

WelchAllyn®
SCANTEAM® 2380 WAND

Keyboard Wedge/
Decoded Out Wand



Technical Manual

STATEMENT OF AGENCY COMPLIANCE

FCC ID: EIF58QST2380

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:

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- 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.

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Limited Warranty

TABLE OF CONTENTS

Statement of Agency Compliance Limited Warranty

Chapter 1 Introduction to the SCANTEAM 2380 Scanner

<i>Section</i>		<i>Page</i>
1.1	Introduction	1-1
1.2	Hardware Description	1-1
1.3	Software Description	1-3
1.4	Wand Models	1-4

Chapter 2 Operational Description

<i>Section</i>		<i>Page</i>
2.1	Chapter Objectives	2-1
2.2	Main Elements of the 2380 System	2-1
2.3	Scanner Identification Label	2-2
2.4	Operating Theory	2-2
2.5	Factors Affecting Scanner Performance	2-2
2.5.1	Scanner Illumination Source	2-2
2.5.2	Scanning Aperture	2-3
2.5.3	Depth of Field	2-4
2.5.4	Scanning Velocity	2-4
2.5.5	High/Low Density Bar Codes	2-4
2.5.6	Print Contrast	2-5

Chapter 3 Setup and Installation

<i>Section</i>		<i>Page</i>
3.1	Chapter Description	3-1
3.2	Preparation	3-1
3.3	Setup and Installation	3-1
3.4	Scanner Checks	3-3

Chapter 4 Programming the Scanner

<i>Section</i>	<i>Page</i>
4.1	Introduction 4-1
4.2	The Programming Menu 4-1
4.2.1	Programming Menu Pages 4-1
4.2.2	Facing Page 4-4
4.2.3	Bar Code Chart 4-4
4.3	Direct Connect Terminal Selection Menu Page . 4-6
4.4	Terminal Selection Menu Page 4-6
4.5	Output Parameters & Format Menu Page 4-6
4.6	COMM 1 Menu Page 4-12
4.7	Scancode Selection Menu Page 4-13
4.8	Symbology Selection Menu Page 4-14
4.9	Message Format 4-15
4.10	Configuration Example 4-16
4.11	Keyboard Layouts and Delimiters 4-18

Chapter 5 Maintenance and Troubleshooting

<i>Section</i>	<i>Page</i>
5.1	Scanner Maintenance and Service 5-1
5.2	Cleaning 5-1
5.3	Inspection 5-2
5.4	Troubleshooting 5-2
5.5	Obtaining Factory Service in the U.S. 5-4
	Obtaining Factory Service in Europe 5-4
	Obtaining Factory Service in Asia 5-4
	Technical Support 5-5

Appendices

A Technical Specifications

<i>Section</i>	<i>Page</i>
A.1 Scanner Performance	A-1
A.2 Optical Specifications	A-1
A.3 Electrical Specifications	A-2
A.4 Environmental Specifications	A-4
A.5 Mechanical Specifications	A-4
A.6 Bar Code Symbol Specifications	A-5

B Keyboard Function Relationships

B.1 Keyboard Function Relationships	B-1
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Index

List of Illustrations

<i>Figure</i>	<i>Page</i>
1.1 Keyboard Wedge Connection	1-2
3.1 "Y" Interface Cable Connections	3-2
4.1 Example of Programming Menu Page	4-2
4.2 Bar Code Chart	4-4
4.3 NCR 7052/32 & 56 Key Terminal	4-18

Preface

SCANTEAM 2380 Bar Code Wand 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 2380 Programming Menu. The Programming Menu contains 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 Menu.

Chapter 1 provides a description of the 2380 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. Scanner identification and scanning techniques are discussed.

Chapter 3 explains how to set up and install your scanner. Instructions to confirm scanner operation and to check bar code labels is provided.

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 2380 Programming Menu.

Chapter 5 explains how to maintain (clean and inspect), troubleshoot and obtain service and technical assistance for your 2380 scanner.

Appendix A provides information about scanner performance, optical, electrical, environmental, mechanical, and bar code label specifications.

INTRODUCTION TO THE SCANTEAM 2380 SCANNER

1

1.1 Introduction

The SCANTEAM 2380 Decoder Output Scanner Keyboard Wedge is a convenient and cost effective way of adding bar code data entry capability to the IBM (and IBM compatible) PC/XT/AT personal computers and IBM PS/2 Models 30, 50, 60 and 80.

Additional interfaces are continually being developed; check with Welch Allyn or an authorized representative for availability.

As described on page 1–4, the SCANTEAM 2380 is available in the following models: 2380/J and 2380/K with visible red illumination. All models of the 2380 are available with stainless steel scanner housings. The contents of this manual applies to these devices except where differentiated.

The SCANTEAM 2380 is designed to read and decode any of nine (9) popular bar code symbologies and output the bar code data to the keyboard port in the same format the keyboard does.

1.2 Hardware Description

The SCANTEAM 2380 system consists of the wand body and a 6' (1.8m) coil (extended) interface cord. When connected as shown in Figure 1.1, the 2380 keyboard “wedge” device provides a transparent interface between the keyboard and the keyboard input port of the host device.

Operation of the SCANTEAM 2380 with a particular computer is accomplished by installing the proper “Y” interface cable and programming the proper keyboard interface routine using the TERMINAL SELECTION sheet of the programming menu.

Once installed, the 2380 simply passes keyboard activity onto the host. Symbols decoded by the SCANTEAM 2380 are translated to corresponding keyboard keycodes and then sent to the keyboard input port of the terminal. Thus, the data appears as if it has been “keyed in” at the keyboard.

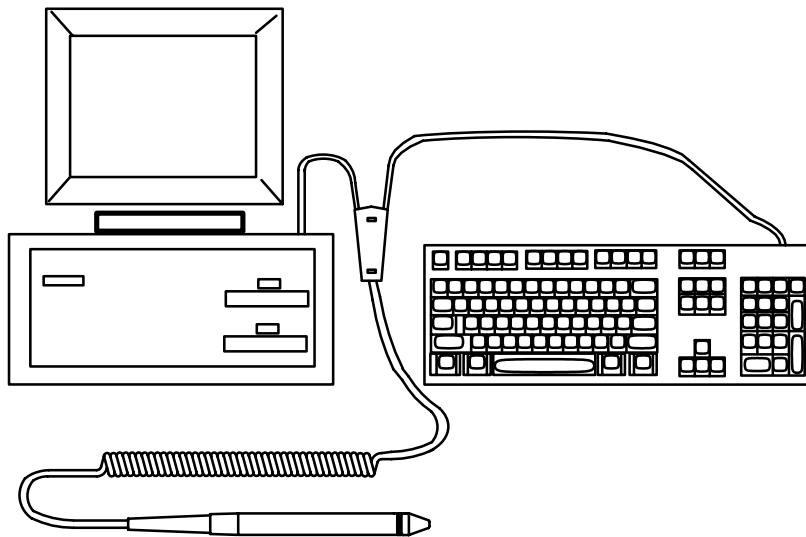


Figure 1.1 SCANTEAM 2380 Keyboard Wedge Connection

Decoding capability is achieved through the use of an internal microprocessor.

All SCANTEAM 2380 units are referred to as contact scanners since the tip of the wand must be in or near contact with the bar code label in order to read.

1.3 Software Description

The standard SCANTEAM 2380 is configured for specific user applications by scanning bar code symbols from the printed programming menu which is supplied with the unit.

System software will support the keyboard model normally supplied with the host device, and is capable of emulating keyboard “function keys.”

The SCANTEAM 2380 may be programmed to autodiscriminate among the following bar code symbologies and their variations: CODABAR, Code 3 of 9, UPC, EAN/JAN, Code 2 of 5, Interleaved 2 of 5, Code 93, MSI, Code 128 and Code 11§.

In addition to the bar code symbology selections, certain input/output parameters, message format and communications protocol are programmable using the wand with the programming menu.

All programmable parameters are stored in non-volatile memory resident in the wand where they are permanently retained in the event of power interruption to the 2380 or the host device.

§ *This feature is not supported in all wand models/software revisions.*

1.4 Wand Models

The SCANTEAM 2380 decoded output scanner keyboard wedge is available in the following Welch Allyn industrial grade digital wand scanner models:

SCANTEAM 2380/J and SCANTEAM 2380/K

The 2380/J and 2380/K are “SRD” scanners, meaning they have a visible red LED illumination source. These units feature a durable body and a replaceable tip. The 2380 has a Welch Allyn logo on the scanner housing.

Either of the models may be ordered with high, medium or low resolution scanning optics so as to meet special requirements imposed by the label substrate and printing method or environmental factors which affect bar code label quality.

For additional assistance in selecting the SCANTEAM 2380 decoded output scanner keyboard wedge best suited to your bar code application, contact Welch Allyn or an authorized representative.

2.1 Chapter Objectives

This chapter describes:

- Scanner identification key.
- Overview of how the SCANTEAM 2380 works, including scanning aperture, depth of field and scanning velocity.
- Reading and decoding a bar code symbol. Description of print contrast, high and low density bar code symbols.
- Discussion of RS-232 interface and external power options.

2.2 Main Elements of the 2380 Bar Code System

The major operational elements of the SCANTEAM 2380 decoded output scanner keyboard wedge include the scanner optics, the digitizing electronics and the decoding circuitry.

The key components of the scanner optical system are the illumination source (LED) and the illumination sensor (photodiode). Both the LED and photodiode are positioned directly behind a specially designed lens in the scanner body.

Cable connections are made directly to the board and exit the scanner body through a flexible strain relief at the end of the wand handle. The integral cable shield affords EMI and associated drain protection to output signals.

2.3 Scanner Identification Label

The scanner identification label is located on the scanner's cable. The identification corresponds to the configuration work sheet description. (Welch Allyn p/n 16206714)

2.4 Operating Theory

The reading ability of the wand scanner is based on the detection of reflected illumination from the bars and spaces which form a bar code symbol.

During a typical scanning operation, the tip of the scanner is moved across the bar code symbol. Illumination from the LED is focused on the bar code symbol. This is absorbed by the dark colored bars and reflected by the lighter background.

The reflected portion re-enters the scanner through the lens where it is detected by the read sensor photodiode. The photodiode converts this into a series of analog pulses which are proportional in width to the bars and spaces in the symbol. These pulses are then digitized and sent to the microprocessor where they are decoded into the characters represented by the bar code symbol.

2.5 Factors Affecting Scanning Performance

The following factors influence reading performance and should be considered when selecting a contact scanner for a particular bar code application.

2.5.1 Scanner Illumination Source

Wand type scanners are equipped with a visible red (660nm) source.

Red illumination is compatible with most printing inks including most thermal papers. Because it provides a visual indication to the operator that the scanner is functioning, red illumination is considered to be more user friendly. Visual feedback to the operator is an important consideration when making a scanner selection.

2.5.2 Scanning Aperture

Scanning performance is affected by the size of the scanning aperture and it is a significant factor to be considered when selecting a scanner. The scanning aperture defines the effective size of the area of the bar code symbol viewed by the scanner optics. It affects the relative ability of the scanning device to “see” or resolve bars and ignore printing defects.

Large aperture systems typically cannot resolve high density bar code or the small printing features (voids within bars or dark specs within the light areas) that small aperture systems would. Thus, they are more compatible with low density bar code and more tolerant of printing defects characteristic of poorly printed labels.

Small aperture systems (high resolution) are better able to resolve which makes them compatible with high density good quality symbol reading requirements.

The SCANTEAM 2380 is available with circular apertures ranging from 6 to 8 mil.

Most scanning applications can be satisfied with a 6 mil (high resolution) or a 8 mil (low resolution) aperture. When selecting an aperture, it is recommended that the aperture dimension be no less than 0.7 times the “X” (width of the narrowest bar code coding element) dimension to be read. An aperture size that is slightly smaller than the narrowest bar code element, 0.9 times “X,” provides optimum resolution of the bars and results in the generation of a digital signal which accurately represents the bar code. An 8 mil (0.2mm) aperture is often a good compromise when labels produced by different printing and label generation methods must be read with one scanner. In no case should the viewing aperture exceed 1.2 the “X” dimension.

2.5.3 Depth of Field

Depth of field is the maximum perpendicular distance from the scanner tip to the bar code symbol surface at which the scanner is capable of operating effectively. In general, most of the SCANTEAM 2380 scanners have a depth of field of 0.065 inches (1.65mm) with a symbol appropriate for the scanner.

A chart showing the relationships between depth of field, scanning aperture and bar code density appears on page A-1.

In normal use, the wand is seldom held perpendicular to the surface of the bar code symbol. Rather, an operator tends to tilt the scanner. Useable scan angle is a function of tip geometry and depth of field. If the depth of field is too small, the scanner may fail to operate at extreme tilt angles ($>35^\circ$).

2.5.4 Scanning Velocity

The wand will operate at scan velocities from 2 to 50 inches/second (5 to 127cm per second) when the minimum bar/space size exceeds 7 mils (0.18mm).

2.5.5 High Density vs Low Density Bar Code Symbols

Bar code density is a measure of the number of characters in a linear measure of bar code. The standard of measure is normally given in terms of the "X" dimension, the width of the narrowest bar code element. As bar code density increases, the width of the narrowest bar code element decreases. The scanning aperture should always be smaller than the narrowest element to assure optimum resolution and the generation of a digital signal which accurately represents the bar code.

2.5.6 Print Contrast

Print contrast is a measure of the relative difference in brightness between the bars and spaces of a symbol and is specified as the Minimum Reflectivity Difference (MRD). The MRD is the difference between the lowest minimum space reflectance value and the highest maximum bar reflectance value as measured across the entire symbol.

$$\text{MRD} = \text{Max} (R_b \text{ max}) - \text{Min} (R_s \text{ min})$$

where: $R_s \text{ min}$ = Minimum Space Reflectance
 $R_b \text{ max}$ = Maximum Bar Reflectance

The scanner will operate with a MRD as low as 37.5% with the proper aperture and appropriate symbol.

A complete description of bar code specifications for factors which affect overall bar code quality are provided on page A-5.



3.1 Chapter Description

This chapter describes:

- Unpacking the SCANTEAM 2380
- Connecting the SCANTEAM 2380
- Confirming scanner operation
- Checking bar code labels

3.2 Preparation

The SCANTEAM 2380 is shipped ready for use. Upon receipt, open the carton(s) and check the contents. Check the part numbers and confirm that each item on the packing list has been supplied.

Thoroughly inspect each component for possible shipping damage. Any damage should be reported immediately to the carrier who delivered the shipment. Damage claims due to handling during shipment should be placed directly with the carrier.

When all components have been identified and checked, prepare the wand for service using the following procedure.

3.3 Set-up And Installation

Installation steps should be performed in the sequence that follows to insure proper set-up and operation of the 2380.

- 1) Position the host unit power switch to the “OFF” position.

The proper “Y” Interface Cable connections are illustrated in Figure 3.1.

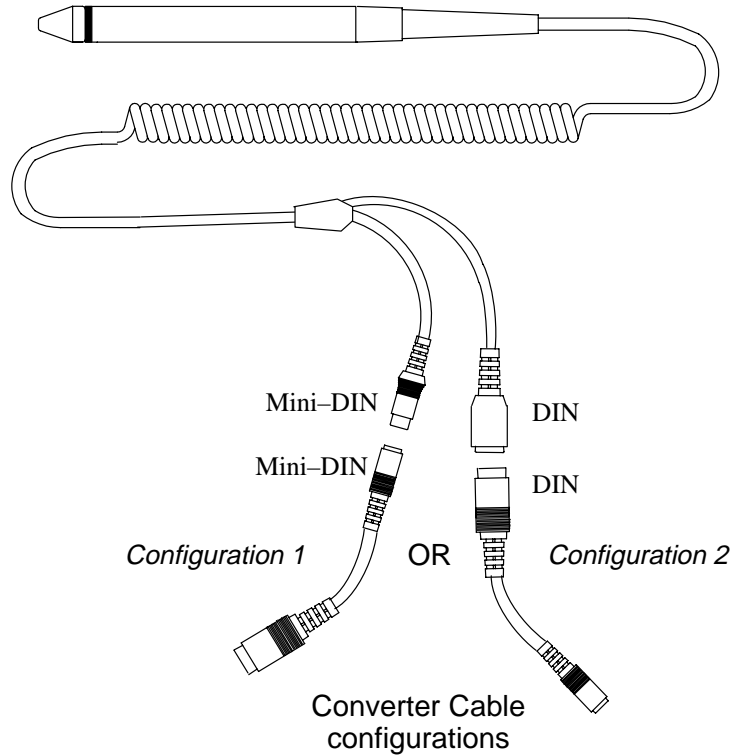


Figure 3.1 “Y” Interface Cable Connections

- a) If you are connecting to an AT/XT terminal, plug the mini-DIN end of the converter cable into the mini-DIN end of the “Y” interface cable (configuration 1). If you are connecting to a PS/2 terminal, plug the DIN end of the converter cable into the DIN end of the “Y” interface cable (configuration 2).
 - b) Disconnect the keyboard plug from the host device and insert it into the mating connector on the short leg of the “Y” interface cable.
 - c) Complete the cable installation by inserting the converter cable into the keyboard connector port on the host device.
- 2) When the SCANTEAM 2380 is fully connected, restore power to the host unit by turning the power switch ON.

3.4 Scanner Checks

1) Confirm Scanner Operation

If you are using a wand which has visible red illumination, the tip of the scanner should glow red indicating that the wand is operational. In addition, at power-up, the beeper in the scanner should issue one (1) “beep” (if the 2380 has been programmed to “beep” on reset).

2) Check Bar Code Labels

Before using any bar code scanner, make sure the label is of good quality and that the window area of your scanner is clean. This is very important because any dirt or specks in the bar code symbol or on the scanner optics may prevent it from reading accurately. Even a label that is smudged during printing or gets wrinkled when it is applied to an item can cause a reading problem.

This completes installation of the wand to the host system. The wand decoder must now be configured to the particular decoding application. Instructions for programming the SCANTEAM 2380 decoded output scanner keyboard wedge using the bar code menu are contained in Chapter 4.



4.1 Introduction

Before the SCANTEAM 2380 can be placed in operation, it must be configured to the particular application by scanning bar code symbols from the Programming Menu.

As program sequences are decoded by the 2380, both the desired operating parameters and data format instructions are stored in nonvolatile memory on the decoder pc board. A beeper is used to indicate scanning activity. The following relationships apply:

- 1) The internal beeper will emit two (2) beeps when entering or exiting the programming mode (i.e., immediately following a scan of the ENTER and EXIT labels, respectively).
- 2) When operating in the programming mode, each successful programming entry (decoder selection) will be acknowledged by a single “good read” beep.

4.2 The Programming Menu

The complete SCANTEAM 2380 Programming Menu consists of six (6) pages: five Menu Pages and the Bar Code Chart. The five menu pages are labeled: TERMINAL SELECTION, OUTPUT PARAMETERS AND FORMAT SELECTION, COMM 1, SCANCODE SELECTION and SYMBOLOGY SELECTION. These pages list the decoder parameters controlled from that menu page and indicate the scanning sequence required to make specific configuration selections. The symbols used to control the configuration process are printed on the Bar Code Chart.

4.2.1 Programming Menu Pages

All SCANTEAM 2380 programming menus follow a similar layout and contain the same programming elements. A typical programming menu page is shown in Figure 4.1.

Each page contains a listing of decoder parameters which can be controlled from that menu and the scanning sequence required to make specific configuration selections. The symbols used to program the scanner are printed on the Bar Code Chart.

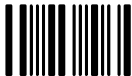
SCANTEAM 2380 Programming Menu

OUTPUT PARAMETERS & FORMAT SELECTION

1 USE THIS PAGE

- To select the pre-programmed asterisk (*) values by scanning DEFAULT symbol.
- To add preambles and/or postambles to the bar code.
- To select function transmit enable.
- To select keyboard type.
- To set intercharacter, interfunction, and intermessage delays to specific values.
- To control scanning indicators.
- To enable the Append Buffer when Code 3 of 9 with append option is enabled.

scan




ENTER **3**

selections **2** **scan** **variables** **scan** **scan**


PREAMBLE (up to 5 chars max)	I	Code ID	A	
		Other ASCII	B	00-7F None*
POSTAMBLE (up to 5 chars max)	II	ASCII values	A	00-7F None*
FUNCTION XMIT	III	Enable		*Yes/No
KEYBOARD TYPE	IV	Primary		01*
		Secondary		02
		Tertiary		03
		Quaternary		04
INTERCHARACTER DELAY	V	x5msecs		*00-99
INTERFUNCTION DELAY	VI	x5msecs		*00-99
INTERMESSAGE DELAY	VII	x5msecs		*00-99
BEEPER	VIII	Beep (on Reset)	A	*Yes/No
		Beep (on Good Read)	B	*Yes/No
APPEND BUFFER	IX			*Yes/No

scan



DEFAULT **4**

scan



EXIT **5**

6

NOTES:

- (1) * Designates DEFAULT selections.
- (2) To delete preambles Scan I then either another selection (roman numeral) or Exit.
- (3) To delete postambles Scan II then either another selection (roman numeral) or Exit.
- (4) See facing page for more information and examples.

Figure 4.1 Example of Programming Menu Page

The general elements found on each menu page include:

- (1) A “USE THIS PAGE” statement that indicates the programming options (capabilities) which appear on that menu page.
- (2) The SELECTIONS/VARIABLES table which lists primary programming selections, variables which can be used to modify the basic selection and the bar code scanning sequence that must be used to configure the scanner to these values.

Three discrete bar code commands perform global menu selections and control movement between the different menu pages.

These discrete commands include:

- (3) An ENTER command. Scanning this bar code symbol will activate that particular menu page. The ENTER code for each menu page is unique, and must be scanned before configuring commands from that page will be recognized by the scanner.
- (4) A generic DEFAULT command which, when scanned, causes all of the programming selections/variables which appear on that particular menu page to automatically default to the values marked by an asterisk(*). Entering a DEFAULT instruction before beginning to program brings all of the parameters on that page to a known value and thus helps to avoid programming confusion.
- (5) The EXIT command is used to conclude programming on the active menu page. The EXIT symbol must be scanned before moving to another page of the programming menu.

Information regarding special bar code applications is often provided at the bottom of menu pages. These include:

- (6) The special NOTES used to explain unusual programming requirements and/or refer the user to necessary information or examples elsewhere in the menu or the 2380 manual.

4.2.2 Facing Page

The page facing the programming menu is frequently used to supplement or clarify material presented on the menu page and may contain programming examples.

4.2.3 The Bar Code Chart

The SCANTEAM 2380 Bar Code Chart shown in Figure 4.2 is an integral part of the Programming Menu. It contains the printed bar code symbols which are scanned to program the desired selections.

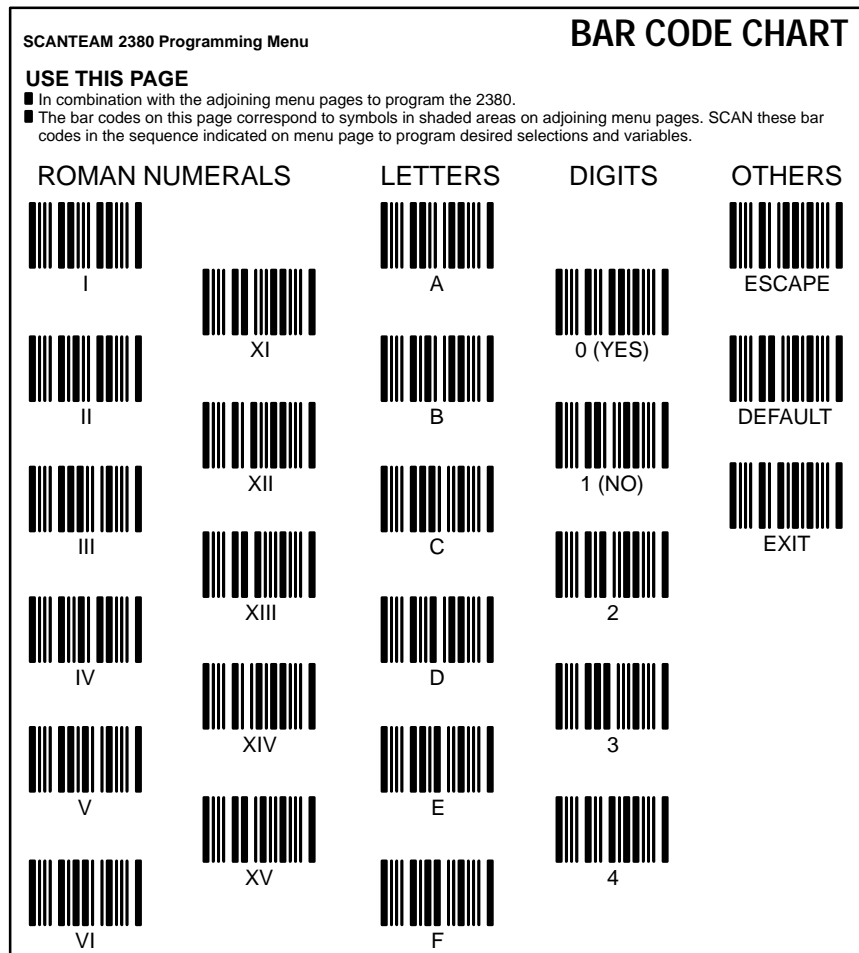


Figure 4.2 Bar Code Chart

Note that the chart contains symbol groupings that include ROMAN NUMERALS, LETTERS and NUMBERS. The sequence in which these symbols are scanned generates the programming instructions which enable or disable specific decoder functions.

The right hand column of the Chart contains three (3) bar code symbols labeled DEFAULT, ESCAPE and EXIT. When these symbols are scanned specific instructions are instantaneously sent to the wand. The function of these commands is explained below.

DEFAULT

Scanning this symbol installs default values (indicated by *'s) at the active programming level. For example, if the DEFAULT symbol is scanned immediately following Page ENTER, it defaults the entire menu page. If it is scanned following a major category selection like Codabar, it will default that whole category. If DEFAULT is scanned following a subcategory selection such as Code 128/Minimum Length, it will default just that subcategory.

EXIT

Scanning the EXIT symbol produces a command which can be used to terminate programming on either menu page. The EXIT symbol must be scanned before moving to or attempting to program on a different menu page. When it is scanned, all configuration instructions for parameters appearing on that page will be stored in memory.

ESCAPE

Scanning the ESCAPE symbol generates a command that will terminate a programming sequence before it is completed and without saving the configuration information. It can be used when a Selection and/or Variable has been scanned in error. The programming sequence must then be restarted.

Note: *The symbol “§” placed next to a programmable feature indicates that this feature is not supported in all wand models/software revisions.*

4.3 DIRECT CONNECT TERMINAL SELECTION Menu Page

This menu page is used to make a direct connect terminal selection. An explanation of programmable selections follows.

Direct Connect Terminal Selection

The terminals that may be selected by scanning the appropriate direct connect bar code are IBM AT and compatibles, IBM XT and compatibles, and IBM PS/2 Model 30. The IBM AT, XT or PS/2 is configured by scanning the one bar code on this page, instead of scanning the ENTER code, the two digit terminal identifier code and the EXIT code on the TERMINAL SELECTION menu page.

4.4 TERMINAL SELECTION Menu Page

This menu page lists the types of host devices which are supported by the 2380, and shows the scanning sequence that should be used to configure the scanner interface to be compatible with a particular host PC.

4.5 OUTPUT PARAMETERS & FORMAT SELECTION Menu Page

This menu page contains parameter selections used to control the data message that will be sent from the scanner to the host. An explanation of programmable selections follows.

Preamble

Preambles are assigned using the programming menu. When the Preamble selection is enabled, any combination of up to five (5) identifiers are transmitted as a header immediately preceding scanned bar code data.

Preamble characters may include Code ID and the ASCII characters (00–7F). These characters will be transmitted in the order in which the selections are programmed.

Both preamble and postamble menuing must always start with a clean slate. Therefore, to clear all preambles, it is necessary only to complete the programming sequence SCAN ENTER, SCAN I, SCAN EXIT.

If the Code ID is selected as a preamble, the wand will transmit a single lower case ASCII character to identify which symbology was decoded. For example, Code 3 of 9 is identified by a lower case “b,” while Code 128 is identified by a lower case “j.”

The code identifier for each bar code symbology is listed below and appears immediately following the symbology name on the Symbology Selection Menu Page.

SYMBOLGY	CODE ID
CODABAR	a
Code 3 of 9	b
UPC	c
EAN	d
Interleaved 2 of 5	e
Code 2 of 5	f
MSI	g
Code 11§	h
Code 93	i
Code 128	j

Postamble

Postamble(s) are programmable data identifiers which follow the bar code messages. Up to five (5) postambles which include the ASCII characters (00–7F) can be programmed. Postamble characters will be transmitted in the order in which they are selected. Since postamble selections also begin with a clean slate, the programming sequence SCAN ENTER, SCAN II, SCAN EXIT will remove existing postambles from the decoder configuration.

Function TX (Transmit)

When this menu selection is enabled, and function codes are contained within the scanned data, the SCANTEAM 2380 transmits the key code to the terminal which corresponds to the decoded ASCII function code. ASCII function codes are represented by the HEX values (00–1F).

When the Function Code Transmit selection is disabled, the scanner does not transmit the key codes which correspond to the HEX characters 01–1F unless they are in preambles or postambles. Instead, the characters 01–1F are stripped from the bar code data. Any keyboard function codes within data in the preamble and postamble will be sent to the terminal regardless of the parameter. Function codes in preambles and postambles are automatically translated to key codes.

Note: *Care should be taken not to embed keyboard function codes that will cause an input inhibit condition within records, preambles, and postambles. Attempts to embed function codes may result in loss of data.*

Example – Keyboard Function Codes (Commercial Application):

The SCANTEAM 2380 is connected to an IBM PC; Keyboard Function Codes within scanned data and the Preamble and Postamble on the COMM 1 section of the Programming Menu.

The SCANTEAM 2380 is programmed as follows:

Preamble: GS (1D)==>F10 key
Postamble: CR (OD)==>ENTER key
Full ASCII Code 3 of 9 Decoding: enabled

Note: *When programming preambles and postambles you must scan a symbology before scanning in a scan code.*

Consider the case of a Code 3 of 9 bar code symbol:

1 2 3 4 “HT” 5 6 7 8

The function emulated depends not only upon the Keyboard Function Code, but also upon the terminal being used with the SCANTEAM 2380. Appendix C lists, by terminal type, the key function emulated by each Keyboard Function Code. (The codes in the center column change.)

CASE 1 – Function Codes “Enabled”

With the Function Code Transmit selection enabled, the SCANTEAM 2380 outputs 1234HT5678 to the terminal as:

<u>F10</u>	<u>1 2 3 4 “TAB ” 5 6 7 8</u>	<u>ENTER</u>
preamble		postamble

Notice that Keyboard Function Code, HT, has been translated and sent as the TAB key.

CASE 2 – Function Codes “Disabled” (Commercial Application):

When the Function Code Transmit selection is disabled, the SCANTEAM 2380 outputs 1234HT5678 to the terminal as:

<u>F10</u>	<u>1 2 3 4 5 6 7 8</u>	<u>ENTER</u>
-------------------	-------------------------------	---------------------

Notice now that HT has been stripped from the data string. Note also, that Keyboard Function Codes contained within the Preamble and Postamble (F10 and ENTER) are not affected by the Function Code Transmit selection (XII) and so they are translated and sent.

Keyboard Function Records

Keyboard Function Records are special incoming data records which originate from the Scanner.

Keyboard Function Records are translated by the SCANTEAM 2380 and sent to the terminal as keyboard function keys. The function which is emulated depends upon both the Keyboard Function Record and the terminal selection. The key functions emulated by each Keyboard Function Record are listed according to terminal type in Appendix C.

Keyboard Function Records differ from Keyboard Function Codes in the following ways:

- (1) Keyboard Function Records cannot be disabled by menu programming.
- (2) Keyboard Function Records cannot be embedded within other Scanner data; they are stand alone records, and if embedded, will be treated as normal data.

-
- (3) When Keyboard Function Records are entered, any Preambles/Postambles which may have been programmed will not be added to the output transmission.

Example: Keyboard Function Records (Commercial Application)

The following examples illustrate the effect of Keyboard Function Records on data transmission.

Scanner Data

In this example the SCANTEAM 2380 is connected to an IBM PC, and the function key F10 is to be emulated using a Keyboard Function Record entered through the Scanner. The symbology Full ASCII Code 3 of 9 has been enabled.

When configured in this way, scanning a Code 3 of 9 label containing the following characters:

/ C 3 1

will produce a decoded output of (#31).

Keyboard Type

This menu selection permits you to program the 2380 to output data using the following keyboard operating modes: NORMAL, CAPS LOCK, CTRL + AND SHIFT LOCK.

NORMAL

This is the Primary Type keyboard selection. When NORMAL is enabled, the 2380 will output scanned data to the terminal in conventional bar code format.

CAPS LOCK

When you are operating in CAPS LOCK mode, the 2380 should also be programmed for CAPS LOCK mode (i.e., CAPS LOCK enabled).

CTRL + When the 2380 is programmed to operate in CTRL + mode, ASCII function codes 00 to 1F are sent to the terminal through a CTRL + sequence (i.e., "CR" = CTRL + M).

SHIFT LOCK

When you are operating in SHIFT LOCK mode, the 2380 should also be programmed for SHIFT LOCK mode (i.e., SHIFT LOCK enabled).

Intercharacter Delay

Intercharacter Delay is the time delay between data characters output by the 2380. The delay is in (X5) milliseconds and can be set to any value between 00 and 99 (X5ms).

Interfunction Delay

Interfunction delay is the time delay between “function key” characters output by the 2380. The delay is in (X5) milliseconds, and any value between 00 and 99 (X5ms) may be selected.

Intermessage Delay

Intermessage delay is the time delay between messages output by the 2380. The delay is in (X5) milliseconds and can be set to any value between 00 and 99 (X5ms).

Beeper

This programming selection permits control of the beeper located in the scanner as a means of indicating scanning activity to the operator. The BEEPER option described below is listed on the Programming Menu.

Beep (On Reset)

When “Beep” (On Reset) is enabled (YES), the beeper in the scanner will “beep once” to indicate that the wand is operational. This single “beep” can be interpreted as a SCANNER READY message from the wand.

Beep (On Good Read)§

When “Beep” (On Good Read) is enabled (YES), the beeper in the scanner will “beep once” following a scan only if the bar code data has been accepted by the host. If the beeper does not sound, the scan should be repeated.

Append Buffer

This scanner selection controls the status of the Append Buffer. When enabled, the Append Buffer stores messages (for example from a “barboard”), until a) it overflows, or b) a symbol without Append or in a new symbology is scanned. When either of these events occur, the contents of the buffer are transmitted, followed by the most recent scan.

Note: *The Append Buffer must be enabled (YES), whenever the decoder is configured to read Code 93, Code 128 or Code 3 of 9 symbology with Append Option.*

4.6 COMM 1 Menu Page§

The COMM 1 page of the Programming Menu is used to select a international keyboard and to reconfigure the 2380 for Intermec compatibility. An explanation of programmable selections follows.

International Keyboards§

The SCANTEAM 2380 re-maps the keyboard layout appropriately for the selected international keyboard. International Keyboards are listed in the table below and appear on the COMM 1 page of the Programming Menu.

International Keyboard	Code
France	A
Germany	B
Spain	C
Switzerland	D
Italy	E
United States (USA)	F (Default setting)

As a general rule, the following characters are not supported by the 2380 for international keyboards other than the United States:

@ | \$ # ^ { } [] = /

Note: *PC users may need to program an Intercharacter Delay of at least 1 X 5ms when a keyboard other than the United States is selected.*

Intermec Capability§

Scanning the “Yes” bar code allows the 2380 to be compatible with the Intermec keyboard function codes. Scanning the “No” bar code symbol causes the 2380 default keyboard codes in the preamble and postamble to remain active at all times. The default selection is “No.”

4.7 SCANCODE SELECTION Menu Page

This menu page is used to select K2 scancode capability, new keyboard scancode table, beep PC, numeric keypad and RX interrupt. An explanation of programmable selections follows.

K2 Scancode Compatibility

This selection only applies to customers using AT, XT, or PS/2's. If this selection is enabled (YES), the 2380 will use the same scancodes as the Welch Allyn SCANTEAM 2300 (K2). If this selection is disabled, the 2380 will use the scancodes found in Appendix C. All other terminals use K2 scancode tables which also appear in Appendix C.

New Keyboard Scancode Table

If the SCANTEAM 2380 has been downloaded to contain another scancode table, programming this selection to “Yes” will cause the new scancode table to be used, rather than the normal scancode table. This menu selection is applicable for use with terminals not equipped with standard manufacturer's keyboards (that is, international keyboards).

Beep PC§

When this menu selection is enabled (YES), the 2380 will beep the PC on a good read. This selection must be disabled (“No”) when “Beep on Reset” (OUTPUT PARAMETERS) is enabled.

Note: *The master DEFAULT bar code on this menu page does not return this parameter to its default setting.*

Numeric Keypad§

When “main keyboard numbers ” is selected, numbers will be sent to the host terminal as if keyed in from the main keyboard. If “numeric keypad” is enabled, numbers will be sent as if keyed in from the numeric keypad.

Note: *The master DEFAULT bar code on this menu page does not return this parameter to its default setting.*

RX Interrupt§

Occasionally, keyboard activity will cause the wand to beep intermittently or turn off. This menu selection will prevent this from happening.

4.8 SYMBOLOGY SELECTION (CODES) Menu Page

This Menu Page is used to program decoding selections. The 2380 can be configured to recognize and decode up to nine (9) popular bar code symbologies by scanning the proper code enabling (Selection) symbols on this Programming Menu page. After a particular code has been enabled, scanning the associated (Variable) code(s) will further program that symbology's decoding parameters.

Keep in mind that at power-up (or upon reset), the wand will automatically configure operating parameters to the last programmed values. Code options which are enabled (YES) will become the active operating parameters unless they are changed by the proper configuration command. Code options with an asterisk (*) next to the (NO) will automatically be disabled unless they are changed by the proper configuration command.

Note: *To obtain maximum security when scanning bar codes, it is recommended that only those symbologies actually being used be enabled. Symbologies not being used should be disabled. Additional data security can be achieved by programming the maximum and minimum character counts when they are known.*

Minimum Length

A two (2) number code which describes the minimum number of characters that will be permitted in the bar code message. The code length must always be represented by two digits. For lengths less than 10 characters, a zero (0) should be used as a filler, for example, (05).

Maximum Length

A two (2) number code which describes the maximum number of characters that will be permitted in the bar code message.

4.9 Message Format

The wand will transmit data automatically to the host as soon as a bar code symbol is scanned. Each data transmission consists of three main elements, 1) a *PREAMBLE*, 2) the *MESSAGE* consisting of the bar code data, and 3) a *POSTAMBLE*.

The actual content of the data transmission will depend upon the Preamble and Postamble characters and the decoded bar code information. The transmission format is shown below.

PREAMBLE *MESSAGE* *POSTAMBLE*

where: *PREAMBLE* = Assigned Preamble Character(s)

MESSAGE = Bar Code Data

POSTAMBLE = Assigned Postamble Character(s).

4.10 Configuration Example

The following example illustrates the proper programming sequence to configure wand parameters to specific operating values.

Example: Configure the SCANTEAM 2380 to decode the following symbologies:

Symbology:	Code 3 of 9 (Code 39)
Maximum Length:	14
Minimum Length:	8
Start/Stop Character:	Transmit
Check Character:	Required
Check Character:	Transmit
Full ASCII	Yes
Symbology:	Code 128
Maximum Length:	12
Minimum Length:	6

Refer to the Selections/Variables table on the SYMBOLOGY SELECTION page of the Programming Menu.

Program these operating parameters following the scanning sequence below.

FUNCTION	SELECTION	VARIABLE
Enter SYMBOLOGY SELECTION Menu Page	ENTER	
Set DEFAULT Values	DEFAULT	
Set Code 3 of 9	II	
Set Minimum Length To 8		A 0 8
Set Maximum Length To 14		B 1 4
Set Start/Stop Characters To Transmit		C Yes

Scanning sequence continued on next page.

FUNCTION	SELECTION	VARIABLE
Set Check Digit		D
To Required		Yes
Set Check Digit		E
To Transmit		Yes
Set Full ASCII		F
To Enabled		Yes
Set Code 128	VIII	
To Enabled		Yes
Set Minimum Length		A
To 6		0
		6
Set Maximum Length		B
To 12		1
		2
Disable CODABAR(1)	I	No
Disable I 2 of 5(1)	III	No
Disable Code 11(1)	V	No
Disable Code 93(1)	VI	No
Disable MSI (Plessey)(1)	VIII	No
Leave Menu Page	EXIT	

(1) – To maximize reading efficiency and security, all unused codes should be disabled. Because all industrial codes default to an enabled (YES) state, it is necessary to disable all codes except Code 39 and Code 128.

4.11 Keyboard Layouts and Delimiters

A delimiter is the unique keycode generated by a particular terminal key whenever it is depressed. Every key on the keyboard is assigned its own code. The terminal uses these codes to identify the key that was depressed, and the function that key represents.

The SCANTEAM 2380 can be programmed to recognize these function keycodes as field delimiters. When field delimiters are used to separate bar code data, the terminal interprets the data codes produced by scanning a bar code symbol(s) as originating from the keyboard without the function key being depressed.

Delimiters for a particular terminal can be determined by referring to the keyboard layouts provided on the Keyboard Layouts page of the programming menu. Refer to Figure 4.3 for an example of the keyboard layout for an NCR 7052/32 and 56 key terminal.

C2	C5	C8	D1	D4	D7	E0
C3	C6	C9	D2	D5	C8	E1
C4	C7	D0	D3	D6	D9	E2
A0	A5	B0	B1	B2	B7	E3
A1	A6			B3	B8	E4
A2	A7			B4	B9	E5
A3	A8			B5	C0	E6
A4	A9			B6	C1	E7

Figure 4.3 NCR 7052/32 & 56 Key Terminal

Note that certain keys are marked with a number and letter. These designations (i.e., the A1, A5, C3 etc.) are the delimiters associated with that particular function key.

Once the delimiters have been programmed, the SCANTEAM 2380 automatically generates the proper keycode and sends it to the terminal just as though the terminal function key had been depressed.

5.1 Scanner Maintenance And Service

All Welch Allyn SCANTEAM 2380 units are designed to provide reliable and efficient operation with a minimum of care. Although specific maintenance is not required, the following periodic checks will contribute significantly to dependable scanner operation.

5.2 Cleaning

The sapphire tip is designed to be maintenance free, but may be cleaned when necessary. The tip of the scanner must be kept clean to assure high first pass reading performance. Since a dirty tip can impair scanning performance, the tip should be examined whenever scanning performance begins to degrade or if the tip has become visibly dirty.

If the tip becomes dirty, it should be cleaned by wiping with a soft cloth or facial tissue that has been dampened with a mild detergent and water solution. The scanner enclosure can also be cleaned using the same procedure.

Note: *DO NOT use abrasive tissues or wipers as these will scratch the tip. NEVER use solvents (ie. alcohol or acetone) on the tip or to clean molded handle scanners since these may damage the finish.*

5.3 Inspection

Cords And Connectors

The scanner cord and the “Y” interface cable should be inspected periodically for wear and other signs of damage. A badly worn cord may interfere with the proper operation of the unit and may require replacement of the scanner. Damaged scanner cables and/or connector(s) can be repaired/replaced by Welch Allyn.

Scanner Case

The scanner enclosure should also be routinely examined for signs of damage. A badly dented enclosure may contact internal components and result in damage to or malfunction of the unit.

5.4 Troubleshooting

If the scanner fails to operate properly, perform the following checks:

- 1) Check the “Y” interface cable connection(s) to make sure the scanner is properly attached to the host P.C.
- 2) If the unit has been programmed to “beep” on Reset, did it “beep”? Failure to beep indicates a possible internal wand problem. Contact Welch Allyn for assistance (refer to page 5-4).
- 3) Confirm that the scanner has been programmed for the correct terminal.
- 4) Confirm that the scanner is properly configured for the bar code symbology(s).
- 5) Inspect the quality of the bar code symbols that are being used. Symbols that are of a low contrast, scratched or otherwise defaced may cause scanning problems. To verify scanner operation, test the system with a high quality bar code symbol. As an additional check, verify the quality of bar code symbols with a bar code verifier such as the Quick Check, available from Welch Allyn.

-
- 6) Check the condition of the scanner tip. If the tip is scratched, the scanner may not read properly. If the tip is broken or cracked, the optics may also become damaged by dust or other foreign matter. Should either of these conditions be present, replace the scanner tip.

The tip can be removed by inserting a thin coin into the tip locking ring and prying it off the end of the scanner.

Do not touch or make contact with the exposed lens surface as permanent damage to the scanner optics may result.

Welch Allyn recommends keeping a supply of spare tips on hand. If replacing the tip does not correct the scanning problem, it may be necessary to replace the entire wand unit.

Note: *Other than the replaceable tip, the wand scanner contains no user serviceable parts and, therefore, the scanner case should not be opened. **Opening the scanner voids the warranty.***

If proper wand operation cannot be obtained after performing these checks, factory service may be required.

5.5 Obtaining Factory Service in the United States

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 (postage paid) with a copy of the dated purchase record attached.

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

Obtaining Factory Service in Europe

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

Welch Allyn, Ltd.

Block 1, Bracken Business Park
Sandyford
Co Dublin
Ireland

Telephone: Int+353-1295-0750
Fax: Int+353-1295-6353

U. K. Office

Dallam Court Dallam Lane
Warrington, Cheshire WA2 7LT
England

Telephone: Int+44 1925 240055
Fax: Int+44 1925 631280

Obtaining Factory Service in Asia

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

Technical Support

If you need assistance installing or troubleshooting your scanner, please call your Distributor or the nearest Welch Allyn technical support office.

North America:

Telephone: (315) 685-2476 (8am to 6pm EST)

Fax: (315) 685-4960

E-Mail: dcd_techsupt@mail.welchallyn.com

Europe:

United Kingdom

Telephone: Int+44 1925 240055

Ireland

Telephone: Int+353-1216-0070

Asia:

Telephone: Int+852-2511-3050 *or* 2511-3132



TECHNICAL SPECIFICATIONS

A

A.1 Scanner Performance

Bar/Space Deviation:

While scanning appropriate bar code symbols, the first bar elongation and inner bar/space errors over the depth of field are defined as follows.

First Bar Elongation: $\leq +0.006$ inch (0.15mm)
 -0.002 inch (0.05mm)

Inner Bar/Space Error: $\leq +0.002$ inch (0.05mm)

A.2 Optical Specifications

Effective

Scanning Aperture: 6 – 10 mil

Light Source: Red LED (Wavelength = 660 nm)

Depth of Field:

Aperture	Depth of Field	X Dimension
6 mil	0 – .065 in. (0 – 1.6mm)	.0070 in. (.178mm)
8 mil	0 – .065 in. (0 – 1.6mm)	.0089 in. (.226mm)

Tilt Angle:

Aperture	Range of Angle	X Dimension
6 mil	0 – 35°	.0070 in. (.178mm)
8 mil	0 – 35°	.0089 in. (.226mm)

A.3 Electrical Specifications

The scanner will function but may not operate within the specified tolerances if the operating voltages indicated below are exceeded.

Operating Voltage: 4.5 VDC – 5.5 VDC

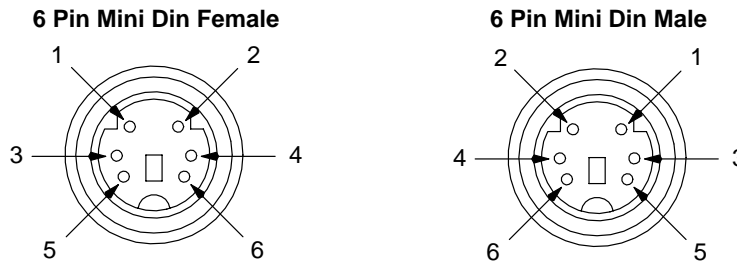
Operating Current: Maximum 35 mA
Typical 20 mA

Power Supply

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

Scanner Connector

Connector Size/Type: Two 6 pin Mini DIN, one male, one female



Connector Pin Assignments

**6 Pin Mini DIN Female
(connects to keyboard)**

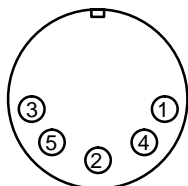
**6 Pin Mini DIN Male
(connects to terminal)**

Pin	Color	Function	Pin	Color	Function
1	Green	Keyboard data	1	Blue	Terminal data
3	White	Ground	3	White	Ground
4	Red	V+	4	Red	V+
5	Yellow	Keyboard clock	5	Black	Terminal clock
Metal Cord Shield	Cord Drain	Cable shield ♦	Metal Cord Shield	Cord Drain	Cable shield ♦

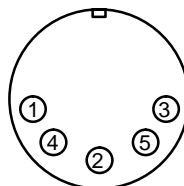
♦ **Shield Isolation:** The resistance between the shield and the power supply common termination exceeds 1 meg ohm. The flashover voltage exceeds 40VDC. A 10KHz AC signal with an amplitude of 1.0 pp can be placed between the shield and the common termination with no operational affect.

Scanner Connector with Converter Cable Option

Connector Size/Type: Two 5 pin DIN, one male, one female



**5 Pin DIN
Female**



**5 Pin DIN
Male**

Connector Pin Assignments

**5 Pin DIN Female
(connects to keyboard)**

**5 Pin DIN Male
(connects to terminal)**

Pin	Color	Function	Pin	Color	Function
Shell	Braid	Cord shield & stainless handle ♦	Shell	Braid	Cord shield & stainless handle ♦
1	Yellow	Keyboard clock	1	Black	Terminal clock
2	Green	Keyboard data	2	Blue	Terminal data
4	White	Ground	4	White	Ground
5	Red	+5VDC power	5	Red	+5VDC power

♦ **Shield Isolation:** The resistance between the shield and the power supply common termination exceeds 1 meg ohm. The flashover voltage exceeds 40VDC. A 10KHz AC signal with an amplitude of 1.0 pp can be placed between the shield and the common termination with no operational affect.

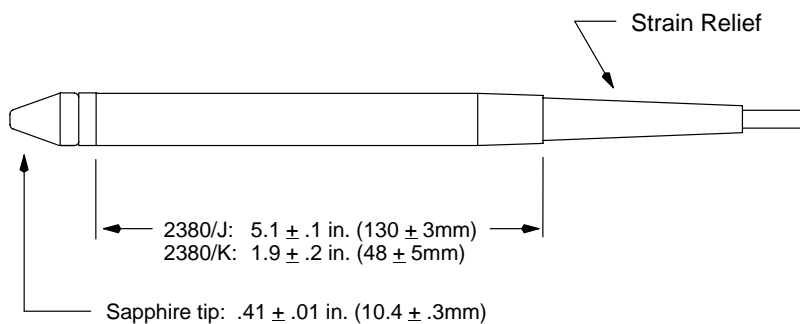
A.4 Environmental Specifications

Operating Temperature:	-4° F to +122° F (-20° 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)
Shock:	Sustains 3 foot (91cm) drop to a non-yielding surface
ESD:	17.5 KV to any external surface
Ambient Illumination:	3,000 Lux fluorescent (maximum) 1,500 Lux incandescent (maximum)
Barometric Pressure:	101,000 to 69,000 Pascals (Sea level to 3000 meters)
Mean Time Between Failure (Ground Benign):	137,419 hrs.

A.5 Mechanical Specifications

Weight:	7 ounces (196 grams) with cord (maximum)
Interface Cable:	6 foot (1.83m) coiled cord
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.

Scanner Dimensions:



A.6 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 inked bars should not exceed 25% reflectance at the wavelength which is being used for reading, whether printed with black ink or colored ink. The reflectance value should not vary more than 5% within the same character. The type of ink should be compatible with the type of radiation in the optical scanner. If a scanner with an infrared radiation source is being used, the ink in the code must be IR absorptive (typically carbon based). Otherwise, the IR would “see through” the ink and be reflected to the sensor as if from a completely white surface.

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.

Contrast

Background reflectance (that of the substrate on which the codes are printed) should always provide a good contrast relative to the ink reflectance (that of the code bars). The difference between the two should be at least 37.5% at the wavelength used for reading.

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.

KEYBOARD FUNCTION RELATIONSHIPS

B

B.1 Keyboard Function Codes – Table 1

The following Keyboard Function Code, Function Record, and Full ASCII “CTRL”+ relationships apply to all terminals that can be used with the 2380.

Keyboard Function Codes	Keyboard Function Records	Keyboard Full ASCII “CTRL” +
NUL	#00	2
SOH	#01	A
STX	#02	B
ETX	#03	C
EOT	#04	D
ENQ	#05	E
ACK	#06	F
BEL	#07	G
BS	#08	H
HT	#09	I
LF	#10	J
VT	#11	K
FF	#12	L
CR	#13	M
SO	#14	N
SI	#15	O
DLE	#16	P
DC1	#17	Q
DC2	#18	R
DC3	#19	S
DC4	#20	T
NAK	#21	U
SYN	#22	V
ETB	#23	W
CAN	#24	X
EM	#25	Y
SUB	#26	Z
ESC	#27	3
FS	#28	4
GS	#29	5
RS	#30	6
US	#31	7

B.1 Keyboard Function Codes – Table 2

<u>Keyboard Function Codes</u>		<u>IBM, PS/2's PC/XT and PC/AT Key Function</u>
NUL	00	RESERVED
SOH	01	RESERVED
STX	02	RESERVED
ETX	03	RESERVED
EOT	04	RESERVED
ENQ	05	RESERVED
ACK	06	RESERVED
BEL	07	RESERVED
BS	08	BACKSPACE
HT	09	TAB FORWARD
LF	0A	END
VT	0B	PAGE UP
FF	0C	PAGE DOWN
CR	0D	NEW LINE (ENTER)
SO	0E	HOME
SI	0F	LEFT ARROW
DLE	10	RIGHT ARROW
DC1	11	DOWN ARROW
DC2	12	UP ARROW
DC3	13	F1
DC4	14	F2
NAK	15	F3
SYN	16	F4
ETB	17	F5
CAN	18	F6
EM	19	F7
SUB	1A	F8
ESC	1B	ESCAPE
FS	1C	F9
GS	1D	F10
RS	1E	F11
US	1F	F12

Keyboard Function Codes and records for the IBM PC, PC/XT, PC/AT, PS/2 and compatible PC's.

NOTE: These function codes are not compatible with other Welch Allyn wedge products. If you are using other Welch Allyn wedge products, or may be in the future, it would be advisable to program the 2380 for K2 compatibility and use the function codes that are on the following two pages.

B.1 Keyboard Function Codes – Table 3

Keyboard Function Codes		IBM AT/PS 2, IBM 30, 50 – 80, K2 Compatible Key Function
NUL	00	RESERVED
SOH	01	ENTER (KP)
STX	02	CAP LOCK
ETX	03	RESERVED
EOT	04	RESERVED
ENQ	05	RESERVED
ACK	06	RESERVED
BEL	07	CR/ENTER
BS	08	RESERVED
HT	09	TAB
LF	0A	RESERVED
VT	0B	TAB
FF	0C	DELETE
CR	0D	CR/ENTER
SO	0E	INSERT
SI	0F	RESERVED
DLE	10	F11
DC1	11	HOME
DC2	12	PRINT
DC3	13	BACKSPACE
DC4	14	BACK 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

Keyboard Function Codes and records for the IBM AT and PS/2 compatibles.

NOTE: These function codes are compatible with other Welch Allyn wedge products.

B.1 Keyboard Function Codes – Table 4

Keyboard Function Codes		IBM XT K2 Compatible Key Function
NUL	00	RESERVED
SOH	01	CR/ENTER
STX	02	CAPS LOCK
ETX	03	RESERVED
EOT	04	RESERVED
ENQ	05	RESERVED
ACK	06	RESERVED
BEL	07	CR/ENTER
BS	08	RESERVED
HT	09	TAB
LF	0A	RESERVED
VT	0B	TAB
FF	0C	DELETE
CR	0D	CR/ENTER
SO	0E	INSERT
SI	0F	RESERVED
DLE	10	RESERVED
DC1	11	HOME
DC2	12	PRINT
DC3	13	BACKSPACE
DC4	14	BACK TAB
NAK	15	RESERVED
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

Keyboard Function Codes and records for the IBM Xt's and compatibles.

NOTE: These function codes are compatible with other Welch Allyn wedge products.

B.1 Keyboard Function Codes – Table 5

Keyboard Function Codes		IBM 3196/97, IBM 3476/77 (122 Key Keyboard) Key Function
NUL	00	RESERVED
SOH	01	ENTER
STX	02	F11
ETX	03	F12
EOT	04	F13
ENQ	05	F14
ACK	06	F15
BEL	07	NEW LINE
BS	08	F16
HT	09	F17
LF	0A	F18
VT	0B	TAB/FIELD FORWARD
FF	0C	DELETE
CR	0D	FIELD EXIT
SO	0E	INSERT
SI	0F	F19
DLE	10	ERROR RESET
DC1	11	HOME
DC2	12	F20
DC3	13	BACKSPACE
DC4	14	BACKFIELD
NAK	15	F21
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

Keyboard Function Codes and records for the IBM 3176/77 and IBM 3476/77 with 122 key keyboards.

NOTE: These function codes are compatible with other Welch Allyn wedge products.

B.1 Keyboard Function Codes – Table 6

Keyboard Function Codes		IBM 3191/92, IBM 3471/72 (122 Key Keyboard) Key Function
NUL	00	RESERVED
SOH	01	ENTER
STX	02	F11
ETX	03	F12
EOT	04	F13
ENQ	05	F14
ACK	06	F15
BEL	07	NEW LINE
BS	08	F16
HT	09	F17
LF	0A	F18
VT	0B	TAB
FF	0C	DELETE
CR	0D	NEW LINE
SO	0E	INSERT
SI	0F	F19
DLE	10	ERROR RESET
DC1	11	HOME
DC2	12	F20
DC3	13	BACKSPACE
DC4	14	BACK TAB
NAK	15	F21
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

Keyboard Function Codes and records for the IBM 3191/92 and IBM 3471/72 with 122 key keyboards.

NOTE: These function codes are compatible with other Welch Allyn wedge products.

B.1 Keyboard Function Codes – Table 7

Keyboard Function Codes		IBM 3196/97, 3476/77, IBM 3491/92, 3471/72 (102 Key Keyboard) Key Function
NUL	00	RESERVED
SOH	01	ENTER
STX	02	F11
ETX	03	F12
EOT	04	F13
ENQ	05	F14
ACK	06	F15
BEL	07	NEW LINE
BS	08	F16
HT	09	F17
LF	0A	F18
VT	0B	TAB/FIELD FORWARD
FF	0C	DELETE
CR	0D	FIELD EXIT
SO	0E	INSERT
SI	0F	CLEAR
DLE	10	ERROR RESET
DC1	11	HOME
DC2	12	PRINT
DC3	13	BACKSPACE
DC4	14	BACK TAB
NAK	15	F19
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

Keyboard Function Codes and records for the IBM 3196/97, 3476/77, 3191/92, and 3471/72 with 102 key keyboards.

NOTE: These function codes are compatible with other Welch Allyn wedge products.

B.1 Keyboard Function Codes – Table 8

<u>Keyboard Function Codes</u>		<u>DEC VT 220/320 /340 Terminals Key Function</u>
NUL	00	RESERVED
SOH	01	ENTER
STX	02	PF1
ETX	03	PF2
EOT	04	PF3
ENQ	05	F11
ACK	06	F12
BEL	07	NEW LINE
BS	08	PF4
HT	09	TAB
LF	0A	F13
VT	0B	F14
FF	0C	REMOVE
CR	0D	NEW LINE
SO	0E	INSERT HERE
SI	0F	CURSOR UP
DLE	10	CURSOR LEFT
DC1	11	CURSOR DOWN
DC2	12	CURSOR RIGHT
DC3	13	DELETE
DC4	14	PRINT
NAK	15	F15
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

Keyboard Function Codes and records for the DEC VT 220/230/240 terminals.

NOTE: These function codes are compatible with other Welch Allyn wedge products.

INDEX

B

Bar Code Symbol Specifications,
A-5
Background Substrate, A-5
Contrast, A-6
Definition, A-5
Ink Color and Type, A-5
Tolerance, A-6
Voids and Specks, A-5
Bar Code Symbolology, 1-3

C

Cleaning, 5-1

E

Electrical Specifications, A-2
Operating Current, A-2
Operating Voltage, A-2
Power Supply Noise Rejection,
A-2
Scanner Connector
5 Pin DIN's, A-2, A-3
Size and Type, 5 Pin DIN's,
A-2, A-3
Environmental Specifications, A-4
Ambient Illumination, A-4
Barometric Pressure, A-4
ESD, A-4
Humidity, A-4
Mean Time Between Failure, A-4
Operating Temperature, A-4
Shock, A-4
Storage Temperature, A-4

F

Factory Service, 5-4

See also Warranty Information

H

Hardware Description, 1-1

I

Inspection, 5-2
Cords and Connectors, 5-2
Scanner Case, 5-2

K

Keyboard Function Codes, B-1
Keyboard Wedge Connection, 1-2

M

Main Elements of 2380, 2-1
Maintenance and Service, 5-1
See also Cleaning and Inspection
Mechanical Specifications, A-4
Cord Flexure, A-4
Interface Cable, A-4
Scanner Dimensions, A-4
Weight, A-4

N

Non-Volatile Memory, 1-3, 4-1

O

Operating Theory, 2-2
Operational Description, 2-1

Optical Specifications, A-1
Depth of Field, A-1
Light Source, A-1
Tilt Angle, A-1

P

Programming Menu, 4-1
Bar Code Chart, 4-4
COMM 1, 4-12
COMM 1 Menu Page
Foreign Keyboards, 4-12
Intermec Capability, 4-13
Configuration Example, 4-16
Direct Connect, Terminal
Selection, 4-6
Direct Connect Terminal
Selection, 4-6
Facing Page, 4-4
Keyboard Layouts and Delimiters,
4-18
Message Format, 4-15
Output Parameters & Format, 4-6
Append Buffer, 4-12
Beeper, 4-11
Function Transmit, 4-8
Intercharacter Delay, 4-11
Interfunction Delay, 4-11
Intermessage Delay, 4-11
Keyboard Function Records,
4-9
Scanner Data, 4-10
Keyboard Type, 4-10
LEDs/Beeper
Beep on Good Read, 4-11
Beep/Blink on Reset, 4-11
Postamble, 4-7
Preamble, 4-6
Code ID, 4-7
Programming Menu Pages, 4-1
Scancode Selection, 4-13
Beep PC, 4-13
K2 Scancode Capability, 4-13

New Keyboard Scancode
Table, 4-13
Numeric Keypad, 4-13
RX Interrupt, 4-14
Symbology Selection, 4-14
Maximum Length, 4-14
Minimum Length, 4-14
Terminal Selection, 4-6

Programming the Scanner, 4-1

S

Scanner Checks, 3-3
Check Bar Code Labels, 3-3
Confirm Scanner Operation, 3-3
Scanner Dimensions. *See*
Mechanical Specifications
Scanner Identification Key, 2-2
Scanner Performance, A-1
Scanning Performance Influences,
2-2
Depth of Field, 2-4
High Density Bar Codes, 2-4
Illumination Source, 2-2
Low Density Bar Codes, 2-4
Print Contrast, 2-5
Scanning Aperture, 2-3
Scanning Velocity, 2-4
SCANTEAM 2380/J and 2380/K,
1-4
Set-Up and Installation, 3-1
Software Description, 1-3
SRD scanner, 1-4

T

Technical Specifications, A-1
Troubleshooting, 5-2

W

Wand Models, 1-4

Warranty Information, i

Y

Y Cable Interface Connections, 3-2



2380/TM Rev E

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