

**HAND HELD<sup>®</sup>  
PRODUCTS**  
a WelchAllyn<sup>®</sup> affiliate

# *SCANTEAM<sup>®</sup> 3700 CCD*



*Technical Manual*

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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.
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For further information, please contact:

Welch Allyn Ltd.  
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Dallam Court Dallam Lane  
Warrington, Cheshire WA2 7LT  
England

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### ***Patents***

The SCANTEAM 3700 product is covered by the following U.S. Patent: 5,932,862. Other U.S. and foreign patents pending.



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## Preface

### Intended Audience

This manual is written for users familiar with serial data communications. An understanding of integrated circuitry and bar code technology is recommended.

### Overview of the Technical Manual

**Chapter 1** provides a brief description of SCANTEAM 3700 software and hardware.

**Chapter 2** discusses the system's hardware, including connectors, ports, and power requirements.

**Chapter 3** explains how to set up and install your 3700 Machine Mount CCD.

**Chapter 4** describes the default operating and configuration parameters and explains how to change these to meet your specific needs using serial commands sent through the host RS-232 communications interface. Explains how to use the configuration status query commands.

**Chapter 5** explains how to obtain service and technical assistance.

**Appendix A** is a guide to CCD operation, bar code basics and scanning techniques.

**Appendix B** provides information about scanning performance, optical, electrical, environmental, mechanical and bar code label specifications.

**Appendix C** lists the configuration, operational and configuration status query serial commands. The default configuration settings are also listed.

**Appendix D** provides an ASCII conversion chart.

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## Related Publications

### Reading Between the Lines: An Introduction to Bar Code Technology

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

### The Bar Code Book: Reading, Printing, and Specification of Bar Code Symbols

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

### Handbook of Bar Coding Systems

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

### Automatic ID Resource Catalog

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.

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## 1.1 Introduction

The Hand Held Products SCANTEAM 3700 is a fixed mount CCD bar code scanner with integral decoder for easy integration into host equipment. Typical host equipment with bar code requirements satisfied by the 3700 include automated clinical chemistry analyzers, pharmaceutical label verification systems, industrial automation equipment, robotic systems, materials handling equipment, library systems, point of sale terminals and office equipment.

The 3700 features Hand Held Products' time-proven decoding algorithms in a microprocessor-controlled bar code scanner/decoder and offers configurable operating parameters, providing you with the capability to tailor the 3700 to your present requirements and the flexibility to meet your future application requirements.

The following features are available with every SCANTEAM 3700:

- Economical, reliable, safe CCD scanning technology
- Audible indicator configurable for good read or no read
- True RS-232 data communications with RTS/CTS, XON/XOFF, ACK/NAK
- Autodiscrimination of 6 bar code symbologies
- 100 scans per second (standard); other scan rates available
- Flexible scan trigger configurations
- Decoder configurable for high security
- Scan voting to ensure bar code data integrity
- Automatic read timeout
- Ease of configuration through RS-232 interface

## 1.2 SCANTEAM 3700 Hardware Description

The SCANTEAM 3700 housing is molded ABS formed to enclose the optics platform and electronics. Standard housing width is 3.5 inches (88.9mm). The housing length is 2.9 inches (73.7mm) and the height is fixed at 1.05 inches (26.7mm).

The scanner uses red (660 nm wavelength) LED's to illuminate the bar code label. A high resolution CCD (charge coupled device) is used as an image or reading sensor. A trigger signal can direct the 3700 to read the bar code. The trigger signal may originate from the scanner itself, from a host serial communications program, or from a hardware object sensor. The scanned code is converted to a digital signal in the scanner, then decoded and sent to the host computer or system. Scan width and focal point of the optics may be customized to the particular requirements of your application.

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Communication is achieved using full duplex, asynchronous serial ASCII through a bidirectional RS-232 connection to the host system. The host defines or sets the configurable features and controls the operation of the 3700. The 3700's configuration may be stored in non-volatile memory.

**Note:** *In this manual, the term "host" refers to any computer that communicates with the SCANTEAM 3700 through its RS-232 port. During the configuration procedure, the host can be the main computer which controls the entire application, or can be a PC which has been connected to the 3700 for just that purpose. The terms "host instrument," "host equipment," and "host device" all refer to the system in which the 3700 has been integrated and which communicates with, controls and configures the operating features.*

### **1.2.1 Interface Port**

The SCANTEAM 3700 has one port for I/O and Power. The port is a 10 pin RJ11 modular female connector. Hardwire connection to the scanner motherboard is available for additional features. Pin assignments and function descriptions are presented in Appendix B. Cables are available from Hand Held Products for evaluation of the 3700. Hand Held Products can provide custom cables for host integration. A modular connector was chosen as the standard configuration for ease in servicing the scanner once installed..

### **1.2.2 Nonvolatile Memory**

The 3700 contains nonvolatile FLASH memory which is used to store operating parameters configured by means of host serial commands. This memory is easily reconfigurable to modify or add symbologies, as well as to modify or add serial commands to emulate a currently installed scanner.

## **1.3 SCANTEAM 3700 Software Description**

SCANTEAM 3700 software employs Hand Held Products' time-proven decoding algorithms, controls the microprocessor functions, selects the scanner ports, decodes the bar codes, and formats the serial output messages.

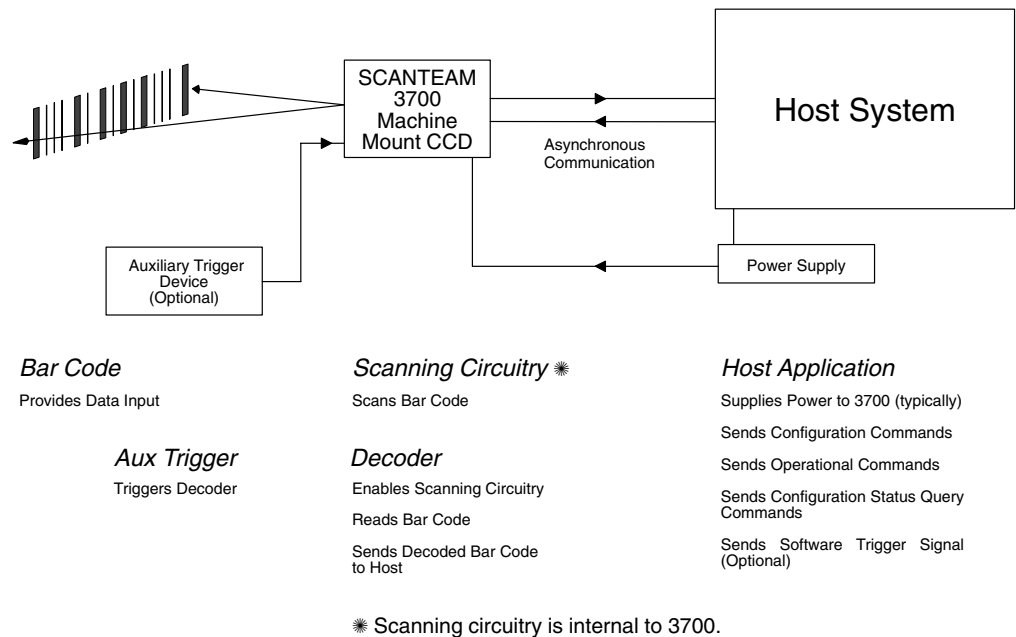
The 3700 standard default parameters can be easily reconfigured to meet most scanning requirements. Application-specific features and options are configurable through the RS-232 communications link to the host system.

The 3700 can be configured to autodiscriminate among the following bar code symbologies and their variations: Codabar, Code 39, Code 128, Interleaved 2 of 5, UPC and EAN. Most common bar code options, such as validating symbol length and optional check character, are supported and easily selected. Symbologies can be added from Hand Held Products' library of decoding algorithms.

In addition to decoding selections; data output formats, such as preamble and postamble strings, and operating parameters are also configurable through the host RS-232 serial communications connection.

## 2.1 Introduction

The major components of the system are the SCANTEAM 3700 Machine Mount CCD and the host instrument or equipment. Electrical power is generally supplied to the 3700 Machine Mount CCD by the host system. Figure 2.1 shows the functional relationships between the components of the basic system.

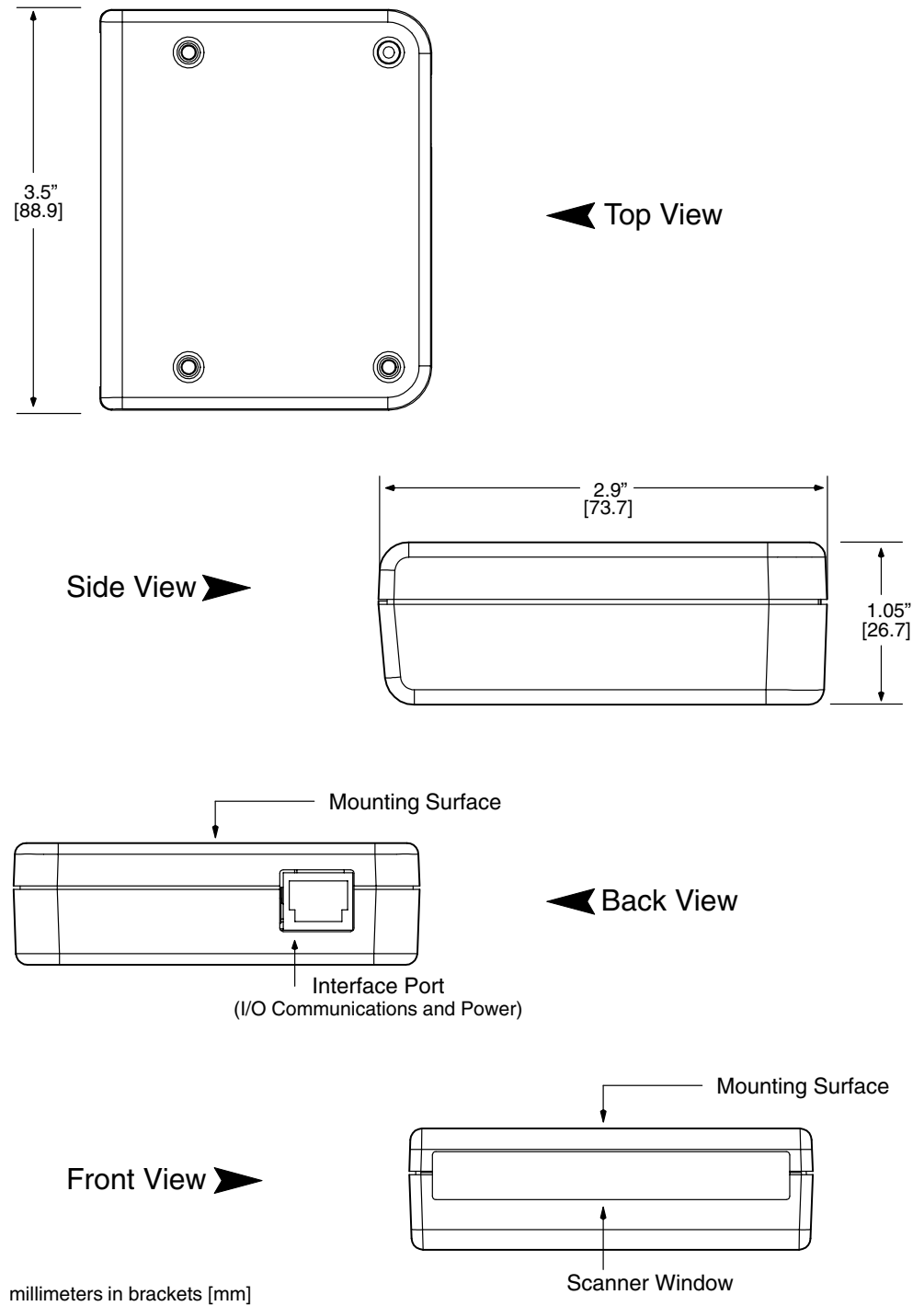


**Figure 2.1 Basic System Operation**

## 2.2 General Characteristics of the 3700

### 2.2.1 Mechanical Layout of the 3700

Figure 2.2 shows several views of the SCANTEAM 3700 Machine Mount CCD, including general dimensions, the location of connectors, and the scanner window.



**Figure 2.2 3700 Fixed Mount CCD Dimensions**

### 2.2.2 Single Modular Input/Output/Power Port

The interface port is an 8-pin female modular connector used for attaching the Asynchronous Serial Communications Interface Cable. Allows triggering capability (at pin 2) for an external triggering device, such as an object sensor or a switch. Power and ground connections are also on this port.

### 2.2.3 Audible Indicator

The beeper can be disabled by using a configuration command. Refer to Chapter 4 for information on setting configuration commands. The beeper also sounds on power-up or reconfiguration as an audible self-check of software configuration.

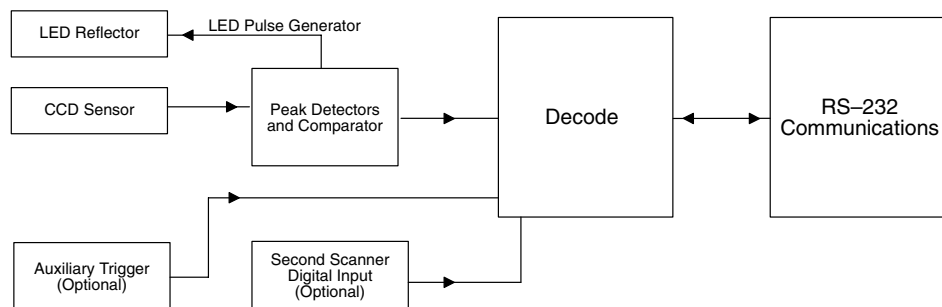
### 2.2.4 Mounting Inserts

Inserts are molded into the housing to retain mounting screws. Inserts are available for metric (3.5) or SAE (#6-32) screws.

## 2.3 Operating Theory

Figure 2.3 presents a block diagram of the basic SCANTEAM 3700 Machine Mount CCD operation.

The SCANTEAM 3700 Machine Mount CCD looks for data input from the scanning circuitry, which includes the LED reflector (illuminates the bar code target), the CCD sensor and imaging lens (focuses the scattered optical energy from the bar code symbol), and the peak detectors and comparator (generates a digital representation of the bar code symbol to send to the microprocessor). Refer to Appendix A, CCD Operation and Bar Code Scanning, for a detailed explanation of 3700 scanning circuitry operation. When the 3700 sees a trigger, a read cycle is started. The read cycle is completed when a bar code is read or the read timeout expires.



**Figure 2.3 Basic Scanner/Decoder Operation**

**Note:** A trigger can be a hardware trigger, such as an object sensor, or a software command, such as a serial trigger command or continuous read trigger mode command, from the host. Refer to chapter 4 for description of serial trigger and trigger mode commands..

During a read cycle, the 3700 evaluates scanner data for a valid bar code symbol. If a valid bar code symbol is seen, data is placed into the output queue where it may be transmitted to the host through the RS-232 communications port. The 3700 can optionally be configured to send a “No Read” message when a read cycle times out.

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## 2.4 Scanner/Host Communication

The RS-232 communications interface of the 3700 is used for entering configuration commands from a PC or host instrument for specific application requirements. The communications I/O port also sends decoded bar code data to the host.

### 2.4.1 Communications Port

The communications port connector for the 3700 is an 8-pin female modular socket for interfacing to the host system or other communications device. Communications between the host system and the 3700 occur using an Asynchronous ASCII protocol. Refer to Appendix B for a complete description of pin assignments of the RS-232 communications port.

**Caution:** **Do not use a host communications cable with more wires connected than are required for the application. Damage to equipment within the system may result if the communications connection is improperly wired.**

### 2.4.2 Asynchronous Serial ASCII Interface

The Asynchronous serial ASCII Interface operates in Full Duplex Mode. Software configuration parameters (see Chapter 4) control Baud Rate, Parity, Data Bits, Stop Bits, Xon/Xoff, ACK/NAK, RTS/CTS, and Pre/Postambles.

Baud rate is a means of expressing data transmission speed, where “baud” equals the number of signal events per second (roughly equivalent to bits per second). Parity is a means of checking character bit patterns for validity by confirming if they contain an Even or Odd number of “1”s. The communications port can be configured to operate at baud rates of 600, 1200, 2400, 4800, 9600, 19200, and 38400, with even, odd, or no parity.

Data bits refers to the number of bits used to encode each ASCII character in a data message. Stop bits refers to the number of stop bits appended to each character. The communications port can be configured to send 7 or 8 data bits, with 1 or 2 stop bits.

**Note:** *For proper operation the 3700 must be configured for the same baud rate, parity, number of data bits, and number of stop bits as the connected RS-232 host device.*

Xon/Xoff are control characters that refer to ASCII characters “DC1” and “DC3,” respectively. If enabled, Xon/Xoff is a method to control data flow in the following manner. Whenever its buffers approaches full, the device receiving communications data sends an “Xoff” to stop data transmission. The transmitting device stops data transmission. When its buffer approaches empty, the receiving device sends “Xon” and the transmitting device starts sending data again. The receiving device refers to the host instrument. Likewise, the transmitting device refers to the 3700.

**Note:** *The SCANTEAM 3700 will respond to XON and XOFF characters from the host, but will not send these characters.*



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ACK/NAK are ASCII characters that allow the receiving device to tell the sending device to repeat a data message that contains errors. If enabled, the 3700 expects to receive an ACK (positive acknowledgement of data transmission) or a NAK (negative acknowledgement of data transmission) from the host after each message is sent. If a NAK is received, the 3700 repeats the message. After three attempts to transmit have been made, with successive NAK from the host, the 3700 will discard the message. The 3700 responds to communication from the host with an ACK or NAK.

Pins are available at the I/O Port to support RTS/CTS handshaking. The RTS/CTS feature may be enabled or disabled in the scanner software configuration. During communications, the 3700 will raise RTS and wait for CTS before each transmission. In applications where the host system does not support “handshaking,” the CTS line may be left unconnected and the 3700 will pull it to the active state. Alternately, if CTS is left unconnected, RTS/CTS can be disabled by configuration command.

Preambles and postambles are optional ASCII strings that precede and are appended to each data message sent by the 3700. Typical preamble and postamble strings would include the ASCII control characters STX (start of text), ETX (end of text), CR (carriage return) and LF (line feed). An identification character to indicate the type of bar code read and source scanner port is included in the standard scanner software configuration.

### **2.4.3 Hardwire Pinouts**

The following signals not related to communications are available by hardwiring to the motherboard (factory ordered with all cable requirements). See Appendix B for the full listing of available pinouts.

- Pin 1 Boot Strap
- Pin 2 Dig In – Auxiliary
- Pin 3 Reset
- Pin 4 IND – Good Read

#### **Auxiliary Trigger**

The scanned data input can be controlled by an external triggering device connected to the Trigger/Enable line (pin 2 of the Communications port). The actual trigger can be as simple as a foot actuated relay switch and as sophisticated as an optical sensor.

The Trigger/Enable line action depends on output mode, as follows:

- Bar/Space Output Mode – continuous scan while active
- ASCII Output Mode – read while active – transmit on timeout.

---

## 2.5 Power Requirements

DC operating voltage is +5 volts and consumes approximately 200 milliamps when scanning. Refer to Appendix B for a complete description of voltage range, current consumption levels, and pin assignments.

## 3.1 Introduction

This chapter explains the SCANTEAM 3700 Machine Mount CCD set-up for use in the design lab and a brief description of installation in a host instrument. The set-up procedures are intended for a technician or design engineer to explore the functions and features of the 3700 Machine Mount CCD in a hands-on setting, before the 3700 is embedded in host equipment. The section on installation in a host instrument includes the general mounting dimensions of the 3700.

Set-up and installation includes unpacking the unit, checking for possible damage during shipment, and connecting the Machine Mount CCD to the host system. The host system in the design lab will typically be a PC/DOS microcomputer with an RS-232 communications port and a serial communications program. Otherwise, the host system is the instrument or equipment the 3700 is intended to be embedded in.

A Hand Held Products representative will provide application support if needed. Refer to Chapter 5 for Hand Held Products' service and technical assistance phone number(s).

## 3.2 General Preparation for Use

Upon receipt, open the carton. Keep the shipping carton since this should be used in the event the scanner ever needs to be returned to the factory for service or repair.

Check the part numbers and confirm that each item on the packing list has been supplied. Check that the scanner model number and any other companion products are the ones ordered for your application. The scanner model and serial numbers are on the identification label attached to the scanner enclosure. Refer to Figure 3.1. You may want to record these numbers for easy reference when communicating with Hand Held Products or your Sales Representative.

Thoroughly inspect the 3700 to determine if any damage has occurred during shipment. Any damage should be reported immediately to the carrier that delivered the 3700. Damage claims due to handling during shipping should be placed directly with the carrier. Hand Held Products will quote for repair of shipment damage (refer to Chapter 5), but the final claim and negotiations with the carrier are the responsibility of the purchaser.

When all the components of your order have been identified and checked, prepare the 3700 for service using the procedures provided in the following sections (for set-up in a design lab or for installation in host equipment). To assure proper operation and prevent possible damage to the 3700 or your host system, perform the following set-up procedures in the sequence in which they are presented.

**Note:** *Before starting the set-up or installation procedure, set the host system or computer power switch to the "OFF" position.*

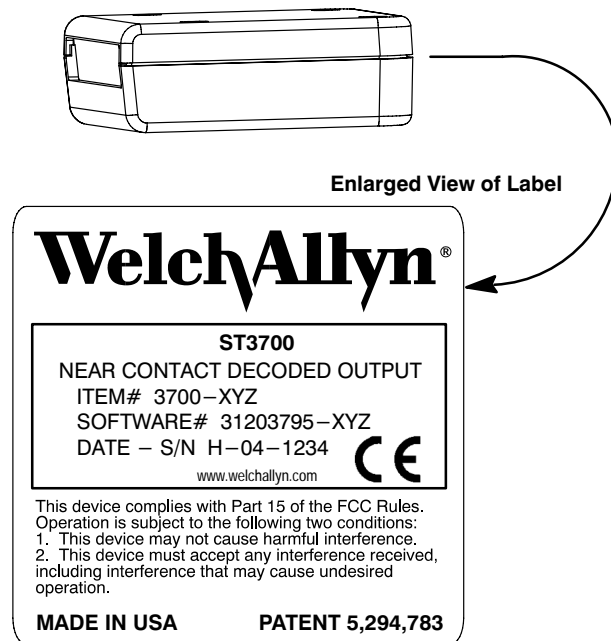


Figure 3.1 SCANTEAM 3700 Identification Label

### 3.3 Set-up Procedure for Evaluation of the 3700

**Caution:** The 3700 contains static sensitive components. The 3700 has been designed for internal protection against damage due to discharge. Precautions should be taken to protect against static discharge to the 3700.

#### 3.3.1 Preparation

Interface cables for evaluating the 3700 are available from Hand Held Products. Hand Held Products also offers 110VAC and 220VAC to 5VDC power supplies for the 3700. If you wish to construct your own cables, Appendix B lists the 3700 port pin assignments.

#### Set-up Checklist

- SCANTEAM 3700 CCD Scanner
- SCANTEAM 3700 Input/Output/Power Cable
- 5 VDC Power Supply
- Computer with Serial I/O Port
- For I/O: may need a 25 pin to 9 pin convertor  
(Refers to step 4 in 3.3.2 Set-up Procedure.)
- For I/O: may need a Null Modem adapter  
(Refers to step 4 in 3.3.2 Set-up Procedure.)
- Terminal Emulation Software  
(Refers to step 6 in 3.3.2 Set-up Procedure.)

---

### 3.3.2 Set-up Procedure

This procedure will verify that bar code scanning and communications between the host and the 3700 has been established.

#### To setup serial communications to the scanner

- 1) Connect the RS-232 communications (I/O) cable between the 3700 and the PC serial port. (You may require a 25 pin to 9 pin converter and Null Modem adapter. Contact your Hand Held Products sales representative or distributor for assistance.)
- 2) Connect power to the 3700. The scanner should beep once.
- 3) Start serial communications software program, such as PCTools Desktop (Central Point Software), on the PC.
- 4) On the PC, set up the serial communications program to match the 3700 default values:
  - Baud rate = 9600
  - Parity = Even
  - Stop Bits = One
  - Data Bits = Seven
- 5) The default factory scanner configuration for the SCANTEAM 3700 requires a serial command from a host to trigger a scan. Change the trigger mode to “Continuous Read, Send Once, Clear on Timeout” by typing **<Kg, 1>**. The elapsed time between the typing of each character should not exceed 5 seconds. The illumination LEDs should light in response to the command.
- 6) Confirm communications to the 3700 with the test label below. Observe that the LED reflector is illuminated. Scan the test label “ABC123” below. The default scanner configuration for preamble is Port ID and Code ID. Default postamble is CR (carriage return) and LF (line feed). Observe within 3 seconds the message “1bABC123” on the PC.
  - “1” = Port ID
  - “b ” = Code ID (Code 39 code ID is “b”)
  - “ABC123” = The bar code label



This completes set-up of the SCANTEAM 3700 Machine Mount CCD for evaluation. You are now ready to configure the 3700 to explore the functions and features. Instructions for configuring the 3700 using configuration and operational commands are provided in Chapter 4, Configuring the SCANTEAM 3700.

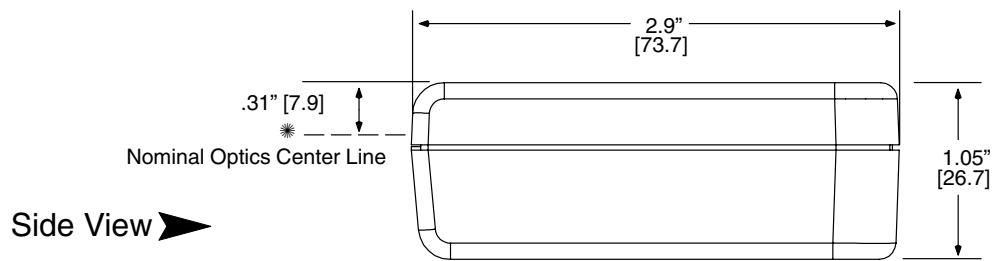
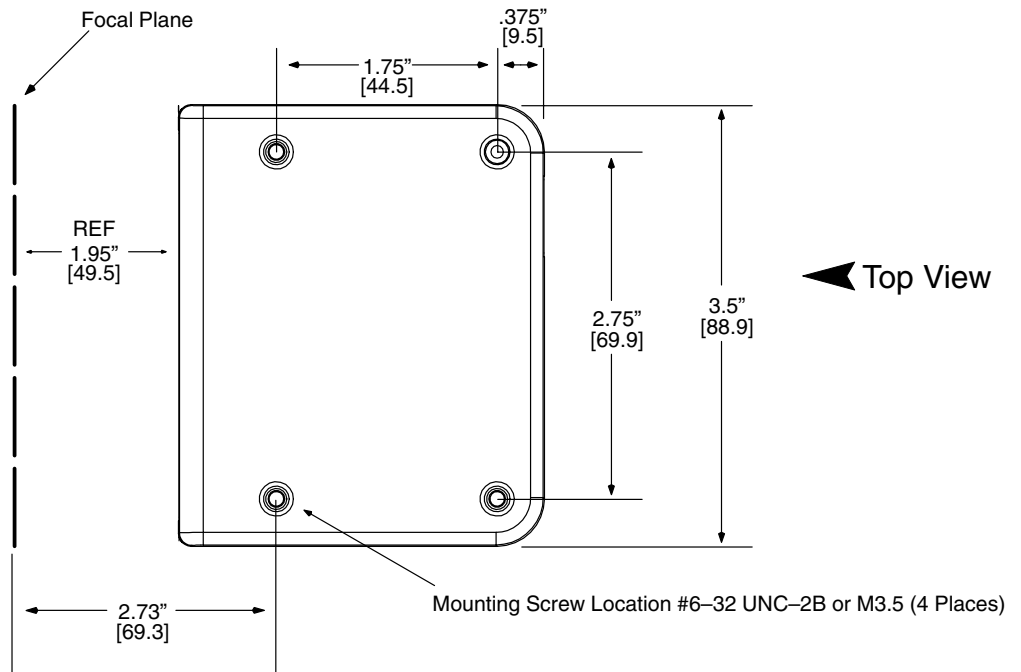
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## 3.4 Installation in the Host Instrument

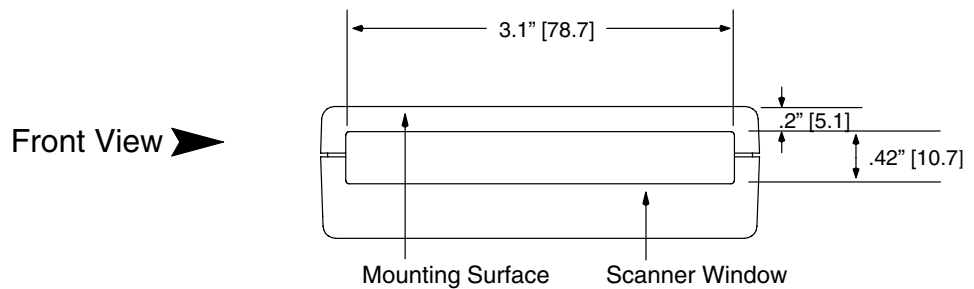
**Caution:** The 3700 contains static sensitive components. Precautions must be taken to eliminate potential static discharge to the 3700.

Installation in the host instrument includes the following activities:

- 1) Power down the host system or instrument.
- 2) Mount the SCANTEAM 3700 in the host instrument. The 3700 has four mounting holes (threaded inserts). Be sure to allow access to all cable connections. Figures 3.2 and 3.3 show the general dimensions for mounting the 3700.
- 3) Connect the 3700 RS-232 Communication Port to the host system I/O.
- 4) If applicable, connect your object sensor or hardware triggering device to the 3700.
- 5) Power up the host system or instrument.



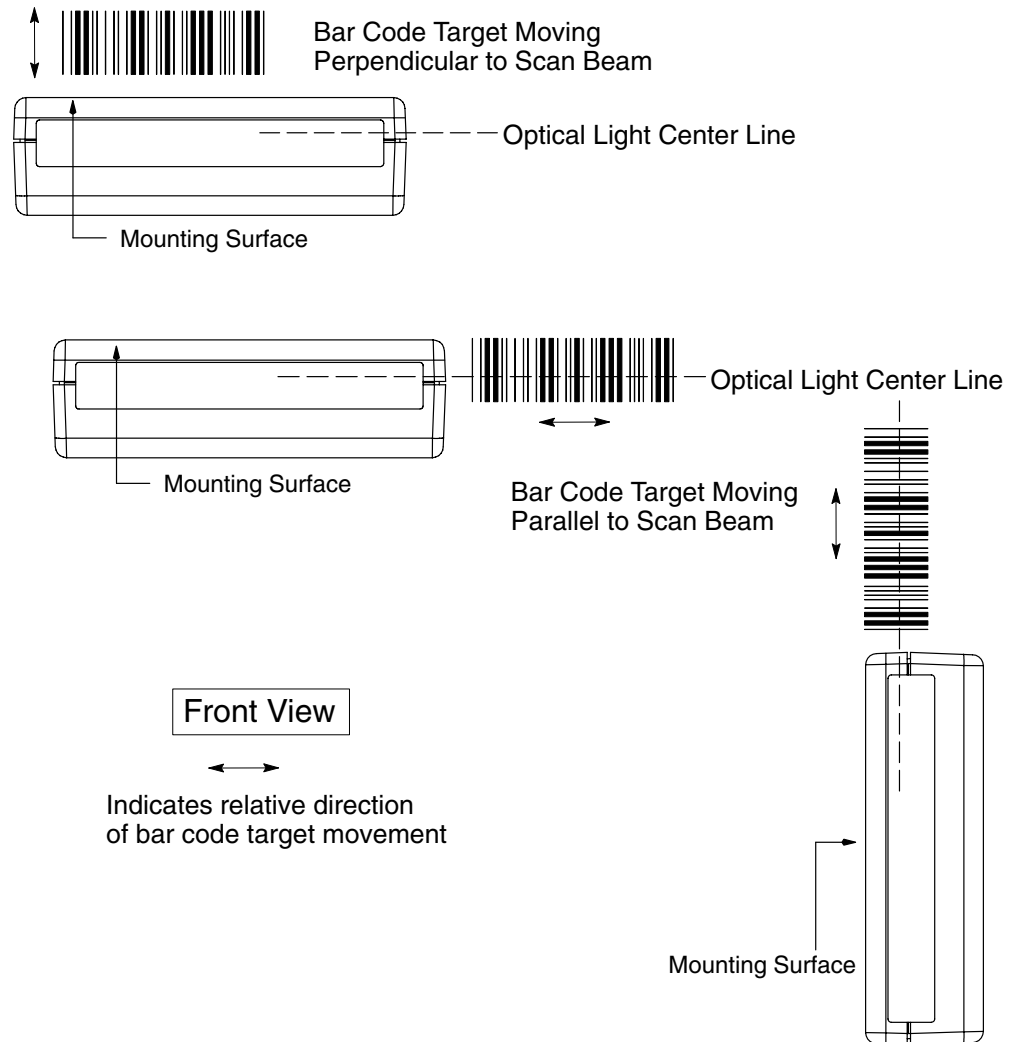
\* Installation should provide adjustment to align the optical center line on the intended target. This adjustment should account for tolerance variation in the 3700 scanner, as well as the host equipment.



millimeters in brackets [mm]

**Figure 3.2 Mounting Dimensions for the 3700**

The 3700 Machine Mount CCD may be oriented in any way so that the beam scanning path moves across the bar code as shown in Figure 3.3. Bar code presentation to the scanner is important for successful scanning of the label. The first requirement is that the beam scan path cross all bars on the label, as well a 0.25 inch quiet zone before and after the code. The Automatic Identification Manufacturers (AIM), the industry association, has defined orientation of the bar code label according to Figure 3.4.

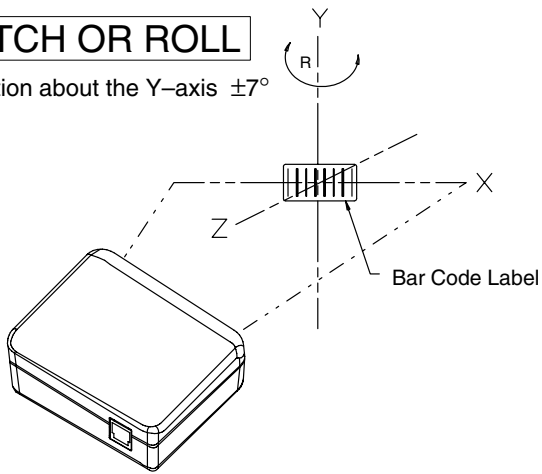


**Figure 3.3 Examples of SCANTEAM 3700 Barcode Orientation**



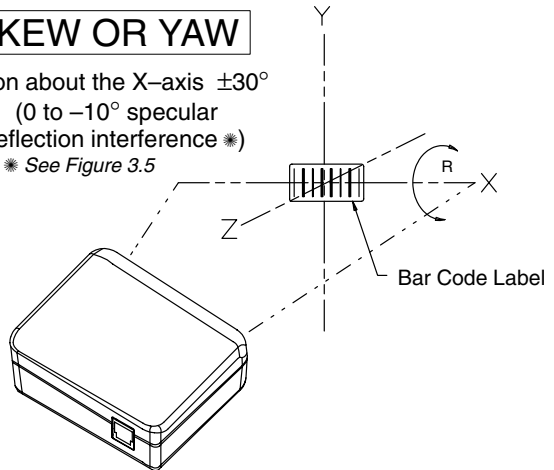
**PITCH OR ROLL**

Rotation about the Y-axis  $\pm 7^\circ$



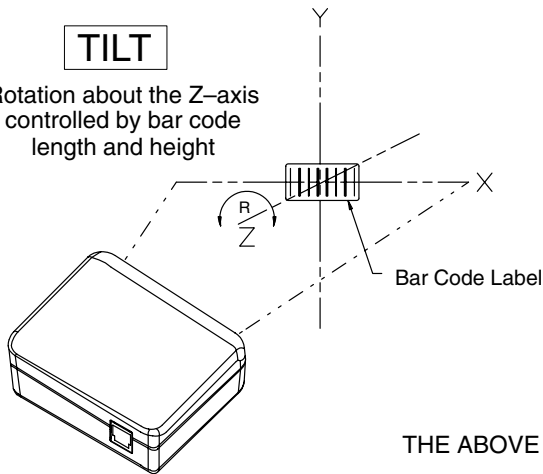
**SKEW OR YAW**

Rotation about the X-axis  $\pm 30^\circ$   
(0 to  $-10^\circ$  specular reflection interference \*)  
\* See Figure 3.5



**TILT**

Rotation about the Z-axis controlled by bar code length and height

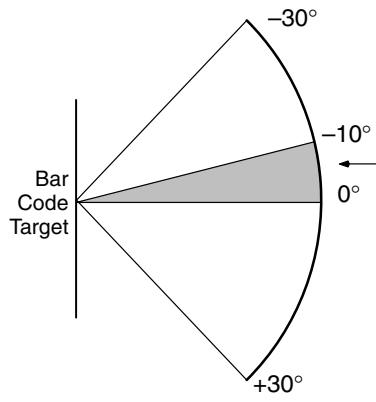


Rear View

R = Rotation

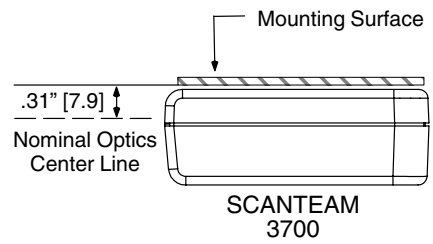
THE ABOVE DEFINITIONS ARE FROM AIM® SPECIFICATIONS

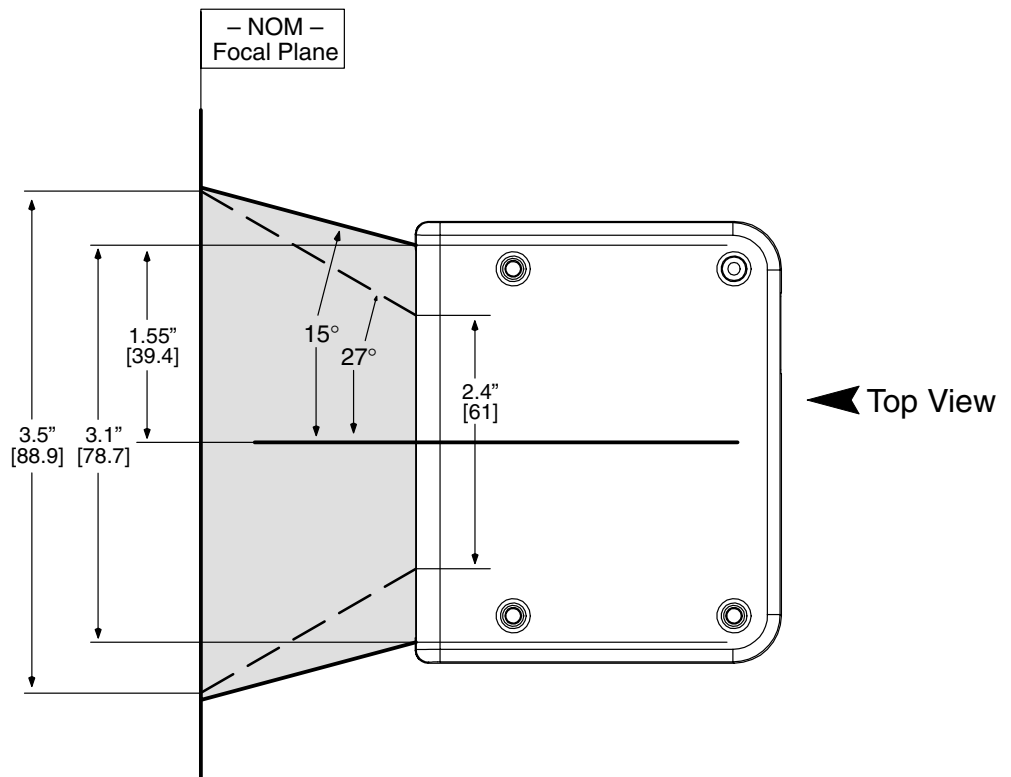
**Figure 3.4 SCANTEAM 3700 Pitch, Skew and Tilt Tolerance**




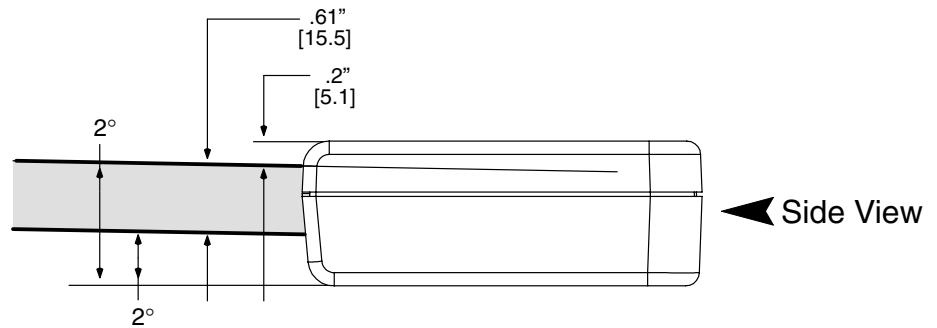
Specular Zone  
(Operation in the Specular Zone must be avoided)

**Figure 3.5 Specular Reflection Interference**





 = Minimum clearance required for scanner illumination of target. †  
 - - = Receive path/area. †



† Illumination area is larger than receive area.

millimeters in brackets [mm]

**Figure 3.6 Scanner Illumination Clearance**

This completes installation of the SCANTEAM 3700 Machine Mount CCD in a host instrument. You are now ready to configure the 3700 for your particular application. Instructions for configuring the 3700 using configuration and operational commands are provided in Chapter 4, Configuring the SCANTEAM 3700.

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---

## 4.1 Preparation

This chapter provides instructions for configuring the software in the SCANTEAM 3700 Machine Mount CCD. The configuration process allows you to change the operating parameters of the scanner software to explore the functions of the 3700. The user-defined configuration is stored in volatile RAM memory and can be changed by the user.

All communication between the host system and the 3700 Machine Mount CCD is through the RS-232 communications interface using an Asynchronous ASCII protocol. The host system sends commands one at a time to the 3700. During the configuration process, there is no acknowledgement or other response from the 3700. It is important to enter commands accurately. If a command is sent erroneously to the 3700, you may terminate that command and send the command again. You may send configuration status query commands to obtain a status listing of the configuration selections.

For detailed instructions on preparing the SCANTEAM 3700 for configuration, refer to section 3.3, Set-up Procedure for Use in the Design Lab, or section 3.4, Installation in the Host Instrument.

The application-specific features that can be modified using the RS-232 communication line include the following:

- Auditory feedback for operator
- Bar code symbology may be disabled for security reasons
- Communications parameters
- Data message options
- Decoding enabled or disabled
- Fully configurable bar code symbologies and their options
- Triggering options.

---

## 4.2 Command Conventions

The following conventions apply when entering configuration commands:

- Actual serial configuration command entries are highlighted in **bold** to distinguish them from descriptive text.
- Spaces shown within command strings must not be included in the actual string; they are for clarity only.
- Commas shown in command strings are used as item separators and are required as place holders; except for trailing commas in abbreviated strings, which are not required.
- Where a selection in a command string is indicated to be more than one character (for example, the time value in the Read Timeout command) commas are never used to separate the characters within that item.

### Command Format

The command format contains the following, with the exception of two commands \*:

- **< data string >**

The data string is the serial command. Send the hexadecimal equivalent of each ASCII value when programming the 3700 from the host. An ASCII conversion chart is provided in Appendix D.

The following three sections, 4.3, 4.4 and 4.5, explain the operational, configuration and configuration status query commands, providing the ASCII and equivalent hex characters for command definitions.

**Note:** *In order to provide compatibility with drivers already written for the SCANTEAM 7300, configuration commands that deal with multiple scanner ports in the SCANTEAM 7300 are also recognized by the SCANTEAM 3700 Machine Mount CCD. These commands may contain port-specific data not relevant to the 3700. This extra data will be accepted, but ignored. These items are identified in the command descriptions by a pound sign (#).*

- \* The two commands, **DC2** and **DC4** for enabling and disabling decoding, do not follow the above command format. They are single character commands which do not need the "<" before or the ">" after the data byte.

---

## 4.3 Operational Commands

Five operational commands recognized by the SCANTEAM 3700 are:

<A> – resets the 3700

DC4 – disables bar code scanning

DC2 – enables bar code scanning

<1> – serial trigger

<Z> – saves current configuration in non-volatile memory.

Explanations, ASCII and hex characters for the operational commands follow.

### Reset Command <A>

<u>COMMAND</u>	<u>ASCII</u>	<u>Hex Characters</u>
Reset	<A>	3C 41 3E

Sending the operational command <A> causes the 3700 to reset. After reset the 3700 will operate according to the last configuration saved in non-volatile memory. If a valid configuration cannot be retrieved from memory, the 3700 will operate according to the default configuration.

### Disable Decoding Command DC4

<u>COMMAND</u>	<u>ASCII</u>	<u>Hex Characters</u>
Disable Decoding	DC4	14

This is a single character command. Sending the operational command DC4 will cause the 3700 to stop looking at bar code data.

### Enable Decoding Command DC2

<u>COMMAND</u>	<u>ASCII</u>	<u>Hex Characters</u>
Enable Decoding	DC2	12

This is a single character command. Sending the operational command DC2 will allow the 3700 to decode according to its current configuration.

**Note:** DC4 and DC2 are ASCII control characters. With a terminal emulation program running on a PC, send a DC4 by holding down the CTRL key while pressing the "T" key. Send a DC2 by holding down the CTRL key while pressing the "R" key.

---

### Serial Trigger Command <1>

<u>COMMAND</u>	<u>ASCII</u>	<u>Hex Characters</u>
Serial Trigger	<1>	3C 31 3E

Sending the operational command <1> sends a serial trigger to scanner port “1.” If the Trigger Mode for Port “1” is set to allow serial triggers, the 3700 enables the Machine Mount CCD and attempts to read a bar code.

Trigger Mode, a configuration command, is described in section 4.4.

### Serial Trigger Command <2>

<u>COMMAND</u>	<u>ASCII</u>	<u>Hex Characters</u>
Serial Trigger	<2>	3C 32 3E

Sending the operational command <2> sends a serial trigger to scanner port “2.” If the Trigger Mode for Port “2” is set to allow serial triggers, the 3700 enables the auxilliary wand input port. The hardware configuration to support this port is optional.

### Save Configuration Command <Z>

<u>COMMAND</u>	<u>ASCII</u>	<u>Hex Characters</u>
Save Configuration	<Z>	3C 5A 3E

Sending the operational command <Z> causes the current configuration to be saved in non-volatile memory.

---

## 4.4 Configuration Commands

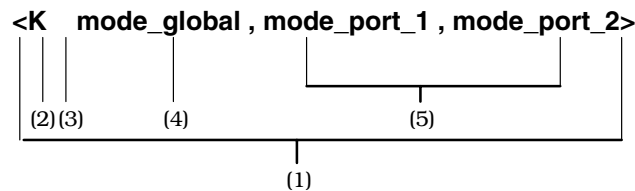
Fifteen configuration commands recognized by the SCANTEAM 3700 are:

- Ka** – sets communication port
- Kd** – sets preamble
- Ke** – sets postamble
- Kf** – sets communications protocol
- Kg** – sets trigger mode
- Kh** – sets read timeout
- Kk** – sets no read message
- Km** – sets votes
- Kp** – sets Code 39
- Kq** – sets Codabar
- Kr** – sets I 2 of 5
- Ks** – sets UPD A/E and EAN 8/13
- Kt** – sets Code 128
- Ku** – sets beeper mode
- Kv** – scan rate

Explanations and ASCII characters for the configuration commands follow.

**Note:** *The commands in this section are shown in ASCII format only. Refer to Appendix D for an ASCII conversion chart.*

### Format for a Configuration Command



- (1) Configuration commands start with “<” and end with “>.”
- (2) Configuration commands include “K” as the start of the command text string. The “K” must be upper case.
- (3) The next letter in the command string defines the function and must be lower case.
- (4) Where applicable, the “mode\_global” portion of the command defines the selection for the particular command (for both scanner inputs) unless specified otherwise in the following mode portions of the command.
- (5) “Mode\_port\_1” and “mode\_port\_2” refer to the configuration for the particular scanner input. The 3700 CCD is port 1, and so is controlled by Mode 1. A second (optional) external digital scanner input is configured as Mode 2.

**Note:** *Default configuration indicated by asterisk “\*” following default configuration. Default options (if applicable) will follow in parenthesis.*

- (6) No more than five (5) seconds may pass between keystrokes or the decoder will not recognize the command as a single string of characters.
- (7) If an incorrect keystroke is entered, end the string with a “>” and enter the string over from the beginning.

---

## Set Communications Port Command Ka

**COMMAND** <Ka baud, parity, stop bits, data bits>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Baud	0	600
	1	1200
	2	2400
	3	4800
	4	9600 *
	5	19,200
Parity	6	38,400
	0	none
	1	even *
Stop Bits	2	odd
	0	one *
Data Bits	1	two
	0	seven *
	1	eight

Sending the configuration command **Ka** sets the communications port parameters. Baud rate, parity, stop bits and data bits may be selected. For example, if you wanted to set the baud rate to 2400, the parity to none, the stop bits to two, and the data bits to eight; you would send the following command: **<Ka 2, 0, 1, 1>**. If you only wanted to set the baud rate to 4800, leaving the other parameters unchanged, you could send the following abbreviated command: **<Ka 3>**. If you only wanted to set the stop bits to two, leaving the other parameters unchanged, you could send the following command: **<Ka , , 1>**. The default setting is 9600 baud, even parity, one stop bit, and seven data bits.

**Tip:** *The **Ka** command does not become effective until the 3700 is reset. Since reset causes the 3700 to use the configuration saved in non-volatile memory, the **Ka** command should be followed by a Save Configuration command **<Z>** and a Reset command **<A>**.*



---

## Set Preamble Command Kd

**COMMAND** <Kd enable, data>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Enable	0	no
	1	yes * (Port ID, Code ID)
Data		one to four ASCII characters

Sending the configuration command **Kd** sets the preamble characters. The preamble option may be enabled or disabled; if enabled, up to four preamble characters may be defined. Any ASCII character can be specified except NUL, ACK, NAK, DC1, DC2, DC3, DC4 or DEL. The character SUB should only be used as the first character in a pair, with the second character being either a 1 or a 2. SUB 1 causes the 3700 to include the Port ID in the preamble, while SUB 2 specifies that the Code ID should be included. Table 4.1 lists the Code ID values. The default setting is preamble enabled, Port ID and Code ID characters sent with data strings.

**Tip:** When character pairs SUB 1 and SUB 2 are specified in the preamble, the SUB characters are not counted toward the maximum number of ASCII characters allowed (four).

Code ID Value	Definition
a	Codabar
b	Code 39
e	Interleaved 2 of 5
j	Code 128
c	UPC
d	EAN
SPACE	No code

**Table 4.1 SCANTEAM 3700 Code ID Values**

---

## Set Postamble Command Ke

**COMMAND** <Ke enable, data>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Enable	0	no
	1	yes * (CR, LF)
Data		one to four ASCII characters

Sending the configuration command **Ke** sets the postamble characters. The postamble option may be enabled or disabled; if enabled, up to four postamble characters may be defined. Any ASCII character can be specified except NUL, ACK, NAK, DC1, DC2, DC3, DC4 or DEL. The character SUB should only be used as the first character in a pair, with the second character being either a 1 or a 2. SUB 1 causes the 3700 to include the Port ID in the postamble, while SUB 2 specifies that the Code ID should be included. Port ID is always 1. Table 4.1 lists the Code ID values. The default setting is postamble enabled, CR and LF characters sent with data strings.

**Tip:** *When character pairs SUB 1 and SUB 2 are specified in the postamble, the SUB characters are not counted toward the maximum number of ASCII characters allowed (four).*

---

## Set Communications Protocol Command Kf

**COMMAND** <Kf mode>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Mode	0	Disable RTS/CTS * Disable XON/XOFF * Disable ACK/NAK *
Mode	1	Enable RTS/CTS Disable XON/XOFF Disable ACK/NAK
Mode	2	Disable RTS/CTS Enable XON/XOFF Disable ACK/NAK
Mode	3	Enable RTS/CTS Enable XON/XOFF Disable ACK/NAK
Mode	4	Disable RTS/CTS Disable XON/XOFF Enable ACK/NAK
Mode	5	Enable RTS/CTS Disable XON/XOFF Enable ACK/NAK
Mode	6	Disable RTS/CTS Enable XON/XOFF Enable ACK/NAK
Mode	7	Enable RTS/CTS Enable XON/XOFF Enable ACK/NAK

Sending the configuration command **Kf** sets the communications protocol. The default setting is Mode 0, with RTS/CTS, XON/XOFF, and ACK/NAK disabled.

---

## Set Trigger Mode Command Kg

**COMMAND** <Kg mode\_global, mode\_port\_1, mode\_port\_2, #>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Mode	0	Continuous Read
Mode	1	Continuous Read, Send Once, Clear on Timeout
Mode	2	External Trigger, Read While Active
Mode	3	External Trigger, Read Once
Mode	4	Serial Trigger
Mode	5	Serial Trigger or External Trigger, Read Once *

Sending the configuration command **Kg** sets the trigger mode. The command string is interpreted left to right. For example, if you send the following command: <**Kg 4, 0**>, both ports will be set to mode 4, then port 1 changes back to mode 0. Likewise, if you send the following command: <**Kg , 0, 4**>, port 1 is set to mode 0 and port 2 is set to mode 4. Both commands have the same end result; port 1 will be in continuous read mode and port 2 will be in serial trigger mode. The default setting is Mode\_global 5, selecting a serial trigger or an external trigger, one read.

**Tip 1:** Careful consideration must be taken when configuring multiple ports to a continuous trigger mode. The 3700 decodes from only one port at a time. With multiple ports triggered, the 3700 will select each in turn and attempt to read. If no bar code label is present at the selected port, the 3700 will wait for read timeout to expire before stepping to the next port. If read timeout is set to a value near or greater than the time it takes a bar code label to pass by a scanner, then the label will often be missed.

## Set Read Timeout Command Kh

**COMMAND** <Kh mode\_global, time\_global, mode\_port\_1, time\_port\_1, mode\_port\_2, time\_port\_2, #, #>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Mode	0	Timeout Ends a Read Attempt * (150)
Time		one to five ASCII digits, range of 10 to 65000

Sending the configuration command **Kh** sets the read timeout. One to five ASCII digits in the range of 10 to 65,000 determine the number of 10ms increments of time that the 3700 will, once triggered, wait while attempting to read from a port. For example, if you wanted to set port 1 to timeout ends a read attempt after 100ms; you would send the following command: <**Kh , , 0, 10**>. Port 2 is not changed. The default setting is Mode\_global 0 and Time\_global 150 (150 x 10 msec = 1.5 seconds).

---

## Set No Read Message Command Kk

**COMMAND** <Kk enable, data>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Enable	0	no
	1	yes * (NR)
Data		one to seven ASCII characters

Sending the configuration command **Kk** sets the no read message. Any ASCII character can be specified except NUL, ACK, NAK, DC1, DC2, DC3, DC4 or DEL. The default setting is NR (no read).

**Tip:** *The No Read Message is not sent for scanner ports that are configured for a continuous trigger mode.*

## Set Votes Command Km

**COMMAND** <Km data\_global, data\_port\_1, data\_port\_2, #>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Data		one or two ASCII digits range of 1 to 31 * (3, 1)

Sending the configuration command **Km** sets the votes. One or two ASCII digits in the range of 1 to 31 determine the number of consecutive identical decodes required for a valid read. A selection of 1 means that no voting will take place. The default setting is Data\_port\_1, 3 and Data\_port\_2, 1, which means voting is set to 3 for port 1 and set to 1 for port 2.

**Tip:** *When using the voting feature for additional decode security, a value of three is generally adequate in most applications.*

---

## Set Code 39 Command Kp

**COMMAND** <Kp enable, require checksum, send checksum, minimum length, maximum length>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Enable	0	no
	1	yes *
Require Checksum	0	no *
	1	yes
Send Checksum	0	no *
	1	yes
Minimum Length		Set from 1 to 48 * (1)
Maximum Length		Set from 1 to 48 * (48)

Sending the configuration command **Kp** sets Code 39 and all its parameters: enable/disable, require checksum, send checksum, minimum length, and maximum length. The default setting is Code 39 enabled, doesn't require or send checksum, minimum length 1, and maximum length 48.

## Set Codabar Command Kq

**COMMAND** <Kq enable, send start/stop, minimum length, maximum length>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Enable	0	no
	1	yes *
Send Start/Stop	0	no
	1	yes *
Minimum Length		Set from 1 to 60 * (6)
Maximum Length		Set from 1 to 60 * (60)

Sending the configuration command **Kq** sets Codabar and all its parameters: enable/disable, send start/stop, minimum length, and maximum length. The default setting is Codabar enabled, send start/stop, minimum length 6, and maximum length 60.

---

## Set I 2 of 5 Command Kr

**COMMAND** <Kr enable, require checksum, send checksum, minimum length, maximum length>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Enable	0	no *
	1	yes
Require Checksum	0	no *
	1	yes
Send Checksum	0	no *
	1	yes
Minimum Length		Set from 2 to 80 * (6)
Maximum Length		Set from 2 to 80 * (80)

Sending the configuration command **Kr** sets I 2 of 5 and all its parameters: enable/disable, require checksum, send checksum, minimum length, and maximum length. The default setting is I 2 of 5 disabled, doesn't require or send checksum, minimum length 6, and maximum length 80.

**Tip 1:** To require a fixed length, set the minimum and maximum lengths to the same value.

**Tip 2:** An Interleaved 2 of 5 symbol must always have an even number of characters encoded in it. However, if you have configured the 3700 to require a checksum but not send the checksum, the 3700 will reduce the number of characters output by one to an odd value. The minimum and maximum lengths will be checked after the checksum is removed and so must be set to allow a symbol length that is one less than actually encoded in the label to be read.

## Set UPC A/E, EAN 8/13 Command Ks

**COMMAND** <Ks enable UPC, enable EAN>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Enable UPC	0	no
	1	yes *
Enable EAN	0	no
	1	yes *

Sending the configuration command **Ks** sets UPC A/E and EAN 8/13 to enable or disable. The default setting is UPC A/E and EAN 8/13 enabled.

---

### Set Code 128 Command Kt

**COMMAND** <Kt enable, minimum length, maximum length>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Enable	0	no
	1	yes *
Minimum Length		Set from 1 to 80 * (1)
Maximum Length		Set from 1 to 80 * (80)

Sending the configuration command **Kt** sets Code 128 and all its parameters: enable/disable, minimum length, and maximum length. The default setting is Code 128 enabled, minimum length 1, and maximum length 80.

### Set Beeper Mode Command Ku

**COMMAND** <Ku mode\_global, mode\_port\_1, mode\_port\_2, #>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Mode	0	Disable beeper *
Mode	1	Enable beeper on valid read
Mode	2	Enable beeper on failed read

Sending the configuration command **Ku** sets the beeper mode. For example, if you wanted to enable the beeper for good reads on port 1; you would send the following command: <**Ku** , 1>. The default setting is Mode\_global 0, with beeper disabled.

### Set Scan Rate Command Kv

**COMMAND** <Kv rate, reserved, reserved>

<u>Parameter</u>	<u>ASCII</u>	<u>Option</u>
Rate	0	50 scans per second
Rate	1	100 scans per second
Rate	3	200 scans per second

The **Kv** command has been retained in the 3700 for compatibility with the SCANTEAM 3600, but the 3700 scan rate is fixed at the time of manufacture and cannot be changed by the **Kv** command. The <**Kv**?> status request (see next section) will report the scan rate setting.



---

## 4.5 Configuration Status Query Commands

The configuration status query commands are used to obtain a status listing of the configuration command selections. You may request a listing of the entire series of individual configuration status messages or you may request the status of a single configuration status message be output to your host system or terminal. Descriptions and ASCII characters for the configuration commands follow.

**Note:** *The commands in this section are shown in ASCII format only. Refer to Appendix D for an ASCII conversion chart.*

The following command causes the entire series of individual configuration status messages to be output to the host system:

`<?>` – configuration query.

Fifteen configuration status query commands recognized by the SCANTEAM 3700 are:

- `<Ka?>` – communications port status
- `<Kd?>` – preamble status
- `<Ke?>` – postamble status
- `<Kf?>` – communications protocol status
- `<Kg?>` – trigger/enable mode status
- `<Kh?>` – read timeout status
- `<Kk?>` – no read message status
- `<Km?>` – votes status
- `<Kp?>` – Code 39 status
- `<Kq?>` – Codabar status
- `<Kr?>` – Interleaved 2 of 5 status
- `<Ks?>` – UPC, EAN status
- `<Kt?>` – Code 128 status
- `<Ku?>` – beeper status
- `<Kv?>` – scan rate status

Each configuration query will cause the current status of the selected option to be output in a format identical to the configuration command string itself, except that global fields are excluded. For example, if the trigger mode\_global is set to 5 `<Kg?>` will result in `<Kg , 5, 5>` being output by the 3700.

Except for the Communication Port Command, configuration commands take effect immediately upon receipt by the 3700. Therefore most configuration commands can be verified as having been received by the 3700 by immediately following the command with a status query. For the Communications Port Command to become effective, the command must be followed by a `<Z><A>` (save configuration and reset the 3700 commands) since the port is only initialized upon a reset. Since the 3700 reports the current configuration of the port itself, the status query `<Ka?>` will not indicate if a Communications Port Configuration Command has been received correctly until the `<Z><A>` has been received.

All status output strings will include the current preamble and postamble. Thus if the preamble is set to DC1 and the postamble to DC3 then a postamble status query `<Ke?>` will result in the output string `DC1<Ke1,DC3>DC3`. The receiving system must be able to handle the embedded DC3 and not treat it as the termination of the string.

---

## 4.6 Default Operating Parameters

The SCANTEAM 3700 is configured at the Hand Held Products factory with standard (default) operating parameters. The default configuration can be used as is or changed (reconfigured) by downloading new parameters over an RS-232 communications line from a host instrument. The default configuration settings are listed below.

### Default Configuration Settings

- ACK / NAK                      Disabled
- Baud Rate                      9600
- Beeper Mode                    Disable beeper
- Data Bits                        7
- No Read Message              “NR”
- Parity                            Even
- Postamble                       CR LF
- Preamble                        Port ID Code ID
- Read Timeout                  Timeout ends a read attempt, 1.5 seconds
- RTS/CTS                        Disabled
- Stop Bit                         1
- Trigger Mode                  Serial Trigger or External Trigger, Read Once
- Votes                            Voting set to 3 for port 1 and set to 1 for port 2
- XON/XOFF                      Disabled

### Default Configuration: Symbology Settings

- Codabar                        Enabled
  - Send Start/Stop            Yes
  - Minimum Length            6
  - Maximum Length            60
- Code 39                        Enabled
  - Require Checksum            No
  - Send Checksum               No
  - Minimum Length             1
  - Maximum Length             48
- Code 128                       Enabled
  - Minimum Length             1
  - Maximum Length             80
- I 2 of 5                        Disabled
  - Require Checksum            No
  - Send Checksum               No
  - Minimum Length             6
  - Maximum Length             80
- UPC A/E, EAN 8/13            Enabled

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## 5.1 Maintenance

The Hand Held Products SCANTEAM 3700 Machine Mount CCD Bar Code Scanner and Decoder is designed to provide reliable and efficient operation, requiring no routine maintenance. The 3700 has no moving physical parts. Convection air flow serves to cool the unit. Maintenance, therefore is related to troubleshooting and replacement of the 3700 Machine Mount CCD.

Troubleshooting procedures are described in the following section. Section 5.4 provides procedures for removing and replacing a SCANTEAM 3700 Machine Mount CCD.

## 5.2 Troubleshooting Guide

This section describes procedures for identifying problems that prevent the SCANTEAM 3700 from operating normally. Field repair procedures include the following:

- Power supply troubleshooting
- 3700 Machine Mount CCD troubleshooting

### 5.2.1 Troubleshooting Hints

If there is no power to the 3700 Machine Mount CCD, check the following:

- Host power supply output to the 3700. Check that the output voltage from the host is +5 VDC. If the voltage isn't present or is out of range, there may be a problem with power distribution from the host system. Appendix B provides the specific voltage range.
- If there is no output voltage, check to be sure the host instrument power switch is set to "ON"; if this switch is on and there is no output voltage, there may be a problem with the host power supply.
- Check all cables for secure connections and continuity (with an ohm/volt/meter).

**Warning:** Only a qualified person should attempt to replace a power supply.

## 5.2.2 Diagnostic Procedure

The SCANTEAM 3700 Machine Mount CCD may be reset to the last saved configuration parameters by issuing a Reset Command. (A list of these parameters may be found on in section 4.6 and C.4.)

- To perform a Reset Command, send an <A> serial command to the 3700. This action causes all data in memory to be erased and the current user configuration parameters to be loaded from non-volatile memory. In the absence of a user configuration, the default configuration is loaded into memory. This action allows the user to clear memory of any corrupt data from scanned data.

## 5.2.3 Troubleshooting Checklist

Problem	Possible Cause	Solution
3700 does not scan.	<ol style="list-style-type: none"> <li>1) Loose I/O communications cable.</li> <li>2) Trigger mode not configured correctly.</li> <li>3) Not triggered.</li> </ol>	<ol style="list-style-type: none"> <li>1) Connect cable.</li> <li>2) Configure the 3700 for the proper trigger mode and read timeout value.</li> <li>3) Provide trigger consistent with the trigger mode configuration.</li> </ol>
3700 is not reading bar code.	<ol style="list-style-type: none"> <li>1) Bar code symbol type is disabled.</li> <li>2) Symbol length is out of range.</li> <li>3) Symbol does not contain a valid checksum character.</li> <li>4) Bar code is bad, damaged or out of spec.</li> <li>5) Window is scratched or dirty.</li> </ol>	<ol style="list-style-type: none"> <li>1) Enable the symbology.</li> <li>2) Configure the 3700 for correct length.</li> <li>3) Configure the 3700 to not require checksum or use a label with a valid checksum.</li> <li>4) Replace bar code.</li> <li>5) Clean window.</li> </ol>
Beeper does not come on.	<ol style="list-style-type: none"> <li>1) 3700 is not decoding.</li> <li>2) Good read is disabled.</li> </ol>	<ol style="list-style-type: none"> <li>1) See “3700 is not reading bar code.”</li> <li>2) Configure the 3700 for desired good read operation.</li> </ol>
Data is not transmitted.	<ol style="list-style-type: none"> <li>1) Loose I/O communications cable.</li> <li>2) 3700 is waiting for clear to send (CTS).</li> <li>3) 3700 is waiting for XON.</li> </ol>	<ol style="list-style-type: none"> <li>1) Connect cable.</li> <li>2a) Have the receiving equipment generate CTS.</li> <li>2b) Disconnect CTS signal allowing the 3700 to force CTS to the active state.</li> <li>3a) Send an XON to the 3700.</li> <li>3b) Configure the 3700 to disable XON.</li> </ol>
Data message is missing or garbled.	Baud rate, parity, stop bits or data bits is wrong.	Configure the 3700 for the proper communications parameters.

**Table 5.1 SCANTEAM 3700 Troubleshooting Checklist**

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### 5.3 Obtaining Factory Service

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

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

#### **Main Office**

#### **Welch Allyn Data Collection, Inc. (d/b/a Hand Held Products)**

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 Hand Held Products' representative (at the address that follows) or your local distributor.

#### **European Office**

#### **Hand Held Products, Ltd.**

Hondsruglaan 87 D  
5628 DB Eindhoven  
The Netherlands

Telephone: Int+ 31 40 242 4486

Fax: Int+ 31 40 242 5672

#### **United Kingdom Office**

#### **Hand Held Products (UK) Ltd.**

Dallam Court  
Dallam Lane  
Warrington  
Cheshire WA2 7LT  
United Kingdom

Telephone: Int+44 (0) 1 925 240055

or Int+353 1 216 0070

Fax: Int+44 (0) 1 925 631280

or Int+353 1 295 6353

For service in Asia, please contact your Hand Held Products' representative (at the address that follows) or your local distributor.

#### **Asia/Pacific Office**

#### **Hand Held Products**

10/F Tung Sun Commercial Centre  
194-200 Lockhart Road  
Wanchai, Hong Kong

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

Fax: Int+852-251-1355

For service in Japan, please contact your Hand Held Products' representative (at the address that follows) or your local distributor.

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**Japan Office**  
**Hand Held Products**

Bon Marusan 8F  
3-5-1 Kanda-Jinbocho  
Chiyoda-ku  
Tokyo 101, Japan

Telephone: Int+81-3-5212-7392  
Fax: Int+81-3-3261-7372

For service in Latin America, please contact your Hand Held Products' representative (at the address that follows) or your local distributor.

**Latin America Office**  
**Hand Held Products**

5150 North Tamiami Trail  
Suite 302  
Naples, FL 34103-2821

Telephone: (941) 263-7600  
Fax: (941) 263-9689

## 5.4 Help Desk

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

**North America:**

Telephone: (315) 685-2476 (8 a.m. to 6 p.m. EST)  
Fax number: (315) 685-4960  
*E-mail: support@handheld.com*

**Europe:**

Telephone—  
European Ofc: Int+31 40 242 4486  
U.K. Ofc: Int+44 1925 240055  
*E-mail: support@handheld.com*

**Asia:**

Telephone: Int+852-2511-3050 or 2511-3132  
*E-mail: support@handheld.com*

### 5.3.1 Service Under Warranty

All Welch Allyn bar code products carry a one (1) year warranty (from date of shipment). The specific Limited Warranty coverage for the SCANTEAM 3700 Machine Mount CCD is described near the end of this manual. Warranty service may be obtained by contacting the Welch Allyn Customer Service Group.

### 5.3.2 Out Of Warranty Service

Factory service is also available for out of warranty products on a time and materials or fixed price basis. The scanner/decoder should be returned (postage paid) for repair only after obtaining a Return Material Authorization (RMA) from a Customer Service Representative. When out of warranty product service is required, you will be advised of a “not to exceed” price for repair when the Return Material Authorization is requested.

---

The following information is required to process an RMA for the product and should be available for the Service Representative. It is located on the manufacturers label attached to the box the SCANTEAM 3700 was shipped in.

Model Number  
Serial Number  
Date of Manufacture

**Note:** *The Welch Allyn Customer Service Group cannot accept materials that are returned without an RMA number.*

When out of warranty service is required the Customer Service Representative will request a Purchase Order Number in the amount of the “not to exceed” price for repair. However, customers will be billed only for the actual service costs.

## 5.4 SCANTEAM 3700 Removal/Replacement

The application intention of the 3700 makes it a component of the host controlled instrument. Power to the host system must be turned off before removing the 3700 Machine Mount CCD. Removing the 3700 involves reversing the steps that you followed during installation (Chapter 3).

**Caution:** **Some circuits in the 3700 Machine Mount CCD are sensitive to electrostatic discharge. Be sure you are properly grounded before removing the 3700 from the host system.**

**Note:** *Set the host instrument power switch to the “OFF” position.*

**Step 1:** Disconnect the data communications/power cable between the 3700 Machine Mount CCD and the host system (see Chapter 2, Figure 2.2 for the exact location of the port on the 3700).

**Step 2:** Using a screwdriver, remove the mounting screws, if applicable, from the 3700 Machine Mount CCD.

**Step 3:** Remove the 3700 Machine Mount CCD and place it immediately into an antistatic container or an antistatic bag.

This completes the 3700 Machine Mount CCD removal procedure. For replacement instructions, please follow the set-up and installation procedures in Chapter 3.





# CCD OPERATION AND BAR CODE SCANNING **A**

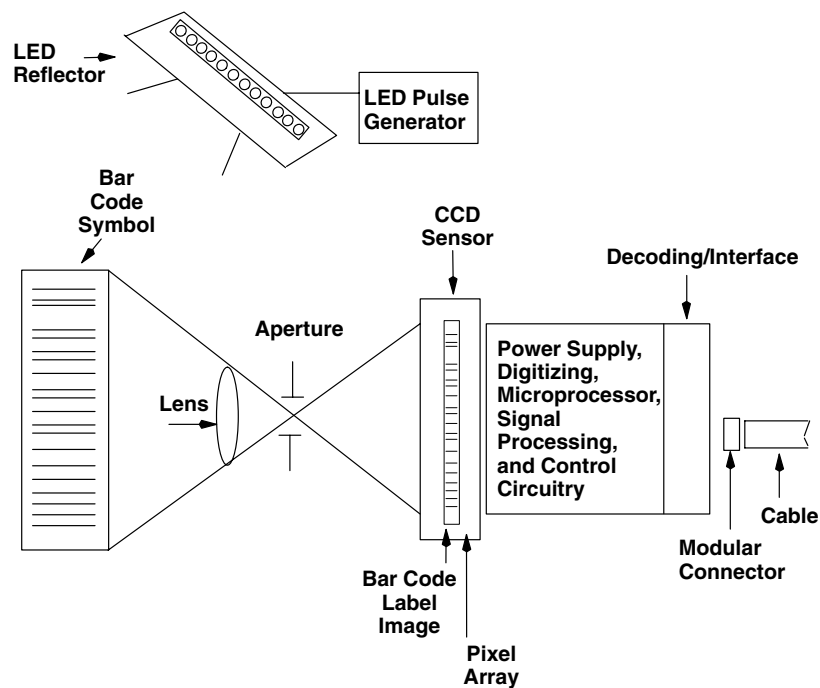
## A.1 Objectives

This appendix describes:

- Reading and decoding a bar code symbol.
- Overview of how the SCANTEAM 3700 works, including a scanner diagram with the main decoding elements listed.
- In-depth discussion of the operation of the scanner, including a block diagram and discussion of the internal parts of the scanner, and a timing sequence diagram.
- Bar code basics and scanning tips.

## A.2 Scanning and Decoding a Bar Code Symbol

The body of the SCANTEAM 3700 houses all the scanning elements, and decoding/interface elements. Refer to Figure A.1.



**Figure A.1 Main Elements of the 3700 CCD Bar Code System**

The SCANTEAM 3700 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 pixels of the CCD (Charged Coupled Device).
  4. The CCD converts the returned light 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 being 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 a successful decode is complete, a beeper is sounded (if enabled to indicate a Good Read). The decoded information is transmitted to the host.
  8. Depending upon the trigger chosen, the scanner either continuously initiates another scan cycle or waits for the next trigger to scan.

#### **LED Reflector**

The bar code symbol is illuminated with a bank of LEDs with a proprietary reflector. The LEDs are pulsed, strobing illumination, to stop relative motion of the scanner and the label.

#### **CCD Sensor**

The optical energy scattered from the bar code symbol is focused with a custom lens onto the pixel array of the CCD sensor.

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.

#### **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.

## Microprocessor

The microprocessor controls the generation of timing signals required for the operation of the SCANTEAM 3700 device. Additionally it monitors the digital output of the device, configures the operating parameters sent through serial commands (as required), and decodes the scanned bar code data.

## Timing Sequence

Figure A.2 illustrates the timing sequence for the SCANTEAM 3700.

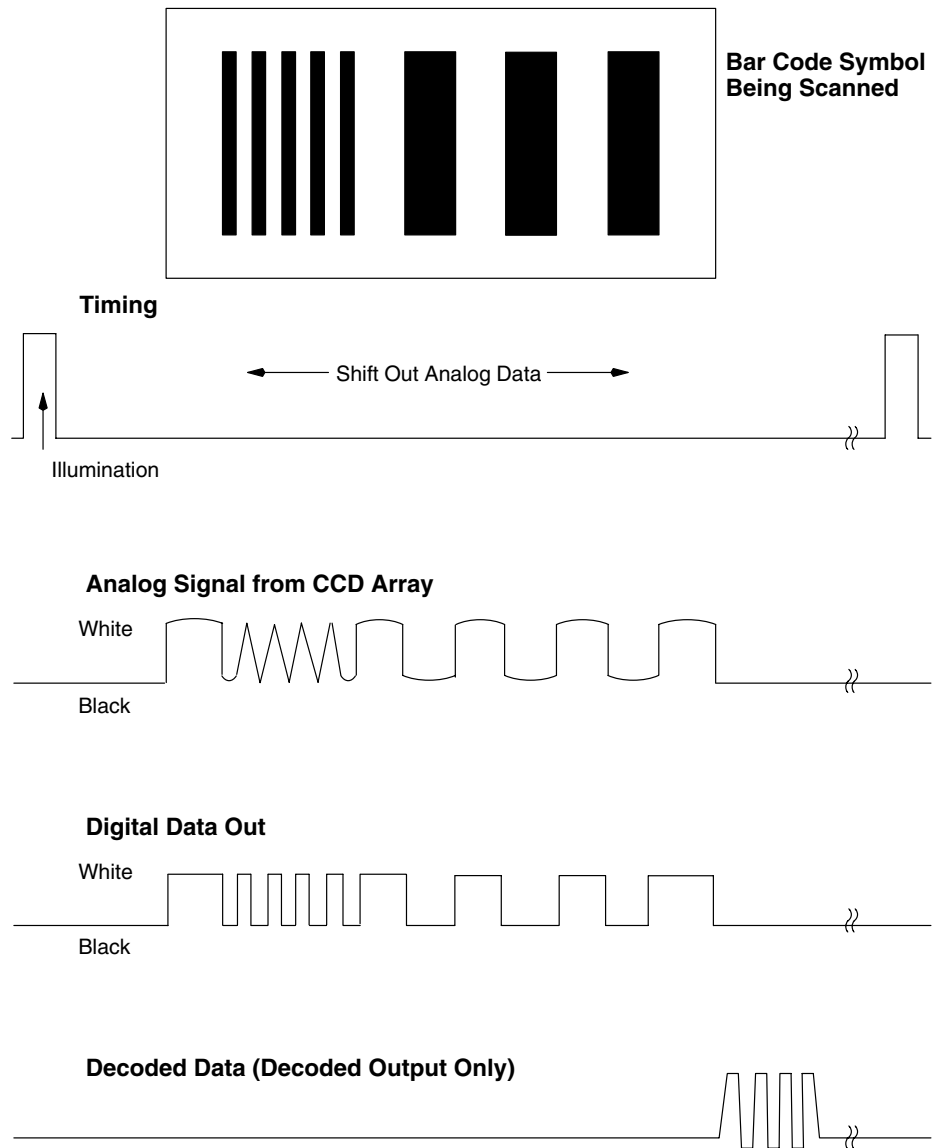


Figure A.2 SCANTEAM 3700 Timing Sequence

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## A.3 Bar Code Basics and Scanning Tips

### A Closer Look At Bar Code Symbols

The illustration at the right shows a typical bar code symbol. If you look at it closely, you'll see it is composed of a series of dark lines (bars) and white areas (spaces) of various widths. By arranging these bars and spaces in a certain order, it is possible to represent, or "encode" letters, words and numbers.



You may also print the numbers represented by the bar code symbol on the label. These human readable characters allow you to know exactly what information the scanner is sending to the register or terminal. The human readable characters under the bar code symbol also allow you to key in information in case the bar code symbol is not readable.

The blank area located just before and just after the bar space pattern is called the "quiet zone." It is placed on the symbol so the scanner knows exactly where the bar code begins and ends. It is important to remember where the quiet zone is located so you can scan accurately.

### Bar Code Scanning

The purpose of the bar code scanner is to "read" the image formed by the bars and spaces. A signal sends the information printed on the bar code symbol to the terminal.

Several types of scanners are in use today. The most common types include the wand scanner, the laser scanner, and the CCD scanner. All scanners use optical systems which are protected by "windows" at the scanning end to read the bar code symbol. On wand scanners, the window is located in the tip. Laser and CCD scanners have a larger and more noticeable viewing "window." It is important to keep these optics clean, because just like the lenses on reading glasses, if they become dirty, scratched or smudged, they won't work properly.

If your scanner is attached to a decoder (or it is also a decoder), the decoder may have a beeper that will let you know when a scan has been performed properly and that the bar code has been read accurately. After you've scanned a symbol, listen for a single beep, (called a "good read" beep). This lets you know that the bar code information has been received by the terminal. If you don't hear the single beep or if you hear several beeps, it means the symbol is unacceptable to the decoder, and the terminal has not received the bar code information. If that happens, try scanning the symbol again.

Before using any scanner, make sure the symbol is of good quality and that the optic area of your scanner is clean. Any dirt or specks in the bar code symbol or on the scanner optics may prevent it from reading accurately. Even a symbol that is smudged during printing, or gets wrinkled when it is applied to an object can cause a reading problem. If you can't get a good read beep or you begin to receive error beeps, be sure to check the scanner optics and the symbol. The decoder may need to enable the beeper, either with a hardware configuration or with a software command.

## B.1 Scanner Performance

The SCANTEAM 3700 performance has been measured in terms of the first bar elongation/contraction and inner bar (space) elongation/contraction when scanning Welch Allyn test targets. If you need more information on these measurements, contact your Welch Allyn representative.

## B.2 Optical Specifications

**Scanning Direction:** Single Line (Unidirectional)

**Scan Rate:** 100 scans per second  
See chart below.

Scan Speeds Scans/Second	Approximate Lateral Scan Speed	
	Inch/Sec	mm/Sec
100	375	9500

**Lateral Motion Sensitivity:** 5 inches per second (254mm/sec)

**Scan Width:** 2.4 inches [61mm] at contact  
3.5 inches [89mm] maximum

---

**Focal Distance (selected at time of order) from scanner window:**

<b>Focal Distance</b>	<b>Maximum Scan Width</b>
0.6 inches [15mm]	with a 3 inch [76mm] maximum scan width
1.95 inches [50mm]	with a 3.5 inch [89mm] maximum scan width
3.2 inches [81.3mm]	with a 3.5 inch [89mm] maximum scan width

**MRD (minimum reflective difference):** 37.5%

**Tilt Angle:** Controlled by bar code length and height  
(See Figure 3.4)

**Skew Angle:** +30 to -30 degrees (See Figure 3.4)  
Specular reflection zone 0 to -10 degrees  
(Operation in this zone must be avoided.)

**Pitch Angle:** +7 to -7 degrees on 7.5 mil (See Figure 3.4)

**Light Source (Illumination):** Visible Red LED (Wavelength = 645 nm  $\pm$ 30)

**CCD Type** Standard Resolution/Standard Performance  
Standard Resolution/Enhanced Performance  
High Resolution/Enhanced Performance

## B.3 Electrical Specifications

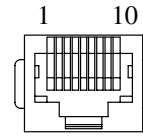
<b>Operating Voltage:</b>	+5V±5% *
<b>Operating Current:</b>	170 to 250 mA, * depending on scan rate for Standard Resolution/Enhanced Performance CCD type

\* Power for the SCANTEAM 3700 is provided by the host system.

### Communications Port Connector Pin Assignments:

See chart below.

#### 10-Pin Modular Connector Communications Port



Pin	Signal	Function
1		
2	Shield	Cord Shield
3	Trigger/Enable *	Trigger Signal to Decoder Scanner Enable (Input)
4	Ground	System Ground
5	RX Data	Receive Data (Input)
6	TX Data	Transmit Data (Output)
7	VCC	+5VDC Power (Input)
8	RTS	Ready to Send (Output)
9	CTS	Clear to Send (Input)
10		

\* State depends on use

### Hardwire Option:

See chart below.

#### Four Pads for Hardwire to 3700 Motherboard

Pin	Signal	Function
1	BTS	Bootstrap
2	DIG IN	Second Scanner Input
3	DEFAULT	Reset
4	IND	Good Read

---

**Indicators:** Beeper.  
See descriptions below.

**Beeper**

The good read/no read beeper indicator is configurable and can be disabled, if desired.

## B.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 3000 meters)

**ESD:** 15 KV \*

\* A drain path for ESD should be provided when installing a 3700 in the host system.

**Shock (Drop Test):** Sustains three (3) drops from 4 feet (1.2 meters) to a non-yielding surface

**Mean Time Between Failure (Ground Benign):** 45,000 hrs. minimum  
(will vary among models)

## B.5 Mechanical Specifications

**3700:** **Width:** 3.5 Inches (89mm)  
**Length:** 2.9 Inches (75mm)  
**Height:** 1.05 Inches (26mm)

**Interface Cables:** 1) Welch Allyn p/n 42204595-01  
Input/Output cable with 25 pin connector.

**Note:** A null modem is required for connection to a DTE type port.

**Mounting Holes:** Four #6-32 UNC-2B (M3.5)  
(Alternate dimensions available.)



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## **B.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 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.

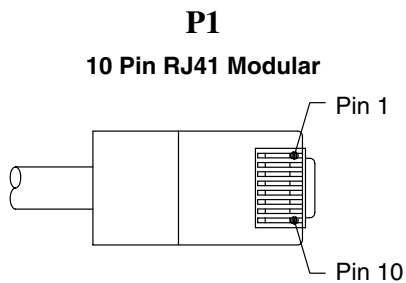
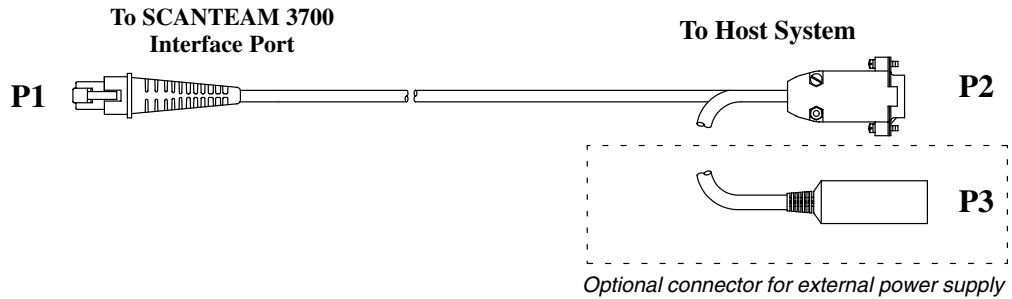
### **Tolerance**

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.

## B.7 SCANTEAM 3700 Interface Cable

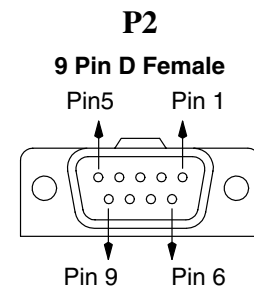
Cable part number: 42205204-01 or 42205204-02 (external power required)

*Caution: Do not substitute any other Welch Allyn serial interface cable.*



### Connector Pinouts

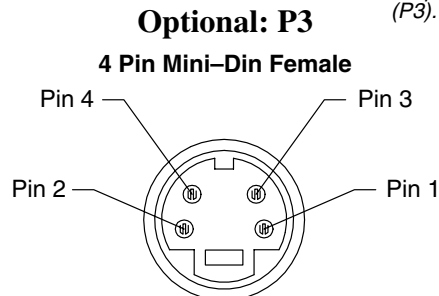
1	
2	Shield/Drain
3	TRIG – Trigger/Enable (input)
4	GND– Ground
5	RX – Receive Data (input)
6	TX – Transmit Data (output)
7	VCC (+5VDC – input)
8	RTS – Ready to Send (output)
9	CTS – Clear to Send (input)
10	



### Connector Pinouts

1	TRIG
2	TX
3	RX
4	Unused
5	GND
6	Unused
7	CTS
8	RTS
9	VCC or Unused*
Shell	Shield/Drain

\*Pin 9 is unused if an external power supply is used (P3).



### Connector Pinouts

1	VCC
2	GND
3	Unused
4	Unused
Shell	Shield/Drain

## C.1 Configuration Commands

The following is a summary of configuration commands sent by the host system. More details are provided in Section 4.4, Configuration Commands.

**Note:** *These commands may contain port-specific data not relevant to the SCANTEAM 3700 machine mount CCD. This extra data will be accepted, but ignored. These items are identified in the command descriptions by a pound sign (#).*

<u>Command</u>	<u>Format</u>
Set Communications Port Command	<Ka baud, parity, stop bits, data bits>
Set Preamble Command	<Kd enable, data>
Set Postamble Command	<Ke enable, data>
Set Communications Protocol Command	<Kf mode>
Set Trigger Mode Command	<Kg mode_global, mode_port_1, mode_port_2, #>
Set Read Timeout Command	<Kh mode_global, time_global, mode_port_1, time_port_1, mode_port_2, time_port_2, #, #>
Set No Read Message Command	<Kk enable, data>
Set Votes Command	<Km data_global, data_port_1, data_port_2, #>
Set Code 39 Command	<Kp enable, require checksum, send checksum, minimum length, maximum length>
Set Codabar Command	<Kq enable, send start/stop, minimum length, maximum length>
Set I 2 of 5 Command	<Kr enable, require checksum, send checksum, minimum length, maximum length>
Set UPC A/E, EAN 8/13	<Ks enable UPC, enable EAN>
Set Code 128 Command	<Kt enable, minimum length, maximum length>
Set Beeper Mode	<Ku mode_global, mode_port_1, mode_port_2, #>

---

## C.2 Operational Commands

The following is a summary of operational commands sent by the host system. More details are provided in Section 4.3, Operational Commands.

<u>Command</u>	<u>Format</u>
Reset Command	<A>
Disable Scanning Command	DC4
Enable Scanning Command	DC2
Serial Trigger Command	<1>
Save Configuration Command	<Z>

## C.3 Configuration Status Query Commands

The following is a summary of configuration status query commands sent by the host system. More details are provided in Section 4.5, Configuration Status Query Commands.

<u>Command</u>	<u>Format</u>
Configuration Query * <?>	
* Causes the entire series of individual status messages to be output.	
Individual Configuration Query	<K*?>
* Stands for the letter of the individual configuration command. Causes a single configuration status message to be output.	

To determine the current configuration status for an individual configuration command section use the appropriate query string indicated below:

<u>Command</u>	<u>Format</u>
Communications Port Status	<Ka?>
Preamble Status	<Kd?>
Postamble Status	<Ke?>
Communications Protocol Status	<Kf?>
Trigger/Enable Mode Status	<Kg?>
Read Timeout Status	<Kh?>
No Read Message Status	<Kk?>
Votes Status	<Km?>
Code 39 Status	<Kp?>
Codabar Status	<Kq?>
I 2 of 5 Status	<Kr?>
UPC, EAN Status	<Ks?>
Code 128 Status	<Kt?>
Beeper Status	<Ku?>
Scan Rate	<Kv?>

---

## C.4 Default Configuration Settings

The following is a summary of default configuration settings.

### Configuration Command Default Settings

ACK / NAK	Disabled
Baud Rate	9600
Beeper Mode	Disable beeper
Data Bits:	7
No Read Message	“NR”
Parity	Even
Postamble	CR LF
Preamble	Port ID Code ID
Read Timeout	Timeout ends a read attempt, 1.5 seconds
RTS/CTS	Disabled
Stop Bit:	1
Trigger Mode	Serial Trigger or External Trigger, Read Once
Votes	3 votes for port 1 and 1 vote for port 2
XON/XOFF	Disabled

### Symbology Configuration

### Default Settings

Codabar	Enabled
Send Start/Stop	Yes
Minimum Length	6
Maximum Length	60
Code 39	Enabled
Require Checksum	No
Send Checksum	No
Minimum Length	1
Maximum Length	48
Code 128	Enabled
Minimum Length	1
Maximum Length	80
EAN 8/13	Enabled
I 2 of 5	Disabled
Require Checksum	No
Send Checksum	No
Minimum Length	6
Maximum Length	80
UPC A/E	Enabled



# ASCII CONVERSION TABLE

# D

BIT NUMBERS						0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1		
b <sub>7</sub>	b <sub>6</sub>	b <sub>5</sub>	b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	COLUMN								
ROW							0	1	2	3	4	5	6	7	
			0	0	0	0	0	NUL	DLE	SP	0	@	P	'	p
			0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
			0	0	1	0	2	STX	DC2	"	2	B	R	b	r
			0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
			0	1	0	0	4	EOT	DC4	\$	4	D	T	d	t
			0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
			0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
			0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
			1	0	0	0	8	BS	CAN	(	8	H	X	h	x
			1	0	0	1	9	HT	EM	)	9	I	Y	i	y
			1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
			1	0	1	1	11	VT	ESC	+	;	K	[	k	{
			1	1	0	0	12	FF	FS	,	<	L	\	l	
			1	1	0	1	13	CR	GS	-	=	M	]	m	}
			1	1	1	0	14	SO	RS	.	>	N	^	n	~
			1	1	1	1	15	SI	US	/	?	O	_	o	DEL

**CONTROL FUNCTION DEFINITIONS**

NUL	Null, or all zeros	DC1	Device control 1
SOH	Start of heading	DC2	Device control 2
STX	Start of text	DC3	Device control 3
ETX	End of text	DC4	Device control 4
EOT	End of transmission	NAK	Negative acknowledge
ENQ	Enquiry	SYN	Synchronous idle
ACK	Acknowledge	ETB	End of transmission block
BEL	Bell, or alarm	CAN	Cancel
BS	Backspace	EM	End of medium
HT	Horizontal tabulation	SUB	Substitute
LF	Line Feed	ESC	Escape
VT	Vertical tabulation	FS	File separator
FF	Form feed	GS	Group separator
CR	Carriage Return	RS	Record separator
SO	Shift out	US	Unit separator
SI	Shift in	SP	Space
DLE	Data link escape	DEL	Delete





# SCANTEAM 3700 GLOSSARY

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**AIM-** is the Automatic Identification Manufacturers, Inc. AIM is an industry organization that supports the application of all varieties of automatic identification technology including bar codes. An important contribution has been AIM's efforts to standardize bar code symbologies and the way they are identified in data communication.

**Algorithm-** is a finite set of rules to solve a problem in a measurable number of steps. It is a predetermined numerical calculation which is permanently programmed into the data system's memory to provide a desired result (bar code decoding, for example).

**Ambient Light Immunity-** describes the ability of a scanner to maintain its specified scanning ability in the presence of external light sources. Usually, scanners are specified for incandescent, florescent, and sunlight.

**Analog-** (used in contrast to Digital) describes a signal whose amplitude is directly proportional to the physical factors responsible for the signal. An example of this is an optical sensor's output depicting the bars and spaces of a bar code as it "sees" it.

**ASCII-** is an acronym for the American Standard Code for Information Interchange. It is a data communications protocol for data transmission between an originating and a destination interface. 128 coded characters are included, comprising 96 noncommunications data characters and 32 control characters. It should be noted that most bar code symbologies are unable to encode the full ASCII set.

**Asynchronous Serial Communication-** is a form of data communication transmission which occurs without a regular or predictable time relationship. The transmission of data characters is one at a time.

**Autodiscriminates-** refers to the ability of the SCANTEAM 3700 to recognize and decode multiple bar code symbologies.

**Bar code-** is an array of parallel bars and spaces arranged in a predetermined pattern to represent data elements called characters.

**Baud Rate-** is a means of expressing data transmission speed, where "baud" equals the number of signal events per second (roughly equivalent to bits per second).

**Beam Velocity-** is the speed of a laser's scanning beam on the target.

**Bidirectional-** refers to the ability of a scanner to scan a bar code in either a left-to-right or right-to-left direction.

**Bit-** is a contraction of "binary digit," the smallest unit of information used in data processing.

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**Buffer**– refers to a storage facility in a data communications system which can compensate for a difference in time or rate of data transmission.

**Byte**– is a group of 8 bits handled as a unit.

**Character (Bar code)**– is group of bars and spaces which represents a single number, letter, mark or other graphic element.

**Check Character or Digit**– is a special character which is part of the bar code and can be generated by an algorithm, and used to insure data integrity. When transmitted, the same algorithm can be used by the host on the data characters and this independent calculation can be compared to the transmitted check character. This procedure can also be accomplished wholly within the decoder. Often the check character is not transmitted because it is not a data character.

**Codabar Start and Stop Enabled**– is a decoder option. When enabled, the capital letters representing the start and stop characters will be included in the data message.

**Code ID**– is a letter that designates the symbology which has been decoded. The Code ID can be included in the data preamble or postamble to identify the scanned symbology to the host device. Welch Allyn has a standard set of lower case Code ID's. These are given in Table 4.2. See also Port ID.

**Code 39 Check Character Included**– is a decoder option. When enabled with Code 39 check character required, the check character will be confirmed and included in the data message.

**Code 39 Check Character Required**– is a decoder option. When enabled, Code 39's checksum will be calculated and confirmed for a valid read.

**(Host) Computer**– is the data system's controlling processor which interfaces with the decoder (either directly or through a multiplexer) and other system elements to receive their data outputs and command their functions.

**Decoder**– (bar code) is a microprocessor based electronic device which translates the electrical signals from a bar code scanner into recognizable or computer compatible data.

**Decoding Enabled**– is a decoder option that allows the decoding of an individual bar code symbology to be enabled or disabled.

**Density (Bar code)**– refers to the number of characters in a linear inch of bar code.

**Depth of Field**– refers to the range of distances over which a scanner can accurately digitize barcode. This distance is measured from the front of the scanner at the exit window and is dependent on code size, contrast, and quality. Depth of field is equal to the far distance minus the near distance ( $\Delta$  distance).

---

**Digital**– (used in contrast to Analog) describes a coded squarewave signal (processed from an analog signal) which is utilized by decoding circuitry. Digital bar code is generally square wave pulses (0 to 5 volts) with widths which depict the bar and space widths in the code.

**DIP**– is an acronym for “dual in–line pins,” a type of integrated circuit package. DIP components are used with through–hole or viahole circuit board technology.

**Exit Window**– is the optical opening through which the laser beam, or other method of illumination, leaves the scanner.

**Far Distance**– is the farthest distance that a scanner can accurately digitize a given bar code.

**Field Width**– is the window width. Refers to the greatest width of bar code label that can be successfully interpreted.

**Firmware**– is a term for software which is permanently designed into a data system device (such as a bar code decoding algorithm) to provide special programs and service routines.

**Focal Distance**– is the distance of highest resolution in front of the scanner window.

**Host Computer**– refers to the data system’s controlling processor which interfaces with the decoder and other system elements to receive their data outputs and command their functions.

**Interleaved 2 of 5 Check Digit Included**– is a decoder option. When enabled with Interleaved 2 of 5 check digit required, the check digit will be confirmed and included in the data message.

**Interleaved 2 of 5 Check Digit Required**– is a decoder option. When enabled, Interleaved 2 of 5’s checksum will be calculated and confirmed for a valid read.

**Laser Enable**– is a scanner input signal that controls the flow of power to the scanner. Usually this signal will control all the scanning functions in the scanner.

**LED**– is an acronym for “light emitting diode.”

**Marker Beam**– refers to a visual indicator that an infrared laser beam is present. The marker beam is an aid to pointing a hand–held or set up a machine mount scanner. This beam is not necessary for the optical performance of the laser scanner.

**Message Length**– refers to the number of characters in the data message decoded from a bar code label.

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**Minimum and Maximum Message Lengths**– refers to how the various symbologies may be restricted in code length to minimize the chances of misreading a bar code. By setting the message length, the decoder will count the data characters plus any others (start/stop, check digit, etc.) and only accept those bar code reads that fall within the set message length parameters. The default values of the minimum and maximum message lengths are indicated in section 4.4 under the specific configuration commands for setting the bar code symbologies.

**Near Distance**– is the nearest distance that a scanner can accurately digitize a given bar code.

**No Read, Non-read, Non-scan**– is the absence of data at the scanner output after an attempted scan due to no code, defective code, scanner failure or operator error.

**Non-volatile**– refers to the characteristic of a device which allows it to retain data in memory when power is lost or turned off.

**Optical Axis**– is a line extending from the center of the exit window to the midpoint of the usable scan length.

**Parity**– is a means of checking character bit patterns for validity by confirming if they contain an Even or Odd number of “1”s.

**PLCC**– is an acronym for “plastic leaded chip carrier,” a type of integrated circuit package. PLCC components are used in surface mount circuit board technology.

**Port**– refers to the electrical connector on a decoder, computer or other system component through which data is transmitted or received.

**Port ID**– is a number that designates the scanner port from which a bar code signal has been decoded. The Port ID can be included in the data preamble or postamble to identify the scanner input port to the host device. The Port ID numbers are given in Table 4.1. See also Code ID.

**Protocol**– refers to a set of procedures for establishing and controlling data transmissions.

**Quiet Area**– is an area of clear space, containing no dark marks, which precedes the start character of a symbol and follows the stop character. Also known as Quiet Zone.

**RS-232-C**– is a set of rules which govern the transfer of data between Data Terminal Equipment (DTE) and Data Communications Equipment (DCE), effected through 25 pin plug-in connectors. This standard applies to both synchronous and asynchronous transmissions at speeds up to 20K bps (bits/sec) in full or half-duplex modes.

**Scan Enable**– is a scanner input signal that controls the flow of power to the scanner. Usually this signal will control all the scanning functions in the scanner.

---

**Scan Rate**– is the number of times a laser’s scanning beam passes through the exit window in one second.

**Scan Velocity**– is the speed of a laser’s scanning beam on a target at a given distance from the front of the scanner or rotating polygon mirror. Usually expressed in inches/sec.

**Scan Width**– is the length of the widest bar code label that can be successfully interpreted by the scanner.

**Scanner**– is an opto–electronic device which produces electrical signals representing the light it detects as it “sees” a bar code.

**SMT**– is an acronym for “surface mount technology.”

**Specular Reflection Zone** – The zone where light from the scanner’s illumination source is reflected directly back into the scanner. Specular reflection interferes with the scanner’s operation. This zone should be avoided.

**Start/Stop Characters**– are characters used at the beginning and end of a bar code label that indicate the start and stop (end) of the label.

**Trigger**– is a signal input to the decoder that the scanning process should be initiated. The actual trigger mechanisms can be a push button switch, photoelectric control, internal object sense, proximity sensor, or multiple combinations of all of these.

**Usable Scan Length**– refers to that portion of the scan path for which the scanner can accurately digitize bar code and maintain all its specifications. This length is specified on a flat surface which is perpendicular to the optical axis of the scanner.

**Volatile**– refers to the characteristic of a device which loses data in memory when power is lost or turned off.

**Voltage Range**– refers to the specified range of voltages over which a decoder or a scanner can maintain all of its electrical, optical (for scanners), and environmental specifications.

**Voting**– is a feature of the SCANTEAM 3700 set by using the Set Votes Configuration Command, **Km**. If the Voting selection is set to more than 1, the SCANTEAM 3700 decodes and compares consecutive outputs from the scanner(s); successive reads of the same data are required for a valid read. Voting results in a slightly slower read rate, but will reduce the probability of reading errors when a laser scanner, especially, is being used. If the Voting selection is set to 1, only one laser scan resulting in a successful decode is required for a valid read.



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## SCANTEAM 3700 LIMITED WARRANTY

Welch Allyn, Inc., hereby warrants its Machine Mount CCD Scanner to be functional and free from manufacturing defects at the time of delivery. Welch Allyn, Inc. further warrants that it will replace or repair, at its option, any unit that fails to perform according to Welch Allyn's published specifications during a period of one (1) year from the time of shipment by Welch Allyn, Inc. to the user or the time it is purchased from any of Welch Allyn Inc.'s Authorized Distributors. Any attempt on the part of the user to disassemble or service the wand, except for tip replacement, shall void the warranty.

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