If the image scanner and base have previously been linked, you do not receive any feedback. If this is the first time that the image scanner and base are linked, both devices emit a short chirp when their radios link. At this point, you are set to one image scanner to one base.

Image Scanner

Green LED

Red LED

2020 Cordless Base

1. Provide power to the base.

2. Place the image scanner into the base. The image scanner and base link.

3. To determine if your cordless system is set up correctly, scan one of the sample barcodes in the back of this manual. If the image scanner provides a single good read beep and the green LED lights, the image scanner has successfully linked to the base. If you receive a triple error beep and the red LED lights, the image scanner has not linked to the base. Refer to page 14-4 for troubleshooting information.

Communication Between the Cordless System and the Host

The cordless image scanner provides immediate feedback in the form of a "good read" indication (a green LED on the image scanner and an audible beep) after a barcode is scanned correctly and the base has acknowledged receiving the data. This is possible since the cordless system provides two-way communication between the image scanner and the base.

When data is scanned, the data is sent to the host system via the base unit. The cordless image scanner recognizes data acknowledgement (ACK) from the base unit. If it cannot be determined that the data has been properly sent to the base, the image scanner issues an error indication. You must then check to see if the scanned data was received by the host system.

3) Base sends
data to host

1) Good Read

2) ACK from base
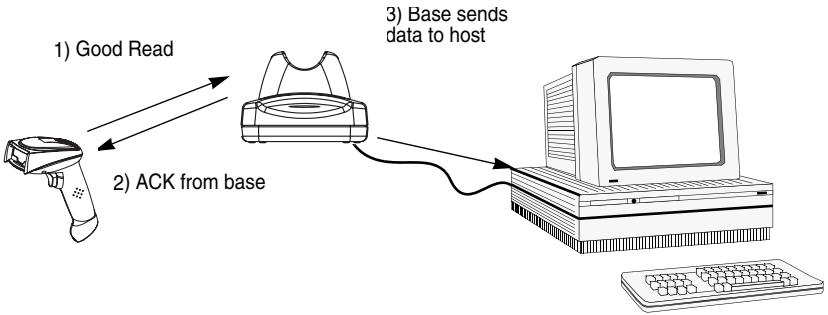
Reading Techniques

The image scanner has a view finder that projects a bright green aiming beam that corresponds to the image scanner's horizontal field of view. The aiming beam should be centered over the barcode, but it can be positioned in any direction for a good read.

Linear barcode   2D Matrix symbol
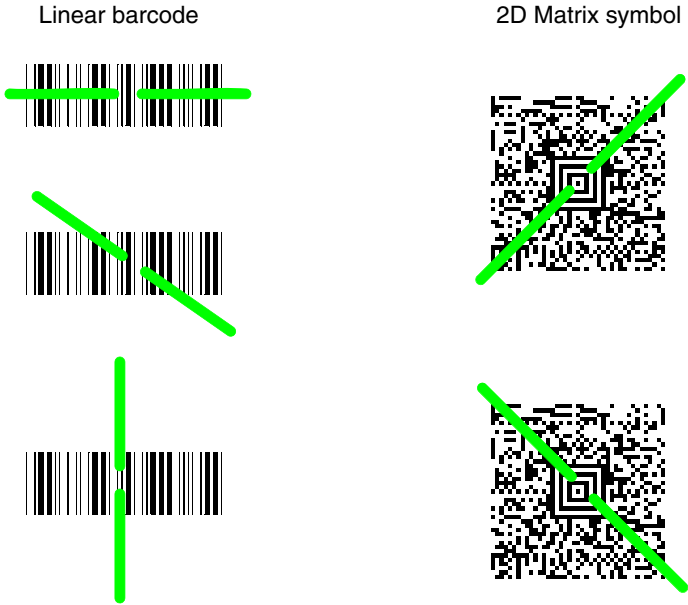
The aiming beam is smaller when the image scanner is closer to the code and larger when it is farther from the code. Symbologies with smaller bars or elements (mil size) should be read closer to the unit. Symbologies with larger bars or elements (mil size) should be read farther from the unit. To read single or multiple symbols (on a page or on an object), hold the image scanner at an appropriate distance from the target, pull the trigger, and center the aiming beam on the symbol. If the code being scanned is highly reflective (e.g., laminated), it may be necessary to tilt the code up 15° to 18° to prevent unwanted reflection.

2

Programming the Interface

Introduction

Chapter 1 describes connecting the base to the computer with the appropriate interface cable. This chapter describes how to program your system for the desired interface.

Programming the Interface - Plug and Play

Plug and Play barcodes provide instant image scanner set up for commonly used interfaces.

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

Keyboard Wedge Connection

If you want your system programmed for an IBM PC AT and compatibles keyboard wedge interface with a USA keyboard, scan the barcode below. Keyboard wedge is the default interface.

Note: The following barcode also programs a carriage return (CR) suffix.

IBM PC AT and Compatibles
with CR suffix

Laptop Direct Connect

For most laptops, scanning the **Laptop Direct Connect** barcode allows operation of the image scanner in parallel with the integral keyboard. The following Laptop Direct Connect barcode selects terminal ID 03, programs a carriage return (CR) suffix and turns on Emulate External Keyboard (page 2-13).

Laptop Direct Connect
with CR suffix

RS-232

The RS-232 Interface barcode is used when connecting to the serial port of a PC or terminal. The following RS-232 Interface barcode also programs a carriage return (CR) and a line feed (LF) suffix, baud rate, and data format as indicated below. It also changes the trigger mode to manual.

Option	Setting
Baud Rate	115200 bps
Data Format	8 data bits, no parity bit, 1 stop bit

RS-232 Interface

Wand Emulation Plug & Play

In Wand Emulation mode, the image scanner decodes the barcode then sends data in the same format as a scanner image scanner. The Code 39 Format converts all symbologies to Code 39.

The Same Code Format transmits UPC, EAN, Code 128 and Interleaved 2 of 5 without any changes, but converts all other symbologies to Code 39.

The *Wand Emulation Plug & Play Code 39 Format* barcode below sets the terminal ID to 61. The *Wand Emulation Plug & Play Same Code Format* barcode sets the terminal ID to 64. These Plug & Play barcodes also set the Transmission Rate to 25 inches per second, Output Polarity to black high, and Idle State to high. (If you want to change the terminal ID *only*, without changing any other image scanner settings, please refer to)

Wand Emulation
Plug & Play
(Code 39 Format)

Wand Emulation
Plug & Play
Same Code

IBM 4683 Ports 5B, 9B, and 17 Interface

Scan one of the following "Plug and Play" codes to program the image scanner for IBM 4683 Port 5B, 9B, or 17.

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

IBM 4683 Port 5B Interface

IBM 4683 Port 9B
HHBCR-1 Interface

IBM 4683 Port 17 Interface

IBM 4683 Port 9B
HHBCR-2 Interface

Each barcode 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 0A 0B
Code 128 **	00 18 0B

* Suffixes programmed for Code 128 with IBM 4683 Port 5B, IBM 4683 Port 9B HHBCR-1, and IBM 4683 Port 17 Interfaces
**Suffixes programmed for Code 128 with IBM 4683 Port 9 HHBCR-2 Interface

IBM SurePos

Scan one of the following "Plug and Play" codes to program the image scanner for IBM SurePos (USB Hand Held image scanner) or IBM SurePos (USB Tabletop image scanner).

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

IBM SurePos
(USB Handheld Scanner)
Interface

IBM SurePos
(USB Tabletop Scanner)
Interface

Each barcode 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

USB PC or Macintosh Keyboard

Scan one of the following codes to program the image scanner for USB PC Keyboard or USB Macintosh Keyboard. Scanning these codes adds a CR and LF, along with selecting the terminal ID (USB PC Keyboard - 124, USB Macintosh Keyboard - 125, USB PC Japanese Keyboard - 134).

USB Keyboard (PC)

USB Keyboard (Mac)

USB Japanese Keyboard (PC)

USB HID

Scan the following code to program the image scanner for USB HID barcode image scanners. Scanning this code changes the terminal ID to 131.

USB HID Barcode Image

USB Com Port Emulation

Scan the following code to program the image scanner 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 Hand Held Products website (www.handheld.com). The driver will use the next available Com Port number. Apple® Macintosh computers recognize the image scanner as a USB CDC class device and automatically uses a class driver. Scanning the code below changes the terminal ID to 130.

USB COM Port Emulation

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

CTS/RTS Emulation

CTS/RTS Emulation On

* CTS/RTS Emulation Off

ACK/NAK Mode

ACK/NAK Mode On

* ACK/NAK Mode Off

Serial Wedge

To set up the serial wedge terminal ID, use the serial terminal ID 050 and follow the instructions on . Make sure that all of the communication parameters match on all of the connected devices. Choosing Both sends scanned data to P1 and P2. Default = P1.

* P1

P2

Both P1 and P2

Programming the Interface - Terminal ID Method

If your interface is not a standard PC AT, refer to Supported Terminals, beginning on page 2-8, and locate the Terminal ID number for your PC. Scan the **Terminal ID** barcode below, then scan the numeric barcode(s) from the Programming Chart inside the back cover of this manual to program the image scanner 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** barcode, then **0**, **0**, **3** from the Programming Chart inside the back cover of this manual, then **Save**. If you make an error while scanning the digits (before scanning Save), scan the **Discard** code on the Programming Chart, scan the **Terminal ID** barcode, scan the digits, and the **Save** code again.

Note: The default interface is Keyboard Wedge (Term ID = 003).

Terminal ID

Save

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

Supported Terminals

Terminal	Model(s)	Terminal ID
DDC	3496, 3497, 122 key	005
DDC	3496, 3497, 102 key	071
DEC	VT510, 520, 525 (PC style)	084
DEC	VT510, 520, 525 (DEC style LK411)	104
Esprit	200, 400	005
Heath Zenith	PC, AT	003 *
Heath Zenith		090
HP	Vectra	003 *
HP	Vectra	023
IBM	XT	001
IBM	PS/2 25, 30, 77DX2	002
IBM	AT, PS/2 30–286, 50, 55SX, 60, 70, 70–061, 70–121, 80	003 *
IBM 102 key	3151, 3161, 3162, 3163, 3191, 3192, 3194, 3196, 3197, 3471, 3472, 3476, 3477	006
IBM 122 key	3191, 3192, 3471, 3472	007
IBM 122 key	3196, 3197, 3476, 3477, 3486, 3482, 3488	008
IBM 122 key	3180	024
IBM 122 key	3180 data entry keyboard	114
IBM DOS/V 106 key	PC & Workstation	102
IBM SurePOS	USB Hand Held Image Scanner	128**
IBM SurePOS	USB Tabletop Image Scanner	129**
IBM Thinkpad	360 CSE, 340, 750	097
IBM Thinkpad		106
IBM Thinkpad	365, 755CV	003 *
I/O 122 key	2676D, 2677C, 2677D	008
ITT	9271	007
Lee Data	IIS	007
NEC	98XX Series	103
Olivetti	M19, M200	001
Olivetti	M240, M250, M290, M380, P500	003
RS-232 TTL		000
Serial Wedge		050
Silicon Graphics	Indy, Indigoll	005

Supported Terminals

Terminal	Model(s)	Terminal ID
Telex 88 key	078, 078A, 79, 80, 191, 196, 1191,1192, 1471, 1472, 1476, 1477, 1483	025
Telex 88 key	Data Entry Keyboard	112
Telex 102 key	078, 078A, 79, 80, 191, 196, 1191,1192, 1471, 1472, 1476, 1477, 1483	045
Telex 122 key	078, 078A, 79, 80, 191, 196, 1191,1192, 1471, 1472, 1476, 1477, 1482, 1483	046
USB COM Port Emulation		130
USB PC Keyboard		124**
USB Mac Keyboard		125**
USB Japanese Keyboard (PC)		134**
USB HID POS		131**
Wand Emulation (Code 39 Format)		061
Wand Emulation (Same Code Format)		064

* Default for 2020-5B and 2020-5BE models
**It is best to use the Plug and Play barcodes, beginning on to program these interfaces, rather than scanning the terminal ID listed in this table.

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

Belgium

Brazil

Canada (French)

Czech Republic

Denmark

Finland (Sweden)

France

Germany/Austria

Greece

Hungary

Israel (Hebrew)

Keyboard Country (continued)

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

Italy

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

Netherlands (Dutch)

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

Poland

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Romania

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

SCS

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Spain

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Switzerland (German)

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Latin America

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Norway

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Portugal

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Russia

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Slovakia

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Sweden

Keyboard Country (continued)

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Turkey F

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖
Turkey Q

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖
U.K.

Please refer to the Hand Held Products website (www.handheld.com) for complete keyboard country support information and applicable interfaces. If you need to program a keyboard for a country other than one listed above, scan the **Program Keyboard Country** barcode below, then scan the numeric barcode(s) for the appropriate country from the inside back cover, then the **Save** barcode.

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖
Program Keyboard Country

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

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 barcode 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

Note: After scanning the Emulate External Keyboard barcode, you must power cycle your computer.

Keyboard Modifiers

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

Control + ASCII Mode On: The image scanner sends key combinations for ASCII control characters for values 00-1F. Refer to Keyboard Function Relationships, page 10-1 for CTRL+ ASCII Values. *Default = Off*

Control + ASCII Mode On

* Control + ASCII Mode Off

Turbo Mode: The image scanner 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

Automatic Direct Connect Mode: This selection can be used if you have an IBM AT style terminal and the system is dropping characters. *Default = Off*

Automatic Direct
Connect Mode On

* Automatic Direct Connect
Mode Off

RS-232 Baud Rate

Baud Rate sends the data from the image scanner to the terminal at the specified rate. The host terminal must be set for the same baud rate as the image scanner. Default = 115,200.

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 None

7 Data, 1 Stop, Parity Odd

7 Data, 2 Stop, Parity Even

7 Data, 2 Stop Parity None

7 Data, 2 Stop, Parity Odd

8 Data, 1 Stop, Parity Even

* 8 Data, 1 Stop, Parity None

8 Data, 1 Stop, Parity Odd

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 barcode below, then scanning digits from the inside back cover 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 allows control of data transmission from the image scanner using software commands from the host device. CTS/RTS operates in mode 2.   When this feature is turned **Off**, no data flow control is used. When Data Flow Control is turned **On**, the host device suspends transmission by sending the XOFF character (DC3, hex 13) to the image scanner. To resume transmission, the host sends the XON character (DC1, hex 11). Data transmission continues where it left off when XOFF was sent. *Default = RTS/ CTS, XON/XOFF and ACK/NAK Off.*

RTS/CTS On

* RTS/CTS Off

XON/XOFF On

* XON/OFF Off

ACK/NAK On

* ACK/NAK Off

Host ACK Selection

Some applications require that the host terminal (or server) approve or reject incoming barcode data and notify the operator of these actions. These applications require that the host maintain control over the response indicators emitted from the source image scanner. Turning the Host ACK selection on, configures the cordless system image scanners to respond to commands from the host system.

The following criteria must be met for the Host ACK to work correctly:

* The cordless system must be configured for Host Port RS-232 (terminal ID = 000) or USB COM Emulation (terminal ID = 130).
* RTS/CTS is defaulted off. You must enable it if the host system requires it.
* Host ACK must be enabled (page 2-19).
* System performance degrades when using Host ACK at rates lower than 9600.
* The host terminal software must be capable of interpreting the barcode data, make decisions based on the data content, and send out appropriate escape commands to the source image scanner.

Escape commands are addressed to the source image scanner via "Application Work Groups." Once a command is sent, all image scanners in a group respond to that command. Because of this situation, **it is recommended that each image scanner is assigned to its own group in host ACK mode**.

The commands to which the image scanner responds are listed on page 2-20. The **<ESC>** is a **1B** in hex. A typical command string is **y <ESC> x,** where "y" is the application work group number, "<ESC> x" is the escape command, and the comma is the terminator, which is required.

Commands may be strung together to create custom response sequences. An example of a command string is listed below.

0<ESC>4<ESC>5<ESC>6,

The above example will make an image scanner in application work group zero beep low**,** medium, high.

Once Host ACK is enabled, the system works as follows:

* The image scanner reads a code and sends data to the base/host system. No audible or visual indication is emitted until the image scanner receives an escape command. The image scanner read illumination goes out upon a successful read.
* Image Scanner operation is suspended until 1) a valid escape string is received from the host system (via the base) or 2) the image scanner "times out."
* Once condition 1 or 2 above has been met, the image scanner is ready to scan again, and the process repeats.

Time out is indicated by three rapid beeps at the same pitch. A time out occurs if the source image scanner does not receive a valid escape command in 10 seconds. If a time out occurs, the operator should check the host system to understand why a response to the image scanner was not received.

1) Good Read

2) Base sends data to host

4) ACK: Base to Image Scanner

3) ACK: Host to Base
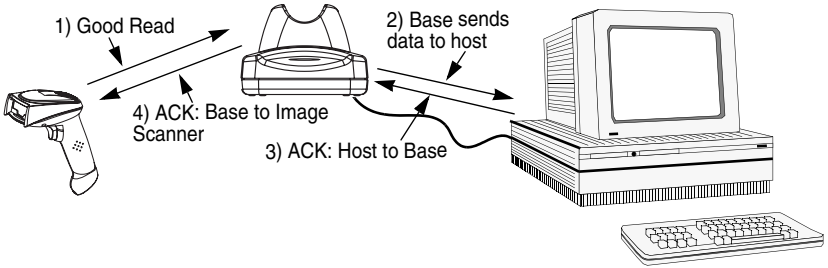
Host ACK Enable

Host ACK On

* Host ACK Off

2020 Host Escape Commands

Command	Action
<ESC> a	Indicate as if successful menu change made
<ESC> b	Indicate as if unsuccessful menu change made
<ESC> 1	Illuminate green LED for 135 milliseconds (followed by at least 70 mSecs. dark time when multiple blinks)
<ESC> 2	Illuminate green LED for two seconds (followed by at least 500 mSecs. dark time when multiple blinks)
<ESC> 3	Illuminate green LED for five seconds (followed by at least 500 mSecs. dark time when multiple blinks)
<ESC> 4	One beep at low pitch tone
<ESC> 5	One beep at medium pitch tone
<ESC> 6	One beep at high pitch tone
<ESC> 7	Indicate as successful decode and communication to host.
<ESC> 8	Indicate as unsuccessful decode and communication to host.

Wand Emulation

Wand Emulation Connection

The Wand Emulation Connection barcodes should be used if you want to change the terminal ID *only*, without changing any other image scanner settings. We recommend using Wand Emulation Plug & Play barcodes to program your image scanner to emulate a wand reader. The Wand Emulation Plug & Play barcodes change other parameters, in addition to changing the terminal ID. Please refer to Wand Emulation Plug & Play on page 2-2 for further information.

In Wand Emulation mode, the image scanner decodes the barcode then sends data in the same format as a wand scanner. The Code 39 Format converts all symbologies to Code 39.

The Same Code Format transmits UPC, EAN, Code 128 and Interleaved 2 of 5 without any changes, but converts all other symbologies to Code 39. 2D symbologies are converted to Code 128.

The **Code 39 Format** barcode below sets the terminal ID to 61, and the **Same Code Format** barcode sets the terminal ID to 64. *Default = Code 39 Format.*

Code 39 Format

Same Code Format

Wand Emulation Data Block Size

This transmits the data in smaller blocks to prevent buffer overflow. *Default = 40.*

20

* 40

60

80

Wand Emulation Delay Between Blocks

This sets the delay time between data blocks. *Default = 50ms.*

5ms

* 50ms

150ms

500ms

Wand Emulation Overall Checksum

When this option is turned on, a computed check character is added at the end of the entire message. The check character is the character which when Exclusive-OR'd with every preceding character of the message yields a result of 0x00 (00H). *Default = Off.*

Wand Emulation Overall
Checksum On

* Wand Emulation Overall
Checksum Off

Wand Emulation Transmission Rate

The Transmission Rate is limited by the terminal's ability to receive data without dropping characters. *Default = 25 inches/second.*

10

* 25

40

80

120

150

200

Wand Emulation Polarity

The Polarity can be sent as standard with black bars high, or reversed with white spaces high. *Default = Black High.*

* Black High

White High

Wand Emulation Idle

The idle describes the state of the image scanner when no data is being transmitted. When in Wand Emulation mode, you must set the image scanner's idle state to match the idle state for the device to which the image scanner is connected. *Default = Idle High.*

* Idle High

Idle Low

3

Basic System Operation

Cordless Base

The cordless base provides the link between the cordless image scanner and the host system. The base contains an interface assembly and an RF communication module. The RF communication module performs the data exchange between the cordless image scanner and the interface assembly. The control assembly coordinates the central interface activities including: transmitting/receiving commands and data to/from the host system, performing software activities (parameter menuing, visual indicator support, power-on diagnostics), and data translation required for the host system.

The base also is the image scanner's battery charger. Refer to "Base Charge Mode" on page 3-3 for additional information.

RF (Radio Frequency) Module Operation

The cordless system uses a two-way Bluetooth radio to transmit and receive data between the image scanner and the base. Designed for point-to-point and multipoint-to-single point applications, the radio operates using a license free ISM band, which sends relatively small data packets at a fast data rate over a radio signal with randomly changing frequencies, makes the cordless system highly responsive to a wide variety of data collection applications and resistant to noisy RF environments. Bluetooth Class 2 power level provides a communication range of 33 feet (10m) between the image scanner and base/ Bluetooth adapter, depending on the environment.

Cordless Image Scanner

The cordless image scanner enables fast and accurate barcode scanning using a non-contact area image scanner.

The image scanner is comprised of an area image engine, a decode/control assembly, and an RF communication module. The image engine performs the barcode image illumination and sensing. The decode/control assembly coordinates the central communication activities including: capturing and decoding the barcode image data, performing software activities (parameter menuing, visual indicator support, low battery indication), and data translation required for the host system. The RF communication module performs the data exchange between the image scanner and the base.

System Conditions

The components of the cordless system interact in specific ways as you associate an image scanner to a base, as you move an image scanner out of range, bring an image scanner back in range, or swap image scanners between two cordless systems. The following information explains the cordless system operating conditions.

Linking Process

Once an image scanner is placed into the base, the image scanner's battery charge status is checked, and software automatically detects the image scanner and links it to the base depending on the selected link mode.

Image Scanner Is Out of Range

The cordless image scanner is in communication with its base, even when it is not transmitting barcode data. Whenever the image scanner can't communicate with the base for a few seconds, it is out of range. If the image scanner is out of range and you scan a barcode, the image scanner issues a triple beep indicating no communication with the base. In addition, your image scanner and base can sound an alarm if programmed to emit an alarm. Refer to "Out-of-Range Alarm" on page 3-14.

Image Scanner Is Moved Back Into Range

The image scanner re-links if the image scanner or the base have been reset or the image scanner comes back into range. If the image scanner re-links, you will hear a single chirp when the re-linking process (uploading of the parameter table) is complete.

Out of Range and Back into Range with Data Accumulation Mode On

The image scanner may store a number of symbols (approximately 500 UPC symbols, others may vary) when out of range and then send them to the base when back in range. You will not hear a communication error beep in this mode, but you will hear a short buzz when you pull the trigger if the radio communication is not working. Once the radio connection is made, the image scanner produces a series of beeps while the data is being transferred to the base.

Base Charge Mode

In order for the battery to be charged, there must be enough voltage for the circuitry to work. There are three methods during which power can be supplied to the base:

1: 9VDC power supply connected to the barrel connector
2: 12VDC host power source only
3: 5VDC host power source only

The chart below describes each selection by condition.

	1	2	3
Automatic	Fast Charge	Slow Charge	No Charge
Full Charge Rate	Fast Charge	Fast Charge	No Charge
Low Charge Rate	Slow Charge	Slow Charge	No Charge
Battery Charge Off	No Charge	No Charge	No Charge

Using a slow charge rate draws less current (power) from the input power source when the battery is mostly discharged.

Note: If you attach the 4820/4820i system to a host with a 12V power source, the 12V host is dominant; the system pulls power from the host and not the 9V power supply. For example, if you have a host system with a 12 volt available to the base, it will supersede the 9V power supply. The 9V supply is not needed for 12V host applications and only serves as a backup if the system goes down.

Scan the appropriate barcode for your application. *Default = Automatic*.

* Automatic

Full Charge Rate

Low Charge Rate

Battery Charge Off

Beeper and LED Sequences and Meaning

The image scanner contains LEDs on the top of the unit to indicate its power up, communication, and battery status. Simply stated, red LED = error; green LED = success of any type. The unit's audible indicators have meaning as well: 3 beeps = error; 2 beeps = menu change; 1 beep = all other successes.

The table below lists the indication and cause of the LED illumination and beeps for the image scanner.

Image Scanner LED Sequences and Meaning

LED Indication	Beeper Indication	Cause
Normal Operation		
Red Flash	None	Battery low
Green Flash	1 beep	Successful communication or linking
Red, blinking	3 beeps	Failed communication
Menu Operation		
Green Flash	2 beeps	Successful menu change
Red, blinking	3 beeps	Unsuccessful menu change

2020 LED Sequences and Meaning

The base contains a red LED that indicates the status of the unit and verifies its communication with the host system and a green LED that indicates image scanner battery charge condition.

Charge Condition	Charge Status Indicator (Green LED)
Image Scanner inserted into base	Three flashes
>80% charged	On continuously
30% to 80% charged	Slow flash, 1 second on, 1 second off
<30% charged	Fast flash, 300 mSec on, 300 mSec off

Note: Charging only occurs with external power applied to the 2020 or 12 volt host power.

The table below list the indication and cause of the LED illumination and beeps for the 2020.

System Condition	System Status Indicator (Red LED)
Power On/System Idle	LED is on
Power On/Diagnostic Error	Blink LED for long duration, pulsing indefinitely
Receiving Data (2020 only)	Blink LED for short duration in multiple pulses. Occurs while transferring data to/from the RF module or the Host port.
Base requests status from its own Bluetooth radio	Blink LED once (occurs approx. every 30 seconds)

Image Scanner Modes

The 4820/4820i is capable of working in single image scanner mode, multiple image scanner mode, or with Bluetooth devices, other than the 2020 base.

Unlinking the Image Scanner

If the base has an image scanner linked to it, that image scanner must be unlinked before a new image scanner can be linked. Once the previous image scanner is unlinked, it will no longer communicate with the base. To unlink an image scanner from the base, scan the Unlink Image Scanner barcode below.

Unlink Image Scanner

Single Image Scanner Operation

There are two link modes to accommodate different applications: Locked Link Mode and Open Link Mode. Scan the appropriate barcodes included in the Open Link and Locked Link Mode explanations that follow to switch from one mode to another. *Default = Locked Link Mode*.

Locked Link Mode - Single Image Scanner

If you link an image scanner to a base using the Locked Link Mode, other image scanners are blocked from being linked if they are inadvertently placed into the base. If you do place a different image scanner into the base, it will charge the image scanner, but the image scanner will not be linked.

* Locked Link Mode
(Single Image Scanner)

To use a different image scanner, you need to unlink the original image scanner by scanning the Unlink Image Scanner barcode. (See "Image Scanner Modes" on page 3-5.)

Open Link Mode - Single Image Scanner

When newly shipped or defaulted to factory settings, the base and image scanner are not linked. By placing an image scanner into the base, they establish a link. Placing a different image scanner into the base establishes a new link and the old image scanner is unlinked. Each time an image scanner is placed into the base, it becomes the linked image scanner; the old image scanner is unlinked.

Open Link Mode
(Single Image Scanner)

Override Locked Image Scanner

If you need to replace a broken or lost image scanner that is linked to a base, scan the Override Locked Image Scanner barcode below with a new image scanner and place that image scanner in the base. The locked link will be overridden; the broken or lost image scanner's link with the base will be removed, and the new image scanner will be linked.

Override Locked Image Scanner
(Single Image Scanner)

Multiple Image Scanner Operation

*Note: Multiple Image Scanner Operation Mode allows you to link up to 7 image
          scanners to one base. You cannot join an eighth image scanner until you
          unlink one of the 7 image scanners or take an image scanner out of range.*

To put the image scanner in multiple image scanner mode, scan the barcode
below. Once you scan this barcode, the image scanner is unlinked from the base
and must be placed into the base to re-link.

Multiple Image Scanner

Image Scanner Name

You may assign a name to each image scanner you are using. When you have multiple image scanners linked to one base, you may want to name each image scanner so you will be able to control the image scanner receiving imaging commands sent from the base.

The default name for a 4820 is "4820," and "4820i" for a 4820i. If you have more than one image scanner linked to a base, and they all have the default names, the first image scanner linked to the base receives commands. You can change the name of an image scanner using a serial command (refer to "Image Scanner Name" on page 12-8) or using a barcode command. To change the name serially, unlink all except one of the image scanners from the base. Send ":4820:BT_NAM*name*." or ":4820i:BT_NAM*name*.", where *name* is the new image scanner name. If you wish to change the names of additional image scanners, re-link them one at a time and repeat the ":4820:BT_NAM*name*." or ":4820i:BT_NAM*name*." command for each image scanner.

To rename image scanners with sequential, numeric names, scan the barcodes below. Scan the **Reset** code after each name change and wait for the scanner to re-link to the base before scanning another barcode to rename the next image scanner.

```
||| | ||| ||| || ||| |||||||||| |||| |||
```
0001

```
||| | ||| ||| ||| || ||| |||||||||| ||| |||
```
0002

```
||| | ||| ||| || |||| ||| ||||||| ||| |||
```
0003

```
||| | ||| ||| || ||| || ||| |||||||| ||||
```
0004

```
||| | ||| ||| || ||| ||| |||||||||| |||
```
0005

```
||| | ||| ||| || ||| || ||| |||||| |||
```
0006

```
||| | ||| ||| || ||| ||| |||||||||| |||
```
0007

```
||| | ||| ||| || ||| || ||| |||| |||
```
Reset

Alternatively, you may change the name with a barcode command if you cannot send serial commands to the base. One way to do this is to scan the barcode below and scan a number for the image scanner name. For example, if you had 7 image scanners to one base, scan the barcode below with the first image scanner, scan the **1** barcode on the Programming Chart inside the back cover of this manual and scan **Save**. Then scan the **Reset** barcode and wait for the scanner to re-link to the base before scanning the next barcode. Repeat that process for image scanner number 2, 3, 4 etc.

```
||| ||| ||| || ||| ||| || ||||||||
```
Image Scanner Name

If you want to assign an alphabetic name to the image scanner, create a Code 128 barcode containing "~BT_NAM*name*." followed by a FNC3 character (hexidecimal 83), where *name* is the new image scanner name. Scan the **Reset** barcode (page 3-9 or on the Programming Chart inside the back cover of this manual). You may use Barcode Builder, which is included with Quick*View. Refer to Quick*View on page 11-5 for instructions about downloading Quick*View from the Hand Held Products website: www.handheld.com.

Image Scanner Report

Scan the barcode below to generate a report for the connected image scanners. The report indicates the port, work group, image scanner name, and address.

Image Scanner Report

Application Work Groups

Your cordless system can have up to seven image scanners linked to one base. You can also have up to seven work groups. If you want to have all of the image scanners' settings programmed alike, you don't need to use more than one work group. If you want each image scanner to have unique settings (e.g., beeper volume, prefix/suffix, data formatter), then you may program each image scanner to its own unique work group and may program each image scanner independently. For example, you might want to have multiple work groups in a retail/warehouse application where you need to have different data appended to barcodes used in the warehouse area versus the retail area. You could assign all of the image scanners in the retail area to one work group and those in the warehouse to another. Consequently, any desired changes to either the retail or warehouse area would apply to all image scanners in that particular work group. Visual Xpress (page 11-4) makes it easy for you to program your system for use with multiple image scanners and multiple work groups.

The image scanner keeps a copy of the menu settings it is using. Whenever the image scanner is connected or reconnected to a base, the image scanner is updated with the latest settings from the base for its work group. The image scanner also receives menu setting changes processed by the base. If an image scanner is removed from one base and placed into another base, it will be updated with the new base settings for whatever work group that the image scanner was previously assigned. For example, if the image scanner was in work group 1 linked to the first base, it will be placed in work group 1 in the second base with the associated settings.

Application Work Group Selection

This programming selection allows you to assign an image scanner to a work group by scanning the barcode below. You may then program the settings (e.g., beeper volume, prefix/suffix, data formatter) that your application requires.

* Group 0

Group 1

Group 2

Group 3

Group 4

Group 5

Group 6

Resetting the Standard Product Default Settings: All Application Work Groups

The following barcode defaults all of the work groups to the factory settings.

Standard Product Default Settings:
All Application Groups

The Menu Commands, beginning on page 12-5 list the standard product default settings for each of the commands (indicated by an asterisk (*) on the programming pages).

Resetting the Standard Product Default Settings: Current Application Work Group

If you aren't sure what programming options are in your image scanner, or you've changed some options and want the standard product default settings restored, scan the **Standard Product Default Settings: Current Application Group** barcode below.

The Menu Commands, beginning on page 12-5 list the factory default settings for each of the commands (indicated by an asterisk (*) on the programming pages).

Note: Scanning this barcode also causes both the image scanner and the base to perform a reset and become unlinked. The image scanner must be placed in its base to re-establish the link before any setup codes are entered. Refer to "Image Scanner Modes" on page 3-5 for additional information.

Standard Product Default Settings:
Current Application Group

*Note: If your image scanner is in multiple image scanner mode and you scan either the current or all application group default barcode, you will hear up to 30 seconds of beeping while all image scanners are re-linked from the base and the settings are defaulted to * settings. The default interface is keyboard wedge and the default image scanner mode is single image scanner locked link mode.*

Using the Image Scanner with Bluetooth Devices

The image scanner can be used either with the 2020 base or with other Bluetooth devices. Scanning the Non-Base Bluetooth Connection barcode below allows the image scanner to be used with other Bluetooth devices (e.g., PDA, PC - Bluetooth USB Adapter). After you scan the barcode below, follow the instructions supplied with your Bluetooth device to locate the image scanner and connect to it. If you go out of range with your image scanner, the image scanner automatically reconnects to the Bluetooth device when it is back in range. If you want to re-link to the 2020 base, refer to *"Override Locked Image Scanner"* on page 3-6 or *"Resetting the Standard Product Default Settings: Current Application Work Group"* on page 3-12.

Note: The multiple work groups option is not available when you are using the image scanner with Bluetooth devices other than the 2020 base.

Non-Base BT Connection

Changing Bluetooth PIN Code

Some devices require a PIN code as part of the Bluetooth security features. Your image scanner's default PIN is 1234, which you may need to enter the first time you connect to your PDA or PC. The PIN code must be between 1 and 16 characters. To change the PIN, scan the barcode below and then scan the appropriate numeric barcodes from the Programming Chart inside the back cover of this manual. Scan **Save** to save your selection.

Bluetooth PIN

Out-of-Range Alarm

Duration

If your image scanner is out range of the base, an alarm sounds from both your base and image scanner. To activate the alarm options for the image scanner or the base and to set the alarm duration, scan the appropriate barcode below and then set the time-out duration (from 0-3000 seconds) by scanning digits on the Programming Chart inside the back cover, then scanning **Save**. *Default = 0 sec (no alarm).*

Base Alarm Duration

Image Scanner Alarm

Note: If you are out of range when you scan a barcode, you will receive an error beep even if you do not have the alarm set. You receive the error beep since the data could not be communicated to the base or the host.

Alarm Sound Type

If you have set the out-of-range alarm enabled, you may change the alarm type for the image scanner or base by scanning the appropriate barcode below and then scanning a digit (0-7) barcode and the **Save** barcode on the Programming Chart inside the back cover of this manual. *Default = 0.* Set the sound type to fit your application.

Base Alarm Type

Image Scanner Alarm Type

Data Accumulation Mode

Scan the barcodes below to turn data accumulation (batch) mode on and off. If data accumulation mode is on, barcode data is stored when the image scanner is out of range of the base and transmitted once the image scanner is back in range.

Data Accumulation Mode On

* Data Accumulation Mode Off

4

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.*

‖‖‖‖‖‖‖‖‖‖‖‖‖‖
* Beeper - Good Read On

‖‖‖‖‖‖‖‖‖‖‖‖‖‖
Beeper - Good Read Off

Beeper Volume – Good Read

The beeper volume codes modify the volume of the beep the image scanner emits on a good read. *Default = Medium.*

‖‖‖‖‖‖‖‖‖‖‖‖‖‖
Low

‖‖‖‖‖‖‖‖‖‖‖‖‖‖
* Medium

‖‖‖‖‖‖‖‖‖‖‖‖‖‖
High

‖‖‖‖‖‖‖‖‖‖‖‖‖‖
Off

Beeper Pitch – Good Read

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

Low (1600 Hz)

* Medium (3250 Hz)

High (4200 Hz)

Beeper Duration – Good Read

The beeper duration codes modify the length of the beep the image scanner 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.*

* LED - Good Read On

LED - Good Read 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 barcode below and then scan a digit (1-9) barcode and the **Save** barcode on the Programming Chart inside the back cover of this manual. *Default = One.*

Number of Beeps/LED Flashes

Good Read Delay

This sets the minimum amount of time before the image scanner can read another barcode. *Default = 0 ms (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 barcode below, then set the delay (from 0-30,000 milliseconds) by scanning digits from the inside back cover, then scanning **Save**.

User-Specified Good Read Delay

Serial Trigger Modes

Manual/Serial Trigger, Low Power

You can activate the image scanner either by pressing the trigger, or using a serial trigger command (see Trigger Commands on page 12-4). When in manual trigger mode, the image scanner scans until a barcode is read, or until the trigger is released.

When in serial mode, the image scanner scans until a barcode has been read or until the deactivate command is sent. In serial mode, the image scanner can also be set to turn itself off after a specified time has elapsed (see Read Time-Out (Serial Trigger Mode), which follows).

* Manual/Serial Trigger

Read Time-Out (Serial Trigger Mode)

Use this selection to set a time-out (in milliseconds) of the image scanner's trigger when using serial commands to trigger the image scanner. Once the image scanner has timed out, you can activate the image scanner either by pressing the trigger or using a serial trigger command. After scanning the **Read Time-Out** barcode, set the time-out duration (from 0-300,000 milliseconds) by scanning digits on the Programming Chart inside the back cover, then scanning **Save**. *Default = 300,000 ms.*

Read Time-Out

Image Scanner Power Time-Out Timer

Note: The Image Scanner Power Time-out Timer option only applies to Manual/ Serial Trigger.

When there is no activity within a specified time period, the image scanner enters low power mode. Scan the appropriate Image Scanner Power Time-Out barcode to change the time-out duration (in seconds).

Note: Scanning zero (0) is the equivalent of setting no time-out.

If there are no trigger pulls during the "image scanner power time-out timer" interval, the image scanner goes into power down mode. Whenever the trigger is enabled, the "image scanner power time-out timer" is reset. If the image scanner is placed in the 2020 cradle and the battery is in the process of being charged, the image scanner will not go into power down mode.

|||||||||||||||||||||||||||||||
0 seconds

|||||||||||||||||||||||||||||||
200 seconds

|||||||||||||||||||||||||||||||
400 seconds

|||||||||||||||||||||||||||||||
900 seconds

|||||||||||||||||||||||||||||||
* 3600 seconds

|||||||||||||||||||||||||||||||
7200 seconds

Note: When the image scanner is in power down mode, pull the trigger to power the unit back up. There will be a set of power up beeps and a delay of up to a few seconds for the radio to join. The image scanner will then be ready to use.

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 image scanner is triggered to read the new code.

Note:The image scanner 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 image scanner's light levels adjust to the saved setting (see LED Power Level on page 4-9). This mode requires at least 50 lux of ambient light to operate correctly.

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 image scanner turns the LEDs on at the configured power level (Default High) and attempts to find and decode barcodes in its field of view.

Scan Stand Symbol

Presentation Mode

Note: This mode requires at least 50 lux of ambient light to operate correctly.

Scanning the barcode below programs the image scanner to work in Presentation Mode. Presentation Mode uses ambient light to detect barcodes. The LEDs are off until a barcode is presented to the image scanner, then the LEDs turn on automatically to read the code. If the light level in the room is not high enough, Presentation Mode may not work properly.

Presentation Mode

Presentation LED Behavior after Decode

When an image scanner is in presentation mode, the LEDs remain on and continue scanning for a short time after a barcode is decoded. If you wish to turn the LEDs off immediately after a barcode is decoded, scan the **LEDs Off** barcode, below. *Default = LEDs On.*

* LEDs On

LEDs Off

Presentation Sensitivity

Presentation Sensitivity is a numeric range that increases or decreases the image scanner's reaction time to barcode presentation. To set the sensitivity, scan the ***Sensitivity*** barcode, then scan the degree of sensitivity (from 0-20) from the inside back cover, 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 image scanner's trigger is pulled when using a hands free mode, the image scanner changes to manual trigger mode. You can set the time the image scanner 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 image scanner reverts to the original hands free mode.

Scan the ***Hands Free Time-Out*** barcode, then scan the time-out duration (from 0-300,000 milliseconds) from the inside back cover, and ***Save***. *Default = 5,000 ms.*

Hands Free Time-Out

Reread Delay

This sets the time period before the image scanner can read the *same* barcode a second time. Setting a reread delay protects against accidental rereads of the same barcode. Longer delays are effective in minimizing accidental rereads. Use shorter delays in applications where repetitive barcode scanning is required. *Default = Medium.*

Reread Delay only works when in Presentation Mode (see page 4-6).

Short (500 ms)

* Medium (750 ms)

Long (1000 ms)

Extra Long (2000 ms)

User-Specified Reread Delay

If you want to set your own length for the reread delay, scan the barcode below, then set the delay (from 0-30,000 milliseconds) by scanning digits from the inside back cover, then scanning **Save**.

User-Specified Reread Delay

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 4-10), the aimer will be at 100% power during the delay, regardless of the LED Power Level.

*Note: If you scan the **Off** barcode, both the aimer and illumination lights turn off, making it impossible to scan barcodes 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** barcode below.*

Off

Low (50%)

* High (100%)

Illumination Lights

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

Note: This setting does not affect the aimer light. The aiming light can be set using Aimer Mode (page 4-10).

* Lights On

Lights Off

Aimer Delay

The aimer delay allows a delay time for the operator to aim the image scanner 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 barcode below, then set the time-out by scanning digits (0 - 4,000 ms) from the Programming Chart inside the back cover of this manual, then scan **Save**.

Delay Duration

Aimer Mode

This feature allows you to turn the aimer on and off. When the Interlaced barcode is scanned, the aimer is interlaced with the illumination LEDs.

Off

* Interlaced

Centering

Use Centering to narrow the image scanner's field of view to make sure the image scanner reads only those barcodes 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, page 4-10, for the most error-free operation in applications where multiple codes are spaced closely together. Using the Aimer Delay and Centering features, the image scanner can emulate the operation of older systems, such as linear laser barcode image scanners.)

In the example below, the gray area is the full image scanner field of view and the white area is the centering window. Barcode 1 will not be read, while Barcode 2 will
be.

Barcode 1

Barcode 2
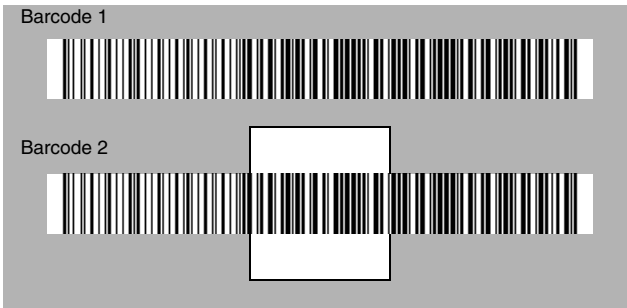
The default centering window is a 128x96 pixel area in the center of the image scanner's field of view. The following diagram illustrates the default top, bottom, left, and right pixel positions, measured from the top and the left side of the image scanner's field of view, which is 640 by 480 pixels.
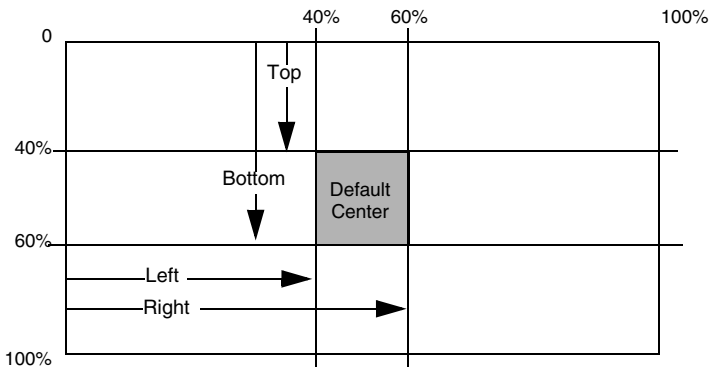
If a barcode is not within the predefined window, it will not be decoded or output by the image scanner. If centering is turned on by scanning **Centering On**, the image scanner only reads codes that intersect the centering window you specify using the **Top**, **Bottom**, **Left**, or **Right** barcodes.

Scan **Centering On**, then scan one of the following barcodes 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 inside back cover of this manual. 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 two selectable decode (scanning) modes:

Full Omnidirectional - Searches for barcode 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.

Note: This search mode is the default setting for the image scanner.

Full Omnidirectional

Quick Omnidirectional - This is an abbreviated search for barcode 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

Output Sequence Overview

Require Output Sequence

When turned off, the barcode data will be output to the host as the image scanner decodes it. When turned on, all output data must conform to an edited sequence or the image scanner 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 image scanner to output data (when scanning more than one symbol) in whatever order your application requires, regardless of the order in which the barcodes are scanned. Reading the *Default Sequence* symbol programs the image scanner 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: You must hold the trigger while reading each barcode in a sequence.

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 (inside back cover) to read these options.

To Add an Output Sequence

1. Scan the *Enter Sequence* symbol (see Require Output Sequence, page 4-16).

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 (inside back cover).

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 Code Page Mapping of Printed Barcodes, page A-6, 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 *F F* to enter an Output Sequence for an additional symbology, or *Save* to save your entries.

•Discard
This exits without saving any Output Sequence changes.

Output Sequence Example

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

Note: Code 93 must be enabled to use this example.

A - Code 39

B - Code 128

C - Code 93

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

SEQBLK62999941FF6A999942FF69999943FF

The breakdown of the command line is shown below:

SEQBLKsequence 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 , but assume a <CR> suffix and specific code lengths, you would use the following command line:

SEQBLK62001241FF6A001342FF69001243FF

The breakdown of the command line is shown below:

SEQBLK sequence editor start command

62   code identifier for **Code 39**

0012   A - Code 39 sample length (11) plus CR suffix (1) = 12

41   start character match for Code 39, 41h = "A"

FF   termination string for first code

6A   code identifier for **Code 128**

0013   B - Code 128 sample length (12) plus CR suffix (1) = 13

42   start character match for Code 128, 42h = "B"

FF   termination string for second code

69   code identifier for **Code 93**

0012   C - Code 93 sample length (11) plus CR suffix (1) = 12

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

When the output sequence is *Off*, the barcode data is output to the host as the image scanner decodes it.

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

Required

On/Not Required

*Off

Multiple Symbols

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

On

* Off

No Read

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

On

* Off

If you want a different notation than "NR," for example, "Error," or "Bad Code," you can edit the output message using the Data Formatter (page 6-5). The hex code for the No Read symbol is 9C.

Print Weight

Print Weight is used to adjust the way the image scanner reads Matrix symbols. If an image scanner 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** barcode, set the print weight (from 1-7) by scanning digits from the inside back cover, then scanning **Save**. *Default = 4.*

Set Print Weight

* Default

Video Reverse

Video Reverse is used to allow the image scanner to read barcodes that are inverted. The "Off" barcode below is an example of this type of barcode. If additional menuing is required, Video Reverse must be disabled to read the menu barcodes and then re-enabled after menuing is completed.

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

On

* Off

Working Orientation

Some barcodes 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 image scanner. *Default = Upright.*

Upright:

Rotate Code Clockwise 90°:

Upside Down:

Rotate Code
Counterclockwise 90°:

* Upright

Rotate Code Clockwise 90°
(Rotate Image Scanner
Counterclockwise)

Upside Down

Rotate Code
Counterclockwise 90°
(Rotate Image Scanner

Data Editing
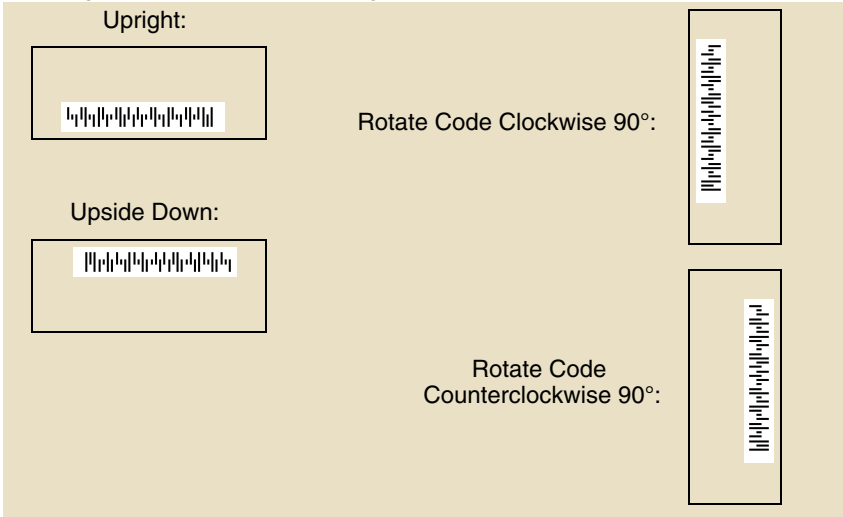
Prefix/Suffix Overview

When a barcode is scanned, additional information is sent to the host computer along with the barcode data. This group of barcode 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:

Prefix	Scanned Data	Suffix
1-11 alpha numeric & control characters	variable length	1-11 alpha numeric & control characters
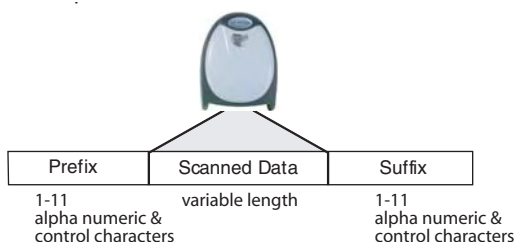
Points to Keep In Mind

- 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 Code Page Mapping of Printed Barcodes on page A-6, 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.
- When setting up for specific symbologies (as opposed to all symbologies), the specific symbology ID value counts as an added prefix or suffix character.

To Add a Prefix or Suffix:

Step 1. Scan the **Add Prefix** or **Add Suffix** symbol (page 5-4).

Step 2. Determine the 2 digit Hex value from the Symbology Chart (included in the Symbology Chart, beginning 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 inside the back cover of this manual or scan **9**, **9** for all symbologies.

Step 4. Determine the hex value from the Code Page Mapping of Printed Barcodes on page A-6, for the prefix or suffix you wish to enter.

Step 5. Scan the 2 digit hex value from the Programming Chart inside the back cover 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 the Symbology Chart, beginning on page A-1) for UPC.

Step 3. Scan **6**, **3** from the Programming Chart inside the back cover of this manual.

Step 4. Determine the hex value from the Code Page Mapping of Printed Barcodes on page A-6, for the CR (carriage return).

Step 5. Scan **0**, **D** from the Programming Chart inside the back cover 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 the Symbology Chart, beginning on page A-1) 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 inside the back cover 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 barcode 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 image scanner transmits the function code to the terminal. Charts of these function codes are provided in Supported Interface Keys starting on page 10-3. When the image scanner is in keyboard wedge mode, the scan code is converted to a key code before it is transmitted. *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** barcode below, then scan the number of milliseconds and the **SAVE** barcode using the Programming Chart inside the back cover of this manual.

Prefix	Scanned Data	Suffix

1 2 3 4 5

Intercharacter Delay

Intercharacter Delay
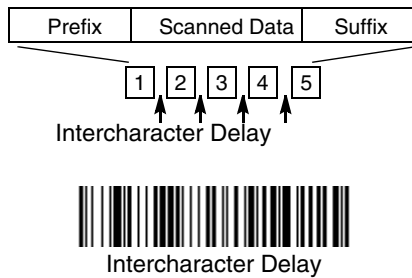
To remove this delay, scan the **Intercharacter Delay** barcode, then set the number of steps to 0. Scan the **SAVE** barcode using the Programming Chart inside the back cover of this manual.

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** barcode below, then scan the number of milliseconds and the **SAVE** barcode using the Programming Chart inside the back cover of this manual.

Next, scan the **Character to Trigger Delay** barcode, then the 2-digit hex value for the ASCII character that will trigger the delay Code Page Mapping of Printed Barcodes on page A-6.

Delay Length

Character to Trigger Delay

To remove this delay, scan the **Delay Length** barcode, and set the number of steps to 0. Scan the **SAVE** barcode using the Programming Chart inside the back cover 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** barcode below, then scan the number of milliseconds and the **SAVE** barcode using the Programming Chart inside the back cover of this manual.

Prefix	Scanned Data	Suffix

STX	1	HT	2	3	4	5	CR	LF

Interfunction Delays
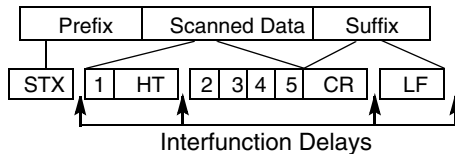
Interfunction Delay

To remove this delay, scan the **Interfunction Delay** barcode, then set the number of steps to 0. Scan the **SAVE** barcode using the Programming Chart inside the back cover of this manual.

Intermessage Delay

An intermessage delay of up to 495 milliseconds may be placed between each scan transmission. Scan the **Intermessage Delay** barcode below, then scan the number of milliseconds and the **SAVE** barcode using the Programming Chart inside the back cover of this manual.

```
┌──┬──┬──┬──┬──┬──┐  ┌──┬──┬──┬──┬──┬──┐
│  │  │  │  │  │  │  │  │  │  │  │  │  │
└──┴──┴──┴──┴──┴──┘  └──┴──┴──┴──┴──┴──┘
```
1st Scan Transmission ↑ 2nd Scan Transmission
Intermessage Delay

Intermessage Delay
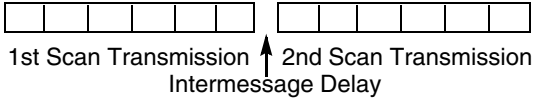
To remove this delay, scan the **Intermessage Delay** barcode, then set the number of steps to 0. Scan the **SAVE** barcode using the Programming Chart inside the back cover of this manual.

6

Data Formatting

Data Format Editor Introduction

You may use the Data Format Editor to change the image scanner's output. For example, you can use the Data Format Editor to insert characters at certain points in barcode 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 barcode, it gets outputted automatically; however when you do a format, you must use a "send" command (see Send Commands on page 6-2) within the format program to output data.

Multiple formats may be programmed into the image scanner. 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 page 6-4.

To Add a Data Format

Step 1. Scan the **Enter Data Format** symbol (page 6-4).

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 barcode using a different data format. After the one barcode has been read, the image scanner reverts to the primary data format. See page 6-5.) If you are programming the primary format, scan **0** using the Programming Chart inside the back cover 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 (page 2-8) and locate the Terminal ID number for your PC. Scan three numeric barcodes on the inside back cover to program the image scanner for your terminal ID (you must enter 3 digits). For example, scan **0 0 3** for an AT wedge.

Note: The wildcard for all terminal types is 099.

Step 4. Code I.D.
In the Symbology Chart, beginning on page A-1, 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 inside the back cover 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 inside the back cover 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 Commands (page 6-2). Scan the symbols 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 inside the back cover 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 inside the back cover 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 2-8), and the barcode data length for the specific data format that you want to delete. All other formats remain unaffected.
- **Save** from the Programming Chart inside the back cover of this manual
  This exits, saving any Data Format changes.
- **Discard** from the Programming Chart inside the back cover 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 Code Page Mapping of Printed Barcodes on page A-6.)

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 Code Page Mapping of Printed Barcodes on page A-6.)

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 Code Page Mapping of Printed Barcodes on page A-6.)

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 Code Page Mapping of Printed Barcodes on page A-6, 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 Code Page Mapping of Printed Barcodes on page A-6.)

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 Code Page Mapping of Printed Barcodes on page A-6.)

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 Code Page Mapping of Printed Barcodes on page A-6.

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 Code Page Mapping of Printed Barcodes on page A-6.)

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 = FBnnxxyy . .zz*** where nn is a count of the number of suppressed characters in the list and xxyy .. zz is the list of characters to be suppressed. (xx stands for the hex value for an ASCII code, see Code Page Mapping of Printed Barcodes on page A-6.)

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 = E4nnxx$_1$xx$_2$yy$_1$yy$_2$...zz$_1$zz$_2$*** where nn is the total count of both

characters to be replaced plus replacement characters; xx_1 defines characters to be replaced and xx_2 defines replacement characters, continuing through zz_1 and zz_2.

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 Code Page Mapping of Printed Barcodes on page A-6.)

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

Clear One Data Format

Save

* Default Data Format

Clear All Data Formats

Discard

Data Formatter

When Data Formatter is turned off, the barcode 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 image scanner 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 barcode using a different data format than your primary format. When data formats are programmed (see page 6-1), 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 barcodes below. The image scanner will scan the next barcode, formatting the data with the selected alternate format, then revert immediately to the primary format.

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Alternate Data Format 1

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Alternate Data Format 2

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

Alternate Data Format 3

7

Symbologies

This programming section contains the following menu selections. Refer to Chapter 12 for settings and defaults.

- All Symbologies
- 4-CB (4-State Customer Barcode)
- Australian Post
- Aztec Code
- British Post
- Canadian Post
- China Post
- Codabar
- Codablock F
- Code 11
- Code 128
- Code 16K
- Code 39
- Code 49
- Code 93
- Data Matrix
- EAN/JAN-13
- EAN/JAN-8
- EAN•UCC Composite Codes
- Interleaved 2 of 5
- ID-tag (UPU 4-State)
- Japanese Post

- Kix (Netherlands) Post
- Korea Post
- Matrix 2 of 5
- MaxiCode
- MicroPDF417
- MSI
- PDF417
- Planet Code
- Plessey Code
- PosiCode A and B
- Postnet
- QR Code
- GS1 DataBar Expanded
- GS1 DataBar Limited
- GS1 DataBar
- Straight 2 of 5 IATA
- Straight 2 of 5 Industrial
- TCIF Linked Code 39 (TLC39)
- Telepen
- UPC-A
- UPC-A/EAN-13 with Extended Coupon Code

8

Imaging Commands

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

Imaging Commands with their modifiers send imaging commands to the image scanner on a single-use basis, and take effect for the next subsequent image capture. Once that capture is complete, the image scanner 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 12-21). When the serial default command is used, that selection becomes the new default setting for the image scanner.

Image Snap - IMGSNP

An image is taken whenever the trigger of the image scanner 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 image scanner, 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 image scanner 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)*

- *n*E Range: 1 - 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)*

    *n*D   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 image scanner is in a stand. LED illumination (1L) is preferred when the image scanner 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. This option only works with Imaging Style 1P (Photo Style). Refer to .

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

    *n*U   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)*

    *n*W   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 - IMGSHP

An image is taken whenever the trigger of the image scanner 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 IMGSHP command.

The image ship command has many different modifiers that can be used to change the look of the image output by the image 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 IMGSHP command. For example, you can use the following command to ship a bitmap image with gamma correction and document image filtering:

IMGSHP8F75K26U

IMGSHP 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
*n*e	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 image scanner is mounted upside down.

    1IX   Invert around the X axis (flips picture upside down)

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

IF- Noise Reduction: Used to reduce the salt and pepper noise.

    0IF   No salt and pepper noise reduction (default)

    1IF   Salt and pepper noise reduction

IR - Image Rotate:

    0IR   Image as snapped (rightside up) (*default*)

    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)*

    *n*J   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. The optimal setting for text images is 50K.

    0K   Gamma correction off *(default)*

    50K   Apply gamma correction for brightening typical document image

    *n*K   Apply gamma correction factor *n* (*n* = 0-1000)

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 639, and device rows are numbered 0 through 479. The resulting cropped image must have two or more rows and two or more columns of pixels or the IMGSHP command will fail (1x1 is not acceptable). For example, sending IMGSHP10L15R5T8B will cause a 6 column by 4 row image to be transmitted.

> *n*L   The left edge of the shipped image corresponds to column *n* of the image in memory. Range: 000 - 639. *(Default = 0)*
>
> *n*R   The right edge of the shipped image corresponds to column *n* - 1 of the image in memory. Range: 000 - 639. *(Default = all columns, or 639 for VGA image scanner)*
>
> *n*T   The top edge of the shipped image corresponds to row *n* of the image in memory. Range: 000 - 479. *(Default = 0)*
>
> *n*B   The bottom edge of the shipped image corresponds to row *n* - 1 of the image in memory. Range: 000 - 479. *(Default = all rows, or 479 for VGA image scanner)*

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

> *n*M   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.

> 0P   None (raw data)
>
> 2P   None *(default for USB)*
>
> 3P   Hmodem compressed *(default for RS-232)*
>
> 4P   Hmodem

S - Pixel Ship: Can be used to decimate the image by shipping only certain, regularly spaced pixels. For example, **4S** 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.

> 1S   ship every pixel *(default)*
>
> 2S   ship every 2nd pixel, both horizontally and vertically *(default)*
>
> 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 8-4), with the image scanner 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 8-3). 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

Image Size Compatibility

If you prefer that an image ship returns images at the sensor's native resolution (752x480 pixels for the 5X00 engine, 640x480 pixels for the 4X00 engine), scan the Native Resolution code. If you have an image scanner with a 4X00 image engine and have designed applications that expect an image ship to return exactly 640x480 pixels, scan the Force VGA Resolution barcode. Refer to *"Show Engine Revision"* on page 11-1 for information on determining the engine in your unit. *Default = Force VGA Resolution*

* Force VGA Resolution

Native Resolution

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 barcode, which is then transmitted to the host application. Upon the receipt of the barcode data, the host application sends the IMGBOX command, which tells the image scanner to output only the area of the image corresponding to the signature capture box. The image scanner also automatically adjusts for aspect ratio and distortion, issues that arise due to image scanner skew with respect to the barcode.

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

negative

positive

0123456789

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 barcode. Using this method, intelligent signature capture always outputs the correct image size and resolution, no matter the distance at which the image scanner is held from the barcode, assuming that the entire signature capture area is within the image scanner's field of view.

The intelligent signature capture command string for this application is:

IMGBOX40S0X70Y190W100H1R0F

IMGBOX Modifiers

A - Output Image Width: This option is used to output an image of a particular width. If using this option, set the resolution to zero.

B - Output Image Height   This option is used to output an image of a particular height. If using this option, set the resolution to zero.

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

R - Resolution of Signature Capture Area: The number of pixels that the image scanner 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. To specify a non-integer value for the resolution, use a number greater than or equal to 1000. For example, use 2500 to specify a resolution of 2.500. The image scanner automatically inserts a decimal point between the first and second digit. Set to zero when using the A and B modifiers.

S - Barcode Aspect Ratio: The ratio of the barcode height to the narrow element width. In the example, the narrow element width is .010 inches and the barcode 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 Barcode 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 Barcode 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 barcode, and positive numbers indicate that the area is below the barcode. In the example, the horizontal offset is 0.70 inches, resulting in a value for Y = 0.7/0.01 = 70.

RF Default Imaging Device

The image scanner supports imaging command processing (IMGSHP, IMGSNP, IMGBOX) so that Quick*View (see "Quick*View" on page 11-5) and other applications are able to perform imaging functions as if they were talking directly to an image scanner. To accomplish this, the image scanner uses a menu command called RF_DID (RF Default Imaging Device). RF_DID is the name of the image scanner (BT_NAM) that is to receive imaging commands. The default for RF_DID is "*"indicating that imaging commands are to be sent to all associated image scanners. Change this setting to RF_DID*image scanner_name* to ensure that they are sent to a particular image scanner. Refer to "Image Scanner Report" on page 11-2 to generate a report containing the port, work group, image scanner name, and address for each image scanner. Refer to "Image Scanner Name" on page 3-8 set a unique name for each image scanner.

9

OCR Programming

Use this section to program the image scanner for optical character recognition (OCR). The image scanner reads 6 to 60 point OCR typeface.

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

The image scanner will read OCR-A, OCR-B, U.S. Currency Serial Number (Money), MICR E-13B, and SEMI Font.

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 9-1 for programming codes that will enable your image scanner to read OCR-A, OCR-B, U.S. Currency, MICR E 13 B, or SEMI fonts. See "OCR Templates" on page 9-3 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 image scanner.

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

OCR Fonts

Default All OCR Settings turns off all OCR capability in the image scanner, so the image scanner will be able to scan linear, stacked, matrix, and composite barcodes, 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, page 4-19, if your OCR symbols will not usually be presented upright to the image 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, page 9-4).

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, page 9-4).

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, page 9-4).

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, page 9-4).

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 amount character is output as **A**

    the on us character is output as **O**

    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 image scanner, so the image scanner will be able to scan linear, stacked, matrix, and composite barcodes, 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 image scanner. 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 image scanner to read any combination of characters in the order you specify. Refer to examples that follow the Template Characters table below.

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"
i	represents character from user-defined variable "g" or "h"
k	represents that a check character is verified but transmitted
l	represents any uppercase letter
t	marks the start of a new template
r	multi row indicator
All other characters represent themselves. Spaces can be used.	
Note: 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.

<u>To Add an OCR Template</u>

1. Turn on the OCR font you want to read (page 9-2).

2. Begin building the template.
    Scan the **Enter OCR Template** symbol (page 9-13).

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 (after the Sample Codes in the back of this manual) to scan the characters for your template.

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

<div align="center">dddddddd</div>

To create this template, you would enable the OCR-A font. Scan the ***Enter OCR Template*** symbol (page 9-13), then scan the ***d*** from the OCR Programming Chart in the back of this manual eight times. Scan ***Save OCR Template*** (page 9-14). This would let you read any string of eight digits, for example:

<div align="center">37680981</div>

Character Match Sequences
On the Code Page Mapping of Printed Barcodes, page A-6, find the Hex value that represents the character(s) you want to match. Use the Programming Chart (inside the back cover) 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:

<div align="center">ddd414243ddd</div>

<div align="center">hex codes for
letters A, B, and C</div>

To create this template, you would enable the OCR-A font. Scan the ***Enter OCR Template*** symbol (page 9-13). Scan the ***d*** from the OCR Programming Chart in the back of this manual three times. Then scan ***414243*** from the inside back cover (the hex characters for "A," "B," and "C"), and scan the ***d*** three more times. Scan ***Save OCR Template,*** page 9-14. This would let you read any string of three digits, "ABC," then any string of three digits, for example:

<div align="center">551ABC983</div>

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:

<div align="center">ddd2041424320ddd</div>

<div align="center">hex code for a space</div>

To create this template, you would enable the OCR-A font. Scan the **_Enter OCR Template_** symbol (page 9-13). Scan the **_d_** from the OCR Programming Chart in the back of this manual three times, then scan **_2041424320_** from the Programming Chart on the inside back cover (the hex characters for "space," "A," "B," "C," "space"). Scan the **_d_** three more times, then scan **_Save OCR Template_** (page 9-14). This would let you read any string of three digits, space, "ABC," space, then any string of three digits. For example:

<p style="text-align:center;">551 ABC 983</p>

Note: If using Quick*View 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 image scanner to accept many OCR formats. To do this, you would string together each format with a "t." This tells the image scanner 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:

<p style="text-align:center;">dddddddddtddddlldd</p>

To create this template, you would enable the OCR-A font. Scan the **_Enter OCR Template_** symbol (page 9-13). Scan the **_d_** from the OCR Programming Chart in the back of this manual 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 **_l_** two times, then scan **_d_** two more times. Scan **_Save OCR Template_** (page 9-14). This would let you read either type of format, for example:

<p style="text-align:center;">99028650</p>

<p style="text-align:center;">*or*</p>
<p style="text-align:center;">9902XZ50</p>

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 (). 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 (). Scan *414243* from the Programming Chart (the hex characters for "A," "B," and "C"). Scan *Save OCR Template* (). 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:

dddddgggg

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 image scanner is capable of decoding multi-row OCR text.

Note: Reading rows longer than sixteen characters is not recommended.

Consider the following example. This example shows serial commands as they would be entered using Quick*View.

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:

OCRTMP"dddddddd".

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

OCRTMP"llllllll".

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:

OCRTMP"ddddddddrllllllll".

To read the three rows below, you would use the template command "OCRTMP"ddddddddrllllllllrllllddddd".

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 image scanner 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* barcode to specify the type of check character used in the OCR strings you're scanning. The image scanner will then only read OCR character strings with a valid check character. The image scanner 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:

ddddddddc

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 9-14). This template will let you read any combination of six digits with a correct check character after. (If the check character is invalid, data is discarded.) 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 image scanner 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:

⌐512351X

The image scanner performs the following check character computation:

(6 + 5 + 1 + 2 +3 + 5 + 1 + X) 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** barcode, below.

Enter OCR Check Character

2. Enter the characters in order. For each character, look up the corresponding hex value from the Code Page Mapping of Printed Barcodes on page A-6. Use the Programming Chart on the inside the back cover of this manual to scan the two symbols for each hex value.

3. Scan the **Save** barcode on the inside back cover.

Example: To program the modulo 11 check character from example #8 on page 9-9, enable the OCR-A font. Scan the **Enter OCR Check Character** barcode on page 9-10, then scan the following hex values in order:

3031323334353637383958

After you enter all the desired hex values, scan the **Save** barcode on the inside back cover 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 image scanner 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:

dddddddc

Then scan the string below:

01234565

The reader performs the check character computation below:

(0 x 3 + 1 x 1 + 2 x 3 + 3 x 1 + 4 x 3 + 5 x 1 + 6 x 3 + 5 x 1) 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 image scanner 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:

dddddddc

Then scan the string below:

0128454

The reader performs the check character computation below:

(0 x 1 + 1 x 2 + 2 x 1 + 8 x 2 + 4 x 1 + 5 x 2 + 4 x 1) modulo 10

= (0 + 2 + 2 + (1 + 6) + 4 + (1 + 0) + 4) modulo 10

= 0

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 barcode. The following example shows how to configure the image scanner 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 image scanner is aimed.

ISBN4-594-03019-X

C0097 ¥838E

1. Scan the OCR-B On barcode on page 9-2.

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 image scanner 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"ISBNgggggggggggggctCdddd hdddEtCdddd hddddE",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 the inside the back cover of this manual.

Exit Selections

||||||||||||||||||||||||||||
Save OCR Template

||||||||||||||||||||||||||||
Discard OCR Template

10

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 image
scanner. Refer to page 2-13 enable Control + ASCII mode.

Function Code	HEX/ASCII Value	Full ASCII "CTRL" +
NUL	00	@
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
ETB	17	W
CAN	18	X
EM	19	Y
SUB	1A	Z
ESC	1B	[
FS	1C	\
GS	1D	]
RS	1E	^
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

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, beginning 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 Decoder Revision

Scan the barcode below to output the decoder revision.

Show Decoder Revision

Show Engine Revision

Scan the barcode below to output the engine revision. It will return the engine type, revision number, and status character [ACK]. For example, an image scanner with a 5100 engine, version 26 would return:

        ENGREVType: 1 Revision: 26[ACK]

Show Engine Revision

Show Scan Driver Revision

Scan the barcode below to output the scan driver revision. The scan driver controls image capture.

Show Scan Driver Revision

Show Software Revision

Scan the barcode below to output the current software revision, unit serial number, and other product information for both the image scanner and base.

Show Revision

Show Data Format

Scan the barcode below to show current data format settings.

Data Format Settings

Reset Image Scanner

Scanning this barcode causes the image scanner to re-link with the base.

Reset Imager

Image Scanner Report

Scan the barcode below to generate a report for the connected image scanners. The report indicates the port, work group, image scanner name, and address. To assign a name to your image scanner, refer to "Menu Command Syntax" on page 12-1.

Image Scanner Report

Image Scanner Address

Scan the barcode below to determine the address of the image scanner you are using.

Image Scanner Address

Base Address

Scan the barcode below to determine the address of the base you are using.

Base Address

Resetting the Standard Product Default Settings: Current Application Work Group

If you aren't sure what programming options are in your image scanner, or you've changed some options and want the standard product default settings restored, scan the **Standard Product Default Settings: Current Application Group** barcode below.

The Menu Commands starting on page 12-5 list the factory default settings for each of the commands (indicated by an asterisk (*) on the programming pages).

Note: Scanning this barcode also causes both the image scanner and the base to perform a reset and become unlinked. The image scanner must be placed in its base to re-establish the link before any setup codes are entered. Refer to "Image Scanner Modes" on page 3-5 for additional information.

Standard Product Default Settings:
Current Application Group

Resetting the Standard Product Default Settings: All Application Work Groups

The following barcode defaults all of the work groups to the factory settings.

Standard Product Default Settings:
All Application Groups

The Menu Commands starting on page 12-5 list 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 image scanner 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.

Note: This feature should not be used during normal image scanner operation.

||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| |||
On
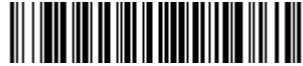
||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| |||
* Off

Visual Xpress

Visual Xpress provides a wide range of PC-based programming functions that can be performed on an image scanner connected to your PC's COM port. Visual Xpress allows you to download upgrades to the image scanner's firmware, change programmed parameters, and create and print programming barcodes. Using Visual Xpress, you can even save/open the programming parameters for an image scanner. This saved file can be e-mailed or, if required, you can create a single barcode that contains all the customized programming parameters and mail or fax that barcode to any location. Users in other locations can scan the barcode to load in the customized programming.

To communicate with an image scanner, Visual Xpress requires that the PC have at least one available serial communication port, or a serial port emulation using a physical USB port. If you are using the serial port and RS-232 cable, an external power supply is required. When using a USB serial port emulation, only a USB cable is required.

Visual Xpress Operations

The Visual Xpress software performs the following operations:

Scan Data

Scan Data allows you to scan barcodes and display the barcode data in a window. Scan Data lets you send serial commands to the image scanner and receive image scanner response that can be seen in the Scan Data window. The data displayed in the Scan Data window can either be saved in a file or printed.

Configure

Configure displays the programming and configuration data of the image scanner. The image scanner's programming and configuration data is grouped into different categories. Each category is displayed as a tree item under the "Configure" tree node in the application explorer. When one of these tree nodes is clicked, the right-hand side is loaded with the parameters' form belonging to that particular category. The "Configure" tree option has all the programming and configuration parameters specified for an image scanner. You can set or modify these parameters as required. You can later write the modified settings to the image scanner, or save them to a dcf file.

Imaging

Imaging provides all the image-related functions that a 2D Image Scanner can perform. You can capture an image using the current settings, and the image will be displayed in an image window. Images captured from the image scanner can be saved to files in different image formats. You can modify the image settings and save the image settings to an INI file, which can be loaded later to capture new images. Imaging also lets you preview the images continuously captured by the image scanner.

Installing Visual Xpress from the Web

1. Access the Hand Held Products web site at www.handheld.com.

2. Click in the **Quick Search** text box and enter **Visual Xpress**.

3. Click on **Search Now**.

4. Click on the entry for **Visual Xpress**.

5. When prompted, select **Save File**, and save the files to the **c:\windows\temp** directory.

6. Once you have finished downloading the file, exit the web site.

7. Using Explorer, go to the **c:\windows\temp** file and unzip the file you saved.

8. Double click on **Setup.exe** and follow the screen prompts to install the Visual Xpress program.

9. If you've selected the defaults during installation, you can click on **Start Menu-Programs**-**Hand Held Products-Visual Xpress**.

*Quick*View*

Quick*View is a Microsoft® Windows® program that displays decoded symbol messages and captures images (for instance, ID photographs) from the image scanner. Barcode information and images are displayed in the Quick*View window.

Installing Quick*View from the Web

1. Access the Hand Held Products web site at www.handheld.com.

2. Click on **Search** and enter **Quick*View**.

3. Click on **Search**.

4. Click on the entry for Software. Select **Quick*View Software Utility**.

5. When prompted, select **Save**, and save the files to the **c:\windows\temp** directory.

6. Once you have finished downloading the file, exit the web site.

7. Using Explorer, go to the **c:\windows\temp** file.

8. Double click on the **Quickview.exe** file. Follow the screen prompts to install the Quick*View program.

9. To start Quick*View, from the Start Menu click on **Programs**, **Quick*View**, **Quick*View**.

*Note: If you wish, you can create a shortcut to the Quick*View executable on your desktop.*

Temporary Quick*View Configuration

For a quick download communication configuration, scan the Quick*View barcode and the image scanner will be temporarily configured for Quick*View settings.

*Note: If you have a unit capable of keyboard wedge mode, scan the barcode below and the unit will communicate in RS-232 mode, allowing it to work with Quick*View. To convert the image scanner back to keyboard wedge communication, cycle the power.*

Quick*View

12

Serial Programming Commands

The serial programming commands can be used in place of the programming barcodes. Both the serial commands and the programming barcodes will program the image scanner. For complete descriptions and examples of each serial programming command, refer to the corresponding programming barcode in this manual.

The device must be set to an RS-232 interface (see page 2-2). 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 [:Name:] Tag SubTag {Data} [, SubTag {Data}] [; Tag SubTag {Data}] […] Storage

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

:Name: To send information to the image scanner (with the base connected to host), use **:**4820**:** or **:**4820i**:** The default factory setting for a 4820 image scanner is 4820, and 4820i for a 4820i image scanner. This setting is changed by using the BT_NAM command, which accepts alphanumeric values. If the name is not known, a wildcard (*) can be used :*:.

Note: Since the base stores all work group settings and transfers to them to image scanner once they are linked, changes are typically done to the base and not to the image scanner.

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 (**I**) separates items in a list of non-continuous values.)

:Name: Field Usage (Optional)

This command returns the query information from the image scanner.

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 image scanner with serial trigger commands. First, the image scanner must be put in Manual/Serial Trigger Mode either by scanning the Manual/Serial Trigger Mode barcode (page 4-4), or by sending the Manual/Serial Menu Command (page 12-9). Once the image scanner 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 image scanner scans until a barcode has been read, until the deactivate command is sent, or until the serial time-out has been reached (see "Read Time-Out (Serial Trigger Mode)" on page 4-4 for a description, and the serial command on page 12-9).

13

Product Specifications

4820 Product Specifications

Parameter	*Specification*
Dimensions (Typical):	
Height	6.2 inches (15.7 cm)
Length	5.3 inches (13.5 cm)
Width	3.2 inches (8.1 cm)
Weight	9.2 ounces (260.8 g)

Aimer:
   Illumination LEDs
   Aiming LEDs
	626nm ±30nm
	526nm ±30nm

Image	VGA, 640x480 (4X00); 752x480 (5X00). Binary, TIFF, or JPEG output.
Skew Angle	±40 degrees
Pitch Angle	±40 degrees
Motion Tolerance	4 inches (10 cm) per second in both lateral and horizontal directions
Symbol Contrast	45% minimum for Matrix codes, 37.5% minimum for all others
Battery:	
Lithium Ion	3.6 Volt 1600 mAHr minimum
Battery Capacity:	Standby Heavy Usage (1 scan per second) 20 hours 12 hours (minimum)
Storage:	5% loss per month
Radio:	
Frequency	2.4 to 2.4835 GHz (ISM Band) Frequency Hopping Bluetooth v.1.2
Range	33 ft. (10 m) typical
Data Range	720 KBps
Temperature Ranges:	
Operating	32° F to +122° F (0° C to +50° C)
Battery Charge	41° F to +104° F (5° C to +40° C)
Storage*	-4° F to +95° F (-20° C to +35° C)
Humidity	Up to 95% non-condensing
Mechanical Drop	Operational after 50 drops from 6 feet (1.8 m) to concrete
Vibration	Withstands 5G peak from 22 to 300 Hz

ESD Sensitivity	15 kV to any external surface
MTBF	per MIL-HDBK-217F Ground Benign exceeds 71,000 hours
Sealant Rating	IP41

4820i Product Specifications

Parameter	*Specification*
Dimensions (Typical):	
Height	6.5 in. (16.5 cm)
Length	5.3 inches (13.5 cm)
Width	3.2 inches (8.1 cm)
Weight	9.6 oz. (272 g)

Aimer:
   Illumination LEDs
   Aiming LEDs
	626nm $\pm$30nm
	526nm $\pm$30nm

Image	VGA, 640x480 (4X00); 752x480 (5X00). Binary, TIFF, or JPEG output.
Skew Angle	$\pm$40 degrees
Pitch Angle	$\pm$40 degrees
Motion Tolerance	4 inches (10 cm) per second in both lateral and horizontal directions
Symbol Contrast	45% minimum for Matrix codes, 37.5% minimum for all others
Battery: Lithium Ion Battery Capacity: Storage:	 3.6 Volt 1600 mAHr minimum Standby Heavy Usage (1 scan per second) 20 hours 12 hours (minimum) 5% loss per month
Radio:	
Frequency	2.4 to 2.4835 GHz (ISM Band) Frequency Hopping Bluetooth v.1.2
Range	33 ft. (10 m) typical
Data Range	720 KBps
Temperature Ranges:	
Operating	14° to 122° F (-10° to 50° C)
Battery Charge	41° F to +104° F (5° C to +40° C)
Storage*	-40° to 158° F (-40° to 70° C)

Humidity	Up to 95% non-condensing
Mechanical Drop	Operational after 50 drops from 6.5 feet (1.9 m) to concrete
Vibration	Withstands 5G peak from 22 to 300 Hz
ESD Sensitivity	15 kV to any external surface
MTBF	per MIL-HDBK-217F Ground Benign exceeds 71,000 hours
Sealant Rating	IP54

*Storage outside of this temperature range could be detrimental to battery life.

2020 Product Specifications

Parameter	*Specification*	
Dimensions (Typical):		
Height	3.1 inches (7.9 cm)	
Length	5.6 inches (14.2 cm)	
Width	4.3 inches (10.9 cm)	
Weight	8.8 ounces (250 g)	
Voltage:		
DC Barrel	8.5 to 9.5 volts	
Host Port	4.5-12 volts	
Current Draw:	Base Only	Base/Image Scanner w/ max charging
5 Volt Host	125	125mA (will not charge)
9 Volt DC Barrel	100	850mA
12 Volt Host	100	825mA
Charge Rate 41° F to +104° F (5° C to +40° C)		
9 Volt DC Barrel (external power)	Maximum 4 hours full charge for fully discharged battery	
Temperature Ranges:		
Operating	32° F to +122° F (0° C to +50° C)	
Battery Charge	41° F to +104° F (5° C to +40° C)	
Storage	-40° F to +140° F (-40° C to +60° C)	
Humidity	Up to 95% non-condensing	
Mechanical Drop	Operational after 50 drops from 3.3 feet (1 m) to concrete	
Vibration	Withstands 5G peak from 22 to 300 Hz	

ESD Sensitivity	15 kV to any external surface
Sealant Rating	IP41

Standard Cable Pinouts

Keyboard Wedge

10 Pin RJ41 Modular Plug
connects to the base

1 Cord shield
2 Tied to supply power
3 Supply ground
4 Terminal clock
5 Terminal data
6 Supply power input (Refer to tables on page 13-1.)
7 Keyboard data
8 Keyboard clock
9
10
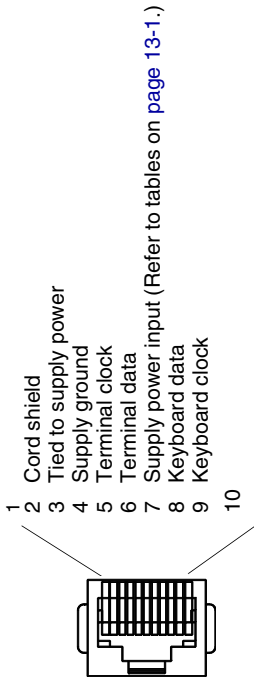
Standard Cable Pinouts

Wand Emulation

10 Pin Modular Plug
connects to the base
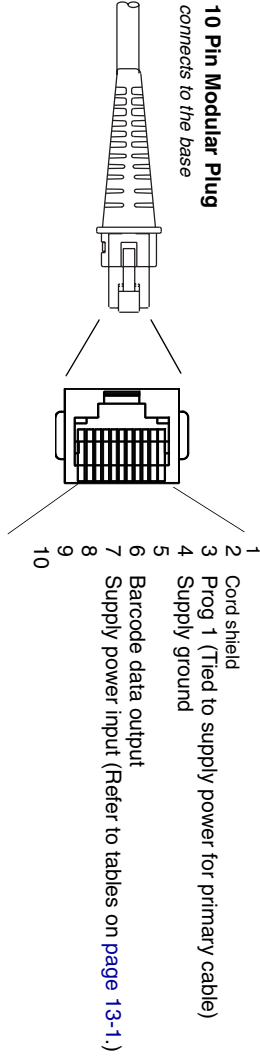
9 Pin Type D Female
connects to your terminal

1 Cord shield
2 Prog 1 (Tied to supply power for primary cable)
3 Supply ground
4
5
6 Barcode data output
7 Supply power input (Refer to tables on page 13-1.)
8
9
10

Supply power input
Barcode data output

1
2
3
4
5
6 Supply ground
7
8 Cord shield
9
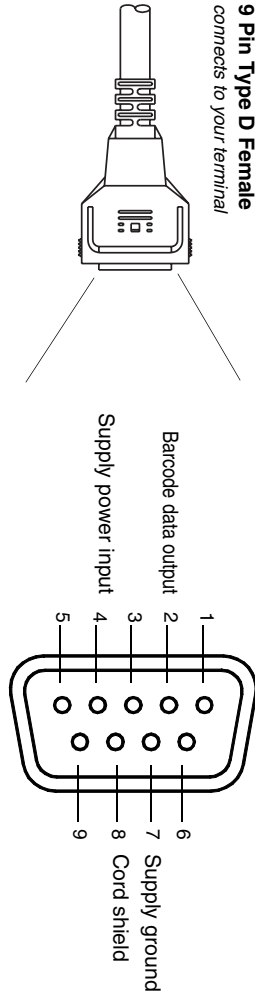
Standard Cable Pinouts

Serial Output

10 Pin RJ41 Modular Plug
connects to the base

1
2   Cord shield
3   Prog 1 (Tied to supply power for primary cable)
4   Supply ground
5   Receive data - Serial data to image scanner
6   Transmit data - Serial data from image scanner
7   Supply power input (Refer to tables on page 13-1.)
8   Request to send data
9   Clear to send data
10

Standard Cable Pinouts

USB

10 Pin Modular Plug
connects to the base

1
2 Data +
3 Tied to supply power
4 Supply ground
5
6
7 5 volt supply power input
8
9
10 Data -

14
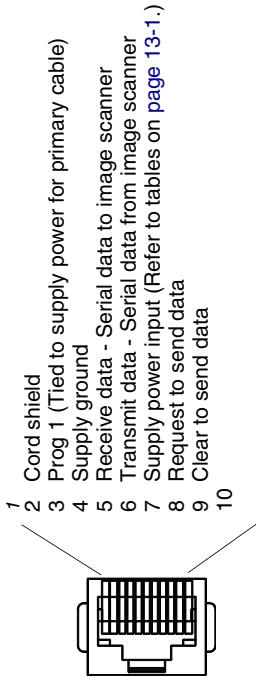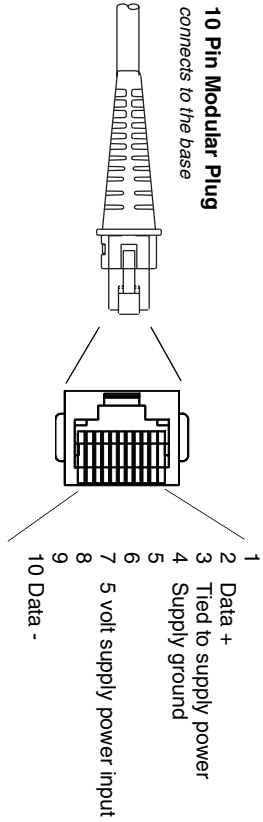
Maintenance

Repairs

Repairs and/or upgrades are not to be performed on this product. These services are to be performed only by an authorized service center. See "Customer Support" on page 15-1 for further information.

Maintenance

The cordless system provides reliable and efficient operation with a minimum of care. Although specific maintenance is not required, the following periodic checks ensure dependable operation:

Cleaning the Image Scanner's Window

Reading performance may degrade if the image scanner's window is not clean. If the window is visibly dirty, or if the image scanner isn't operating well, clean the window with a soft cloth or lens tissue dampened with water (or a mild detergent-water solution). If a detergent solution is used, rinse with a clean lens tissue dampened with water only.

The image scanner and base's housing may also be cleaned the same way.

⚠ **Caution:**

Do not submerge the image scanner in water. The image scanner's housing is not watertight.

Do not use abrasive wipes or tissues on the image scanner's window – abrasive wipes may scratch the window. Never use solvents (e.g., alcohol or acetone) on the housing or window – solvents may damage the finish

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Inspecting Cords and Connectors

Inspect the base's interface cable and connector for wear or other signs of damage. A badly worn cable or damaged connector may interfere with image scanner operation. Contact your Hand Held Products distributor for information about cable replacement. Cable replacement instructions are on page 14-2.

Replacing the 2020 Interface Cable:

1. Turn the power to the host system OFF.

2. Disconnect the base's cable from the terminal or computer.

3. Turn the base upside down.

4. Pull the connector out while maintaining pressure on the connector release clip.

5. Replace with the new cable. Insert the connector into the opening and press firmly. The connector is keyed to go in only one way, and will click into place.
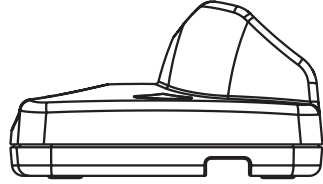
Changing the Image Scanner Battery:

1. Remove the screw on the end cap. (For a 4820, use a Phillips screwdriver. For a 4820i, loosen the thumbwheel screw by hand, or use a flat screwdriver or hex wrench.)

2. Remove the battery from the handle.

3. Insert replacement battery.

4. Replace end cap and screw.

End Cap
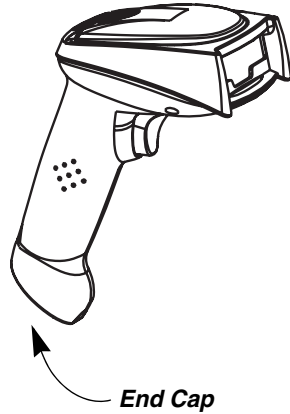
Assembling the Battery Charge Sleeve Kit

Attach Tether

1. Use the phillips screw to connect the metal ring of the coiled tether to the battery charge sleeve.

2. Peel the backing from the metal plate on the coiled tether and affix the metal plate to the back of the 2020 base.

   Note: For best adhesion, allow a 24 hour cure time before placing stress on the metal plate.

Remove Battery

Remove the end cap of the image scanner (turn the thumbwheel or use a hex wrench).

Insert Battery into Charge Sleeve

1. Place the squared-off end of the battery into the sleeve and slide it until it stops. The battery contacts should be showing through the small rectangular opening in the battery sleeve.

2. Press other end of the battery until you feel a click.

Charge Battery

With the battery inside the battery charge sleeve, place the battery charge sleeve into the base with the battery contacts going in first and facing up.

Troubleshooting Base

Note: Please visit the Services and Support section of our website (www.handheld.com) to check for the latest software for both the image scanner and the base.

If your base is not functioning properly, review the following troubleshooting guidelines to try to isolate the problem.

Is the red LED on?

If the red LED isn't illuminated, check that:

• The power cable is connected properly and there is power at the power source.
• The host system power is on (if external power isn't used).

Is the green LED on?

If the *green* LED isn't illuminated, check that:

• The image scanner is correctly placed in the base.
• There is external power or 12 volt host power.
• Charge mode is turned on. (See "Base Charge Mode" on page 3-3)

- The battery is not bad or deeply discharged. In some cases, the image scanner's battery may trickle charge to bring it into an acceptable level and then transition to a normal charge cycle.

Troubleshooting Image Scanner

Note: Make sure that your image scanner's battery is charged.

Note: Please visit the Services and Support section of our website (www.handheld.com) to check for the latest software for both the image scanner and the base.

Is the image scanner having trouble reading your symbols?

If the image scanner isn't reading symbols well, check that the symbols:

- Aren't smeared, rough, scratched, or exhibiting voids.
- Aren't coated with frost or water droplets on the surface.
- Are enabled in the base to which the image scanner connects.

Is the barcode displayed but not entered into the application?

The barcode is displayed on the host device correctly, but you still have to press a key to enter it (the Enter/Return key or the Tab key, for example).

You need to program a suffix. Programming a suffix enables the image scanner to output the barcode data plus the key you need (such as "CR") to enter the data into your application. Refer to Prefix/Suffix Overview on page 5-1 for further information.

Does the image scanner read the barcode incorrectly?

If the image scanner reads a barcode, but the data is not displayed correctly on the host screen:

- The base may not be programmed for the appropriate terminal interface. For example, you scan "12345" and the host displays "@es%."

  Reprogram the base with the correct Plug and Play or Terminal selection barcode. See Chapter 1 and Chapter 2.
- The base may not be programmed to output your barcode data properly. For example, you scan "12345" and the host displays "A12345B."

  Reprogram the base with the proper symbology selections. See Chapter 7.

The image scanner won't read your barcode at all.

1. Scan the sample barcodes in the back of this manual. If the image scanner reads the sample barcodes, check that your barcode is readable. Verify that your barcode symbology is enabled (see Chapter 7).

2. If the image scanner still can't read the sample barcodes, scan All Symbologies on page 7-2.

15

Customer Support

Product Service and Repair

Hand Held Products provides service for all its products through service centers throughout the world. To obtain warranty or non-warranty service, return the unit to Hand Held Products (postage paid) with a copy of the dated purchase record attached. Contact the appropriate location below to obtain a Return Material Authorization number (RMA #) before returning the product.

North America

Hand Held Products Corporate Offices
Telephone: (800) 782-4263, option 3
Fax: (704) 566-6015
E-mail: naservice@handheld.com

América Latina

Hand Held Products América Latina
Teléfono: (704) 998-3998, opción 8, opción 4
Teléfono: (800) 782-4263,, opción 8, opción 3
Fax: (239) 263-9689
E-mail: laservice@handheld.com

Brasil

Hand Held Products Rio de Janeiro
Telefone: +55 (21) 2178-0500
Fax: +55 (21) 2178-0505
E-mail: brservice@handheld.com

México

Hand Held Products México
Teléfono: +52 (55) 5203-2100
Fax: +52 (55) 5531-3672
E-mail: mxservice@handheld.com

Europe, Middle East, and Africa

Hand Held Products Europe
Telephone: +31 (0) 40 2901 633
Fax: +31 (0) 40 2901 631
E-mail: euservice@handheld.com

Asia Pacific

Hand Held Products Asia/Pacific
Telephone: +852-2511-3050
Fax: +852-2511-3557
E-mail: apservice@handheld.com

Japan

Hand Held Products Japan
Telephone: +81-3-5770-6312
Fax: +81-3-5770-6313
E-mail: apservice@handheld.com

Online Product Service and Repair Assistance

You can also access product service and repair assistance online at
www.handheld.com.

Technical Assistance

If you need assistance installing or troubleshooting, please call your Distributor
or the nearest Hand Held Products technical support office:

North America/Canada

Telephone: (800) 782-4263, option 4 (8 a.m. to 6 p.m. EST)
Fax number: (315) 685-4960
E-mail: natechsupport@handheld.com

América Latina

Teléfono: (704) 998-3998, opción 8, opción 3
Teléfono: (800) 782-4263, opción 8, opción 3
E-mail: latechsupport@handheld.com

Brasil

Telefone: +55 (21) 2178-0500
Fax: +55 (21) 2178-0505
E-mail: brtechsupport@handheld.com

México

Teléfono: (704) 998-3998, opción 8, opción 3
E-mail: latechsupport@handheld.com

Europe, Middle East, and Africa

Telephone: +31 (0) 40 7999 393
Fax: +31 (0) 40 2425 672
E-mail: eurosupport@handheld.com

Asia Pacific

Telephone - Hong Kong: +852-3188-3485 *or* 2511-3050
Telephone - China: +86 21 6361 3818
E-mail: aptechsupport@handheld.com

Online Technical Assistance

You can also access technical assistance online at www.handheld.com.

Limited Warranty

Hand Held Products, Inc. ("Hand Held Products") warrants its products to be free from defects in materials and workmanship and to conform to Hand Held Products published specifications applicable to the products purchased at the time of shipment. This warranty does not cover any Hand Held Products product which is (i) improperly installed or used; (ii) damaged by accident or negligence, including failure to follow the proper maintenance, service, and cleaning schedule; or (iii) damaged as a result of (A) modification or alteration by the purchaser or other party, (B) excessive voltage or current supplied to or drawn from the interface connections, (C) static electricity or electro-static discharge, (D) operation under conditions beyond the specified operating parameters, or (E) repair or service of the product by anyone other than Hand Held Products or its authorized representatives.

This warranty shall extend from the time of shipment for the duration published by Hand Held Products for the product at the time of purchase ("Warranty Period"). Any defective product must be returned (at purchaser's expense) during the Warranty Period to Hand Held Products factory or authorized service center for inspection. No product will be accepted by Hand Held Products without a Return Materials Authorization, which may be obtained by contacting Hand Held Products. In the event that the product is returned to Hand Held Products or its authorized service center within the Warranty Period and Hand Held Products determines to its satisfaction that the product is defective due to defects in materials or workmanship, Hand Held Products, at its sole option, will either repair or replace the product without charge, except for return shipping to Hand Held Products.

EXCEPT AS MAY BE OTHERWISE PROVIDED BY APPLICABLE LAW, THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER COVENANTS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, ORAL OR WRITTEN, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

HAND HELD PRODUCTS' RESPONSIBILITY AND PURCHASER'S EXCLUSIVE REMEDY UNDER THIS WARRANTY IS LIMITED TO THE REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT. IN NO EVENT SHALL HAND HELD PRODUCTS BE LIABLE FOR INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, AND, IN NO EVENT, SHALL ANY LIABILITY OF HAND HELD PRODUCTS ARISING IN CONNECTION WITH ANY PRODUCT SOLD HEREUNDER (WHETHER SUCH LIABILITY ARISES FROM A CLAIM BASED ON CONTRACT, WARRANTY, TORT, OR OTHERWISE) EXCEED THE ACTUAL AMOUNT PAID TO HAND HELD PRODUCTS FOR THE PRODUCT. THESE LIMITATIONS ON LIABILITY SHALL REMAIN IN FULL FORCE AND EFFECT EVEN WHEN HAND HELD PRODUCTS MAY HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH INJURIES, LOSSES, OR DAMAGES. SOME STATES, PROVINCES, OR COUNTRIES DO NOT ALLOW THE EXCLUSION OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

All provisions of this Limited Warranty are separate and severable, which means that if any provision is held invalid and unenforceable, such determination shall not affect the validity of enforceability of the other provisions hereof. Hand Held Products, Inc. extends these warranties only to the first end-users of the products. These warranties are nontransferable.

The limited duration of the warranty for the 2020 and 4820/4820i is for three (3) years. The limited duration of the warranty for the image scanner battery is for one (1) year.

A

Reference Charts

Symbology Chart

Symbology	AIM ID	Possible AIM ID Modifiers (*m*)	Hand Held Products Code ID (hex)
All Symbologies			(0x99)
4-CB (4-State Customer Barcode)	]X0		M (0x4D)
Australian Post	]X0		A (0x41)
Aztec Code	]z*m*	0-9, A-C	z (0x7A)
British Post	]X0		B (0x42)
Canadian Post	]X0		C (0x43)
China Post	]X0		Q (0x51)
Codabar	]F*m*	0-1	a (0x61)
Codablock F	]O*m*	0, 1, 4, 5, 6	q (0x71)
Code 11	]H3		h (0x68)
Code 128	]C*m*	0, 1, 2, 4	j (0x6A)
Code 16K	]K*m*	0, 1, 2, 4	o (0x6F)
Code 32 Pharmaceutical (PARAF)	]X0		< (0x3C)
Code 39	]A*m*	0, 1, 3, 4, 5, 7	b (0x62)
Code 49	]T*m*	0, 1, 2, 4	l (0x6C
Code 93 and 93i	]G*m*	0-9, A-Z, a-m	i (0x69
Data Matrix	]d*m*	0-6	w (0x77)
EAN-13	]E0		d (0x64)
EAN-8	]E4		D (0x44)
EAN•UCC Composite	]e*m*	0-3	y (0x79)
EAN-13 with Extended Coupon Code	]E3		d (0x64)
ID-tag (UPU 4-State)	]X0		N (0x4E)
Interleaved 2 of 5	]I*m*	0, 1, 3	e (0x65)
Japanese Post	]X0		J (0x4A)
KIX (Netherlands) Post	]X0		K (0x4B)
Korea Post	]X0		? (0x3F)

Symbology	AIM ID	Possible AIM ID Modifiers (*m*)	Hand Held Products Code ID (hex)
Matrix 2 of 5	]X0		m (0x6D)
MaxiCode	]U*m*	0-3	x (0x78)
MicroPDF417	]L*m*	3-5	R (0x52)
MSI	]M*m*	0	g (0x67)
No Read			(0x9C)
OCR-A	]o1		O (0x4F)
OCR-B	]o2		O (0x4F)
OCR MICR E-13B	]ZE		O (0x4F)
OCR US Money Font	]o3		O (0x4F)
SEMI Font	]o3		O (0x4F)
PDF417	]L*m*	0-2	r (0x72)
Planet Code	]X0		L (0x4C)
Plessey Code	]P0		n (0x6E)
PosiCode	]p*m*	0, 1, 2	W (0x57)
Postnet	]X0		P (0x50)
QR/Micro QR Code	]Q*m*	0-6	s (0x73)
Reduced Space Symbology (GS1 DataBar, GS1 DataBar Limited, GS1 DataBar Expanded)	]e*m*	0	y (0x79)
Straight 2 of 5 IATA (two-bar start/stop)	]R*m*	0, 1, 3	f (0x66)
Straight 2 of 5 Industrial (three-bar start/stop)	]S0	0, 1, 3	f (0x66)
TCIF Linked Code 39 (TLC39)	]L2		T (0x54)
Telepen	]B*m*	0, 1, 2, 4	t (0x74)
Trioptic Code	]X0		= (0x3D)
UCC/EAN-128	]C1		I (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.*

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

Refer to <Italics>Data Editing beginning on page 5-1 and <Italics>Data Formatting beginning on page 6-1 for information about using Code ID and AIM ID.

ASCII Conversion Chart (Code Page 1252)

Note: This table applies to U.S. style keyboards. Certain characters may differ depending on your Country Code/PC regional settings.

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	NUL	32	20		64	40	@	96	60	'
1	01	SOH	33	21	!	65	41	A	97	61	a
2	02	STX	34	22	"	66	42	B	98	62	b
3	03	ETX	35	23	#	67	43	C	99	63	c
4	04	EOT	36	24	$	68	44	D	100	64	d
5	05	ENQ	37	25	%	69	45	E	101	65	e
6	06	ACK	38	26	&	70	46	F	102	66	f
7	07	BEL	39	27	'	71	47	G	103	67	g
8	08	BS	40	28	(	72	48	H	104	68	h
9	09	HT	41	29	)	73	49	I	105	69	i
10	0A	LF	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	46	2E	.	78	4E	N	110	6E	n
15	0F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	DLE	48	30	0	80	50	P	112	70	p
17	11	DC1	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	DC3	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	NAK	53	35	5	85	55	U	117	75	u
22	16	SYN	54	36	6	86	56	V	118	76	v
23	17	ETB	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	EM	57	39	9	89	59	Y	121	79	y
26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	FS	60	3C	<	92	5C	\	124	7C	l
29	1D	GS	61	3D	=	93	5D	]	125	7D	}
30	1E	RS	62	3E	>	94	5E	^	126	7E	~
31	1F	US	63	3F	?	95	5F	_	127	7F	

Dec.	Hex	Char	Dec.	Hex	Char	Dec.	Hex	Char	Dec.	Hex	Char
128	80	€	160	A0		192	C0	À	224	E0	à
129	81	□	161	A1	¡	193	C1	Á	225	E1	á
130	82	‚	162	A2	¢	194	C2	Â	226	E2	â
131	83	ƒ	163	A3	£	195	C3	Ã	227	E3	ã
132	84	„	164	A4	¤	196	C4	Ä	228	E4	ä
133	85	…	165	A5	¥	197	C5	Å	229	E5	å
134	86	†	166	A6	¦	198	C6	Æ	230	E6	æ
135	87	‡	167	A7	§	199	C7	Ç	231	E7	ç
136	88	ˆ	168	A8	¨	200	C8	È	232	E8	è
137	89	‰	169	A9	©	201	C9	É	233	E9	é
138	8A	Š	170	AA	ª	202	CA	Ê	234	EA	ê
139	8B	‹	171	AB	«	203	CB	Ë	235	EB	ë
140	8C	Œ	172	AC	¬	204	CC	Ì	236	EC	ì
141	8D	□	173	AD	-	205	CD	Í	237	ED	í
142	8E	Ž	174	AE	®	206	CE	Î	238	EE	î
143	8F	□	175	AF	¯	207	CF	Ï	239	EF	ï
144	90	□	176	B0	°	208	D0	Ð	240	F0	ð
145	91	'	177	B1	±	209	D1	Ñ	241	F1	ñ
146	92	'	178	B2	²	210	D2	Ò	242	F2	ò
147	93	"	179	B3	³	211	D3	Ó	243	F3	ó
148	94	"	180	B4	´	212	D4	Ô	244	F4	ô
149	95	•	181	B5	µ	213	D5	Õ	245	F5	õ
150	96	–	182	B6	¶	214	D6	Ö	246	F6	ö
151	97	—	183	B7	·	215	D7	×	247	F7	÷
152	98	˜	184	B8	¸	216	D8	Ø	248	F8	ø
153	99	™	185	B9	¹	217	D9	Ù	249	F9	ù
154	9A	š	186	BA	º	218	DA	Ú	250	FA	ú
155	9B	›	187	BB	»	219	DB	Û	251	FB	û
156	9C	œ	188	BC	¼	220	DC	Ü	252	FC	ü
157	9D	□	189	BD	½	221	DD	Ý	253	FD	ý
158	9E	ž	190	BE	¾	222	DE	Þ	254	FE	þ
159	9F	Ÿ	191	BF	¿	223	DF	ß	255	FF	ÿ

Code Page Mapping of Printed Barcodes

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 barcode 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 barcodes were created. The data characters should then appear properly.

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

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

Minimizing Bluetooth/ISM Band Network Activity

The settings described below can help you customize the re-linking behavior of the cordless linear imaging system to obtain the best compromise between convenience and low interference.

Note: ISM band refers to the 2.4 to 2.48 GHz frequency band used by wireless networks, cordless phones, and Bluetooth.

Auto Reconnect Mode

Auto Reconnect controls whether or not the image scanner automatically begins the re-link process when a loss of connection is detected. When the **Auto Reconnect On** barcode is scanned, the image scanner begins the re-link process immediately, without user intervention. *Default = Auto Reconnect On.*

||||||||||||||||||||||||||||||||||||||
* Auto Reconnect On

||||||||||||||||||||||||||||||||||||||
Auto Reconnect Off

The table below shows the results of the Auto Reconnect On and Off settings:

Event	Auto Reconnect On	Auto Reconnect Off
Image scanner out of range	Re-link occurs automatically. If maximum number of link attempts (see Maximum Link Attempts on page B-2) is unsuccessful, then the trigger must be pulled or the image scanner must be placed in the base unit to re-link.	The trigger must be pulled to initiate re-linking.
Base reset (firmware upgrade or power cycle)	Image scanner behaves as if out of range.	No attempt to re-link made while base unit is powered off. Trigger must be pulled to initiate re-linking.

Event	Auto Reconnect On	Auto Reconnect Off
Image scanner power down due to Power Time-Out Timer setting (see page 4-4)	Trigger must be pulled or the image scanner must be placed in the base unit to re-link. (Note: image scanner re-links on power up, but powers on due to one of the above actions.)	
Image scanner reset due to firmware upgrade	Re-link occurs automatically.	
Image scanner reset due to battery change	Re-link occurs automatically.	
Image scanner placed in different base unit	Re-link to new base occurs automatically.	

Maximum Link Attempts

The Maximum Link Attempts setting controls the number of times the image scanner tries to form a connection with a base unit or PC. During the connection setup process, the image scanner transmits in order to search for and connect to a base unit. In order to prevent continuous transmissions that could interfere with other users of the ISM band, the number of attempts to connect is limited by this setting. After the maximum number of attempts is reached, the image scanner will not attempt to reconnect to the base unit. Pressing the trigger or placing the image scanner in the cradle resets the attempt count and the image scanner will again try to link to the base unit. When set to zero, the image scanner will try to link until the Power Time-Out Timer setting (see page 4-4) expires.

Scan the **Maximum Link Attempts** barcode, then scan the number of attempts for the setting (from 0-100) from the inside back cover. Scan Save to save the setting. *Default = 0.*

Maximum Link Attempts

Relink Time-Out

Relink Time-Out controls the idle time between re-link attempts. An attempt to link an image scanner to a base unit typically lasts up to 5 seconds. This is the time when the image scanner is actually attempting to contact base unit. Relink Time-Out controls the amount of time, in seconds, that elapses between the end of one connection attempt and the start of the next.

Note: The length of time for an attempt depends on the number of image scanners connected to a base unit. An extra 7 seconds may be required when a connection is successful.

Scan the **Relink Time-Out** barcode, then scan the number of seconds for the setting (from 1-100) from the inside back cover. Scan Save to save the setting. *Default = 3 seconds.*

Relink Time-Out

Bluetooth/ISM Network Activity Examples

Default values:

When the image scanner goes out of range, the image scanner repeatedly attempts to connect to base unit. Each attempt consists of approximately 5 seconds of active time followed by 3 seconds of idle time. After one hour, the image scanner powers off and batch mode data is lost.

Maximum Link Attempts set to 15
Other values at default setting:

When the image scanner goes out of range, 15 attempts are made to link to the base unit. Each attempt consists of approximately 5 seconds of active time followed by 3 seconds of idle time. After 15 cycles (8*15 =120), or about 2 minutes, the image scanner stops trying to connect to the base unit, but retains any barcodes that may have been saved in batch mode. After one hour, the image scanner powers off and batch mode data is lost.

Auto Reconnect Mode set to 0
Maximum Link Attempts set to 15
Other values at default setting:

When the image scanner goes out of range, no action is taken to re-link. When the trigger is pulled, 15 attempts are made to link to the base unit. Each attempt consists of approximately 5 seconds of active time followed by 3 seconds of idle time. After 15 cycles (8*15 =120), or about 2 minutes, the image scanner stops trying to connect to the base unit, but retains any barcodes that may have been saved in batch mode. After one hour, the image scanner powers off and batch mode data is lost. Refer to Auto Reconnect Mode, page B-1, to review other events that can start the re-link process.

Auto Reconnect Mode set to 1
Maximum Link Attempts set to 0
Relink Time-Out set to 10
Image Scanner Power Time-Out Timer set to 1800:

Note: See Image Scanner Power Time-Out Timer on page 4-4.

The image scanner attempts to connect to the base unit every 15 seconds, measured from start of attempt to start of attempt. After one half hour, the image scanner powers off.

Sample Symbols

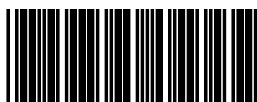**UPC-A**

0 123456 7890

Interleaved 2 of 5

1234567890

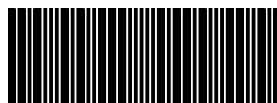**Code 128**

Code 128

EAN-13

9 780330 290951

Code 39

BC321

Codabar

A13579B

Code 93

123456-9$

Straight 2 of 5 Industrial

123456

Sample Symbols

Matrix 2 of 5

6543210

PDF417

Car Registration

Code 49

1234567890

QR Code

Numbers

GS1 DataBar

(01)00123456789012

Postnet

Zip Code

Data Matrix

Test Symbol

4-CB (4-State Customer Barcode)

01,234,567094,987654321,01234567891

ID-tag (UPU 4-State)
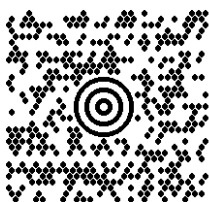
J18CUSA8E6N062315014880T

Sample Symbols

Aztec

Package Label

MaxiCode

Test Message

Micro PDF417

Test Message

OCR-B with Modulo 10 check character

5324277

OCR-A with Modulo 36 check character

532427D

OCR Programming Chart

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Discard

Programming Chart

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Programming Chart

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Save

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Discard

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Reset

*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.*