Welch Allyn WA®

SCANTEAM® 3400 PDF

PDF417 Capable CCD Reader
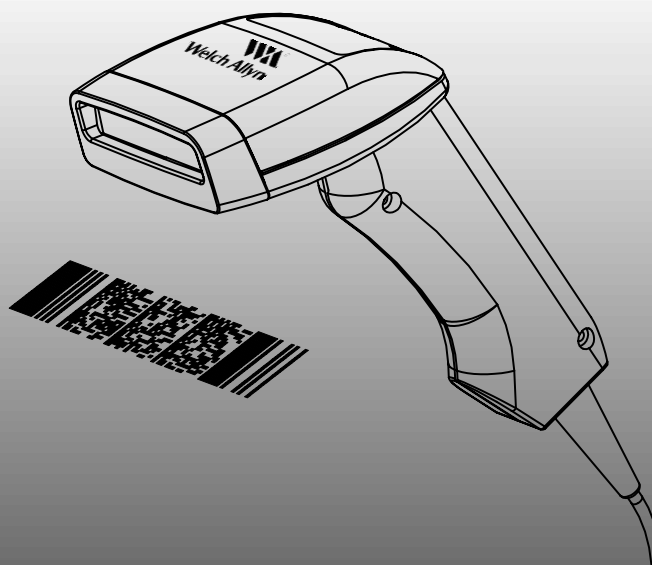
Technical Manual

STATEMENT OF AGENCY COMPLIANCE

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, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Class B Compliance Statement

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.

Caution: Any changes or modifications made to this device that are not expressly approved by Welch Allyn, Inc. may void the user's authority to operate the equipment.

Note: To maintain compliance with FCC Rules and Regulations, cables connected to this device must be *shielded* cables, in which the cable shield wire(s) have been grounded (tied) to the connector shell.

Canadian Notice

This equipment does not exceed the Class B limits for radio noise emissions as described in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la classe B prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

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The warranty does not apply to product which have been damaged by improper handling, shipping, or misuse. The warranty does not apply, if, in the sole opinion of Welch Allyn, Inc., the unit has been damaged by accident, misuse, neglect, improper shipping and handling. Since the unit is sensitive to static, the responsibility to protect it from static damage is solely that of the user. The warranty is valid only if the unit or scanner has not been tampered with or serviced by any party unauthorized by Welch Allyn, Inc. as a repair facility.

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Limited Warranty

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Disclaimer
Limited Warranty

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Preface

SCANTEAM 3400PDF CCD Scanners are used in both retail and commercial environments. The retail environment includes point–of–sale uses, while the commercial environments include industrial type applications (e.g., time and attendance information gathering).

This technical manual is an extension of the SCANTEAM PDF Programming Menu. The Programming Menus contain information and bar codes that you will use to set up your system to meet your needs. This manual provides you with additional, in–depth information about the options in the Programming Menus.

Chapter 1 provides a description of the 3400PDF scanner software and hardware.

Chapter 2 is an in–depth description of the operating system, explaining how the scanner works, and how it reads/decodes a bar code symbol.

Chapter 3 explains how to set up and install your scanner. Scanner identification, scanning techniques, and interface cable replacement is discussed.

Chapter 4 explains how to program your scanner to meet your specific needs. Refer to Chapter 4 for detailed information when you are using the PDF Programming Menu.

Chapter 5 explains how to print PDF 417 labels.

Appendix A provides information about optical, electrical, environmental, mechanical, and bar code label specifications, scanner performance, interface definition, regulatory and safety requirements, and patents.

Related Publications

<u>Reading Between the Lines: An Introduction to</u>
<u>Bar Code Technology</u>

Craig K. Harmon and Russ Adams
© 1989 Helmers Publishing Inc.
174 Concord Street
Peterborough, NH 03458
(603) 924–9631

<u>The Bar Code Book: Reading, Printing, and</u>
<u>Specification of Bar Code Symbols</u>

Roger C. Palmer
© 1989 Helmers Publishing Inc.
174 Concord Street
Peterborough, NH 03458
(603) 924–9631

<u>Handbook of Bar Coding Systems</u>

Harry E. Burke
© 1984 NCR Corporation
Van Nostrand Reinhold Company, Inc.
115 Fifth Avenue
New York, New York 10003

<u>Automatic ID Resource Catalog</u>

AIM USA Publications
634 Alpha Drive
Pittsburgh, PA 15238–2802
Fax: 412–963–8753
Phone: 412–963–8588

AIM "Guidelines on Symbology Identifiers," "Uniform Symbology
Specifications" (USS), and other AIM resources from the address above.

INTRODUCTION TO THE SCANTEAM 3400PDF 2X READER   **1**

1.1 Introduction

The SCANTEAM 3400PDF 2X reader is a hand held, non−contact CCD (Charge Coupled Device) integrated scanner decoder. The SCANTEAM 3400PDF 2X reader includes a serial interface to support large datafile communications, including the PDF417 symbology. The durable linear CCD technology collects data by swiping down a bar code with non−contact scanning using a top to bottom motion. The integrated decoder feature of the SCANTEAM 3400PDF 2X offers users a one piece solution for reading and decoding PDF labels.

The solid state design of the device means the SCANTEAM 3400PDF 2X has no moving mirrors or temperature sensitive components and carries a three (3) year warranty. The unit provides a decoded RS−232 or "serial" output signal for easy integration with a broad range of computer and bar code terminals.

The SCANTEAM 3400PDF 2X reader offers extensive programming parameters, including audio feedback, RS−232 output, auto or manual trigger, prefix/suffix, and symbology selection, to allow maximum flexibility in integrating the reader with a range of PCs and terminals and a broad set of user applications. The SCANTEAM 3400PDF 2X has a 3.0 inch (7.62cm) scan width which allows you to scan wide bar code symbols.

The reader is available with a manual trigger circuit. With the manual trigger option, the scanner turns on when the switch is depressed. In the auto trigger mode, the default option, the scanner triggers automatically when a bar code is placed within its read range.

The SCANTEAM 3400PDF 2X reader fits into both commercial and retail environments, providing scanning capabilities useful in industrial type applications (e.g., inventory and asset tracking), as well as in retail use (e.g., point−of−sale applications).

The SCANTEAM 3400PDF 2X reader has a high first pass read rate and scans bar code symbols at a lateral speed of up to 10 inches (25cm) per second. The light weight and ergonomically−designed handle provides maximum comfort, even when the product is used for an extended period of time. The field replaceable cable of the SCANTEAM 3400PDF 2X makes it possible to replace damaged cables in the field, thus reducing system downtime.

Table 1.1 illustrates the host of SCANTEAM 3400PDF 2X configurations.

Table 1.1 SCANTEAM 3400PDF 2X Configurations

	Product Code
SCANTEAM 3400PDF Product Options	
	3400PDF/G X X 2
Base Model (200 scans/second)	G
Trigger Options	
Auto Trigger	0
Manual Trigger	1
Serial Output Options	
"Pseudo" RS–232 or TTL Output	2
"True" RS–232 Output (5 or 12 volts)	3
Wand Emulation	5
	2 non–contact

Documentation	Product Code
PDF417 Programming Menu	PDF/PM
Technical Manual	3400PDF/TM
Companion Products	
Countertop Holder	SCANHOLDER
Wall Mount Holder	WALL
Hand Free Holder	HFSTAND
Hand Free Holder (Right Side Mount)	HFSTAND
Hand Free Holder (Left Side Mount)	HFSTAND
Power Supply +5 volt (US)	PS5/C
Power Supply +5 volt (Europe)	EPS5/C

1.2 Bar Code Symbologies

In addition to providing integrated decoding for PDF417, the SCANTEAM 3400PDF 2X reader auto−discriminates up to 7 of the most popular bar codes. The supported symbologies are included in the table below.

Table 1.2 Supported Symbologies

Supported Symbologies	
Industrial	
Codabar	Code 39
Interleaved 2 of 5	Code 128
Retail	
UPC	EAN
Stacked	
PDF417	

1.3 PDF417

PDF417 is a multi−row bar code symbology capable of encoding large amounts of data in a single symbol. The symbol can be read using an ordinary linear scanning device, such as a laser or a CCD. A powerful error detection and correction scheme is built into the symbology to assure data integrity.

PDF417 is suited for encoding messages up to 1108 bytes, 1850 text characters, or 2710 digits. Traditional bar codes encode short messages, up to 35 characters. Where large amounts of data are required, bar codes are used together with a computer data base. The bar code encodes an identification number that in turn references the desired data file.

A PDF417 symbol can encode an entire data file, thus eliminating the need for an additional data base. **PDF** stands for **P**ortable **D**ata **F**ile.

1.4 Programmable Option Summary

Standard programmable features to customize the scanner for your application are entered by scanning bar code symbols from the SCANTEAM PDF417 Programming Menu. Programmable features include audio feedback parameters, RS−232 serial output parameters, trigger type, prefix/suffix handling, and symbology selection. All programming parameters are stored in non−volatile memory to ensure data integrity, even in the event of power interruption to the reader or host terminal.

Refer to Chapter 4, Programming the Reader or to the SCANTEAM PDF417 Programming Menu for additional information about programming the SCANTEAM 3400PDF 2X scanner.

1.5 Hardware Summary

The primary hardware components of the SCANTEAM 3400PDF 2X reader follow. Figure 1.1 presents a dimensional representation of the SCANTEAM 3400PDF 2X scanner. Refer to Appendix A for additional hardware figures.

- Polycarbonate, rugged, plastic housing

- High resolution, 3.0 inch scan width

- Light source of 660nm red LEDs

- High resolution 2048 pixel CCD image sensor

- Manual or Automatic Trigger

- Good Read LED

- Programmable audio feedback

- Interface Cord (Field replaceable)

SCANTEAM 3400PDF 2X

Side View

Belt Loop
(for portable applications)

3/4 View

5.84 in
[14.8cm]

Front View

5.83 in
[14.8cm]

2.97 in
[7.5cm]

Top View

Welch Allyn
SCANTEAM 3400 PDF 2X
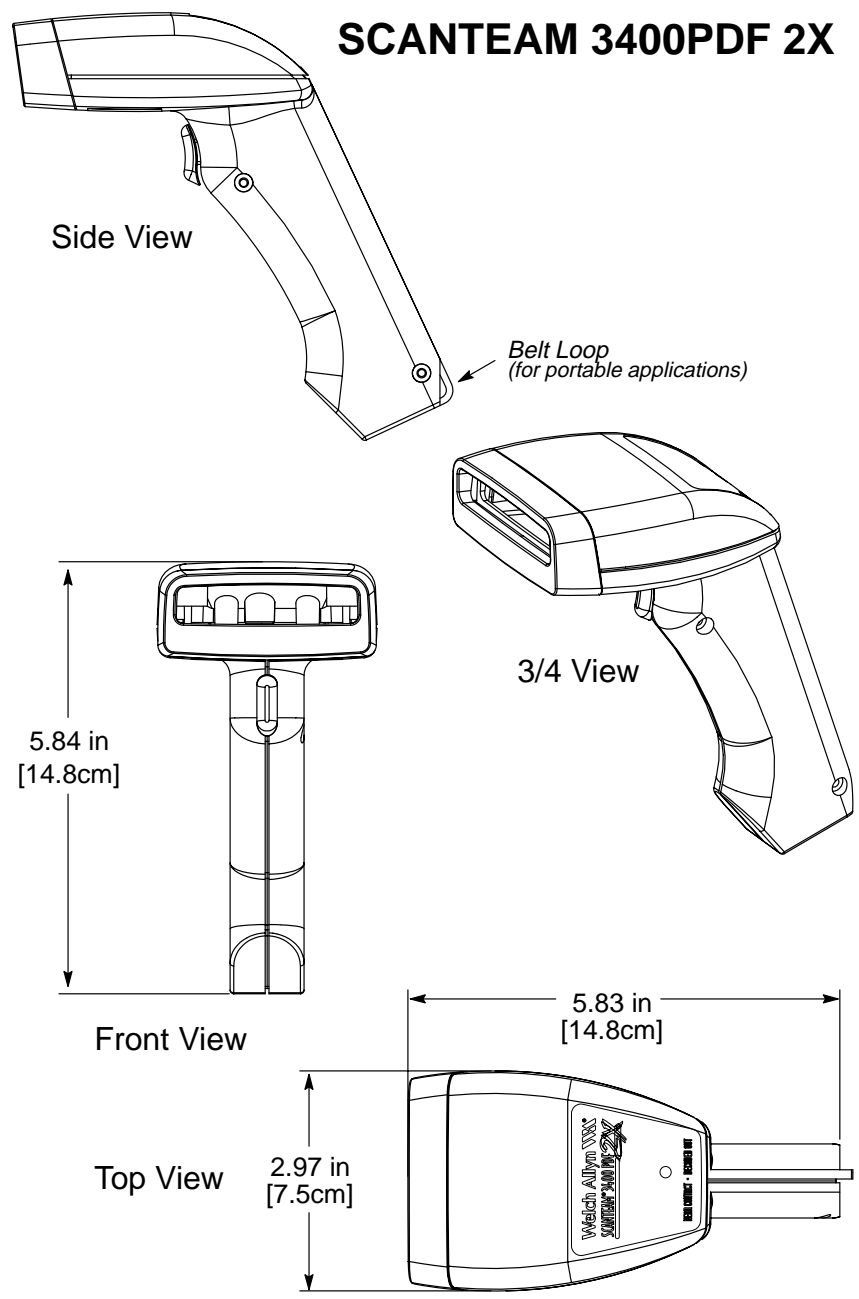
Figure 1.1   Dimensional Figure of SCANTEAM 3400/PDF

1.6 Product Accessories

Scanner Holder

A holder for mounting the scanner on a table, counter top, or cash register when not in use is available for the SCANTEAM 3400PDF 2X and may be ordered separately.

Replacement/Alternate Interface Cables

Contact your Welch Allyn Sales Representative for information about ordering additional cables.

OPERATIONAL DESCRIPTION 2

2.1 Reading Conventional and PDF417 Codes

The SCANTEAM 3400PDF reader can be used to scan both
conventional (1D or "linear") codes and the new PDF417 high
density "portable data files." The operator technique for the two
types of supported codes is very different.

The SCANTEAM 3400PDF reader allows the operator to move
up to 2.5 inches from the bar code label.

Scan Bar Code
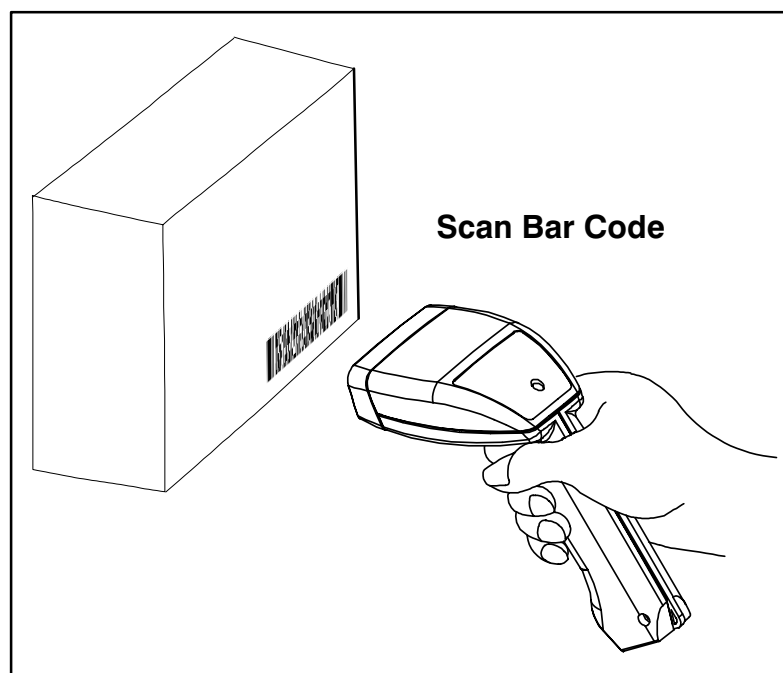
Figure 2.1 1D Standard Reader

PDF417 is a high density symbology that can store up to 2,000 characters. Consequently, PDF417 codes cannot be read with a single "touch" of the label. Instead, operators "swipe" or "drag" the SCANTEAM 3400PDF reader across the PDF417 label.

As an operator using the scanner moves the device down the PDF417 label, the reader "ticks" to indicate PDF data collection. Once the reader has collected enough data, the ticking stops and the device emits a "hum" indicating the start of the decoding process. A "good read" single beep indicates the decoding is complete, and the unit is ready to begin the next PDF scanning operation.

Scan Bar Code
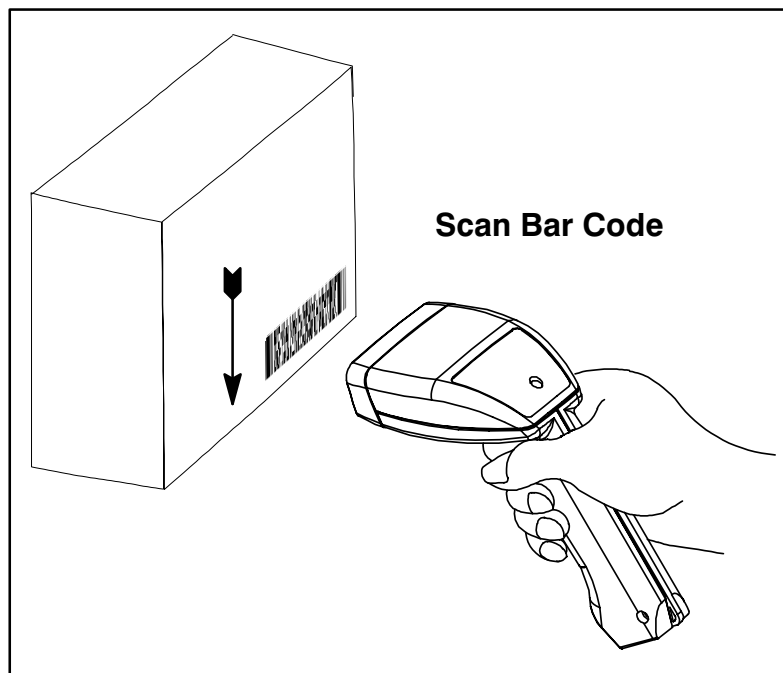
Figure 2.2 PDF Reading with Swipe

2.2 SCANTEAM 3400PDF Hardware Components

The body of the SCANTEAM 3400PDF houses all the scanning elements and decoding/interface elements. Refer to Figure 2.3.
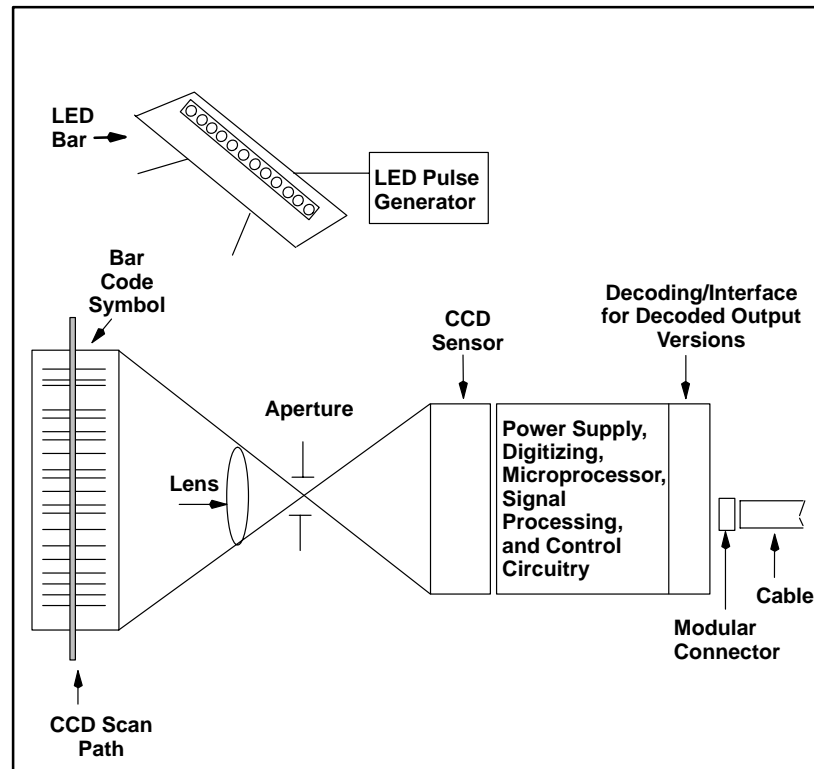
Figure 2.3   Main Elements of the 3400PDF CCD Bar Code System

The SCANTEAM 3400PDF performs the following steps when scanning and decoding a bar code symbol:

1. The scanner turns the LEDs (Light Emitting Diodes) inside the scanner ON, and the light from the LEDs illuminate the bar code symbol.

2. The black bars on the symbol absorb the LED light, while the white spaces scatter the LED light.

3. A portion of the scattered light re−enters the scanner's optical system and is detected by the CCD (Charged Coupled Device) sensor.

4. The CCD converts the analog light signal into a sequence of electrical pulses with amplitude proportional to the energy level of the scattered light.

5. The digitizer converts the analog light signal to a bit serial representation of the bar code symbol. The width of the binary signal pulse is proportional to the width of the bars and spaces of the bar code symbol.

6. The Decoding Circuitry decodes the digitized pulses into characters of data representative of the bar code symbol.

7. After the scanning cycle is complete, a "Good Read" LED on top of the scanner turns ON, and a beeper is sounded if the Beep On Good Read option is enabled. The decoded information is prepared for transmission to the host.

8. Depending upon the trigger mode chosen, the scanner either initiates another scan cycle or returns to the wait or "standby" state.

2.2.1   LED Bar

The bar code symbol is illuminated with a bank of 8 LEDs and a parabolic reflector assembly. The LEDs are pulsed resulting in stroboscopic illumination to stop the relative motion.

2.2.2   CCD Sensor

The optical energy scattered from the bar code symbol is focused with a custom lens onto the CCD sensor array. The CCD sensor array is a linear array with 2048 pixels. The nominal signal amplitude from the CCD is approximately 200 mV p−p. The output is black high with an offset level of 5 to 9V. The analog portion of the CCD requires a power supply of +12V and all of the drive logic is at 5V levels. The output level is shifted to the signal processing level with a Black Level Clamping circuit.

The switching transients from the CCD are removed with analog filters. This filtered signal is then an analog representation of scattered light incident on the CCD.

2.2.3   Peak Detectors and Comparator

The positive and negative peak detectors retain the signal level associated with the minimum black and maximum white reflectances respectively. The comparator threshold is then set at a point between the black and white peak reflectance levels. The threshold level and the analog representation of the scattered light are then compared with a comparator, generating the bit serial digital representation of the bar code symbol.

2.2.4   Microprocessor

One microprocessor controls the generation of timing signals required for the operation of the SCANTEAM 3400PDF device. Another microprocessor monitors the digital output of the device and decodes the digitized pulses as required.

2.3 Timing Sequence

Figure 2.4 illustrates the timing sequence for the SCANTEAM 3400PDF.

Bar Code Symbol Being Scanned

Timing

Shift Out Analog Data

Illumination

Start of Scan

Analog Signal from CCD Array

White

Black

Digital Data Out

White

Black

Decoded Data (Decoded Output Only)
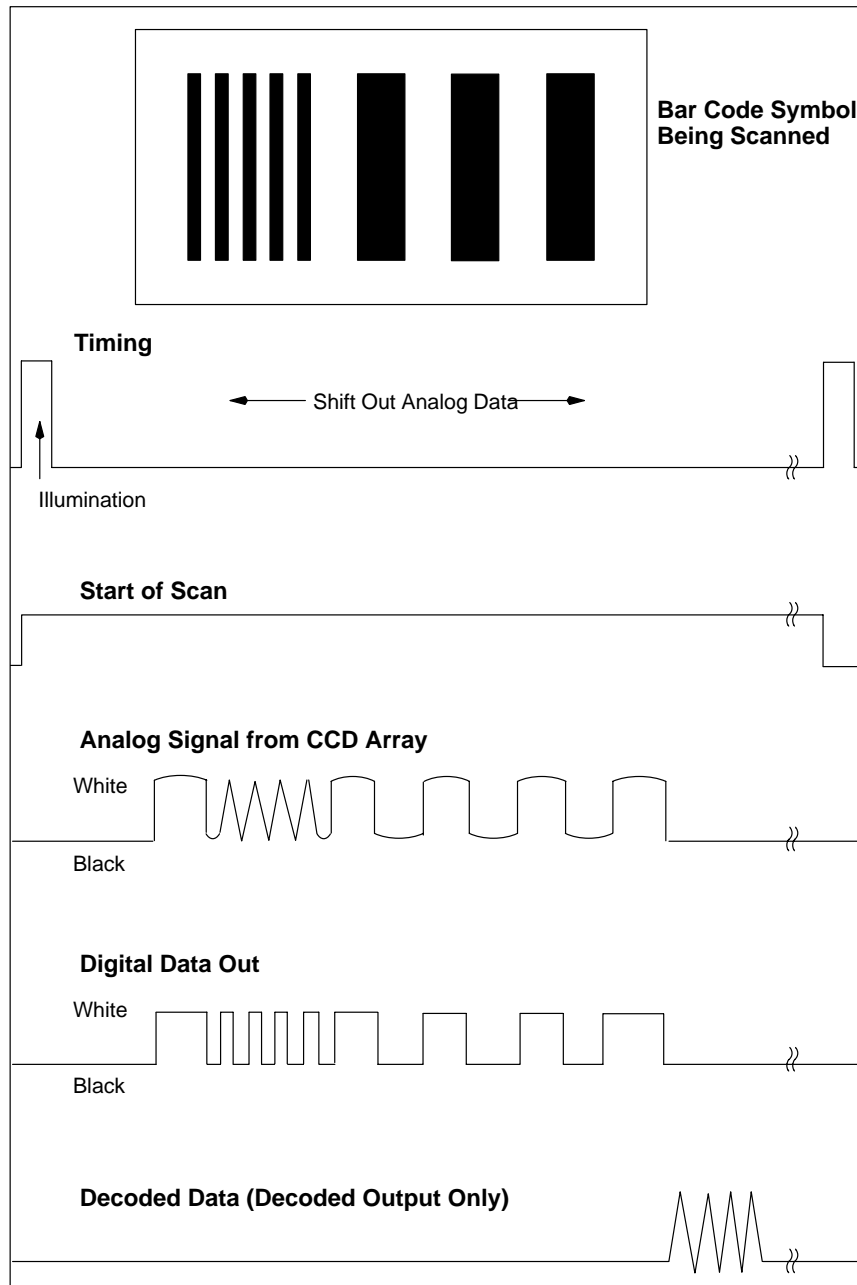
Figure 2.4   SCANTEAM 3400PDF Timing Sequence

Operational Description

SET–UP AND INSTALLATION 3

3.1 Chapter Description

This chapter describes:

*   Unpacking the SCANTEAM 3400PDF

*   Scanner Labeling and Serial Number

*   Connecting the SCANTEAM 3400PDF

*   Scanning Techniques

*   Testing the Scanner

3.2 Unpacking the Scanner

Remove the scanner and the interface cable from the shipping carton. Check the contents of the carton against the packing list to make sure everything you ordered is present. Keep the shipping carton. You should use the shipping carton if you ever need to return the reader for servicing.

Thoroughly inspect the scanner and interface cable(s) to determine if any damage has occurred during shipment. Any damage should be reported immediately to the carrier who delivered the unit. Damage claims due to handling during shipping should be placed directly with the carrier.

3.3 Reader Identification

The SCANTEAM 3400PDF's model and serial number are on the identification label attached to the under side of the reader's body. Refer to Figure 3.1. You may want to record these numbers for easy reference in case you are asked for the model and serial numbers when communicating with your Welch Allyn Sales Representative.

Welch Allyn WX®

SKANEATELES FALLS, NY 13153-0187 USA
ITEM #   3400PDF/G-122
SOFTWARE REV   1.0C = *= *=1.4
ATE - S/N   H-04-1234

This device complies with Part 15 of the
FCC Rules. See instruction manual.
MADE IN USA
PATENT 5,294,783
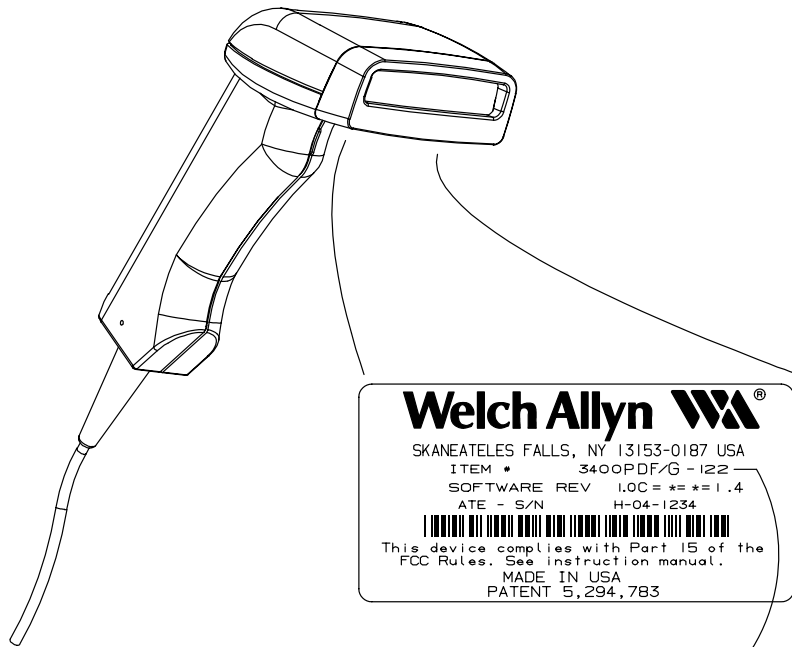
SCANTEAM 3400PDF Identification Label

Scan Rate ❶

G = 200 Scans/Second

ITEM#   3400PDF/G−122
❶ ❷❸❹

Trigger Option ❷

0 = Auto Trigger
1 = Manual Trigger

Interface with Attached Cable Option ❸

Interface

2 = TTL RS−232
3 = TRUE RS−232
5 = Wand Emulation

Focal Distance ❹

1 = Contact
2 = Standard

Figure 3.1   SCANTEAM 3400PDF Identification Label

3.4 Set–up And Installation

When reader components have been checked, the SCANTEAM 3400PDF can be prepared for service.

1)   Connecting the Interface Cord to the Scanner:

The scanner end of the interface cord is supplied with a 10–pin modular (RJ41) connector. This end of the cord should be inserted into the opening at the base of the scanner handle. The connector is "keyed" so that it cannot be inserted incorrectly. When the connector is properly oriented and firmly pressed into the opening, it clicks into place. Refer to Figure 3.2.
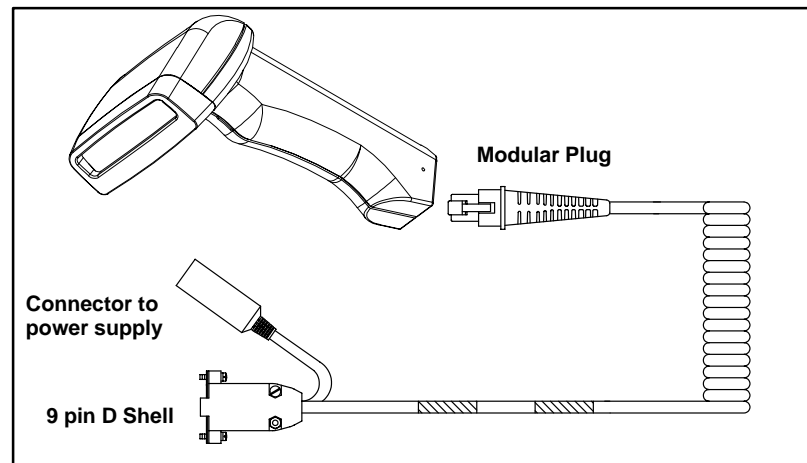
Figure 3.2   SCANTEAM 3400PDF
(with RS–232 Interface Cable)

2) Connecting the Interface Cord to the Host Device:

Turn off the power switch on the host device. Connect the
interface cord to the host device. The connector that plugs into
the host device will vary depending on the application for which
it is being used.

Note: The SCANTEAM 3400PDF provides RS–232 output capability
          ONLY. The interface will be a serial RS–232 output cable with a
          connector compatible with the host terminal's RS–232 port.

3) Power up the host device device.

3.5 Interface Cable Replacement

The standard Interface Cable is attached to the scanner with a
8/10–pin modular I/O connector. When properly seated, the
connector is secured in the scanner handle by a flexible
retention tab. The cable is designed to be field replaceable, yet
tamper resistant. Replacement cords can be obtained from
Welch Allyn or an authorized distributor.

To replace the cable:

1) Turn the power to the host device OFF.

2) Disconnect the scanner cable from the host device.

3) Locate the small hole on the top of the scanner handle near
   the back.

4) Straighten one end of a paper clip.

5) Insert the end of the paper clip into the hole and press
   down. This depresses the retention tab, which in turn
   releases the connector. Pull the connector out of the
   scanner while maintaining pressure on the paper clip.

3.6 Manual and Automatic Trigger

You will use different reading techniques depending upon the
type of reader trigger you have. Explanations follow Figure 3.3
for both the manual trigger and the automatic trigger scanners.

For both scanner types, position the scanner's read nose slightly below the upper edge and centered over the bar code symbol. Refer to Figure 3.3.
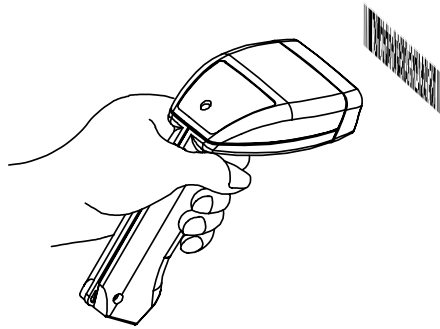
Figure 3.3   3400PDF Scanner Reading Bar Code Symbol

3.6.1   Using the Manual Scan Mode

In the manual triggering mode, you must press the trigger on the scanner to read the bar code symbol. Once the trigger is activated, the scanner becomes active and reads the bar code symbol.

3.6.2   Using the Autotrigger

If the Autotrigger option has been selected using the SCANTEAM PDF417 Programming Menu, the scanner is activated by placing a bar code symbol in the scanning field of view. When the scanner senses the presence of the bar code symbol, the trigger signal is activated and starts the scanning process.

The scanner reads the bar code and transmits the information to the host terminal. A "Good Read" beep indicates the bar code has been successfully read, and the information will be transmitted to the host terminal. If a "Good Read" beep does not occur, try reading the symbol again while moving the scanner up and down slowly.

To read the same symbol more than once, or to read a different symbol, simply lift the scanner from the symbol surface and restart the scanning process.

The Autotrigger option is the default Trigger Mode.

3.6.3 Scanning Bar Code Symbols

Before using any bar code scanner, make sure the symbol is of good quality and the read window is clean. You may not be able to read a symbol if you have any dirt or specks in the bar code symbol or on the scanner optics. A symbol that is smudged during printing or gets wrinkled when it is applied to an item can cause a reading problem.

If there is a reading problem, verify proper operation of the host and the scanner by using symbols of known readability. The symbol below may be used for this purpose if the decoder/terminal is configured to read PDF417.

PDF417

WELCH ALLYN IS PDF CAPABLE!

Figure 3.4 Bar Code Test Symbol

Once you have set up the scanner, tested it, and confirmed it is operating properly, you need to program the scanner for your bar code application. Steps for programming the scanner are described in Chapter 4, Programming the Scanner.

PROGRAMMING THE READER   4

4.1 Chapter Description

This chapter provides information on the following topics:

- SCANTEAM 3400PDF programmable functions

- scanner signals and what they mean

- how to use the Programming Menus

Note: *For additional information on programming the SCANTEAM 3400PDF CCD reader, refer to the SCANTEAM PDF417 Programming Menu. The Programming Menu is used to select the various parameters for reader operation discussed below and includes specific application guidelines for reader programming.*

4.2 Reader Programming Conventions

The SCANTEAM 3400PDF Reader is programmed by scanning bar code symbols included in the SCANTEAM PDF417 Programming Menu. The menus contain the bar code symbols you scan to:

- Enter the programming mode

- Select application options

- Exit the program mode

As you scan the bar code symbols, the information represented by the bar code symbols is stored in the reader's non-volatile PEROM memory. If the unit is turned off, the non-volatile PEROM memory retains the programmed application options.

Note: *The SCANTEAM 3400PDF scanner stores configuration parameters in flash memory. Saving configuration parameters more than 1000 times exceeds the specifications of the flash memory.*

The Programming Menu for the SCANTEAM 3400PDF has seven main sections:

Table 4.1 Programming Menu Sections

Main Sections	Application Options
Beeper	Volume (Low, medium–low, medium–high, high) Beep on Power Up Beep on Good Read Ticking Indicates Scanning Progress (PDF) Humming Indicates Decoder is Busy (PDF)
RS-232 Output	Baud Rate Character Format Data Flow Control No Read Notification
Wand Emulation	Characters per Data Block Delay Between Data Blocks Effective Output Scan Rate Digital Output Scan Rate Overall Checksum
Trigger Mode	Autotrigger Enable Manual Trigger Enable
Prefix/Suffix	Prefix Characters Suffix Characters
Code Selection	Industrial Symbologies (Codabar, Code 39, Interleaved 2 of 5, Code 128) Retail Symbologies (UPC, EAN) Stacked Codes (PDF417)
Disable All Symbologies	Disable all codes
Serial Menu	Used to program the SCANTEAM 3400PDF Reader by sending serial commands from the host computer. Used in conjunction with bar code symbols on the SCANTEAM PDF Serial Menu Charts.

4.3 Scanner Signals and What They Mean

The SCANTEAM 3400PDF Reader provides various types of audio feedback to the operator to enhance ease of use and productivity. The unit emits single, double, and triple beeps and also emits a ticking sound and a hum. Each of these sounds indicates a different condition. Additional information about the audio feedback is provided later in this chapter.

4.3.1 Audio Feedback and PDF417 Decoding

Using the SCANTEAM 3400PDF Reader, there are three distinct "phases" to a successful PDF417 decode:

- Data Collection

- Decoding

- Good Read/Data Transmission

The SCANTEAM 3400PDF unit provides distinct audio feedback for each of these phases, as follows:

Data Collection Constant "ticking" as the operator moves the reader across the PDF417 code and acquires PDF417 codewords for decoding

Decoding Once the reader has acquired enough data for decoding, the unit stops all collection (ticking stops) and produces a steady tone (a "hum") to indicate the reader is decoding the collected data.

Note: *The time a SCANTEAM 3400PDF unit spends decoding ("humming") is dependent on the size of the PDF symbol and the error correction level used when the symbol was printed. The more data encoded in a PDF symbol, the longer the time to decode. Proper scanning technique will reduce decoding time.*

Good Read Once the SCANTEAM 3400PDF Reader has completed a successful decode, the unit produces a single beep and transmits the decoded information to the host device.

4.4 Using the Programming Menus

The SCANTEAM PDF417 Programming Menu has three components:

- Menu Selection −− Lists all programming options, by function

- Bar Code Chart −− Located at the back of the SCANTEAM PDF417 Programming Menu, this section is used to "enter" alphanumeric and Roman numeral data during the programming mode.

- Information/Examples −− Additional information and examples to assist the operator in programming the reader.

To program a reader, the operator provides responses to Menu Selection parameters by scanning codes from the Bar Code Chart.

Figures 4.1 is an example of the CODE SELECTION II (RETAIL) Menu Selection Page and the "Digits" section of the Bar Code Chart.

USE THIS PAGE

■ As a general overview of the programming menu. The programming menu consists of two basic components as shown below.

Welch Allyn WA Programming Menu		**CODE SELECTION II (RETAIL)**

USE THIS PAGE
■ To select the pre-programmed asterisked (*) values by scanning DEFAULT symbol.
■ To enable or disable listed code selections.

selections	scan		variables		scan	scan
UPC ID = c (HEX 63)	I		Version A	A		*Yes/No
			Version D(2)	B		No*
			Version E0	C		*Yes/No
			Version E1	D		*Yes/No
			Check Digit Xmit	E		*Yes/No
			Number System Xmit	F		*Yes/No
			Version E Expand	G		Yes/No*
			2–Digit Addenda	H		*Yes/No
			5–Digit Addenda	I		*Yes/No
EAN ID = d (HEX 64)	II		EAN/JAN 13	A		*Yes/No
			EAN/JAN 8	B		*Yes/No
			Check Digit Xmit	C		*Yes/No
			2–Digit Addenda	D		*Yes/No
			5–Digit Addenda	E		*Yes/No
UPC & EAN Addenda Req'd.	III		Enable			Yes/No*

Notes:
(1) * Designates DEFAULT selections.
(2) UPC Version D is not supported at this time.

ENTER

DEFAULT

ESCAPE

EXIT

SAMPLE MENU PAGE

Welch Allyn WA Programming Menu   **BAR CODE CHART II**

USE THIS PAGE
■ In combination with the adjoining menu pages to program the unit.
■ The bar codes on this page correspond to symbols in shaded areas on adjoining menu pages. SCAN these bar codes in the sequence indicated on menu page to program desired selections and variables.

DIGITS

0 (YES)

1 (NO)

2

3

4

5

6

7

8

9

OTHERS

ESCAPE

DEFAULT

EXIT

BAR CODE CHART

Figure 4.1   Programming Menu Example - Code Selection II (Retail) and Digits Sections

4.5 Performing Menu Selections

The following explains how to use the Menu Selections page and the Bar Code Chart to program your SCANTEAM 3400PDF scanner.

1. Scan the ENTER bar code symbol on the menu page to begin the programming sequence. Listen for a double beep. After scanning this symbol, the desired options from the menu selections page may be selected. The ENTER symbol activates that particular menu page. The scanner does not accept programming instructions from a menu page until the ENTER/MENU PAGE symbol on that page has been scanned.

2. Scanning the DEFAULT symbol, from the menu page or Bar Code Chart, causes all of the programming selections which appear on the menu selections page to automatically default to the values marked with an asterisk(*). Entering a DEFAULT instruction before beginning to program brings all of the parameters on that page to a known value and helps to avoid programming confusion.

3. Once the menu page has been activated by scanning the Enter bar code symbol, scan individual bar code symbols on the Bar Code Chart to program the scanner to the indicated values. For example, to disable UPC Version E1, scan I, D and No from the Bar Code Chart.

4. Scan the EXIT/PROGRAM MODE symbol after all of the program selections have been made and the programming process is terminated.

Note*: The page opposite the selection/variable chart in the SCANTEAM PDF417 Programming Menu is frequently used to supplement or clarify material presented in the selection/variable chart. The opposite page also may contain programming examples.*

4.6 Specifics of the Programming Menu

4.6.1 Recommended Programming Sequence

The SCANTEAM 3400PDF operating parameters can be programmed in any order by moving from one menu page to another. However, since the programming process typically requires numerous scans, it is recommended that you plan and document each configuration command in advance. The following sequence is recommended for programming scanner parameters:

Step 1) Beeper Attributes

Step 2) RS-232 Parameters

Step 3) Wand Emulation

Step 4) Trigger Options

Step 5) Prefix/Suffix Programming

Step 6) Code Selection (Industrial, Retail, Stacked Codes)

The Serial Menu also may be used to program the scanner, instead of scanning symbols from the Bar Code Chart.

4.6.2 Beeper Attributes

The information below and on the following page summarizes the various programmable "Audio Feedback" options of the SCANTEAM 3400PDF Reader.

4.6.2.1 Volume

This programming selection provides control of the reader's beeper volume. The beeper volume may be set from low to high in four increments. Default = "2," medium-high.

4.6.2.2 Beep on Power Up

When enabled, the reader will double beep each time the system is reset. When disabled, the beeper will not sound whenever the system is reset. Default = enabled ("Yes").

4.6.2.3   Beep On Good Read

When enabled, the reader will beep once following a successful decode. When disabled, the beeper will not sound following a decode. Default = enabled ("Yes").

4.6.2.4   PDF417: Ticking Indicates Scanning Progress

When enabled, the reader will emit a ticking sound as it scans a PDF417 symbol. The rate of ticking is proportional to the rate of data collection. When disabled, you will not hear a ticking sound while scanning a PDF417 symbol. Default = enabled ("Yes").

4.6.2.5   PDF417: Humming Indicates Decoder Is Busy

When enabled, the reader will emit a humming sound while it is decoding a PDF417 symbol. When disabled, you will not hear a humming sound while decoding a PDF417 symbol. Default = enabled ("Yes").

Table 4.2 Beeper Feedback

What the Beeper is Telling you:	
As audible feedback, the PDF Capable reader provides five different beeps: single beep, double beep, triple beep, tick, and hum.	
Single Beep	One beep signals a successful barcode read.
Double Beep	Two beeps in succession indicate either: • a hardware reset (as when the unit is first powered on) • ENTER/EXIT/ESCAPE programming mode (when using the programming menu pages).
Triple Beep	Three quick beeps in succession indicate an error condition, as when an illegal menu code is scanned, or when the serial input buffer overflows. Every character sent to the PDF Capable reader is stored in a buffer. If the characters arrive faster than the reader can process them, it is possible (though rare) that the input buffer will completely fill up, and an overflow occurs. The serial input buffer can hold 128 characters.
Tick	The "Tick" has the shortest duration, and no perceivable pitch. It is used to indicate scanning progress while reading PDF417. A tick is initiated for every 32 PDF417 codewords read. A high rate of ticking corresponds to a high rate of data collection, thus good printing and good scanning technique are indicated by a high ticking rate.
Hum	The "Hum" is a steady tone with a lower pitch and volume than the beep, and a variable duration. The PDF417 reader cannot scan while decoding PDF417. When a great deal of error correction is required, the reader may appear to be "locked up." Humming indicates that the reader is busy decoding. Use the ticking option for PDF417 to learn how to scan for optimum performance. Careful scanning greatly decreases PDF417 decoding time.

4.6.3 RS-232 Serial Output Options

The section below provides detailed information on the various programming options for SCANTEAM 3400PDF RS-232 Output.

4.6.3.1 Baud Rate

This programming selection sets the baud rate from 600 bits per second to 38,400 bits per second. Programming baud rate causes the data to be sent at the specified rate. Default = 9600 bits per second.

4.6.3.2 Character Format

This programming selection allows you to set the character format for number of data and parity bits. PDF capable products support seven or eight bits of data and zero or one parity bit per character. The number of start and stop bits is fixed at one each. If an application requires only ASCII characters 0 through 127 decimal (text, digits, and punctuation), select 7 data bits. For applications requiring use of the full ASCII set, select 8 data bits per character. Default = eight data bits, no parity, and one stop bit.

Note: *PDF417 data is checked for accuracy before it is transmitted. This does not guarantee that errors will not be introduced during data communication. A parity bit may be added to each transmitted character as a means of character validation. A checksum character may also be added to the message as a suffix, for even stronger security (see Prefix/Suffix menu page). The receiving device must be set up for precisely the same character format and baud rate as the reader, to ensure reliable communication.*

4.6.3.3 Data Flow Control

Flow control may be necessary to handle the larger PDF417 messages. The PDF417 reader will normally transmit a message immediately following a successful decode. With flow control selected, the receiver can enable/disable the reader's transmitter. Default = "None," no data flow control option selected.

For example: suppose the receiver stores transmitted characters in a 512-byte buffer, yet the PDF417 reader has a 1400-byte message to transmit. The receiver might take 510 characters into its buffer, then tell the reader to STOP transmitting. As the receiver processes the message, space becomes available in the 512-byte buffer and the receiver can tell the reader to START transmitting again.

Two methods of flow control have been implemented in the PDF capable products: RTS/CTS hardware handshaking, and an XON/XOFF protocol.

RTS/CTS Handshaking
This option uses two signals in addition to the transmit and receive signals. The reader will have control of the RTS signal, the receiver controls the CTS signal.

Whenever the reader has a message to send, it will raise the Request To Send (RTS) line. If the reader has no messages to send, the line will be held low. When the receiver wants to suspend transmission, the Clear to Send (CTS) line will be held low. The reader looks at the state of CTS prior to sending each character. When the receiver is willing to accept a message from the reader it should raise the Clear To Send (CTS) line. The reader will resume sending messages, continuing where it left off when the CTS line was lowered.

XON/XOFF Protocol
This option uses only the transmit/receive lines between the reader and the receiver.

When the receiver wants to suspend transmission, it will send the XOFF character (ASCII 19 decimal) to the reader. When the receiver wants to resume transmission, it will send the XON character (ASCII 17 decimal) to the reader. The reader will resume sending messages, continuing where it left off when the XOFF character was sent.

4.6.3.4 "No Read" Notification

If Manual Trigger is enabled and you activate and deactivate the trigger without successfully reading a bar code, you will receive the output sequence {Prefix}"NR"{Suffix}. This occurs when the trigger switch is pressed or when the scanner is triggered serially.

4.6.4 Wand Emulation

The Wand Emulation interface transmits decoded bar code data to a decoding device by emulating the digital output of a wand. Large messages are broken down into data blocks that are transmitted as individual wand scans.

4.6.4.1 Characters per Data Block

This programming selection allows you to set the size of the data block which will be transmitted as a wand scan.

4.6.4.2 Delay Between Data Blocks

This programming selection sets the effective delay between sub-symbols.

4.6.4.3 Effective Output Scan Rate

This sets the transmission rate of the digital output signal. The available parameters assume a bar code density of .010 inches (10 mil).

4.6.4.4 Digital Output Signal Polarity

This programming parameter allows you to set the output logic convention for the digital output. The choices are White High (Laser Output) and Black High. Default = Black High.

4.6.4.5 Overall Checksum

When enabled, a computed check character will be added at the end of the entire message. The check character is the character which when Exclusive-ORed with every preceding character of the messaged yields a result of 0x00 (00H). The default is Disabled.

Note: *PDF Wand Emulation Users*

Encrypted PDF symbols (Veritas or Hypercompression) are designed to be used with specific applications running on the host device or PC. If the host device or PC is not running the specific application, the control sequences contained in the encrypted PDF symbol could affect the host device or PC. For example, when connected to a PC running Windows™ and **not** running the specified application, symptoms range from different application functions appearing on the screen to various Windows options opening over the application which is running. Concurrent with this, you may notice that the Caps Lock and/or Num Lock keys may be turned on or off on the PC keyboard. This same sequence of events also could occur when you use a wand to scan a linear bar code label containing control sequences.

It is highly recommended that you only scan PDF bar code labels when the host device or PC is running the proper application.

It is also recommended that if you are going to scan a label into the Windows environment via a keyboard wedge, you test the label for possible problems. The problems should be corrected before committing to that PDF label.

If you are using a PDF encrypted or control code label, and you encounter the above problems in Windows, it is recommended that RS-232 be looked into as an option.

Note: *If you are using Wand Emulation interface and connected to a SCANTEAM 2000, refer to the following instructions.*

If your application requires that the Caps Lock key on the PC be left on, you may notice that your PDF displays upper case characters as lower case and vice versa. To resolve this problem, program the SCANTEAM 2000 for a Caps Lock Keyboard style. Refer to the Output Parameters page in the SCANTEAM 2000 Programming Menu. The default keyboard style is set to Primary. In the PC environment, the Caps Lock Keyboard style is Secondary. (Enter, II, B, Exit).

4.6.5 Trigger Options

The following information describes the two trigger options and provides additional notes, including information on the SCANTEAM 3400PDF power saving mode.

Generally, a TRIGGER ON causes the reader to begin decoding, and a TRIGGER OFF halts decoding. The meaning of TRIGGER ON and TRIGGER OFF depends on the trigger mode.

4.6.5.1 Autotrigger Enable

In autotrigger mode, the reader scans continuously. It does not, however, output decoded messages continuously. Internal logic determines when to output a decoded message. This decision is based on several factors, including the state of TRIGGER ON/OFF. In the context of autotrigger mode, TRIGGER ON/OFF are defined as:

> **Trigger On** – The scanner senses the presence of several black/white elements (does not yet know if pattern is decodable).

> **Trigger Off** – The scanner senses the lack of black/white elements.

The reader's new autotrigger logic is aggressive, resulting in fast reads. It is not necessary to TRIGGER OFF in order to read a new code, but in order to reread the same code, one needs to TRIGGER OFF for about a quarter of a second or until the scanner senses the lack of black and white elements.

4.6.5.2 Manual Trigger Enable

In manual trigger mode, a TRIGGER ON is required to activate scanning and decoding. In the context of manual trigger mode, TRIGGER ON/OFF are defined as:

> **Trigger On** – (A) The trigger switch is pressed or (B) The serial TRIGGER ON command (ASCII 18 decimal) is sent to the reader.

> **Trigger Off** – (A) The trigger switch is released or (B) The serial TRIGGER OFF command (ASCII 20 decimal) is sent to the reader.

In manual trigger mode it is necessary to TRIGGER OFF following a successful decode before another code can be read. The scanning stops immediately following a successful decode, but the reader is not TRIGGERED OFF until one of the conditions above has been satisfied.

Note: *If the scanner is triggered serially, it is not necessary to send the TRIGGER OFF command following a good read.*

Note: *A SCANTEAM 3400 must be in manual trigger mode to use the switched power option.*

Note: *A SCANTEAM 3400 that has a trigger, defaults to Manual Trigger Enable.*

A power-saving mode is available for hand-held readers operating in manual trigger mode. Using the proper cable and selecting the manual trigger option enables the low-power mode. (Contact your sales representative or refer to the IPWC Cable Matrix for constant/switched-power cable information.) On power-up, the reader senses if the unit is using the switched-power cable, and goes immediately into a low-power mode. Only the trigger-sensing circuitry is powered (current draw is less than 1mA @ 5V until the trigger is pulled.

4.6.6   Prefix/Suffix Programming

The scanner will transmit the decoded message after every successful bar code read. You have the option of adding characters before (prefix) and after (suffix) the bar code message:

Transmitted data frame –>	**Prefix**	**Bar Code Message**	**Suffix**

Characters for the prefix and suffix are selected by their hexadecimal ASCII value, up to 8 characters each. In addition, special characters are available for code identification and for error detection. Programming prefix/suffixes is flexible, allowing creative framing possibilities.

These prefix/suffixes apply to all messages regardless of the symbology, and cannot be assigned for a specific symbology. The special characters for Code ID will change to indicate the decoded symbology.

Prefix/Suffix Examples:

1. The suffix defaults to a carriage return plus line feed:

| Bar Code Message | <CR> <LF> |

If no suffix is desired, scan:

ENTER, **II**, EXIT

To clear a prefix, scan:

ENTER, **I**, EXIT

Where: ENTER (Prefix/Suffix) enters programming mode.
II selects suffix programming and clears current suffix.

EXIT saves changes and exits programming mode.

2. To frame a message with <STX> (start of transmission) and <ETX> (end of transmission):

| <STX> | Bar Code Message | <ETX> |

First program the prefix, then the suffix, by scanning:
ENTER, **I**, 0, 2, **II**, 0, 3, EXIT

Where: ENTER (Prefix/Suffix) enters programming mode.

I selects prefix programming and clears current prefix.

02 represents the hexadecimal ASCII value for the <STX> character.

II selects suffix programming and clears current suffix.

03 represents the hexadecimal ASCII value for the <ETX> character.

EXIT saves changes and exits programming mode.

Table 4.3 HEX-ASCII Chart

HEX - ASCII CHART															
NUL	00	DLE	10	SP	20	0	30	@	40	P	50	'	60	p	70
SOH	01	DC1	11	!	21	1	31	A	41	Q	51	a	61	q	71
STX	02	DC2	12	"	22	2	32	B	42	R	52	b	62	r	72
ETX	03	DC3	13	#	23	3	33	C	43	S	53	c	63	s	73
EOT	04	DC4	14	$	24	4	34	D	44	T	54	d	64	t	74
ENQ	05	NAK	15	%	25	5	35	E	45	U	55	e	65	u	75
ACK	06	SYN	16	&	26	6	36	F	46	V	56	f	66	v	76
BEL	07	ETB	17	'	27	7	37	G	47	W	57	g	67	w	77
BS	08	CAN	18	(	28	8	38	H	48	X	58	h	68	x	78
HT	09	EM	19	)	29	9	39	I	49	Y	59	i	69	y	79
LF	0A	SUB	1A	*	2A	:	3A	J	4A	Z	5A	j	6A	z	7A
VT	0B	ESC	1B	+	2B	;	3B	K	4B	[	5B	k	6B	{	7B
FF	0C	FS	1C	,	2C	<	3C	L	4C	\	5C	l	6C	|	7C
CR	0D	GS	1D	–	2D	=	3D	M	4D	]	5D	m	6D	}	7D
SO	0E	RS	1E	.	2E	>	3E	N	4E	^	5E	n	6E	~	7E
SI	0F	US	1F	/	2F	?	3F	O	4F	_	5F	o	6F	DEL	7F

Table 4.4 Symbology Chart

SYMBOLOGY CHART								
Symbology	**Code ID**	**ASCII**	**Symbology**	**Code ID**	**ASCII**	**Symbology**	**Code ID**	**ASCII**
Codabar	a	61	Code 2 of 5	f	66	Code 49	l	6C
Code 39	b	62	MSI code	g	67	Matrix 2 of 5	m	6D
UPC	c	63	Code 11	h	68	Plessey code	n	6E
EAN	d	64	Code 93	i	69	Code 16K	o	6F
Interleaved 2 of 5	e	65	Code 128	j	6A	PDF417	r	72

Table 4.5 Special Characters

Hex Character	Result
80	Insert Code ID The 80 hex will be replaced by a single character identifying the decoded barcode symbology. *See the Symbology Chart, above.*
81	Insert AIM Symbology ID and Modifier The 81 hex will be replaced by a three character string:]CM *Where:*] is the symbology ID flag character C is the symbology ID character M is the modifier character *See AIM Guidelines on Symbology Identifiers for more information.*
85	Insert LRC Checksum as two printable hexadecimal characters plus a space. When placed at the end of a transmitted message, the LRC checksum provides a modest amount of error detection. The checksum is computed as the Exclusive-Or of every transmitted character, after being initialized to zero. The LRC checksum can have any value 00 through FF hexadecimal, but not all characters in this range are printable. This option causes the LRC checksum to be transmitted as three characters; two hexadecimal numbers plus a space.
86	Insert LRC Checksum as a single byte A single character is transmitted having a value 00 through FF hexadecimal.
87 XX	Set LRC Checksum = XX (hexadecimal) For initializing the checksum to some value other than zero, XX can be any value 00 through FF hexadecimal. This option is set as the first prefix.

Longitudinal Redundancy Checking in the PDF Decoder
As with parity checking on serially transmitted data, Longitudinal Redundancy Checking (LRC) is an optional means of detecting communication errors on transmissions to the host.

The LRC character is computed as the Exclusive-OR of each character, beginning with the prefix, as it is transmitted. To compute the Exclusive-OR of two characters, compare binary ASCII representations, bit by bit. The result will be a binary zero (0) in bit positions that match, and a binary one (1) in bit positions that are different.

LRC checking is beneficial in environments where characters received by the host might be corrupted by noise and where the host application will be checking the transmitted LRC character. Communication of characters is susceptible to corruption if a long unshielded cable connects the device to the host, if the highest baud rate is selected, or if a nearby device radiates too much energy. Normally RS-232 communication does not suffer from noise.

LRC Menuing Options
The Programming Menu offers a variety of options for inclusion of the LRC. The LRC can be represented as a single character, two printable characters, or can be initialized to a chosen character. When used, the LRC checksum is normally the last character in a suffix. In this case it is not necessary to initialize the LRC checksum. The following example shows a case when it is desirable to initialize the LRC checksum.

All values for prefixes and suffixes are entered as HEX values. Refer to the HEX-ASCII chart on page 4−15.

Example Application #1

The host application requires that the bar code data be framed by a leading STX character (the prefix) and a trailing ETX character (the suffix). As an added assurance that the data is transmitted correctly, the whole string including the suffix(es) must be checked for validity on the host application side.

The LRC programming is done on the Prefix/Suffix programming menu page in the SCANTEAM PDF417 Programming Menu.

Set LRC
STX	Bar Code Message	LRC,ETX
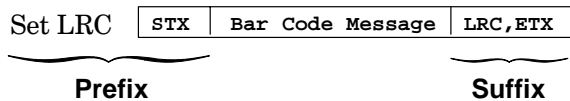
Prefix   **Suffix**

In this example, the LRC would be initialized to the suffix character ETX (03).

Programming Flow

1. Enter Prefix/Suffix programming.

2. Select Prefix programming.

3. Set the LRC to the value of the required (HEX value) suffix. (87XX) (This includes the suffix in the LRC calculations.)

4. Scan the required prefix as a HEX value.

5. Select Suffix programming.

6. Scan 86 to transmit the LRC to transmit as one character.

7. Scan the required suffix as a HEX value.

8. Exit Prefix/Suffix programming.

Programming Steps

1. Scan the Enter label on the Prefix/Suffix menu page.

2. On Bar Code Chart I, scan Roman Numeral I.

3.   On Bar Code Chart III, scan   8
                                       7
                                       0
                                       3

4.   On Bar Code Chart III, scan 02

5.   On Bar Code Chart I, scan Roman Numeral II.

6.   On Bar Code Chart III, scan 86.

7.   On Bar Code Chart III, scan 03.

8.   Scan the Exit label.

The data will be transmitted as [STX]data[LRC][ETX]. The host can Exclusive-OR each character as it is received, including the STX, LRC, and ETX. If no communication errors have occurred, the result will be zero.

What if the application required two or more suffix characters following the LRC? To what value should the LRC character be initialized?

Example Application #2

Set LRC	Remaining Prefix Characters	Bar Code Message	LRC,CR,ETX

    Prefix   Suffix
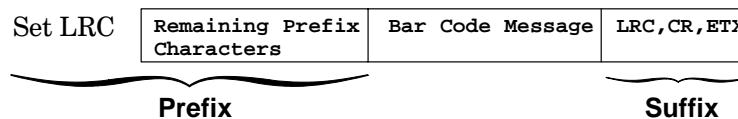
Since the [CR] and [ETX] characters are transmitted **after** the LRC, they are not normally included in the LRC calculation. You can, however, compute the Exclusive-OR of all characters that follow the LRC, and then initialize LRC to that value as the first step in the prefix.

CR binary value	=	00001101
ETX binary value	=	00000011
XOR'ed	=	00001110 (0E HEX)

The LRC value would be initialized to 0E [SO].

Data will be transmitted as [prefix]data[LRC][CR][ETX]

If the LRC is the last character of the prefix, then it is not necessary to initialize its value.

Programming Flow

1.   Enter Prefix/Suffix programming.

2.   Select Prefix programming.

3.   Set the LRC value to the computed X'ored (Hex) value (87XX)

4.   Scan the required prefix as a Hex value.

5.   Select Suffix programming.

6.   Scan 86 to transmit the LRC to transmit as one character.

7.   Scan the required suffixes as Hex values.

8.   Exit Prefix/Suffix programming mode.

Programming Steps

1.   Scan the Enter label on the Prefix/Suffix menu page.

2.   On Bar Code Chart I, scan Roman Numeral I.

3.   On Bar Code Chart III, scan   8
                                         7
   0
                                         E

4.   On Bar Code Chart III, scan 02

5.   On Bar Code Chart I, scan Roman Numeral II.

6.   On Bar Code Chart III, scan 86.

7. On Bar Code Chart III, scan   0
                                     D
                                     0
                                     3

8. Scan the Exit label.

Data will be transmitted to the host as
[STX]data[LRC][CR][ETX]

4.6.7   Code Selection I (Industrial) Menu Page

The SCANTEAM 3400PDF autodiscriminates between the following
Industrial symbologies: Codabar, Code 39, Interleaved 2 of 5, and Code
128.

The Code Selection I (Industrial) page of the SCANTEAM PDF417
Programming Menu is used to disable or enable all Industrial
symbologies. When a symbology is disabled, the unit ignores any scans
of that particular symbology. No error signal (beep) is issued. Available
Industrial codes and their options are listed in Table 4.6. Minimum and
Maximum lengths are selectable for all Industrial symbologies.

Table 4.6   Industrial Symbologies

Symbology	Length Min	Max	Options
Codabar	01	60	Start/stop transmit, check character transmission, concatenation
Code 39	00	48	Start/Stop transmit, check character transmission, full ASCII, symbol appendation
I 2 of 5	02	80	Check digit, check digit (even #'s only) transmission
Code 128	01	80	None

Example: Configure the SCANTEAM 3400PDF to decode the following symbologies:

Code 39:   Minimum Length = 8

                 Maximum Length = 14

                 Start/Stop: Transmit

                 Check Digit: Required

                 Check Digit: Transmit

                 Full ASCII: Yes

Code 128:   Minimum Length = 6

                 Maximum Length = 12

Refer to the Selections/Variables options on the CODE Selection I (Industrial) page of the SCANTEAM PDF417 Programming Menu.

Note: *If Check Digit is required and the code does not contain a check digit, the SCANTEAM 3400PDF will not read the code.*

The scanning sequence to program the scanner to read these Code 39 and Code 128 formats would be:

FUNCTION	SELECTION	VARIABLE
Enter Menu Page	ENTER	
Set DEFAULT Values	DEFAULT	
Set Code 39	II	
Set Start/Stop Characters		A
To Transmit		Yes
Set Check Char Required		B
To Required		Yes
Set Check Digit		C
To Transmit		Yes
Set Full ASCII		D
To enabled		Yes
Set Minimum Length		F
To 8		0
		8
Set Maximum Length		G
To 14		1
		4

Scanning sequence continued on next page.

FUNCTION	SELECTION	VARIABLE
Set Code 128	IV	
To enabled		Yes
Set Minimum Length		A
To 6		0
		6
Set Maximum Length		B
To 12		1
		2
Leave Menu Page	EXIT	

Note: *To maximize reading efficiency and security, all unused codes should be disabled.*

Code 39 may have the "append" function enabled or disabled with the programming menu, whereas the Code 128 "append" function cannot.

Note: *If you try this example, the reader will be left operating with these parameters. To return the reader to the default parameters settings, scan*

ENTER
DEFAULT
EXIT

4.6.8   Code Selection II (Retail) Menu Page

The SCANTEAM 3400PDF autodiscriminates between the following Retail symbologies: UPC, EAN.

The Code Selection II (Retail) page of the SCANTEAM PDF417 Programming Menu is used to disable or enable all Retail symbologies. When a symbology is disabled, the unit ignores any scans of that particular symbology, and no error signal (beep) is issued. Available Retail symbologies and their options are listed in Table 4.7.

Table 4.7   Retail Symbologies

Symbology	Length Min	Max	Options
UPC	Not Selectable		Enable Version (A, E), Version E output compressed or expanded, 2 or 5 digit addendum, check digit transmission, number system digit transmission.
EAN/JAN	Not Selectable		Enable Version 8 and 13, 2 or 5 digit addendum, check digit transmission ISBN conversion.
UPC & EAN	Addenda Required		Yes or No

A symbology with an incorrect check character is ignored, that is; it is treated as a disabled symbology. The check character for all applicable symbologies may be transmitted or not, depending on the menu selection made. UPC Version E may be transmitted as an expanded symbology (with zeros inserted) or in its compressed state as shown in the human readable interpretation.

For example, consider the decoded UPC–E data message 078349. The number system digit and check digit transmissions are disabled. When the "compressed" option is enabled, data will be transmitted as 078349. If the "expanded" option (Version E Expand) is enabled, the same data message will be transmitted as 0783400009.

In order to assure highest reading accuracy, all unused symbologies which do not default to the disabled state should be disabled.

Example: Configure the SCANTEAM 3400PDF to the following retail code symbologies and values:

UPC–A will be sent with the following properties:
> Check Digit Xmit Disabled
> # System Digit Disabled
> Read UPC Version E (expanded)
> 2-digit Addenda Disabled
> 5-digit Addenda Disabled

Refer to the Selections/Variables table on the CODE Selection II (Retail) page of the SCANTEAM PDF417 Programming Menu.

The scanning sequence to program the scanner to read only this UPC Code format would be:

FUNCTION	SELECTION	VARIABLE
Enter Menu Page	ENTER	
Set DEFAULT Values	DEFAULT	
Enable UPC–A	I	A
		Yes
Enable UPC Version E 0		C
		Yes
Enable UPC Version E 1		D
		Yes
Disable Check Digit Xmit		E
		No
Disable # System Xmit		F
		No
Enable UPC–E Expanded		G
		Yes
Disable 2-digit Addenda		H
		No
Disable 5-digit Addenda		I
		No
Disable EAN	II	
Disable EAN/JAN 13		A
		No

Scanning sequence continued on next page.

FUNCTION	SELECTION	VARIABLE
Disable EAN/JAN 8		B
		No
Disable UPC & EAN	III	
Addenda Required		No
Leave Menu Page	EXIT	

Note: *To assure highest reading accuracy, all unused symbologies (EAN/JAN13, EAN/JAN 8) were disabled.*

Note: *If you try this example, the reader will be left operating with these parameters. To return the reader to the default parameters settings, scan*

FUNCTION	SELECTION	VARIABLE
	ENTER	
	DEFAULT	
	EXIT	

4.6.9   Code Selection III (Stacked) Menu Page

The SCANTEAM 3400PDF autodiscriminates the PDF417 symbology.

4.6.9.1   Macro PDF417

Up to 16 Macro PDF417 symbols encoding up to 13,000 characters of data can be combined in designated order and transmitted as a single data packet in the PDF417 readers. Disabling Macro PDF417 causes the data from every PDF417 symbol to be transmitted independently in the order scanned.

4.6.9.2   Show Macro Control Block

Enabling this feature causes Macro PDF417 Control Block contents to be included at the end of the encoded data except when all data messages have been successfully merged and are issued as a single data packet (see above). When enabled, the backslash "\" is used as an escape character and natural occurrences of "\" in data are replaced by "\\".

4.6.9.3   Show GLI Blocks

Enabling this feature causes GLI Commands to be issued where located within their encoded data sequences. When enabled, the "\" is used as an escape character and natural occurrences of "\" in data are replaced by "\\".

4.6.9.4   One Pass

If this option is enabled, any partial PDF417 scan will be cleared from memory upon a TRIGGER OFF. Normally PDF scans are saved in memory until either a DECODE or a new PDF417 label is scanned. If a new label is detected, the partial data will be cleared, but it is not always possible for the reader to know when a new label is introduced.

4.6.9.5   Notify When Certain

If this option is enabled, the reader sends out a message (ASCII decimal 23) to notify the host system that a successful PDF417 decode is certain; no more scanning is required.

For example, in a machine-mount system, a host computer moves a PDF417 label back and forth in front of the PDF Capable reader until the ASCII decimal 23 is received. At that point scanning is completed, and the decoded message will follow.

4.6.9.6   When To Decode

The PDF Capable reader must temporarily halt scanning in order to perform PDF417 decoding. A refined algorithm automatically predicts when enough information has been scanned to insure a successful decode. If the scanned data contains many errors, though, decoding cannot succeed and more scanning is required.

In a machine-mount system with a predetermined scan cycle, it may be an advantage to use ***Trigger-Off Decoding***. When this option is enabled the reader will not attempt to decode PDF417 until a TRIGGER OFF. During the predetermined scanning time, the reader is sure to be collecting data.

4.6.9.7 Scan Diagnostics

Enabling scan diagnostics causes progress reports to be issued during PDF417 scanning. Interim reports are in the cryptic form: "21x07=115+032=147 129 C"
which reports:
(#Rows)x(#DataColumns)=(#DataWords)+(#CheckWords)=(Total) (#Read) (Grade)
The first five parameters describe the symbol being scanned while the final two report on the progress made in scanning it. Enabling scan diagnostics also enables a prolonged delay before attempting an array decode, allowing results to accumulate over several scans of the symbol. Upon successful array decode, a final report is issued in the form:

"003 Eras + 001 Errs = >143 A"

which presents the results of the error correction calculations.

Note: *The Scan Diagnostics parameter applies to scanners configured for RS-232 output.*

Note: *The "No Read" Notification parameter applies to scanners configured for wand emulation output.*

4.6.10 Disable All Symbologies

Selecting this feature disables the scanner from decoding any bar code symbologies. This feature would normally be used as part of a programming sequence to enable decoding only on selected symbologies. After selecting this feature, the user enables the symbology he wants to decode.

4.6.11 Serial Menu

The serial menu may be used any time in place of the bar code menuing. The serial menu is particularly useful for programming PDF capable machine mount readers.

Every programming menu code can be replaced by a two-character serial command. A serial device programs the reader by sending the proper sequence of serial commands. Use the menu pages to select the programming variables your application requires.

For every menu code, the equivalent two-character serial command (and its corresponding ASCII decimal value) are given in the SERIAL MENU CHARTS included in the SCANTEAM PDF417 Programming Menu.

Example 1
If you want PDF417 enabled and all other bar code symbologies disabled, use the following sequence of serial commands:

E <Ctrl–X> T <Ctrl–Y> <SPC> <Ctrl–Y> F <Ctrl–X> K <Ctrl–Y> 0 <Ctrl–Y> <SPC> <Ctrl–Y>

The above serial commands correspond to the selections and variables on the programming menu page:

- ENTER code for Disable All Symbologies Menu Page
- Confirm selection
- "EXIT" code for that menu page
- "ENTER" code for stacked codes
- PDF417 selection (Roman Numeral I)
- "Yes" (Digit 0) to enable PDF417 decoding
- "EXIT" code for that menu page.

Example 2
If you wish to set the Beeper Volume to its highest setting, use the BEEPER menu page. The correct sequence of serial commands would be:
A <Ctrl–X> K <Ctrl–Y> 3 <Ctrl–Y> <SPC> <Ctrl–Y>

The above serial commands correspond to the selections and variables on the programming menu page:
- ENTER code for that menu page
- "Volume" selection (Roman Numeral I)
- "High" (Digit 3) to select the high option
- "EXIT" code for that menu page.

Special Notes:
Take care not to confuse the letter O and the number 0. Note also that the DEFAULT code is represented by a period (.) followed by <Ctrl−Y>. ASCII (decimal) values are included on the SERIAL MENU CHARTS (below the corresponding serial command).

RS-232 parameter changes are immediately affected. The connected host serial device must also change to the programmed selections accordingly. After changing baud rate, it may be necessary to wait a short amount of time for the serial port to stabilize. For this reason bar code menuing is suggested for changing RS-232 parameters.

In manual trigger mode, two serial commands may be used to turn the trigger on/off. The commands are:

ASCII 18 (decimal)   **Ctrl−R**   Trigger ON
ASCII 20 (decimal)   **Ctrl−T**   Trigger OFF

PRINTING PDF417 LABELS FOR IMPROVED READABILITY   **5**

5.1 Printing PDF417 Labels for Improved Readability with SCANTEAM 3400PDF Readers

PDF417 was designed to allow great flexibility in printing, making it possible to print labels to meet a variety of requirements. This appendix describes five label parameters, demonstrates how these parameters affect the printed symbol, and presents suggestions for choosing the parameters for maximum readability. The goal is to produce labels that are easy to scan.

5.2 PDF417 Label Parameters

The following parameters may be chosen when printing PDF417 symbols:
1. X dimension
2. Y dimension, or row height
3. Number of columns of data $(1-30)$
4. Number of rows of data $(3-90)$
5. Error correction level $(0-8)$

5.2.1 X Dimension, Y Dimension

Codewords are the building blocks of PDF417. Each codeword is comprised of four bars and four spaces and can be divided into 17 equal modules. The X dimension is the width of a single module. The Y dimension is the height of the codeword.

5.2.2 Number of Columns and Rows

Every PDF417 label is a matrix of codewords. You pick the number of columns (1−30) and rows (3−90) in the matrix. For example, to print a label which encodes 216 codewords, you could choose 9 rows by 24 columns to equal 216 codewords, or 18 rows by 12 columns to equal 216 codewords. The resulting labels will have very different shapes, but each encodes the same message. This feature allows you to fit a PDF417 label to a desired shape. Because of this arrangement, the Y dimension can be called the *row height*.

5.2.3 Error Correction Level

PDF417 employs powerful error correction techniques. The decoded message will not contain any errors, even when the label is damaged. Extra codewords, called error correction codewords, are added. Message codewords fill the top rows of the matrix, and error correction codewords fill the bottom rows of the matrix.

The error correction level is selectable. Choose the level depending on the expected amount of label damage. Higher levels can compensate for higher amounts of label damage, but every increase in error correction level doubles the amount of error correction codewords needed. The damage may be located anywhere in the label as long as the total area damaged is less than the total area filled by error correction codewords.

Since the amount of damage is typically proportional to the size of the label, choose the number or error correction codewords to be proportional to the number of message codewords. Welch Allyn recommends adding an extra 15−25% codewords for error correction. If little or no damage is expected, try 10%. If more damage is expected, use 30%.

5.3 Improving Readability

Printing parameters strongly affect the label's readability. When chosen carefully, printing parameters can make scanning easy. Readability can be measured by:
1.   Tilt angle
2.   Scan speed
3.   Tolerance to label damage

5.3.1   Tilt Angle

When reading PDF417 labels, the scanner first reassembles the codeword matrix in memory. Bar code scanners are good at interpreting patterns of bars and spaces. When reading PDF417 labels, the scanner has the added task of being able to locate each codeword in the matrix. This task is easiest when the scan line is parallel to the rows of codewords. PDF417 has been designed to allow a small amount of tilt.

Welch Allyn PDF417 capable products have been designed to perform well even at high tilt angles. The absolute maximum angle is determined by the X and Y dimensions. At least two codewords must be captured in a single row.

5.3.2   Scan Speed

As the scanner passes over the PDF417 label, codewords are interpreted and stored into memory. For excellent readability, the scanner should capture every row at least once as it passes over the label. The taller the row height, the faster the scanner can pass over the label. A scan captured at or near the edge between two rows will be hampered by reflectance from the neighboring row (inter−row interference).

5.3.3   Tolerance to Label Damage

The more tolerance to label damage, the easier the label is to scan. Increasing the error correction level helps. Even when the label has no damage, the error correction can help fill in any missing codewords. In traditional bar codes, row height provided tolerance to label damage. The encoded information is repeated over the height of the row. Even with some damage it is possible to find a good scan path.

Error correction levels $0-2$ are not recommended since they tolerate very few errors and scanning is difficult. Error correction levels $7-8$ are not recommended since they add a great deal of area to the label. Welch Allyn suggests using error correction levels $3-6$, depending on the message size. These levels offer excellent protection from label damage without adding a great deal of area to the label.

5.4 Suggestions for Maximum Readability

5.4.1   Making X Dimension as Small as Possible

Reducing the X dimension will improve readability by increasing the maximum tilt angle. Welch Allyn CCD readers can easily resolve elements 6.6 mils wide. Many printers can accurately print at that density since it is a derivative of 300 dots per inch.

5.4.2   Making Y Dimension as Large as Possible

A good rule of thumb is to have the Y dimension four times (at a minimum) as large as the X dimension (4X).
Increasing the Y dimension improves readability by:
1.   Increasing the maximum tilt angle
2.   Allowing higher scan speeds
3.   Providing slight tolerance to label damage since the encoded information is repeated over the height of the row

Unfortunately an increase in row height means a decrease in information density. Readability and information density are both important. You will need to determine the needs of your particular application. In any case, you should make the row height as large as space allows. If necessary, try increasing the number of columns to match the width of the scanner. Since fewer rows may then be needed, they may be printed taller.

5.4.3   Choosing Error Correction

Choose the error correction level so that the number of error correction codewords is about $15-25\%$ the number of message codewords. Increasing error correction level generally improves readability. Where space is limited, however, it may be more of an advantage to use a lower error correction level and instead increase the Y dimension.

Increasing error correction level means decreasing information density. Readability will greatly improve in going from level 0 to level 3. The information density will not change much.

5.5 Example of PDF417 Printing

Problem: Encode about 544 digits for maximum readability into space 22mm x 72mm. Expect above average label damage.

Solution:

1. Choose $\boxed{\text{X Dimension = 0.17mm}}$ ≈ 6.6 mils

2. Use 30% extra for error correction
   554 digits require how many codewords?

$\dfrac{554}{44}$ = 12 groups of 15 PDF417 codewords

      encodes 12 (44) = 528 digits

$\dfrac{26 \text{ remaining digits}}{\log_{10} 900}$ = 8.8 => 9 more codewords

Then 12(15) + 9 = 189 codewords are needed. PDF requires one codeword to describe length of symbol and one to switch to numeric compaction mode.
            Total = 191 message codewords

Message codewords: $\underset{30\%}{191\ (0.30)}$ = 57.3 => Round up to 64 error
                                      correction codewords

$\boxed{\therefore \qquad \text{Use error correction level 5}}$

3. Choose as many columns as space allows.

LH = Label Height

LW = Label Width
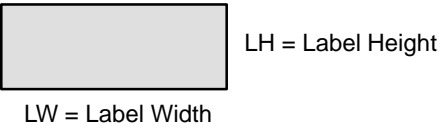
LW ≥ 2X quiet zones + 17X (# columns)
                 + 17X (2 row indicators) + 17X start pattern
                 + 18X stop pattern

\# columns   ≤ $\dfrac{LW - 2X - 34X - 35X}{17X}$

For LW =72mm, X = 0.17mm

$$\text{\# columns} \leq \frac{72\text{mm} - 71X}{17X}$$

$$\leq \frac{72\text{mm} - 12.07\text{mm}}{2.89\text{mm}} = 20.73$$

> Choose # columns = 20
> The true LW = 411X = 69.87mm

4. Finally, choose row height to be as large as space allows.

   LH = Y (# rows)   No quiet zones needed

Total number of code-words in matrix	$\geq$	message codewords	+	error correction codewords
	$\geq$	191	+	64
	$\geq$	255 codewords		

Total number of code-words in matrix	=	(# columns) (# rows)
255	$\leq$	20 (# rows)
$\dfrac{255}{20}$	$\leq$	# rows
12.75	$\leq$	# rows

> Choose the number of rows = 13

At 13 rows, compute Y to be:

$$Y = \frac{LH}{13}$$

For LH = 22mm

$$Y = 1.69mm$$

The actual number of digits one can encode in this label is:

Total number of   =   (# columns) (# rows) = (20) (13)
codewords in matrix

=   260

Subtract 64 for error correction level 5, 1 for symbol length and 1 more for numeric mode => 194.

$\frac{194}{15}$ = 12 groups of 44 digits

(14 remaining codewords) $\log_{10}$ 900 => 40 digits

Then this label can hold max 12(44) + 40 = 568 digits

MAINTENANCE AND TROUBLESHOOTING   6

6.1 Maintenance

The SCANTEAM 3400PDF provides reliable and efficient operation with a minimum of care. Although specific maintenance is not required, the following periodic checks contribute significantly to dependable scanner operation.

6.1.1   Cleaning the Scan Window

The scanning window must be kept clean to assure a high "first pass" rate performance. Since a dirty scan window can impair scanning performance, it should be cleaned whenever scanning performance begins to degrade or the window is visibly dirty.

If the scanning window becomes dirty, clean it by wiping with a soft cloth or facial tissue that has been dampened with water or a mild detergent−water solution. If a detergent solution is used for cleaning, you must follow it with a rinse step using a clean tissue dampened with water only. The body of the scanner can be cleaned using the same procedure.

Caution: Do not submerge the scanner in water. The scanner's housing is not water–tight. Do not use abrasive wipers or tissues on the optical window. These wipers will scratch the window. Never use solvents (alcohol or acetone) on the enclosure or window. Solvents may damage the finish or the window.

6.1.2   Inspecting the Scanner

6.1.2.1   Cords and Connectors

Inspect the scanner cable and connector periodically for wear and other signs of damage. A badly worn cable or damaged connector may interfere with the proper operation of the unit and should be replaced. Contact the Welch Allyn Customer Service Group for information about cable replacement. Instructions for replacing the cable are included below.

6.1.3   Interface Cable Replacement

The standard Interface Cable is attached to the scanner with a 10−pin modular I/O connector. When properly seated, the connector is secured in the scanner handle by a flexible retention tab. The cable is designed to be field replaceable, yet tamper resistant. Replacement cords can be obtained from Welch Allyn or an authorized distributor. When ordering a replacement cable, specify the cable number of the original cable.

To replace the cable:

1)   Turn the power to the host device OFF.

2)   Disconnect the scanner cable from the host device.

3)   Locate the small hole on the side of the scanner handle near the back.

4)   Straighten one end of a paper clip.

5)   Insert the end of the paper clip into the hole and press down. This depresses the retention tab, which in turn releases the connector. Pull the connector out of the scanner while maintaining pressure on the paper clip.

6.1.4   Reader Case

Routinely examine the reader case for signs of damage. A damaged case may cause the internal components to be moved and result in a malfunctioning unit.

6.2 Troubleshooting

The SCANTEAM 3400PDF reader automatically performs self−tests whenever you turn it on. If your unit is not functioning properly, review the following Troubleshooting Guide to try and isolate the problem.

Note: *The scanner does not contain any user serviceable parts and, therefore, the scanner case should not be opened. Opening the scanner voids the warranty.*

6.2.1   Troubleshooting Guide

Is the power turned on ?

Are the scanner interface cable and all other terminal cables properly connected?

Is the decoder programmed to read the type of bar code symbols you are scanning? *(See Section 1.4 Programming Options Summary)*

Are all the necessary application options programmed?

- Bar Code Symbology

- Interfaces

- Communication format

Is the symbol you are trying to scan smeared, rough, or exhibiting voids?

Bar code symbols with water droplets or frost on the surface, or symbols larger than the READ Window, or of low contrast, scratched or otherwise blemished, may cause scanning problems.

To verify scanner operation, test the scanner with a high quality bar code symbol, such as the PDF417 symbol in Figure 3.4. As an additional check, verify the quality of the bar code symbols with a bar code verifier such as the Quick Check available from Welch Allyn.

6.3 Obtaining Factory Service

Welch Allyn provides service for all its products through a service center located at its manufacturing facilities in Skaneateles, New York. To obtain warranty or non−warranty service, return the unit to Welch Allyn, Inc. (postage paid) with a copy of the dated purchase record attached.

In the United States, please contact the Welch Allyn Product Service Department at the address/telephone number listed below to obtain a Return Material Authorization number (RMA #).

> **Welch Allyn, Inc.**
> Data Collection Division
> *Product Service Department*
> 4619 Jordan Road
> P.O. Box 187
> Skaneateles Falls, New York 13153−0187
>
> *Product Service Department*
> Telephone: (315) 685−4278 or 685−4360
> Fax: (315) 685−4156

For service in Europe, please contact your Welch Allyn representative (at address below) or your local distributor.

> **Welch Allyn, Ltd.**
> 28 Sandyford Office Park
> Foxrock
> Dublin 18
> Ireland
>
> Telephone: Int+353−1295−0750
> Fax: Int+353−1295−6353
>
> **U. K. Offices**
> **Northern Office**
> The Lodge, Tanners Lane
> Warrington, Cheshire WA2 7NA
> England
>
> Telephone: Int+44 1925 240055
> Fax: Int+44 1925 631280

Southern Office
Aston Abbotts
Buckinghamshire HP22 4ND
England

Telephone: Int+44 1296 682140
Fax: Int+44 1296 682104

For service in Asia, please contact your Welch Allyn
representative (at address below) or your local distributor.

Welch Allyn, Hong Kong Office
10/F Tung Sun Commercial Centre
194−200 Lockhart Road
Wanchai, Hong Kong

Telephone: Int+852−2511−3050 *or* 2511−3132
Fax: Int+852−2511−3557

Help Desk

If, after reviewing the Troubleshooting Guide, you still need
assistance installing or troubleshooting the device, please call
your Distributor or the Help Desk:

Telephone: (315) 685−8945

Maintenance and Troubleshooting

TECHNICAL SPECIFICATIONS   A

A.1 Scanner Performance

The SCANTEAM performance has been measured in terms of the first bar elongation/contraction and inner bar (space) elongation/contraction when scanning the test targets defined below:

SCANTEAM 3400PDF Performance
First bar contraction 0.001 inch [.025 mm]
First bar elongation 0.005in [.127 mm]
Inner bar contraction 0.002 inch [0.51 mm]
Inner bar elongation 0.004 inch [.102 mm]
Inner space contraction 0.004 inch [0.102 mm]
Inner space elongation 0.002 inch [0.051 mm]

A.2 Optical Specifications

Scanning Direction:	**Single Line (Right to Left)**
Scan Rate:	**200 scans per second**
Skew Angle: (Refer to Figure A.1)	**±30 degrees**
Pitch Angle: (Refer to Figure A.1)	**±7 degrees**
Read Starting Method:	**Programmable Manual or Automatic Trigger**
Light Source:	**Red LED (Wavelength = 660 nm)**
Reading Sensor	**CCD (Charged Coupled Device) (2048 pixels)**
Maximum Bar Code Width:	**4 inches**

Pitch or Roll

±7°

±30°
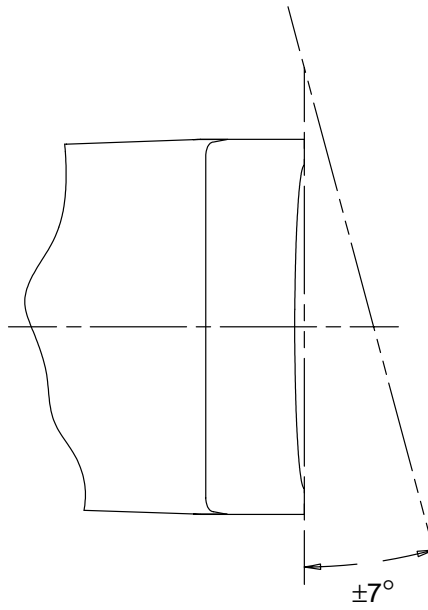
Skew or Yaw
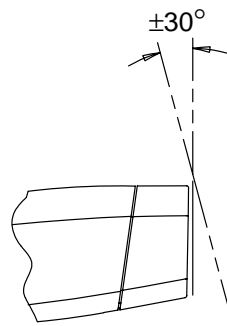
Figure A.1   Pitch/Roll and Skew/Yaw

A.3 Electrical Specifications

Operating Voltage:

Decoded Output (3400PDF/G–12X) 5V±10%

Decoded Output (3400PDF/G–13X) 5V±10% or 12V±10%

Operating Current: **Auto–Trigger Mode**. See chart below.

5 Volts Decoded Output		Extended Voltage	
		12 Volts	
Typical	Maximum	Typical	Maximum
175mA	210mA	175mA	210mA

Operating Current: **Manual Trigger – Switched Power Mode (Off–State).** (Requires switched power cable.) See chart below

5 Volts Decoded Output		Extended Voltage	
		12 Volts	
Typical	Maximum	Typical	Maximum
<1mA	1mA	1mA	3mA

Power Supply

Noise Rejection: Withstands up to 100mV p–p noise and ripple

SCANTEAM 3400PDF Options: –X2X (TTL), and –X3X (TRUE)

Decoded Out Connector Pin Assignments:
The Scanner provides decoded output data format. See chart below.

10–Pin RJ41 Modular Connector

1   10
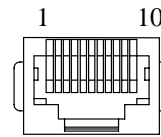
Pin	Standard Welch Allyn Color Code	Signal	Function
1		N/C	
2	Braid	N/C	Cord Shield
3	Blue	Prog 1	
4	Black	Ground	Supply Ground
5	Orange	RXD	Receive Data – Serial Data to Scanner
6	Green	TXD	Transmit Data – Serial Data from Scanner
7	Red	+5VDC	5 Volt Power Connection
8	White	RTS	Request to Send Data
9	Gray	CTS	Clear to Send Data
10		N/C	

SCANTEAM 3400PDF Options: –X2X (TTL), and –X3X (TRUE)
continued

9–Pin D Shell Connector
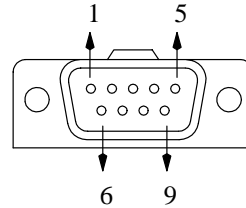
Pin	Standard Welch Allyn Color Code	Signal	Function
1	Blue	Prog 1	
2	Green	TXD	Transmit Data – Serial Data from Scanner
3	Orange	RXD	Receive Data – Serial Data to Scanner
4		N/C	
5	Black	Ground	Supply Ground
6		N/C	
7	Gray	CTS	Clear to Send Data
8	White	RTS	Request to Send Data
9	Red	+5VDC	5 Volt Power Connection

A.4 Environmental Specifications

Operating Temperature: 32° F to 122° F (0° C to 50° C)

Storage Temperature: –40° F to 158° F (–40° C to 70° C)

**Relative Operating
and Storage Humidity:**   0 to 95% (non–condensing)

Barometric Pressure: 101,000 to 69,000 Pascals
(Sea level to 3400 meters)

Shock: Sustains 5 foot drop to a non–yielding surface

ESD: 15 KV

Ambient Illumination: 3400 Lux

**Mean Time Between
Failure (Ground Benign):**   74,000 hrs.

Note: *The SCANTEAM 3400PDF scanner stores configuration parameters in flash memory. Saving configuration parameters more than 1000 times exceeds the specifications of the flash memory.*

A.5 Mechanical Specifications

Weight: 8.5 ounces without cord

Interface Cable: 8 foot coiled cord (Refer to Figure A–2)

Cord Flexure: Cord–scanner strain relief withstands in excess of 1,000,000 flexures of +90 degree flexure while stressed with a weight of 6.7 ounces.

Interface Connector: Standard Connector – 9–Pin D Shell
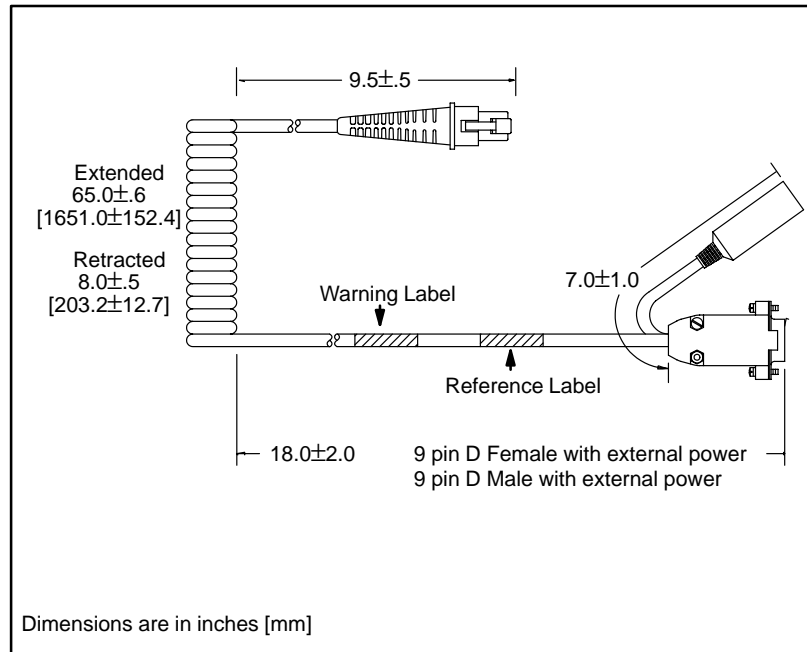
Figure A.2   Dimensional Figure of 8' Coiled Cord

A.6 Regulatory and Safety Requirements

FCC Class B
Canadian Ministry of Communications
CE Mark

A.7 Patents

Patents Pending

A.8 Bar Code Symbol Specifications

All bar code symbols should satisfy the appropriate AIM Uniform Symbology Specification.

Background Substrate

The bar code symbol should be printed on material which is reflective and has a matte (not glossy) finish. A background diffuse reflectance of at least 70% to 80% is desirable for optimum contrast.

Ink Color and Type

The type of ink should be compatible with 660nm LEDs used in the scanner. The bar code symbols inked bars should not exceed 10% reflectance at 660nm which is being used for reading, whether printed with black ink or colored ink.

Voids and Specks

The code should be printed clearly, free of voids, specks, blemishes and lines which could "fool" the scanner. Specks or blemishes in the white spaces, or false or missing bar sections could be interpreted by the reading equipment as part of the code. Generally, the width of such flaws is more serious than the height. Code symbols should be rejected if these defects are present.

Definition

The bars in the bar code symbol should be well defined. Their edges should not be rough or fuzzy, so that the bars and spaces have the proper widths intended for the bar code symbology used. Since a scanner's aperture and resolution are chosen to comply with these widths, definition should be sharp and consistent.

Tolerance

The ratio of the widths of bars and spaces in a bar code symbol must conform to the appropriate AIM bar code specifications and can cause problems if not correct throughout the bar code. Problems can occur when bar edges are smeared or rough, or when they exhibit voids.

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