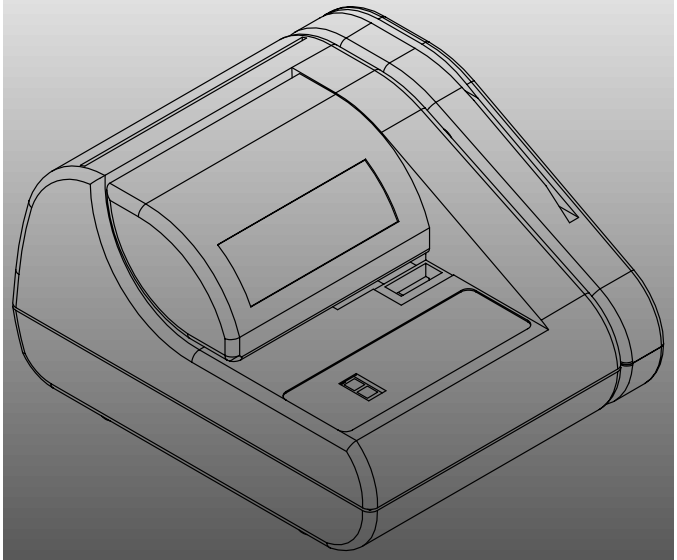
Welch Allyn

SCANTEAM® 8300 SERIES

Check Reader
8300/8310



Technical Manual

STATEMENT OF AGENCY COMPLIANCE

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Class B Compliance Statement

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

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

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

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

Canadian Notice

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

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

CE

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

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

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Limited Warranty

TABLE OF CONTENTS

Statement of Agency Compliance
Disclaimer
Limited Warranty

Chapter 1 Introduction to the SCANTEAM 8300 Check Reader

Section *Page*

1.1 Introduction 1–1
1.2 Operational Example 1–2

Chapter 2 Physical Description, Illustrations, and Operation

Section *Page*

2.1 Chapter Description 2–1
2.2 Physical Specifications 2–1
2.3 SCANTEAM 8300 Product Illustrations 2–2
2.4 SCANTEAM 8300/8310 Set-up and Installation 2–5
2.4.1 Unpacking the Check Reader 2–5
2.5 Set-up 2–6
2.5.1 Host-Powered Installations 2–6
2.5.2 Externally-Powered Installations 2–9
2.6 Check Reading Procedure 2–16

Chapter 3 Hardware Interface Description

Section *Page*

3.1 Chapter Description 3–1
3.2 DB-15F Host Port Connector 3–1
3.2.1 Model 8300-1: DB-15 Pin Assignment 3–2
3.2.2 Model 8300-2: DB-15 Pin Assignment 3–3
3.2.3 Model 8300-4: DB-15 Pin Assignment 3–4
3.3 Auxiliary RS-232 Ports 3–5
3.4 Magnetic Stripe Card Reader Port 3–6
3.5 Bar Code Scanner Port 3–6
3.6 SCANTEAM 8300/8310 Operating Power Requirements 3–8
3.6.1 Keyboard Wedge Applications 3–9
3.6.2 RS-232 Output Configurations 3–9
3.6.3 Power Requirements for IBM 468X/469X POS/ECR Direct Connect 3–10
3.6.4 Power Requirements for OCR Direct Connect 3–10
3.6.5 Wand Emulation Applications 3–10

Chapter 4 Software Operation

Section *Page*

4.1 Chapter Description 4–1
4.2 Host Port Interface Compatibility 4–1
4.2.1 SCANTEAM 8300-1 IBM 468X/469X and Retail Configuration 4–2
4.2.2 SCANTEAM 8300-2 Retail (Non-IBM) and Commercial 4–3
4.2.3 SCANTEAM 8300-4 Retail: Series RS-232 (PC-POS) and IBM 468X/469X 4–3
4.2.4 RS-232 Host Communication Parameters: 4–5
4.3 Serial RS-232 Aux Port Functionality 4–5
4.4 Communication Protocols 4–6
4.4.1 End of Record and 60ms Timeout 4–7
4.4.2 Tranz™ 330 Protocol 4–8
4.4.3 Zon™ Jr. Protocol 4–9
4.4.4 Host Command Protocol 4–10
4.5 Magnetic Stripe Card Reader Interface 4–11
4.6 Bar Code Scanner Symbology 4–12
4.7 Displaying the Firmware Part Number and Revision Level 4–12
4.7.1 PC Upload/Download Using Quick*Load 4–13

Chapter 5 MICR Data Processing

Section *Page*

5.1 MICR Character Recognition 5–1
5.2 MICR Line Data Parsing 5–1
5.2.1 MICR Format Exception Table 5–2
5.3 MICR Data Formatter 5–3
5.4 Output Data Formatter 5–4
5.4.1 Output Data Formatter Command Set 5–6
5.5 MICR Character Signal Strength Testing 5–7
5.6 Error Condition Reporting 5–7
5.6.1 SCANTEAM 8300 LED Display Error Codes 5–7

Chapter 6 Maintenance

Section *Page*

6.1 Paper Transport and MICR Read Head 6–1
6.2 Plastic Cabinet 6–1
6.3 Magnetic Stripe Card Reader (MSR) 6–1

Chapter 7 Service and Repair

Section *Page*

7.1 Obtaining Factory Service 7–1
7.1.1 Service Under Warranty 7–1
7.1.2 Out of Warranty Service 7–1

Chapter 8 Specifications

Section *Page*

8.0 Summary of SCANTEAM 8300/8310 Specifications 8–1

Appendix A SCANTEAM 8310 Information

Section *Page*

A.1 Chapter Description A–1
A.2 Physical Specifications A–1
A.3 SCANTEAM 8310 Product Illustrations A–2
A.4 Set-up A–5
A.4.1 Host-Powered Installations A–5
A.4.2 Externally-Powered Installations A–6
A.5 SCANTEAM 8310 Hardware Interface A–13
A.5.1 DB-15F Host Port Connector A–13
A.6 SCANTEAM 8310 Software Operation A–14
A.6.1 RS-232 Host Communication Parameters: A–14
A.6.2 Communication Protocols A–15
A.6.3 Displaying the Firmware Part Number and Revision Level A–18
A.6.4 PC Upload/Download Using Quick*Load A–18
A.7 MICR Data Formatter A–19
A.7.1 Error Condition Reporting A–19
A.7.2 Pre-Canned Format 10 - Error Code Reporting A–21

Appendix B Introduction to MICR Check Reading and MICR Technology

Section *Page*

B.1 MICR Definition and Techniques B–1
B.2 MICR Fonts B–2
B.2.2 The E13-B Character Set B–2
B.2.3 The CMC-7 Character Set B–2
B.3 Information Fields on an E13-B Character Based Check B–3
B.3.1 Micr Line Fields - Location and Content B–5
B.4 Reference Documents B–6

List of Illustrations

Figure *Page*

Figure 1 SCANTEAM 8300
(Shown with Optional Integrated MSR) 2–2

Figure 2 Rear View of the SCANTEAM 8300
(Shown with Optional Integrated MSR
and Scanner Port) 2–3

Figure 3 Bottom View of the SCANTEAM 8300
(Shown with Optional Integrated MSR
and Second Auxiliary Port) 2–4

Figure 4 Disassembly of the SCANTEAM 8300 2–10

Figure 5 SCANTEAM 8300 Power Jumper Placement 2–11

Figure 6 SCANTEAM 8300 PC Board 2–12

Figure 7 Optional Power Jumper Placement for the
SCANTEAM 8300 PC Board 2–13

Figure 8 Feeding a MICR Document
into the SCANTEAM 8300/8310 2–16

Figure 9 SCANTEAM 8310 . . . . . A–2

Figure 10 Rear view of the SCANTEAM 8310 . . . . . A–3

Figure 11 Bottom view of the SCANTEAM 8310 . . . . . A–4

Figure 12 Disassembly of the SCANTEAM 8310 . . . . . A–8

Figure 13 SCANTEAM 8310 Power Jumper Placement A–9

Figure 14 SCANTEAM 8310 PC Board A–10

INTRODUCTION TO THE SCANTEAM 8300/8310 CHECK READER 1

1.1 Introduction

The SCANTEAM 8300/8310 check reader is a peripheral device which attaches to a Point of Sale Terminal, PC, credit/debit authorization terminal or other intelligent "host" device. The SCANTEAM 8300/8310 reads the Magnetic Ink Character Recognition (MICR) data from a paper check and transmits that data to the host device. Refer to Appendix B for MICR technology information.

In addition to providing MICR character recognition, the SCANTEAM 8300 provides interface port expansion to the host device to which it is attached. The SCANTEAM 8300 allows MICR, magnetic stripe reader (MSR), bar code scanner, and up to two channels of auxiliary RS-232 data to be concentrated and attached to a single physical interface port or keyboard interface on a host device.

For many host device types, the SCANTEAM 8300/8310 draws its operating power directly from the host device to which it is attached, making an external power pack unnecessary.

Note: *Most information for the check reading functions of the SCANTEAM 8300 are also applicable to the SCANTEAM 8310. The SCANTEAM 8310 only reads MICR data from checks, and provides no additional MSR, auxiliary or scanner ports. For detailed information specific to the SCANTEAM 8310, please see Appendix A.*

1.2 Operational Example

The SCANTEAM 8300/8310 can be used by an operator to automatically acquire and transfer data from the MICR line on a personal check to the POS terminal which is being used for a retail transaction.

The SCANTEAM 8300/8310 is faster than manual keying and eliminates errors which can be made when keying data manually. Instead of entering the MICR data using the keyboard, the sales associate places a check into the SCANTEAM 8300/8310 document tray. The SCANTEAM 8300/8310 senses the presence of the check in the document tray, automatically moves the check past an MICR read head, performs all required data manipulation, and electronically transfers the check data to the host POS device.

PHYSICAL DESCRIPTION, ILLUSTRATIONS, AND OPERATION 2

2.1 Chapter Description

This chapter describes:

- Physical specifications of the SCANTEAM 8300
- Unpacking the SCANTEAM 8300/8310
- Product illustrations and disassembly instructions
- Installing the SCANTEAM 8300 with either host-power or external-power
- Reading checks

Note: *Please refer to Appendix A for Physical Specifications and Set-up of the SCANTEAM 8310. All other information in this chapter is applicable to both the SCANTEAM 8300 and the SCANTEAM 8310.*

2.2 Physical Specifications

Case Material Type:	ABS Plastic enclosure UL 94 V-0 flame rating
Rear Panel Material Type:	Stainless steel
Dimensions (no MSR):	4.08 in (10.4 cm) wide x 5.75 in (14.6 cm) deep x 3.43 in (8.71 cm) high
Dimensions (with MSR):	4.71 in wide x 5.75 in (14.6 cm) deep x 3.43 in (8.71 cm) high
Color:	Pantone #413C, IBM Pearl White
Weight:	1.25 lb (567 g) max (not including power pack)
Mounting Options:	Desktop, or wall mount (check insertion from top or bottom) via bi-directional keyholes molded into enclosure case bottom.

2.3 SCANTEAM 8300 Product Illustrations

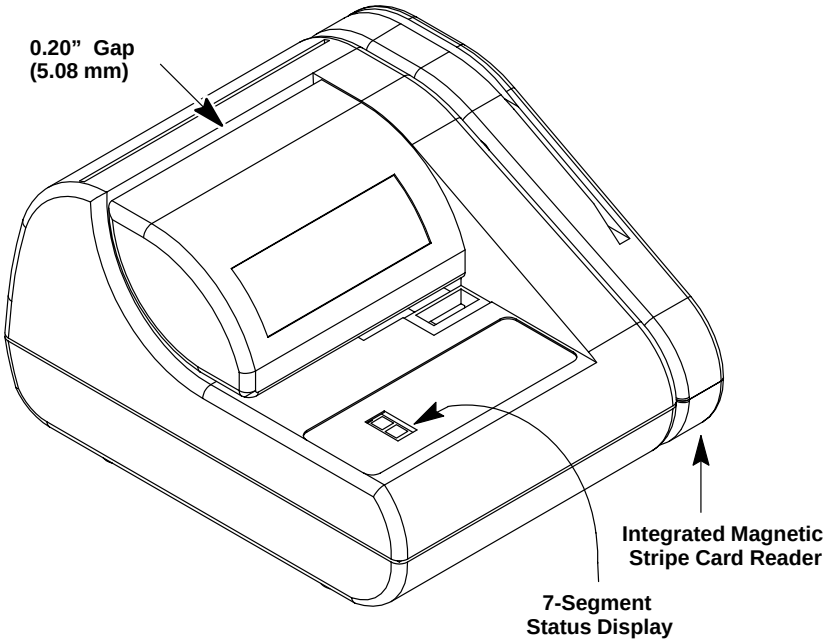


Figure 1 SCANTEAM 8300
(Shown with Optional Integrated MSR)

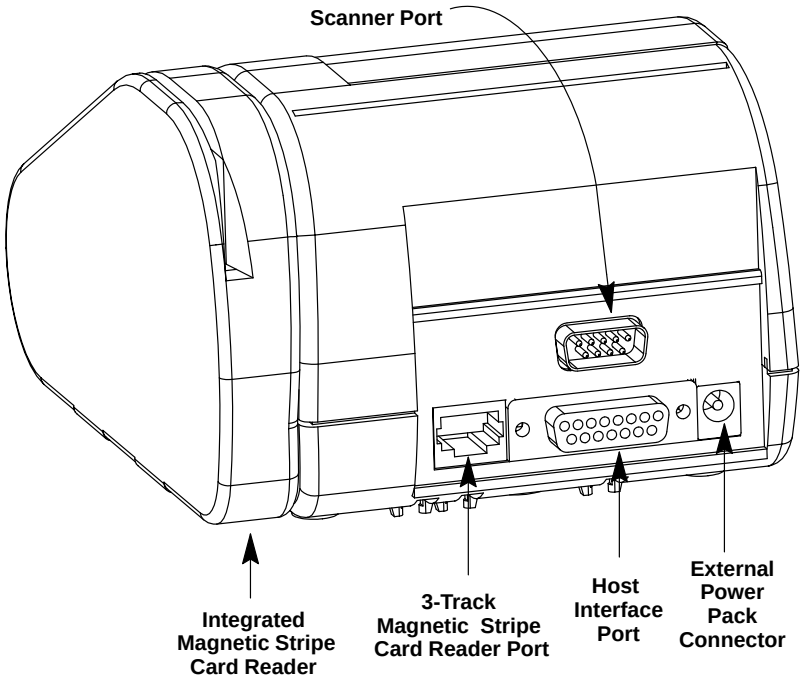


Figure 2 Rear View of the SCANTEAM 8300 (Shown with Optional Integrated MSR and Scanner Port)

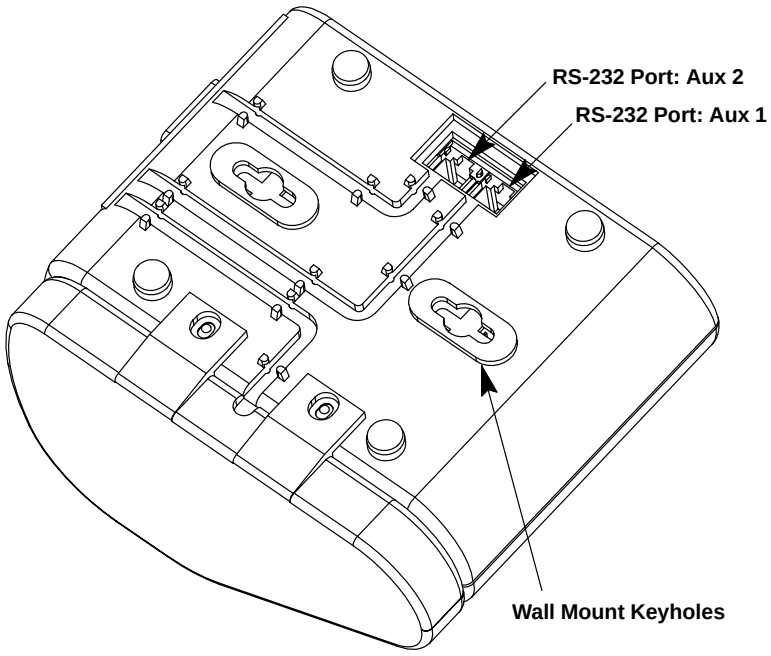


Figure 3 Bottom View of the SCANTEAM 8300 (Shown with Optional Integrated MSR and Second Auxiliary Port)

2.4 SCANTEAM 8300/8310 Set-up and Installation

2.4.1 Unpacking the Check Reader

Remove the check reader, interface cable(s) and any optional components from the shipping carton. Check the contents of the carton against the packing list to make sure everything you ordered is present. Keep the shipping carton. You should use the shipping carton if you ever need to return the reader for servicing.

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

Insure that the plastic MICR head cover is properly snapped in place and is fully seated flush against the right side wall of the document tray. When properly attached, the gap in the front and rear between the MICR head cover and the main SCANTEAM 8300 enclosure (which allows for MICR document entrance and exit) is a fixed dimension of approximately 0.20 inches.

To insure proper operation and prevent possible damage to the SCANTEAM 8300 check reader or terminal, you should perform the following installation procedures in the sequence in which they are presented.

2.5 Set-up

Caution: The SCANTEAM 8300 contains static sensitive components. Precautions must be taken to eliminate potential static discharge to any printed circuit board.

Note: *SCANTEAM 8300 Power Architecture:*
The SCANTEAM 8300 is shipped from the factory with an internal jumper set to allow the check reader to operate from power supplied by a host device through the DB-15 host interface connector. Refer to section 2.5.2 on page 2–9 if you plan to operate the SCANTEAM 8300 using external power supplied by a wall or desk mount power pack.

Note: *Scanner Port Power:*
The optional bar code scanner port on the SCANTEAM 8300 and the Auxiliary RS-232 ports are configured to support +5 volt DC bar code scanning and peripheral devices unless you have specifically ordered a custom SCANTEAM 8300 product configuration. Contact your Welch Allyn Sales Coordinator if you require the SCANTEAM 8300 to support bar code scanning and peripheral devices which require a supply voltage other than +5 VDC.

2.5.1 Host-Powered Installations

Typically, serial RS-232 interface connections to the SCANTEAM 8300 are not powered by the host device and require the use of an external source of DC power, such as a wall mount AC/DC power transformer. If your installation requires external power, please follow the "Externally Powered Installation" instructions on page 2−9.

Some configurations do provide host power. Keyboard wedges, IBM 468X and 469X series direct connect configurations, and bar code scanner port attachments are typical host-powered interface installations. Use the following procedure for installations in which the power for the SCANTEAM 8300 (and any peripherals attached to it) is provided by the host device.

Installation Instructions

(1) Turn off the power for the host device to which the 8300 will be connected.

(2) Locate the SCANTEAM 8300 host device interface cable and verify its part number. (Cable part numbers are provided in the Welch Allyn Interface Products Work Center (IPWC) Interface/Cable Matrix, part number 11208627, document.)

(3) Attach the SCANTEAM 8300 interface cable to the host terminal.

(4) Plug the 15-pin male connector of the interface cable into the 15-pin female connector located on the back panel of the 8300. Secure the cable to the SCANTEAM 8300 using the mounting screws included on the interface cable.

Note: *For IBM 468X/469X installations, steps (5) and (6) below are replaced by the following procedure:*

Attach the end of the SCANTEAM 8300 interface cable containing the modular "SDL" connector into the appropriate physical connector on the rear panel of the host IBM POS device.

(5) Disconnect the keyboard from the terminal (display) and insert it into the mating connector on the short leg of the "Y" interface cable.

(6) Complete the cabling procedure by inserting the remaining long leg of the "Y" interface cable into the terminal keyboard connector. (The connector from which the keyboard cable was removed.)

(7) Position the 8300 so that all cables run freely and smoothly. If desired, the 8300 can be secured to the wall using pan head screws which attach into the key holes molded into the bottom of the SCANTEAM 8300.

(8) If you have ordered the bar code scanner port option, plug the scanning device (either a CCD scanner, moving beam laser, or hand held wand) into the 9-pin male squeeze D connector on the SCANTEAM 8300 rear panel. The scanning device cable clicks into place when properly seated in the connector port.

(9) If you are using an external TTL output magnetic stripe card reader (such as a Welch Allyn SCANTEAM 6901/X series product), plug the reader into the 8-pin modular connector on the SCANTEAM 8300 rear panel.

Note: *If you have ordered the SCANTEAM 8300 check reader with the integrated magnetic stripe card reader option installed, the output cable from the integrated MSR will be attached to the MSR port on the SCANTEAM 8300 rear panel at the factory.*

(10) If you are using an auxiliary RS-232D input device, plug the connector of the Aux port cable into the connector labeled **Aux1** or **Aux 2** on the bottom of the SCANTEAM 8300. Route the RS-232 interface cable through the molded raceway on the bottom of the SCANTEAM 8300 chassis. Connect the other end of the cable to the RS-232D input device.

(11) Apply power to the SCANTEAM 8300's host terminal. The green LED status display should flash a series of numeric characters which indicate the revision level of the firmware contained in the SCANTEAM 8300. (See "Displaying the Firmware Part Number and Revision Level" on page NO TAG.)

After successfully performing power-up /initialization tests and displaying the firmware revision number, the SCANTEAM 8300 issues a single beep and displays an upper case "0" on its status display indicating the SCANTEAM 8300 is in a non-error condition, idle state.

Caution: Do not try to enter data until the host terminal has fully initialized.

2.5.2 Externally-Powered Installations

Usage Restrictions

The SCANTEAM 8300 may be operated by power supplied by an external wall or desk mount power pack only under either of the following conditions:

1. Use of External Power (EP) Host Interface Cable:
   If the host interface cable used to attach the SCANTEAM 8300 to a host device does not contain conductors which supply power from the host device to the SCANTEAM 8300, that cable is referred to as an "External Power" (EP) cable. Note that most serial RS-232 cables are EP cables unless specified otherwise.

2. Internal Power Jumper Set for External Power:
   If the internal power jumper on the SCANTEAM 8300's printed circuit board is set for external power, the SCANTEAM 8300 may be operated from an external power source regardless of the use of host power or external power (EP) host interface cables.

Note: *The SCANTEAM 8300's factory default jumper setting is for host power.*

Note: *Use of an external power pack without the use of the proper EP cable, or without the SCANTEAM 8300 jumper set to the EP position, may damage your host device.*

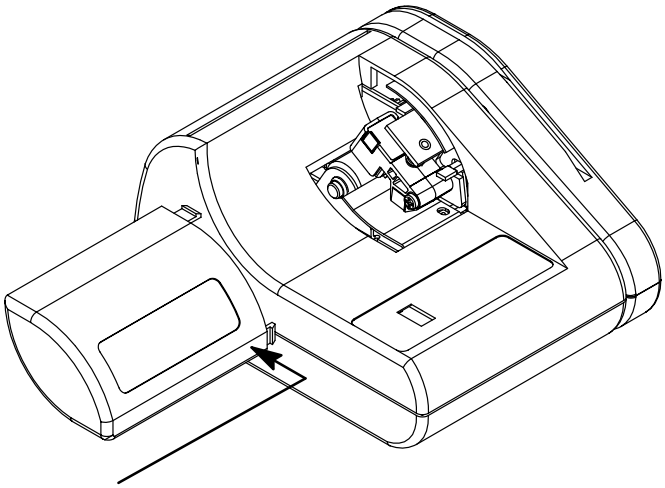
Set-up Procedure for External Power

Use the following procedure for installations in which the power operating the SCANTEAM 8300 (and any peripherals attached to it) is provided by an external power source. An external-power installation requires the use of a wall mount AC/DC power transformer or other source of DC power to the check reader.

When using an external power supply in conjunction with a host interface cable which provides host power, you must make a jumper change to a 3-pin header on the SCANTEAM 8300's PC board. (The default configuration assumes a host-powered application.) The following illustrations show the disassembly of the SCANTEAM 8300 and the optional power jumper placement for an externally powered installation.

Note: *Before disassembling the SCANTEAM 8300 you must disconnect all power and host terminal connections to the reader to prevent possible damage to the SCANTEAM 8300 or host terminal. In addition, you should ground yourself (e.g., wear a groundstrap) to prevent any electrostatic discharge to the SCANTEAM 8300.*

To gain access to the power jumpers, first remove the hood of the SCANTEAM 8300, as shown below.



1 **Press gently at this point to release tabs. Slide hood away from unit.**

Figure 4 Disassembly of the SCANTEAM 8300

Once the hood is removed, the power jumpers on the JP2, JP4 and JP3 3-pin headers are accessible using small, needle-nosed pliers.

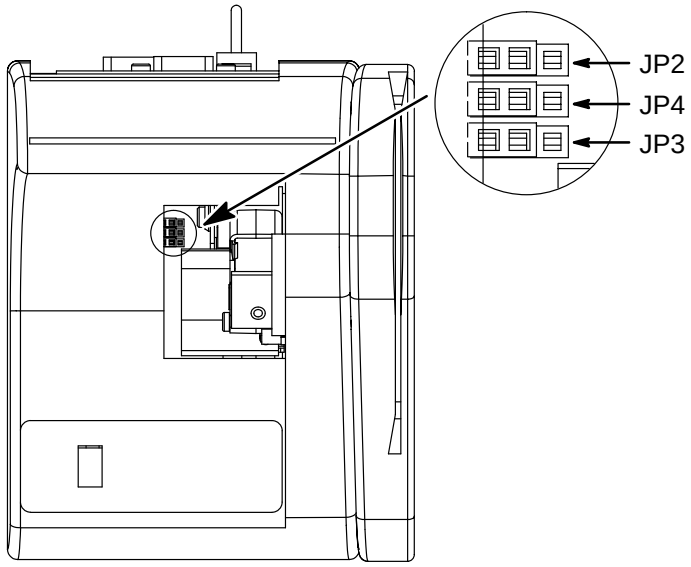


Figure 5 SCANTEAM 8300 Power Jumper Placement

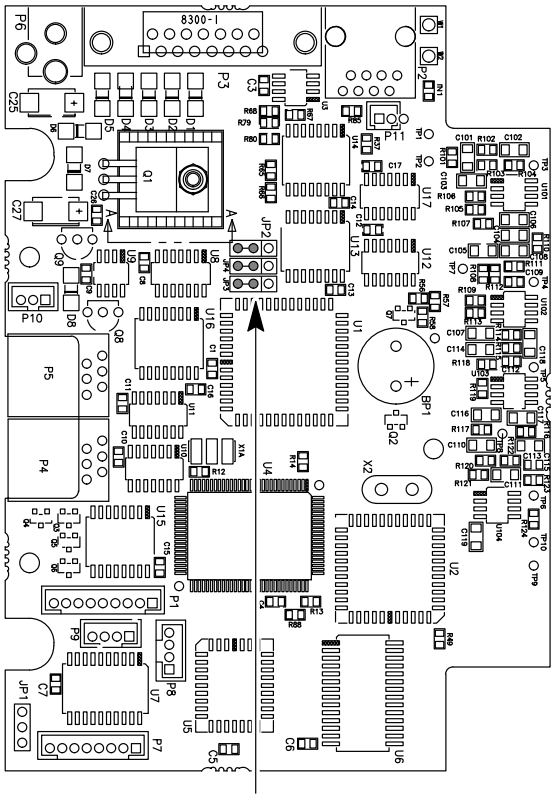


Figure 6 SCANTEAM 8300 PC Board

Note: *Please see page 2–13 for optional power jumper placements.*

Note: *This PC board complies with European CE standards, and is contained in SCANTEAM 8300 products which are marked "CE" on the bottom product label. Please contact Welch Allyn technical support for details concerning jumper position and placement for products which do not contain the CE mark.*

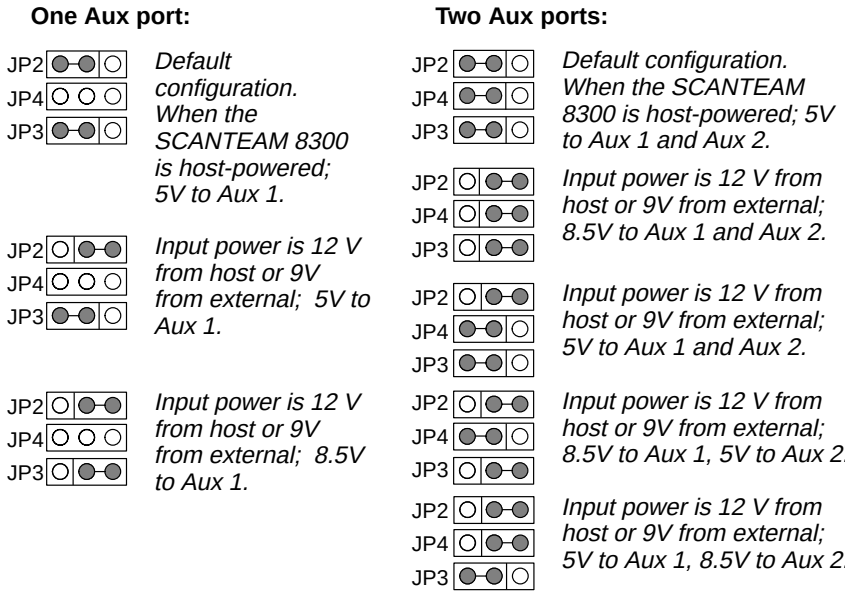


Figure 7 Optional Power Jumper Placement for the SCANTEAM 8300 PC Board

Once the PC Board has been configured for an externally-powered installation, and the SCANTEAM 8300 is reassembled and reconnected, continue with the Installation Instructions below.

Installation Instructions

(1) Turn off the power for the host device to which the 8300 will be connected.

(2) Locate the interface cable and verify its part number. (Cable part numbers are provided in the Welch Allyn Interface Products Work Center (IPWC) Interface/Cable Matrix document.)

(3) Attach the SCANTEAM 8300 interface cable to the host terminal.

(4) Plug the 15-pin male connector of the interface cable into the 15-pin female connector located on the back panel of the 8300. Secure the cable to the SCANTEAM 8300 using the mounting screws included on the interface cable.

(5) Position the 8300 so that all cables run freely and smoothly. If desired, the 8300 can be secured to the wall using pan head screws which attach into the key holes molded into the bottom of the SCANTEAM 8300. (A wall mounting bracket consisting of an aluminum plate with pan head screws and a velcro attaching kit is available from Welch Allyn under part number "8300WALL.")

Caution: You must keep the SCANTEAM 8300/8310 away from sources of EMI/EMC radiation, such as power supplies.

Note: You can program the 8300/8310 to detect magnetic interference. Refer to the 8300 and 8310 Programming Menus, under Output Parameters, Magnetic Sniffer.

(6) If you have ordered the bar code scanner port option, plug the scanning device (either a CCD scanner, moving beam laser, or hand held wand) into the 9-pin male squeeze D connector on the SCANTEAM 8300 rear panel. The scanning device cable clicks into place when properly seated in the connector port.

(7) If you are using an external TTL output magnetic stripe card reader (such as a Welch Allyn SCANTEAM 6901/X series product), plug the reader into the 8-pin modular connector on the SCANTEAM 8300 rear panel.

Note: *If you have ordered the SCANTEAM 8300 check reader with the integrated magnetic stripe card reader option installed, the output cable from the integrated MSR will be attached to the MSR port on the SCANTEAM 8300 rear panel at the factory.*

(8) If you are using an auxiliary RS-232D input device, plug the connector of the Aux port cable into the connector labeled **Aux1** or **Aux 2** on the bottom of the SCANTEAM 8300. Route the RS-232 interface cable through the molded raceway on the bottom of the SCANTEAM 8300 chassis. Connect the other end of the cable to the RS-232D input device.

(9) Insure that the external power supply is not connected to an AC power source. Connect the external power supply to the SCANTEAM 8300 by plugging the power supply's output barrel connector plug into the mating barrel connector jack located on the rear panel of the SCANTEAM 8300.

(10) Apply power to the SCANTEAM 8300's host terminal.

(11) Plug the wall mount power supply into the source of AC power. The green LED status display should flash a series of numeric characters which indicate the revision level of the firmware contained in the SCANTEAM 8300. (See "Displaying the Firmware Part Number and Revision Level" on page NO TAGNO TAG.)

After successfully performing power-up /initialization tests and displaying the firmware revision number, the SCANTEAM 8300 issues a single beep and displays an upper case "O" on its status display indicating the SCANTEAM 8300 is in a non-error condition idle state.

Caution: Do not try to enter data until the host terminal has fully initialized.

This completes set-up and installation of the SCANTEAM 8300 Check Reader. You are now ready to configure the unit for your particular application. Instructions for configuring the SCANTEAM 8300/8310 are provided in the SCANTEAM 8300/8310 Programming Menus. The SCANTEAM 8300/8310 Programming Menus contain programming instructions for bar code based programming (for SCANTEAM 8300/8310 devices which contain a bar code port), as well as MICR document based programming.

2.6 Check Reading Procedure

Once the SCANTEAM 8300/8310 Check Reader has been properly installed and configured with its host device, you may read MICR documents. The SCANTEAM 8300/8310 contains sensors which detect the proper physical placement of a check (or other MICR encoded document) in the SCANTEAM 8300/8310 Check Reader.

In Figure 6, notice that the check being entered into the check reader has its MICR characters oriented so they appear on the **TOP SURFACE** and along the **RIGHT HAND SIDE** of the check. (A graphical representation of the proper orientation is illustrated on the SCANTEAM 8300/8310 document tray label.)

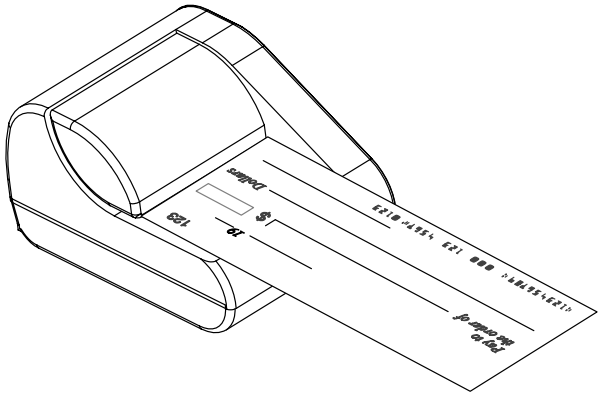


Figure 8 Feeding a MICR Document into the SCANTEAM 8300/8310

Once you have entered the check into the SCANTEAM 8300/8310 check reader, the internal paper sensors detect the presence of the check and turn on the motorized transport. As soon as the check reader begins to draw the check into the unit, release the check. Failure to release the check will affect the speed of the check through the check reader, possibly resulting in a misread.

Note: After any power-up cycle, the SCANTEAM 8300 utilizes factory set average MICR reading parameters during its first MICR read process. If these average parameters do not result in a good read, the SCANTEAM 8300 displays a “C” on its LED status display, and adjusts the MICR reading parameters based on the data taken during that first read. After this initial calibration process, all subsequent MICR readings will proceed normally.

HARDWARE INTERFACE DESCRIPTION 3

3.1 Chapter Description

This chapter describes:

- Hardware specifications of the SCANTEAM 8300 ports:
  - The DB-15F Host Port connector
  - The Auxiliary RS-232 port
  - The Magnetic Stripe Card Reader port
  - The Bar Code Scanner port
- SCANTEAM 8300/8310 operating power requirements

Note: *Please refer to Appendix A for the Hardware Interface Description for the SCANTEAM 8310. The Operating Power Requirements (page 3–8) are applicable to both the SCANTEAM 8300 and the SCANTEAM 8310.*

3.2 DB-15F Host Port Connector

The female 15 pin sub-miniature D host port connector signals are unique for each version of the product (SCANTEAM 8300-1, -2, -3, and -4). The pinout of the DB-15F host port connector is described in the following tables for each SCANTEAM 8300 product configuration.

3.2.1 Model 8300-1: DB-15 Pin Assignment

Pin #	Signal
1	Logic ground
2	VCC (+ 5V)
3	D6 (OCR)
4	D4 (OCR)
5	Keyboard wedge data (Input)/EOT (OCR)
6	Keyboard wedge Clk (Input)/Edit Check (OCR)
7	RDATA (OCIA)
8	Data ready (OCR)/5B RX/TX
9	Vin (+ 12V)
10	Bootstrap
11	D5 (OCR)
12	D3 (OCR)
13	Keyboard wedge term data (Output)/D2 (OCR)
14	Keyboard wedge term Clk (Output)/D1 (OCR)/CLKIDATA (OCIA)
15	User Ready (OCR)/5B $\overline{RX}/\overline{TX}$

Note: *An external power supply may be required for certain interfaces.* *See Operating Power Requirements on page 3–8.*

3.2.2 Model 8300-2: DB-15 Pin Assignment

Pin #	Signal
1	Logic ground
2	VCC (+ 5V)
3	D6 (OCR)
4	D4 (OCR)
5	Keyboard wedge data (Input)/EOT (OCR)
6	Keyboard wedge Clk (Input)/Edit Check (OCR)
7	RDATA (OCIA)
8	Data ready (OCR)
9	Vin (+ 12V)
10	Bootstrap
11	D5 (OCR)
12	D3 (OCR)
13	Keyboard wedge term data (Output)/D2 (OCR)
14	Keyboard wedge term Clk (Output)/D1 (OCR)/CLKIDATA (OCIA)
15	User Ready (OCR)

Note: *An external power supply may be required for certain interfaces.* *See Operating Power Requirements on page 3–8.*

3.2.3 Model 8300-4: DB-15 Pin Assignment

Pin #	Signal
1	Logic ground
2	VCC (+ 5V)
3	RXD input (RS-232)
4	CTS input (RS-232)
5	Keyboard wedge data (Input)
6	Keyboard wedge Clk (Input)
7	RDATA (OCIA)
8	Data ready (OCR)/5B RX/TX
9	Vin (+ 12V)
10	Bootstrap
11	TXD output (RS-232)
12	RTS output (RS-232)
13	Keyboard wedge term data (Output)
14	Keyboard wedge term Clk (Output)/D1 (OCIA)
15	5B $\overline{RX}/\overline{TX}$

Note: *An external power supply may be required for certain interfaces. See Operating Power Requirements on page 3–8.*

3.3 Auxiliary RS-232 Ports

Note: *The base level SCANTEAM 8300 is supplied with a single RS-232 Aux port. A second RS-232 port is available only as a factory installed option.*

The pinouts for pin positions 1 through 6 of the RJ-11 modular connectors are the same for both ports and are as follows:

Pin #	Function
1	Ground
2	Transmit data TXD output
3	Receive data RXD input
4	RTS (output from 8300)
5	CTS (input to 8300)
6	DC power out; +5V or + 12V (Factory default is +5V. See Notes below)

Notes Concerning Aux port Power on Pin # 6:

- +12 VDC is available on Aux port pin 6 only by special factory order of a six digit part numbered version of the SCANTEAM 8300.
- The power supplied on Aux port pin #6 is identical for both Aux port connectors. That is, if +12 VDC Aux port power is ordered, +12 VDC will be present on pin 6 of both Aux 1 and Aux 2 connectors.
- +12 VDC is only available on the Aux port pin #6 if the host device connected to the SCANTEAM 8300's DB-15 host port supplies +12 VDC on the DB-15 host connector pin 9.

3.4 Magnetic Stripe Card Reader Port

The SCANTEAM 8300 supports the attachment of magnetic stripe readers capable of outputting synchronous TTL signals (clock and data) on tracks 1, 2 and 3. The unit can decode any combination of one, two, or three tracks simultaneously, supporting bi-directional card swipes.

Connector Type: **RJ-45 8 pin modular (ST2000 compatible)**

Connector Pinouts:

Pin #	Function
1	Ground
2	Mag Clk 3
3	VCC (+ 5V)
4	Mag Clk 2
5	Mag Data 2
6	Mag Data 3
7	Mag Data 1
8	Mag Clk 1

3.5 Bar Code Scanner Port

An optional interface connector (a factory installed option) installed in the rear panel of the SCANTEAM 8300 supports the attachment of a + 5 volt non-decoded output scanner. The SCANTEAM 8300 is compatible with all Welch Allyn contact and non-contact bar code scanners, including bar code contact wands, lasers, CCDs, and swipe readers. Consult your Welch Allyn Sales Coordinator for specific model numbers of compatible scanners.

The main printed circuit board on the SCANTEAM 8300 contains an optional circuit layout that allows the power supplied to the host port DB-15 pin 9 (typically +12 VDC) to be supplied on the DB-9 scanner port. Contact your Welch Allyn Sales Coordinator if your application requires +12 VDC supplied on the 8300 scanner port.

Note: *The scanner port is NOT a field upgradeable option.*

Scanner Port Connector

Connector Type: **Panel mount 9 pin squeeze "D" female receptacle contact**

Connector Pinouts:

Pin #	Function
1	NC
2	TTL input signal (data in)
3	Good read (output)
4	+5V (VCC)
5	Trigger (input)
6	Enable (output)
7	Ground
8	Shield
9	+ 5V (VCC)

Note: *Pin 4 is connected to +5 VDC through a zero ohm resistor. This resistor is always populated unless specified differently at time of order. No +12V devices are supported in the standard product configuration.*

3.6 SCANTEAM 8300/8310 Operating Power Requirements

Operation from a Host-Supplied Source of DC Power (+5 or +8 to +12 VDC)

The SCANTEAM 8300/8310 Check Reader draws approximately 250 milliamps at idle, and 500 milliamps during motor operation. Any attached peripheral devices draw their operating power from the SCANTEAM 8300/8310 connectors and must be considered as an additional current draw above the SCANTEAM 8300/8310's requirements. If the host device cannot supply the operating current requirements within the allowed voltage tolerance range, an external power pack must be used to power the SCANTEAM 8300/8310 and its peripheral devices.

Operation from a Host-Supplied +5 Volts DC Power Source

The SCANTEAM 8300/8310 has a power monitor circuit which monitors the +5 VDC line and shuts down the microprocessor when voltage drops below +4.5 VDC. After taking into consideration all voltage drops through the connector and cable systems, the SCANTEAM 8300/8310 must be provided with +5 VDC ± 10% at its DB-15 connector pin in order to guarantee reliable product operation.

Operation from an External Power Pack

When the SCANTEAM 8300/8310 is powered by a Welch Allyn external DC power pack, it will have a minimum of 500 milliamps of +5 VDC power available to power the peripheral devices attached to it. All external power packs sold by Welch Allyn provide an unregulated + 9 volts DC with approximately 1000 milliamps current capacity.

Note: *When the SCANTEAM 8300/8310 is operated from an external power pack in conjunction with a host interface which typically supplies power (such as an IBM 46XX or PC wedge interface), the SCANTEAM 8300/8310 must be attached to the host device using an external power (EP) type cable, or the SCANTEAM 8300/8310 PC Board must be configured to operate from an external power source. (See section 2.5.2 on page 2–9 for configuration instructions.) See the Welch Allyn IPWC Cable Matrix for a listing of SCANTEAM 8300/8310 host interface cables.*

The power packs which are currently offered by Welch Allyn for the SCANTEAM 8300/8310 are listed below:

Part #	Primary Voltage	Style	AC Power Plug Type
PS120/9V	120V/60hz	Wall Mount	North American 2 blade conductor

3.6.1 Keyboard Wedge Applications

When the SCANTEAM 8300/8310 functions as a keyboard wedge, the power is usually supplied by the host device through the keyboard interface connector. Please verify that the system has an adequate power supply to operate the SCANTEAM 8300/8310 since many early PC systems have no excess power capacity to support the attachment of peripheral devices such as the SCANTEAM 8300/8310.

The SCANTEAM 8300/8310 must be operated from an external power pack if the host device does not have adequate power capacity to support the SCANTEAM 8300/8310.

3.6.2 RS-232 Output Configurations

For most serial RS-232 interface installations, the SCANTEAM 8300/8310 draws low voltage DC power from a +9 volt DC power pack. Some host systems may have a source of +5 volt DC available, typically on pin 9 of a DB-9 connector. For these systems, insure the power is within the SCANTEAM 8300/8310's +5 volt DC input power specifications, and the proper host interface cable with conductors supplying host power has been selected from the Welch Allyn IPWC Cable Matrix.

3.6.3 Power Requirements for IBM 468X/469X POS/ECR Direct Connect

The SCANTEAM 8300/8310 draws all its power from the IBM POS when configured for this application. Since different ports on the IBM POS offer +5 or +12 volts, the interface connector system on the SCANTEAM 8300/8310 is designed to accept and operate the reader from either voltage supplied through the IBM POS cable.

3.6.4 Power Requirements for OCR Direct Connect

The SCANTEAM 8300/8310 can be configured to draw all its power from an IBM or Fujitsu POS device when configured for these host interfaces. Field experience has shown that some Fujitsu systems do not have adequate +5 volt DC power to supply the check reader requirements. For these Fujitsu systems an external power pack and an external power (EP) type host interface cable are required.

3.6.5 Wand Emulation Applications

When the SCANTEAM 8300/8310 is connected with wand emulation host communications, you may choose to have the terminal supply power through the wand port interface connector. Depending on the power capacity of the host device, an external power pack may be required for this interface configuration.

SOFTWARE OPERATION 4

4.1 Chapter Description

This chapter describes:

- The SCANTEAM 8300 Host Port interfaces
- Serial RS-232 Auxiliary port functionality
- Communications Protocols
- The Magnetic Stripe Card Reader interface
- Bar Code Scanner symbology
- Displaying the firmware part number and revision level

Note: *Please refer to Appendix A for Software Operation information for the SCANTEAM 8310.*

4.2 Host Port Interface Compatibility

The SCANTEAM 8300 is designed around a single printed circuit board which may be populated with various component configurations in order to support product variations.

There are three basic product configurations, each of which is compatible with multiple host devices. The specific host interfaces supported by each of the standard versions of the SCANTEAM 8300 are shown in the following tables. (If your host interface configuration is not shown, please contact your Welch Allyn Sales Coordinator to inquire about a custom SCANTEAM 8300 product.)

4.2.1 SCANTEAM 8300-1 IBM 468X/469X and Retail Configuration

IBM 4683/4 & IBM 4693/4 Interface:

Physical connection to Port 5A, 5B, 9A, 9B, 9E, or 17.

Logical Operation:

Bar Code (only 1 in operation at a time):	Logical Address 4B or 4A (port 17)
MSR:	Logical address 47
ASYNC Serial Comm:	Logical address 64, 65, 68, or 69 (one only)
MICR:	Typically sent as bar code data (as above)
Power:	No external power pack is required for IBM 468X/469X direct connect communications. (Either +5 VDC or + 12 VDC is supplied to the SCANTEAM 8300-1 through the communication cable).

Note: *The check reader device can respond to a total of three logical addresses at the same time. They are: (4B or 4A), 47, and (64 or 65) or (68 or 69).*

Additional Host Interfaces Supported:

NCR OCIA (short and long format)
IBM/Fujitsu OCR

Keyboard Wedge Interfaces:

NCR 7052
PC AT & PS/2

4.2.2 SCANTEAM 8300-2 Retail (Non-IBM) and Commercial

Retail and commercial terminal configurations support the following interfaces:

Direct Connect Interfaces:

NCR OCIA (short and long format)
IBM/Fujitsu OCR

Keyboard Wedge Interfaces:

PC AT/XT/PS2
NCR 7052, NCR 2152
IBM 3683
IBM 3471, 3472, 3476, 3477, 3151, 3161, 3162, 3163, 3179, 3180, 3191, 3192, 3196, 3197
Harris H180, 191
WYSE 30, 60, 85/185, 120, 150, 160, 325, 370

Note: *Depending on the interface an external power pack may be required.*

4.2.3 SCANTEAM 8300-4 Retail: Series RS-232 (PC-POS) and IBM 468X/469X

The 8300-4 is compatible with the IBM 4683/4, IBM 4693/4, RS-232 interfaces and limited other retail interfaces. (Please reference the Welch Allyn IPWC Interface/Cable Matrix for a complete list of current interfaces.)

IBM 4683/4 & IBM 4693/4 Interface:

Physical connection to Port 5A, 5B, 9A, 9B, 9E, or 17.

Logical Operation:

Bar Code (only 1 in operation at a time): . . . . . Logical Address 4B or 4A (port 17)

MSR: . . . . . Logical address 47

ASYNC Serial Comm: . . . . . Logical address 64, 65, 68, or 69 (one only)

MICR: . . . . . Typically sent as bar code data (as above)

Power: . . . . . No external power pack is required for IBM 4683 direct connect communications. (Either +5 VDC or + 12 VDC is supplied to the SCANTEAM 8300-1 through the communication cable).

Note: *The check reader device can respond to a total of three logical addresses at the same time. They are: (4B or 4A), 47, and (64 or 65) or (68 or 69).*

Additional Host Interfaces Supported:

True RS-232 Serial Communications (PC comm port compatible)
NCR OCIA (short and long format)
An external power pack is required for the true RS-232 interface

Keyboard Wedge Interfaces:

NCR 7052
PC AT & PS/2

4.2.4 RS-232 Host Communication Parameters:

Baud rate, start and stop bits, and parity are programmable parameters for the host serial RS-232 interface. Refer to the SCANTEAM 8300 Programming Menu for instructions on how to modify the parameters from the default settings listed in the following table.

Serial RS-232 Host Communication Default Parameters:

Baud Rate: . . . . . 9600 bps

Character size: . . . . . 7 bits

Start bits: 1

Stop bits: 1

Parity : . . . . . Even

Signal Level: . . . . . True RS-232 (+/- 8VDC)

Other baud rate options are: 300, 600, 1200, 2400,4800, 9600, 19.2K, 38.4K. Other parity options are: Odd, Mark, Space, and none.

4.3 Serial RS-232 Aux Port Functionality

The Aux ports are multiplexed off a single serial channel to the SCANTEAM 8300's microcontroller. The Aux ports are polled via software by checking the RTS line of the port. When RTS is asserted for Aux 1 or Aux 2, CTS for that line is asserted and the device connected to the port can send its data. On power-up, the unit enables Aux 1 to load the software into the SCANTEAM 8300.

The SCANTEAM 8300 **cannot** simultaneously receive data sent on Aux port 1 and Aux port 2. Data flow must be under the control of the SCANTEAM 8300 using RTS and CTS. When the SCANTEAM 8300 is configured for serial RS-232 host port communications, the host port cannot send data to the 8300 while data is being received from the Aux ports. The SCANTEAM 8300 uses the host port CTS output line to indicate to the host device that the SCANTEAM 8300 is busy and cannot accept host communications.

RS-232 Aux Port Communication Parameters:

Baud rate, parity and the number of start and stop bits are parameters which may be independently programmed for each Aux port. Refer to the SCANTEAM 8300 Programming Menu for instructions on how to modify the parameters from the default settings listed below.

RS-232 Aux Port Default Parameters:

Baud Rate: . . . . . 9600 bps
Character size: . . . . . 7 bits
Start bits: 1
Stop bits: 1
Parity: . . . . . Even
Signal Level: . . . . . True RS-232 (+/- 8 VDC)

Other baud rate options are: 300, 600, 1200, 2400, 4800, 9600, 19.2k, and 38.4K. Other parity options are: Odd, Mark, Space, and none.

4.4 Communication Protocols

There are five choices available in the SCANTEAM 8300 Programming Menu for the SCANTEAM 8300's Main Port Protocol:

End of Record
60ms Timeout
Tranz™ 330 Protocol
Zon™ Jr. Protocol
Host Command Protocol.

These selections are detailed on the following pages.

The SCANTEAM 8300 provides up to three RS-232 input/output ports. The configuration of the SCANTEAM 8300 with the most RS-232 interface ports is the SCANTEAM 8300-42XX which supplies two auxiliary RS-232 ports (two 6 pin modular connectors) and one host RS-232 port (15 pin D connector). Each port provides the following signals:

TX (output from 8300)
RX (input to 8300)
RTS (output from 8300)
CTS (input to 8300)
Ground
+5.0 VDC

4.4.1 End of Record and 60ms Timeout

The following describes how the three ports of the SCANTEAM 8300 operate using End of Record or 60ms Timeout protocols with an RS-232 terminal. (Please refer to the Terminal Selection and Main Port Configuration sections in the 8300 Programming Menu to program the SCANTEAM 8300 for an RS-232 terminal and End of Record or 60ms Timeout protocols.)

The three RS-232 ports are controlled by a serial communications polling scheme. A simple RTS/CTS hardware flow control is utilized. The End of Record and 60ms Timeout protocols are as follows:

a) Assert RTS of selected port to allow data input.

b) Wait 5ms for data input to be seen.

c) If no data comes in during this time, de-assert RTS, select next port, then return to step a).

If data comes in during this time, wait for the end of record.

Note: *If you are using the End of Record protocol, the end of record is indicated by the End Of Record character you programmed using the 8300 Programming Menu. If you are using the 60ms Timeout protocol, the end of record is indicated by a 60 ms delay between characters.*

De-assert RTS, send to host terminal, then return to step a). Data messages received from the host must have a prefix (default “r” or “s”) to identify the message destination as either Aux 1 or Aux 2, respectively. If the prefix is not present, the data is ignored.

Notes:

- *There can be no more than a 15 second intercharacter delay for characters in a data record. A timeout resets the data buffer, and all previous data for that record is lost.*
- *Data records greater than 255 bytes cause a buffer overflow. This resets the data buffer, and all previous data for that record is lost.*
- *Parity and framing errors cause the SCANTEAM 8300 to error beep and to ignore the data record.*
- *Data sent to the SCANTEAM 8300 while the 8300 has RTS de-asserted will be lost.*

4.4.2 Tranz™ 330 Protocol

This section describes how the main port of the SCANTEAM 8300 operates using the Tranz 330 protocol. (Please refer to the Terminal Selection and Main Port Configuration sections in the 8300 Programming Menu to program the SCANTEAM 8300 for the Tranz 330 protocol, and the baud rate and parity of the Tranz 330.)

The Tranz 330 protocol requires the SCANTEAM 8300 to have host port RS-232 hardware. Input/output to and from the Aux ports is not allowed. The end of a data record from the Tranz 330 is recognized by utilizing the 60ms delay timeout. The protocol is as follows:

a) The SCANTEAM 8300 sends data <STX>data<ETX>LRC where LRC is the XOR of all characters after the <STX>.

b) The expected response to data is <ACK> or <NAK>. If <ACK> or <NAK> is not received within 2.5 seconds, the data is assumed to be accepted. If a <NAK> is received, the data is re-sent. After the third <NAK>, the SCANTEAM 8300 gives up and enters its normal operating loop.

Notes:

- *There can be no more than a 15 second intercharacter delay for characters in a data record. A timeout resets the data buffer, and all previous data for that record is lost.*
- *Data records greater than 255 bytes cause a buffer overflow. This resets the data buffer, and all previous data for that record is lost.*
- *Parity and framing errors cause the SCANTEAM 8300 to ignore the data record.*

4.4.3 Zon™ Jr. Protocol

The main port of the SCANTEAM 8300 operates in the following manner when using the Zon Jr. protocol. (Refer to the Terminal Selection and Main Port Configuration sections in the 8300 Programming Menu to program the SCANTEAM 8300 for the Zon Jr. protocol, and baud rate and parity of the Zon Jr.)

The Zon Jr. protocol requires the SCANTEAM 8300 to have host port RS-232 hardware. Input/output to and from the Aux ports is not allowed. The end of a data record from the Zon Jr. is recognized by utilizing the 60ms delay timeout. The protocol is as follows:

a) The SCANTEAM 8300 sends <ENQ> to tell the Zon Jr. that it has data.

b) The SCANTEAM 8300 waits for <ETX><NUL> which tells it that data can be sent.

c) The SCANTEAM 8300 sends data <STX>data<ETX>LRC where LRC is the XOR of all characters after the <STX>. (If a MICR read error occurred, the data would be a single "?" character.)

d) The expected response to data is <ACK> or <NAK>. If <ACK> or <NAK> is not received within 2.5 seconds, the data is assumed to be accepted. If a <NAK> is received, the data is re-sent. After the third <NAK>, the SCANTEAM 8300 gives up and enters its normal operating loop.

Notes:

- *There can be no more than a 15 second intercharacter delay for characters in a data record. A timeout resets the data buffer, and all previous data for that record is lost.*
- *Data records greater than 255 bytes cause a buffer overflow. This resets the data buffer, and all previous data for that record is lost.*
- *Parity and framing errors cause the SCANTEAM 8300 to ignore the data record.*

4.4.4 Host Command Protocol

This section describes the operation of the main port of the SCANTEAM 8300 when using Host Command Protocol, and when the user has programmed the SCANTEAM 8300 for a Terminal Selection of RS-232 (50) using the 8300 Programming Menu, and devices are connected to Aux ports 1 and 2.

The Host Command protocol requires that the SCANTEAM 8300 has the host port RS-232 hardware. It allows the SCANTEAM 8300 to operate with peripherals such as pin pads and signature capture units that do not support an RTS/CTS handshake. This protocol requires that the SCANTEAM 8300 host port and both Aux ports operate at the same baud rate (9600 or less). The SCANTEAM 8300 performs no parity checks but instead relies on the host port device and/or the peripheral devices to do so. The end of a data record from a port is recognized by programming the SCANTEAM 8300 port for either the 60ms Timeout or for the End of Record character search. To insure data integrity, the host device should implement an RTS/CTS handshake. The protocol is as follows:

a) Data messages received from the host must have a prefix (default “r” or “s”) to identify the message destination as either Aux 1 or Aux 2, respectively. All messages received from the Aux ports are sent to the host; no prefixes are necessary.

b) Once the message is sent to either Aux 1 or Aux 2, the SCANTEAM 8300 stays locked onto that port until a message is received from the host with a prefix indicating a different Aux port destination.

c) Data messages from the host are received by sensing an external interrupt and then locking the SCANTEAM 8300 onto the host port to receive the message. During this time, any messages being sent from the Aux port(s) will be lost.

d) While the SCANTEAM 8300 is sending data messages to the host, the 8300 continues to look for data from the appropriate Aux port.

Notes:
- *Data records greater than 255 bytes cause a buffer overflow. This resets the data buffer, and all previous data for that record is lost.*
- *The SCANTEAM 8300 does not look for any receive framing errors.*

4.5 Magnetic Stripe Card Reader Interface

The MSR port on the rear panel of the SCANTEAM 8300 is compatible with the SCANTEAM 6901 series of single, dual and triple track magnetic stripe readers as well as the optional integrated SCANTEAM 8300 magnetic stripe readers. It is designed to accept coded TTL level digital signals from the MSR. To format the MSR data for transmission to the SCANTEAM 8300's host device, the SCANTEAM 8300 MSR port parameters must be programmed using MICR programming checks, a program parameter download from a PC or host device, or through the optional scanner port using the SCANTEAM 8300 Programming Menu. The SCANTEAM 8300 MSR port cannot be programmed using the magnetic stripe reader.

The SCANTEAM 8300 can decode mag stripe information contained on bank credit cards, travel and entertainment cards (e.g., American Express), which conform to ISO 7813 card standards for tracks 1, 2, and/or 3. The SCANTEAM 8300 may be configured to react and transmit to its host any combination of tracks 1, 2, or 3. Specific instructions for programming the MSR port are discussed in the SCANTEAM 8300 Programming Menu.

AAMVA Driver's License Magnetic Stripe Decoding

The data contained on tracks 1, 2, and 3 of an AAMVA (American Association of Motor Vehicle Administrators) or California driver's license can be read and decoded by the SCANTEAM 8300 using the standard firmware shipped in every SCANTEAM 8300. Although the data format of track 3 on a driver's license does not conform to ISO card standards, the SCANTEAM 8300 has the capability to decode this information.

Note: *The AAMVA is developing a North American standard for driver's license magnetic stripe data.*

4.6 Bar Code Scanner Symbology

The optional bar code scanner interface on the SCANTEAM 8300 decodes the following bar codes:

UPC/EAN

Code 128

Code 39

Contact your Welch Allyn Sales Coordinator if you need additional symbology decoding.

4.7 Displaying the Firmware Part Number and Revision Level

The revision level of the firmware operating in the SCANTEAM 8300 is embedded in the part number assigned to that firmware e.g., 34019XXX.

Whenever the reader is powered up or if the internal firmware executes a system reset, the current software revision level is flashed on the LED display. Four digits flash. The first three digits displayed are the current revision level of the software. The last digit indicates the state of the reader (refer to the Error Code chart on page NO TAG).

4.7.1 PC Upload/Download Using Quick*Load

The SCANTEAM 8300 contains reprogrammable memory that contains the operating system for the 8300. This memory is a type of Read Only Memory (ROM) called flash memory. Flash memory can be electronically erased and reprogrammed like typical RAM, but does not lose its contents when power is lost.

When the SCANTEAM 8300 must be upgraded or modified, new operating system (firmware) or parameter data files must be placed into its flash memory. This is done using a special protocol, designed specifically for this purpose. The Welch Allyn software tool called Quick*Load is designed to implement the protocols used by the Welch Allyn flashable devices making it easy for users to download and upload firmware and run diagnostics on SCANTEAM products. Please refer to your Quick*Load manual for further information about using Quick*Load with your SCANTEAM 8300.

MICR DATA PROCESSING 5

The SCANTEAM 8300/8310 utilizes a sequential process to identify MICR characters, verify the integrity of data fields against ANSI/ISO specifications, and to manipulate the MICR data in a format compatible with the reader's host device requirements. The following chapter describes these functions.

Note: *Please refer to Appendix A for Pre-Canned Format Error Code Reporting for the SCANTEAM 8310. All other information in this chapter is applicable to both the SCANTEAM 8300 and the SCANTEAM 8310.*

5.1 MICR Character Recognition

The SCANTEAM 8300/8310 uses a proprietary digital signal processing MICR character recognition technique which has its origins in the advanced bar code decoding technology used at Welch Allyn. This technique allows Welch Allyn to obtain a high character recognition rate and low substitution error rate on "real world" MICR documents.

5.2 MICR Line Data Parsing

The SCANTEAM 8300/8310 contains a software algorithm which inspects MICR characters read from a check, then assigns groups of those characters (parses the data) to the following fields:

1 Auxiliary On-Us
2 External Processing Code
3 Routing (bank identifier)
4 On-Us (contains account number and check serial number)
5 Amount

Once the MICR data is successfully parsed into these five information fields, the task of sub-parsing the On-Us field is performed. The SCANTEAM 8300/8310 On-Us field parsing algorithm is capable of parsing all the On-Us field formats which are in common use in North American retail banking today. Unfortunately, the content of the On-Us data field on a check (the account number and check serial number are in this field) is not covered by a banking or ANSI standard, and new MICR line data formats may appear on future checks which the SCANTEAM 8300/8310 cannot properly parse.

The SCANTEAM 8300/8310 contains a field programmable MICR Exception Table which allows the user to properly parse new MICR line formats which may be created by future check issuers.

Note: *"Raw MICR" refers to MICR data which is sent to the host system in the same order in which it is read by the check reader. The SCANTEAM 8300/8310 supports raw MICR output.*

5.2.1 MICR Format Exception Table

The MICR Format Exception Table is a dedicated table in memory which may be loaded with instructions to correctly parse non-conventional MICR lines.

This exception table may be updated by any one of the following methods:

1. By passing a Welch Allyn custom printed MICR document through the check reader which contains the parsing instructions. (These custom documents may be obtained through the Welch Allyn Technical Support Group.)

2. By downloading the custom parsing instructions to the SCANTEAM 8300 through its Aux port from a PC or other RS-232 device.

3. By downloading the custom parsing instructions to the SCANTEAM 8300/8310 through its host communication port (host down line load).

4. By cloning the memory contents from another SCANTEAM 8300/8310 which has already been updated to include the new exception table instructions.

5. By scanning a bar code from a SCANTEAM 8300/8310 Programming Menu (if a scanner port is configured on the SCANTEAM 8300, or if a decoded output bar code scanner has been attached to the SCANTEAM 8310's host interface port).

5.3 MICR Data Formatter

Every SCANTEAM 8300/8310 contains a MICR data formatter which is used by the SCANTEAM 8300/8310 to arrange the MICR data fields (bank transit number, account number, check serial number, and amount) from the MICR line on a check before sending that information to a host system.

The SCANTEAM 8300/8310's MICR data formatter allows the SCANTEAM 8300/8310 user to select from a list of common formats which are used by the major check verification and guarantee services. These formats may be selected during the initial set up of the SCANTEAM 8300/8310 user configuration parameters. The parameters are input by feeding MICR encoded programming checks (available from Welch Allyn) into the check reader, scanning bar codes from the 8300/8310 Programming Menu with an RS-232 device (e.g., a wand), downloading parameters from the host or an RS-232 device, or by cloning existing parameters from a "source" SCANTEAM 8300/8310 to a "destination" SCANTEAM 8300/8310.

The following table shows the standard MICR data formats which are pre-loaded in the SCANTEAM 8300/8310, and may be selected during SCANTEAM 8300/8310 configuration parameter set up.

SCANTEAM 8300/8310 MICR Line Formatter
Standard MICR Output Data Formats

Programming Menu Format #	MICR Data Format Transmitted to the Host
00	<ENTIRE MICR LINE UN-EDITED (RAW MICR)> • Includes spaces and symbols • Field format rules not verified
02	<TRANSIT #>T<ACCOUNT #>A<CHECK SERIAL #> • Account #: space, dash, On Us
03	<TRANSIT #>T<14 DIGIT ACCOUNT #>A<6 DIGIT CHECK SERIAL #> • Account #: no spaces or dashes, zero filled, right justified • Check #: zero filled, right justified
04	<TRANSIT #>T<ACCOUNT #>A<CHECK SERIAL #> • Account #: includes spaces and dashes, but no On Us
98	<ENTIRE MICR LINE UN-EDITED (RAW MICR)> • Includes spaces and symbols • Field format rules verified
99	<ENTIRE MICR LINE UN-EDITED (RAW MICR)> • Includes spaces and symbols • Field format rules not verified • A question mark (?) is sent for unreadable characters

5.4 Output Data Formatter

After the MICR information has been processed by the parsing routines, the MICR information can be further manipulated by the SCANTEAM 8300/8310's output data formatter.

The SCANTEAM 8300/8310 output data formatter operates on all types of SCANTEAM 8300/8310 data before it is sent to the host. This data formatter can uniquely format each data type (MICR, MSR, bar code, Aux port) prior to sending it to the host. That is, MICR data can be formatted one way, mag stripe data can have a second format, bar code data can utilize a third format, and Aux port data can have a fourth format

For MICR data, the output data formatter operates after the MICR data has first passed through the MICR line parsing operation and the MICR line formatter. In this way, the MICR line data is left in the format presented by the MICR line formatter (the check verification/guarantee service provider's format you select), or further customized. Please refer to the SCANTEAM 8300/8310 Programming Menu for detailed information and instructions for use of the MICR data formatter and editor.

5.4.1 Output Data Formatter Command Set

The format of the data output from the SCANTEAM 8300/8310 may be manipulated by using the built-in data formatter/editor. The SCANTEAM 8300/8310's data formatter/editor is programmed by the user through the process of scanning a sequence of bar codes from the SCANTEAM 8300/8310 Programming Menu, by feeding MICR encoded programming checks through the check reader which correspond to the bar codes in the SCANTEAM 8300/8310 Programming Menu, or through the use of the Welch Allyn PC-based upload/download tool, Quick*Load. The MICR characters equivalent to the bar codes contained in the 8300/8310 Programming Menu are listed in the following chart:

MICR Characters for Bar Code Chart

Roman Numeral	MICR Data	Roman Numeral	MICR Data	Alpha Char	Alpha Data	Digits	MICR Data
I	t1	XI	o1	A	a1	0 (yes)	d0
II	t2	XII	o2	B	a2	1 (no)	d1
III	t3	XIII	o3	C	a3	2	d2
IV	t4	XIV	o4	D	a4	3	d3
V	t5	XV	o5	E	a5	4	d4
VI	t6	XVI	o6	F	a6	5	d5
VII	t7	XVII	o7	G	a7	6	d6
VIII	t8	XVIII	o8	H	a8	7	d7
IX	t9	XIX	o9	I	a9	8	d8
X	t0	XX	o0	J	a0	9	d9

Special Functions	MICR Data
ESCAPE	tt0
DEFAULT	tt1
EXIT	tt2
END PROGRAMMING	tt3

where: t = transit symbol
o = On Us symbol
a = amount symbol
d = dash symbol

5.5 MICR Character Signal Strength Testing

The SCANTEAM 8300/8310 is capable of detecting low character signal levels which may indicate fraudulent photocopied checks. The signal level threshold for rejecting a check due to possible fraud is a programmable parameter for the SCANTEAM 8300/8310's microcontroller.

The MICR decoding algorithm calculates and reports relative signal level information as an average for all characters. Relative signal level is the ratio, stated as a percentage, that the signal level of the character being measured bears to the nominal signal level for that character with reference to the WCC (wire card calibration) standard taken as 100 percent for the On-Us symbol. (Reference ANSI Standard X9.27-1988 Section 13.3.)

The host routine compares the average signal information for the characters to the programmed signal level parameter and rejects those checks with averages below the programmed minimum level, or above the programmed maximum level.

5.6 Error Condition Reporting

5.6.1 SCANTEAM 8300 LED Display Error Codes and Single Character Host Error Codes

The SCANTEAM 8300 can report certain error conditions through the use of error codes displayed on the LED display, as well as support error code reporting to the host device.

The status and error conditions which appear on the LED display are shown in the following table. These status and error codes may also be displayed on the host device. (Refer to the SCANTEAM 8300 Programming Menu, Output Parameters, MICR Error Coding for complete instructions on programming this selection.)

Condition	LED Display	Single Error Code Sent to Host	Double Error Code Sent to Host	Beep Sequence
Good power-up initialization	O	none	none	1 beep
Good E13-B read	O	none	00	1 beep
Canadian check	O	none	01	1 beep
No account number	O	none	03	1 beep
Business check (unless Canadian)	O	none	08	1 beep
Travelers check	O	none	12	1 beep
No sequence number (unless Travelers check)	O	none	11	1 beep
Serial number less than 300	O	none	15	1 beep
Old U.S. Check	O	none	04	1 beep
Good CMC-7 read	O	none	00	1 beep
Bad check - no MICR	n	N	09	3 beeps
Low signal level	L	L	10	3 beeps
High signal level	H	H	none	3 beeps
Initial power-up calibration	C	none	none	3 beeps
Power up initialization error	F	F	none	3 beeps
Questionable MICR character	E	E	06	3 beeps
Program mode	P	none	none	2 beeps
Format error	Y	Y	11	3 beeps
Check unreadable	U	see list pg. 5–9	none	3 beeps
Exception Formatting Error	J	J	11	3 beeps
Magnetic Interference	b	none	none	none

Unreadable (U) error codes:

0	Auxiliary On-Us field error (not bounded by On-Us symbols)
1	Invalid EPC character
2	Missing transit symbol
3	Wrong number of digits in transit field
4	Mod 10 check digit failure
5	More than 24 characters in On-Us field
6	No On-Us symbol in On-Us field
7	No On-Us field
8	Wrong number of digits in amount field
9	Missing amount symbols

MAINTENANCE 6

6.1 Paper Transport and MICR Read Head

The check reader drive roller and magnetic read head should be cleaned monthly or every 10,000 checks, whichever comes first. Clean the check reader drive roller and magnetic read head using a cleaning card saturated with an alcohol solvent. Welch Allyn offers a MICR head and transport cleaning card as a service item under the Welch Allyn product name "MICRCLEAN."

Up to four check readers can be cleaned using a single cleaning card. When using the card on multiple check readers, orient the cleaning card so a clean area of the card enters the SCANTEAM 8300/8310 transport first.

6.2 Plastic Cabinet

The SCANTEAM 8300/8310 cabinet may be cleaned using most common liquid spray cleaners. The check reader may be damaged if the spray cleaner gets inside the cabinet, so do not spray the cleaning solution onto the check reader. Spray the cleaning solution onto a soft cloth, then clean the cabinet with the cloth. Do not use petroleum based solvents to clean the SCANTEAM 8300/8310 cabinet.

6.3 Magnetic Stripe Card Reader (MSR)

The MSR head should be cleaned every four weeks when there is a low to moderate transaction volume (such as in retail department stores and specialty stores). The MSR head should be cleaned every two weeks or weekly when there is a high transaction volume (such as in multi-lane stores and bank teller applications).

The MSR head should be cleaned using a cleaning card saturated with an alcohol solvent. Welch Allyn offers an MSR head cleaning card as a service item under the Welch Allyn product name “MSRCLEAN.”

Up to four MSR heads can be cleaned using a single cleaning card. When using the card on multiple MSR’s, orient the cleaning card so a clean area of the card contacts the read head as the cleaning card is swiped through the MSR.

Note: *If you have a SCANTEAM 8300 with an integrated MSR, the MSR read head is located on the left hand side of the card slot (when viewed from the front).*

SERVICE AND REPAIR 7

7.1 Obtaining Factory Service

Welch Allyn provides service for its decoder products through its UK and Hong Kong service centers as well as its manufacturing and service facilities in Skaneateles, New York. To obtain warranty or non-warranty service you should return the unit to Welch Allyn, Inc., postage paid. A copy of the dated purchase record must be attached.

7.1.1 Service Under Warranty

The SCANTEAM 8300/8310 check reader carries a 2 year warranty (from the date of shipment). Warranty service may be obtained by contacting the Welch Allyn Product Service Group. (Refer to the next page for addresses and phone numbers.) The warranty statement is located in the beginning of this manual.

7.1.2 Out of Warranty Service

Factory service is also available for out of warranty products on a time and materials or fixed price basis. The device should be returned (postage paid) for repair only after obtaining a Return Material Authorization (RMA) from a Product 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 handling your inquiry. The information is located on the manufacturer's label attached to the bottom of the SCANTEAM 8300/8310.

Model Number

Serial Number

Date of Manufacture

Note: *The Welch Allyn Product 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, you will be billed only for the actual service costs.

In the United States, please contact Welch Allyn, Inc. at the address or telephone number listed below to obtain a return material authorization number (RMA number):

Welch Allyn, Inc.
Data Collection Division
Product Service Department
4619 Jordan Road
P.O. Box 187
Skaneateles Falls, New York 13153−0187

Product Service Department
Telephone: (315) 685−4278 or 685−4360
Fax: (315) 685−4156

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

Welch Allyn, Ltd.
28 Sandyford Office Park
Foxrock
Dublin 18
Ireland

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

U. K. Offices
1st Floor
Dallam Court Dallam Lane
Warrington, Cheshire WA2 7LT
England

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

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

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

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

Help Desk

If you need assistance installing or troubleshooting the device, please call your Distributor or the Help Desk:

Telephone: (315) 685-8945

SPECIFICATIONS 8

8.0 Summary of SCANTEAM 8300/8310 Specifications

MICR Reading Performance	99.5% first pass read rate. 99.9% second pass read rate. Read rates are based upon documents read at the nominal motor speed and which fully conform to ANSI X9.27-1988 signal levels in the 80-120% range.
Mechanical Design (without MSR)	Small footprint: Maximum dimensions of 4.08 in (10.4 cm) wide and 5.75 in (14.6 cm) deep. Maximum height: 3.43 in (8.71 cm).
Mechanical Design (with MSR)	Small footprint: Maximum dimensions of 4.71 in (11.96 cm) wide and 5.75 in (14.6 cm) deep. Maximum height: 3.43 in (8.71 cm).
Product Labelling	A recessed area is provided for the application of a product name/logo label on the front surface of the SCANTEAM 8300/8310.
MICR Character Set Recognition	E13-B and CMC-7. Auto-discrimination or single font decoding is menu programmable.
Electronic Hardware Architecture	Motorola Microcontroller WA ASIC (SCANTEAM 8300 only) Flash EEPROM SRAM
Check Handling and Transport	Motorized paper transport.
Sensors	Top of form sensor. Paper edge/alignment sensor.
Check Media Read	Personal and commercial checks.
MICR Fields Read	All ANSI specified character positions on a personal check can be read by the SCANTEAM 8300/8310. This includes the Transit, On-Us, Auxiliary On-Us, and Amount fields.

Read Performance	Total read, decode, parse, and transmit time to the host system does not exceed 2 seconds.
Audio Indicator	Audible alarm with programmable output frequency decibel level.
Operator Display	SCANTEAM 8300: Green, seven segment LED display with all segments individually controlled by the application program. SCANTEAM 8310: Single green LED to indicate power and read status.
Magnetic Stripe Reader (SCANTEAM 8300 only)	Contains connector for attachment of single, dual, or triple track TTL output MSR. All three tracks are capable of being read concurrently. Optional product configurations are available for integrated single, dual, or triple track MSR. Mag stripe decoding supports a card swipe in either direction through an external or integrated MSR.
Scanner Interface (SCANTEAM 8300 only)	Optional product configurations provide an interface connector for attachment of an external wand, CCD, or laser scanner device (+5V only unless a special factory configuration is requested). All bar code decoding is performed by the SCANTEAM 8300.
Program Loading	All versions of the SCANTEAM 8300/8310 support the Welch Allyn download program, “Quick*Load.” The SCANTEAM 8300/8310 supports “cloning” of the memory contents of one SCANTEAM 8300/8310 to another SCANTEAM 8300/8310.

Input Power Requirements

The SCANTEAM 8300/8310 will operate from any one of the following power sources:

- Regulated +5 +/-10% VDC, 100mV ripple max.
- Regulated or unregulated +7 to +13.5 VDC, 500 mV ripple max.
- +9 VDC supplied by a wall mount power pack
- Motor start: Total current draw not to exceed 700 mA for a time duration not to exceed 50 mS.

Operating Power (typical values)

Operating current at 25 degrees C:

Condition	+5 VDC	+9 VDC	+12 VDC
Motor off	200 mA	205 mA	210 mA
Motor on	500 mA	510 mA	580 mA

Power Pack

Wall mount, UL/CSA listed, 110 VAC input power, +9 vDC unregulated output power. 5.5 mm barrel connector, outside of barrel (-), inside barrel (+).

Susceptibility to Electrical Disturbances

ESD: Operation without degradation when subjected to direct discharge of 8KV.

For a 15 KV ESD discharge to any top surface, or a 10 KV charge to the bottom surface, operation may be degraded, but the SCANTEAM 8300/8310 sustains no permanent damage and automatically returns to full operational capabilities after the discharge event.

Electro-Magnetic Fields:
(Reference IEC 801-3 Level 2 limits.)

Environmental Specifications

Operating Environment:
Temp: +32˚F to +122˚F
(0˚C to 50˚C)
Humidity: 90% max, non-condensing
Storage Environment:
Temp: 0˚F to +140˚F
(-18˚C to 60˚C)
Humidity: 95% max non-condensing

Physical Shock	No degradation in performance after five drops randomly oriented to a concrete surface from a one foot height. Acceptable cosmetic damage.
Vibration	The SCANTEAM 8300/8310 is designed to sustain vibrations with a displacement of 0.20 inches p-p from 5HZ to 20HZ and with an acceleration of 10 G's peak to peak from 20HZ to 200HZ. The frequency sweep was linear in one direction and was 15 minutes in duration. The test continued for 2 hours along with each of 3 axis.
Regulatory and Safety	Radiated and Conducted Emission**:** Tested to meet specifications of: • FCC Part 15 Class A • EN55022 Power Pack Safety Agency Markings: • 110 VAC input power pack: UL/CSA • 230VAC input power pack: TUV/GS • 240VAC input power pack: TUV/GS Refer to back of FCC page for CE/LVD directives.

SCANTEAM 8310 INFORMATION A

A.1 Chapter Description

This chapter describes:

- SCANTEAM 8310 Physical Specifications
- Installing the SCANTEAM 8310 with either host-power or external-power
- SCANTEAM 8310 Hardware Interface
- SCANTEAM 8310 Software Operation
- SCANTEAM 8310 MICR Data Processing

A.2 Physical Specifications

Case Material Type:	ABS Plastic enclosure UL 94 V-0 flame rating
Rear Panel Material Type:	Stainless steel
Dimensions:	4.08 in (10.4 cm) wide x 5.75 in (14.6 cm) deep x 3.43 in (8.71 cm) high
Color:	Pantone #413C, IBM Pearl White
Weight:	1.25 lb (.567 kg) max (not including power pack)
Mounting Options:	Desktop, or wall mount (check insertion from top or bottom) via bi-directional keyholes molded into enclosure case bottom.

A.3 SCANTEAM 8310 Product Illustrations

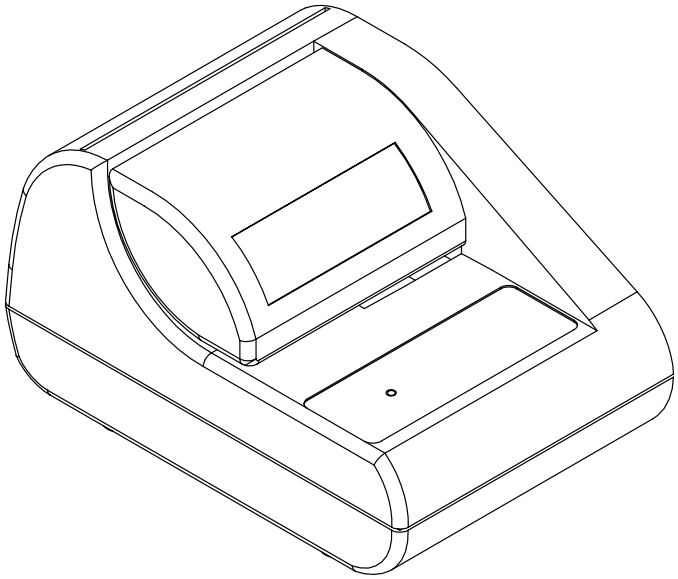


Figure 9 SCANTEAM 8310

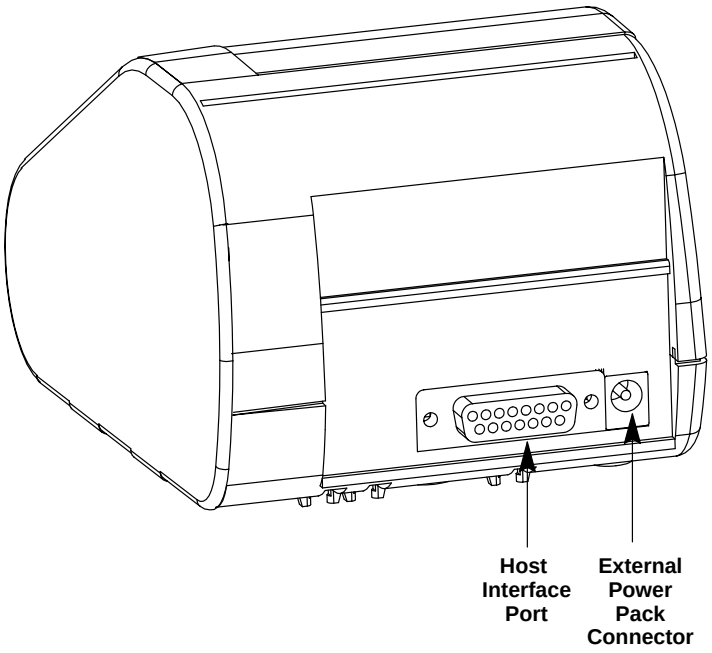


Figure 10 Rear view of the SCANTEAM 8310

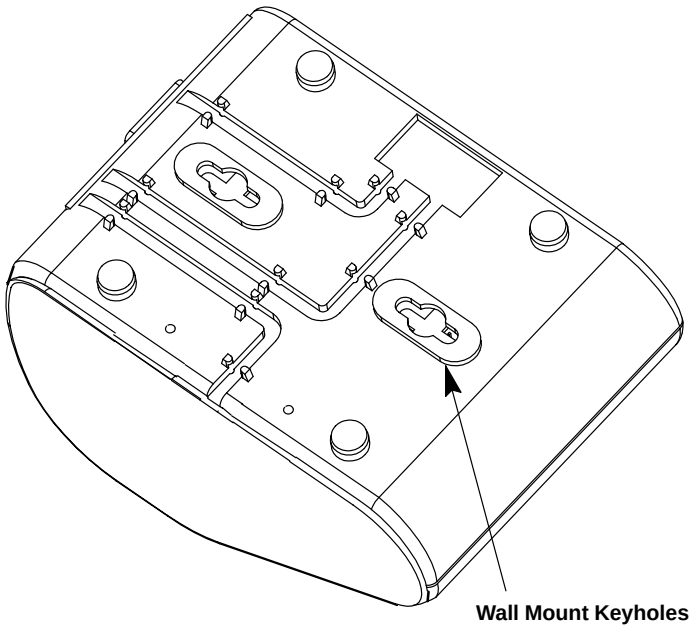


Figure 11 Bottom view of the SCANTEAM 8310

A.4 Set-up

Caution: The SCANTEAM 8310 contains static sensitive components. Precautions must be taken to eliminate potential static discharge to any printer circuit board.

Note: *SCANTEAM 8310 Power Architecture:*
The SCANTEAM 8310 is shipped from the factory with an internal jumper set to allow the check reader to operate from power supplied by a host device through the DB-15 host interface connector. Refer to section A.4.2 on page A–6 if you plan to operate the SCANTEAM 8310 using external power supplied by a wall or desk mount power pack.

A.4.1 Host-Powered Installations

Typically, serial RS-232 interface connections to the SCANTEAM 8310 are not powered by the host device and require the use of an external source of DC power, such as a wall mount AC/DC power transformer. If your installation requires external power, please follow the "Externally Powered Installation" instructions on page A−6.

Some configurations do provide host power. Use the following procedure for installations in which the power for the SCANTEAM 8310 is provided by the host device.

Installation Instructions

(1) Turn off the power for the host device to which the 8310 will be connected.

(2) Locate the SCANTEAM 8310 host device interface cable and verify its part number. (Cable part numbers are provided in the Welch Allyn Interface Products Work Center (IPWC) Interface/Cable Matrix, part number 11208627, document.)

(3) Attach the SCANTEAM 8310 interface cable to the host terminal.

(4) Plug the 15-pin male connector of the interface cable into the 15-pin female connector located on the back panel of the 8310. Secure the cable to the SCANTEAM 8310 using the mounting screws included on the interface cable.

(5) Disconnect the keyboard from the terminal (display) and insert it into the mating connector on the short leg of the "Y" interface cable.

(6) Complete the cabling procedure by inserting the remaining long leg of the "Y" interface cable into the terminal keyboard connector. (The connector from which the keyboard cable was removed.)

(7) Position the 8310 so that all cables run freely and smoothly. If desired, the 8310 can be secured to the wall using pan head screws which attach into the key holes molded into the bottom of the SCANTEAM 8310.

(8) Apply power to the SCANTEAM 8310's host terminal. The SCANTEAM 8310 issues a single beep indicating the SCANTEAM 8310 is in a non-error condition, idle state.

Caution: Do not try to enter data until the host terminal has fully initialized.

A.4.2 Externally-Powered Installations

Usage Restrictions

The SCANTEAM 8310 may be operated by power supplied by an external wall or desk mount power pack only under the following conditions:

1. Use of External Power (EP) Host Interface Cable:
   If the host interface cable used to attach the SCANTEAM 8310 to a host device does not contain conductors which supply power from the host device to the SCANTEAM 8310, that cable is referred to as an "External Power" (EP) cable. Note that most serial RS-232 cables are EP cables unless specified otherwise.

2. Internal Power Jumper Set for External Power:
   If the internal power jumper on the SCANTEAM 8310's printed circuit board is set for external power, the SCANTEAM 8310 may be operated from an external power source regardless of the use of host power or external power (EP) host interface cables.

Note: *The SCANTEAM 8310's factory default jumper setting is for host power.*

Note: *Use of an external power pack without the use of the proper EP cable, or without the SCANTEAM 8310 jumper set to the EP position, may damage your host device.*

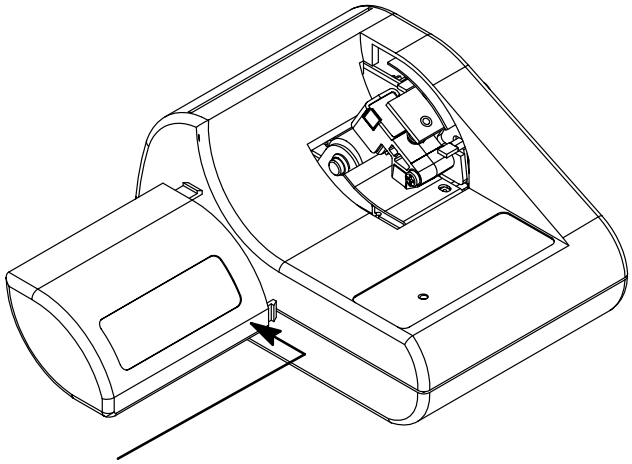
Set-up Procedure for External Power

Use the following procedure for installations in which the power operating the SCANTEAM 8310 is provided by an external power source. An external-power installation requires the use of a wall mount AC/DC power transformer or other source of DC power to the check reader.

When using an external power supply in conjunction with a host interface cable which provides host power, you must make a jumper change to a 3-pin header on the SCANTEAM 8310's PC board. (The default configuration assumes a host-powered application.) The following illustrations show the disassembly of the SCANTEAM 8310 and the optional power jumper placement for an externally powered installation.

Note: *Before disassembling the SCANTEAM 8310 you must disconnect all power and host terminal connections to the reader to prevent possible damage to the SCANTEAM 8310 or host terminal. In addition, you should ground yourself (e.g., wear a groundstrap) to prevent any electrostatic discharge to the SCANTEAM 8310.*

To gain access to the power jumpers, first remove the hood of the SCANTEAM 8310, as shown below.



1 **Press gently at this point to release tabs. Slide hood away from unit.**

Figure 12 Disassembly of the SCANTEAM 8310

Once the hood is removed, the power jumper on the JP1 3-pin header is accessible using small, needle-nosed pliers.

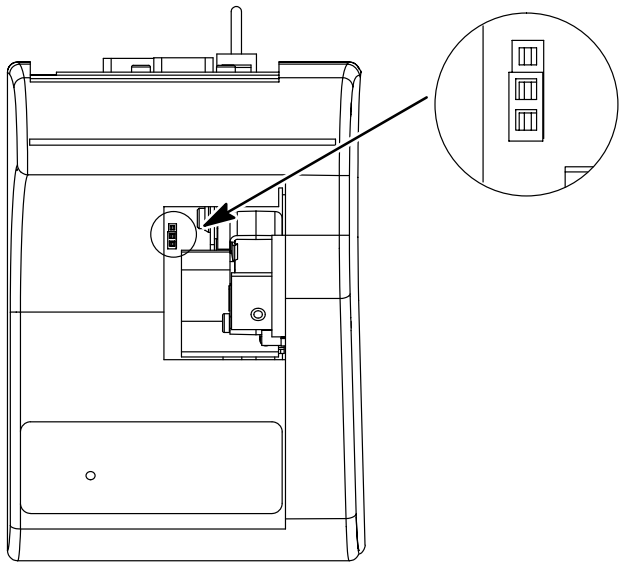
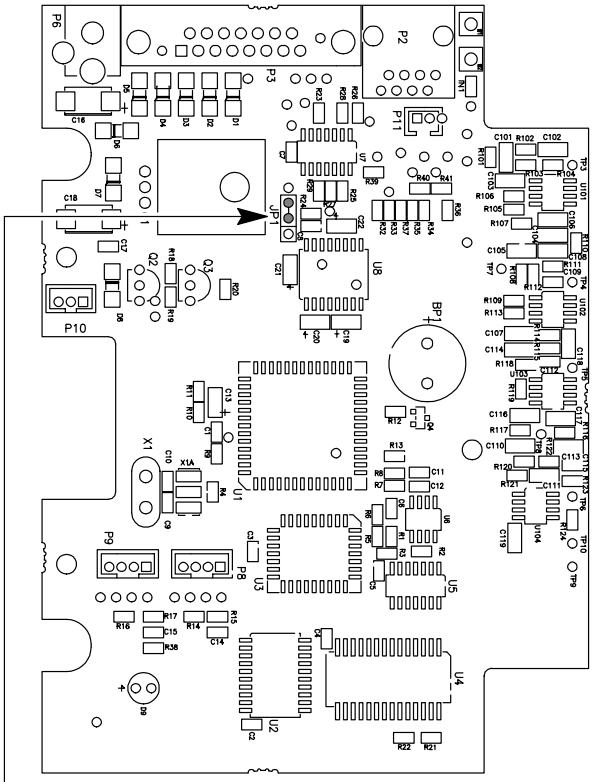


Figure 13 SCANTEAM 8310 Power Jumper Placement



JP1 3-pin header:

Host terminal
+5.0 VDC in
Vcc
No connect

Optional Power Jumper Placement for the JP1 3-pin header:

Default configuration. When the SCANTEAM 8310 is host-powered.

Optional configuration. When an external power source is used for the SCANTEAM 8310.

Figure 14 SCANTEAM 8310 PC Board

Note: *This PC board complies with European CE standards, and is contained in SCANTEAM 8310 products which are marked "CE" on the bottom product label. Please contact Welch Allyn technical support for details concerning jumper position and placement for products which do not contain the CE mark.*

Once the PC Board has been configured for an externally-powered installation, and the SCANTEAM 8310 is reassembled and reconnected, continue with the Installation Instructions below.

Installation Instructions

(1) Turn off the power for the host device to which the 8310 will be connected.

(2) Locate the interface cable and verify its part number. (Cable part numbers are provided in the Welch Allyn Interface Products Work Center (IPWC) Interface/Cable Matrix document.)

(3) Attach the SCANTEAM 8310 interface cable to the host terminal.

(4) Plug the 15-pin male connector of the interface cable into the 15-pin female connector located on the back panel of the 8310. Secure the cable to the SCANTEAM 8310 using the mounting screws included on the interface cable.

(5) Position the 8310 so that all cables run freely and smoothly. If desired, the 8310 can be secured to the wall using pan head screws which attach into the key holes molded into the bottom of the SCANTEAM 8310.

(6) Insure that the external power supply is not connected to an AC power source at this time. Connect the external power supply to the SCANTEAM 8310 by plugging the power supply's output barrel connector plug into the mating barrel connector jack located on the rear panel of the SCANTEAM 8310.

(7) Apply power to the SCANTEAM 8310's host terminal.

(8) Plug the wall mount power supply into the source of AC power. The SCANTEAM 8310 issues a single beep indicating the SCANTEAM 8310 is in a non-error condition idle state.

Caution: Do not try to enter data until the host terminal has fully initialized.

This completes set-up and installation of the SCANTEAM 8310 Check Reader. You are now ready to configure the unit for your particular application. Instructions for configuring the SCANTEAM 8310 are provided in the SCANTEAM 8310 Programming Menu. The SCANTEAM 8310 Programming Menu contains programming instructions for bar code based programming (for SCANTEAM 8310 devices which contain a bar code port), as well as programming with MICR encoded programming checks.

A.5 SCANTEAM 8310 Hardware Interface

A.5.1 DB-15F Host Port Connector

The pinout of the SCANTEAM 8310 DB-15F host port connector is described below.

Pin #	Signal
1	Logic ground
2	VCC (+ 5V)
3	RXD input (RS-232)
4	CTS input (RS-232)
5	Keyboard wedge data (Input)
6	Keyboard wedge Clk (Input)
7	Not Connected
8	Not Connected
9	Vin (+ 12V)
10	Bootstrap
11	TXD output (RS-232)
12	RTS output (RS-232)
13	Keyboard wedge term data (Output)/Wand Emulation Output
14	Keyboard wedge term Clk (Output)
15	Not Connected

Note: *An external power supply may be required for certain interfaces.* *See Operating Power Requirements on page 3–8.*

A.6 SCANTEAM 8310 Software Operation

The SCANTEAM 8310 supports keyboard wedge interfaces, wand emulation, and an RS-232 connection out the host port.

Keyboard Wedge Interfaces:

PC AT/XT/PS2
NCR 7052
IBM 3471, 3472, 3476, 3477, 3151, 3161, 3162, 3163, 3179, 3180, 3191, 3192, 3196, 3197
Harris H180, 191

Additional Host Interfaces Supported:

True RS-232 Serial Communications (PC comm port compatible)
Wand Emulation

Note: *Depending on the interface an external power pack may be required.*

A.6.1 RS-232 Host Communication Parameters:

Baud rate, start and stop bits, and parity are programmable parameters for the host serial RS-232 interface. Refer to the SCANTEAM 8310 Programming Menu for instructions on how to modify the parameters from the default settings listed in the table which follows.

Serial RS-232 Host Communication Default Parameters:

Baud Rate: . . . . . 9600 bps
Character size: . . . . . 7 bits
Start bits: 1
Stop bits: 1
Parity : . . . . . Even
Signal Level: . . . . . True RS-232 (+/- 8VDC)

Other baud rate options are: 300, 600, 1200, 2400,4800, 9600, 19.2K, 38.4K. Other parity options are: Odd, Mark, Space, and none.

A.6.2 Communication Protocols

There are four choices available in the SCANTEAM 8310 Programming Menu for the SCANTEAM 8310's Main Port Protocol:

End of Record
60ms Timeout
Tranz 330™ Protocol
Zon Jr.™ Protocol.

These selections are detailed in the following pages.

A.6.2.1 End of Record and 60ms Timeout

The following describes how the SCANTEAM 8310 main port operates using the End of Record or 60ms Timeout protocols. (Please refer to the Terminal Selection and Main Port Configuration sections in the 8310 Programming Menu to program the SCANTEAM 8310 for an RS-232 terminal and End of Record or 60ms Timeout protocol.)

The RS-232 port is controlled by a serial communications polling scheme. A simple RTS/CTS hardware flow control is utilized. The End of Record and 60ms Timeout protocols are as follows:

a) Assert RTS of selected port to allow data input.

b) Wait 5ms for data input to be seen.

c) If no data comes in during this time, de-assert RTS then return to step a).

   If data comes in during this time, wait for the end of record. (The end of record is indicated either by the End Of Record character programmed using the 8310 Programming Menu, or by a 60 ms delay between characters.) De-assert RTS, send to host terminal, then return to step a).

Notes:

- *There can be no more than a 15 second intercharacter delay for characters in a data record. A timeout resets the data buffer, and all previous data for that record is lost.*
- *Data records greater than 255 bytes cause a buffer overflow. This resets the data buffer, and all previous data for that record is lost.*
- *Parity and framing errors cause the SCANTEAM 8310 to error beep and to ignore the data record.*
- *Data sent to the SCANTEAM 8310 while the 8310 has RTS de-asserted will be lost.*

A.6.2.2 Tranz™ 330 Protocol

The following describes how the main port of the SCANTEAM 8310 operates using the Tranz 330 protocol. (Please refer to the Terminal Selection and Main Port Configuration sections in the 8310 Programming Menu to program the SCANTEAM 8310 for the Tranz 330 protocol, and the baud rate and parity of the Tranz 330.)

The Tranz 330 protocol requires that the SCANTEAM 8310 has the host port RS-232 hardware. The end of a data record from the Tranz 330 is recognized by utilizing the 60ms delay timeout. The protocol is as follows:

a) The SCANTEAM 8310 sends data <STX>data<ETX>LRC where LRC is the XOR of all characters after the <STX>.

b) The expected response to data is <ACK> or <NAK>. If <ACK> or <NAK> is not received within 2.5 seconds the data is assumed to be accepted. If a <NAK> is received, the data is re-sent. After the third <NAK>, the SCANTEAM 8310 gives up and enters its normal operating loop.

Notes:

- *There can be no more than a 15 second intercharacter delay for characters in a data record. A timeout resets the data buffer, and all previous data for that record is lost.*
- *Data records greater than 255 bytes cause a buffer overflow. This resets the data buffer, and all previous data for that record is lost.*
- *Parity and framing errors cause the SCANTEAM 8310 to ignore the data record.*

A.6.2.3 Zon™ Jr. Protocol

The following describes how the main port of the SCANTEAM 8310 operates using the Zon Jr. protocol. (Please refer to the Terminal Selection and Main Port Configuration sections in the 8310 Programming Menu to program the SCANTEAM 8310 for the Zon Jr. protocol, and the baud rate and parity of the Zon Jr.)

The Zon Jr. protocol requires that the SCANTEAM 8310 has the host port RS-232 hardware. The end of a data record from the Zon Jr. is recognized by utilizing the 60ms delay timeout. The protocol is as follows:

a) The SCANTEAM 8310 sends <ENQ> to tell the Zon Jr. that it has data.

b) The SCANTEAM 8310 waits for <ETX><NUL> which tells it that data can be sent.

c) The SCANTEAM 8310 sends data <STX>data<ETX>LRC where LRC is the XOR of all characters after the <STX>. (If a MICR read error occurred, the data would be a single "?" character.)

d) The expected response to data is <ACK> or <NAK>. If <ACK> or <NAK> is not received within 2.5 seconds the data is assumed to be accepted. If a <NAK> is received, the data is re-sent. After the third <NAK>, the SCANTEAM 8310 gives up and enters its normal operating loop.

Notes:

- *There can be no more than a 15 second intercharacter delay for characters in a data record. A timeout resets the data buffer and all previous data for that record is lost.*
- *Data records greater than 255 bytes cause a buffer overflow. This resets the data buffer, and all previous data for that record is lost.*
- *Parity and framing errors cause the SCANTEAM 8310 to ignore the data record.*

A.6.3 Displaying the Firmware Part Number and Revision Level

The revision level of the firmware operating in the SCANTEAM 8310 is embedded in the part number assigned to that firmware. The SCANTEAM 8310 displays the firmware revision level on the host terminal when commanded to do so during programming.

The programming commands are initiated by scanning bar codes from the SCANTEAM 8310 Programming Menu (if the SCANTEAM 8310 has been connected to an RS-232 device), or by passing the **Status** programming check through the check reader. Refer to the STATUS CHECK section in the SCANTEAM 8310 Programming Menu for the software revision display command sequence.

When a status is programmed, the current software revision level is flashed on the host display. Four digits flash. The first three digits displayed are the current revision level of the software. The last digit indicates the state of the reader (refer to the Error Code chart on page A−19).

A.6.4 PC Upload/Download Using Quick*Load

The SCANTEAM 8310 contains reprogrammable memory that contains the operating system for the 8310. This memory is a type of Read Only Memory (ROM) called flash memory. Flash memory can be electronically erased and reprogrammed like typical RAM, but does not lose its contents when power is lost.

When the SCANTEAM 8310 must be upgraded or modified, new operating system (firmware) or parameter data files must be placed into its flash memory. This is done using a special protocol, designed specifically for this purpose. The Welch Allyn software tool called Quick*Load is designed to implement the protocols used by the Welch Allyn flashable devices making it easy for users to download and upload firmware and run diagnostics on SCANTEAM products. Please refer to your Quick*Load manual for further information about using Quick*Load with your SCANTEAM 8310.

A.7 MICR Data Formatter

A.7.1 Error Condition Reporting

A.7.1.1 LED Display Error Codes and Single Character Host Error Codes

The SCANTEAM 8310 can report certain error conditions through the use of error code reporting to the host device.

The status and error conditions which appear on the LED display are shown in the following table. These status and error codes may also be displayed on the host device. (Refer to the SCANTEAM 8310 Programming Menu, Output Parameters, MICR Error Coding for complete instructions on programming this selection.)

Condition	Single Error Code Sent to Host	Double Error Code Sent to Host	Beep Sequence
Good power-up initialization	none	none	1 beep
Good E13-B read	none	00	1 beep
Canadian check	none	01	1 beep
No account number	none	03	1 beep
Business check (unless Canadian)	none	08	1 beep
Travelers check	none	12	1 beep
No sequence number (unless Travelers check)	none	11	1 beep
Serial number less than 300	none	15	1 beep
Old U.S. Check	none	04	1 beep
Good CMC-7 read	none	00	1 beep
Bad check - no MICR	N	09	3 beeps
Low signal level	L	10	3 beeps
High signal level	H	none	3 beeps
Initial power-up calibration	none	none	3 beeps
Power up initialization error	F	none	3 beeps
Questionable MICR character	E	06	3 beeps
Program mode	none	none	2 beeps
Format error	Y	11	3 beeps
Check unreadable	see list pg. 5–9	none	3 beeps
Exception Formatting Error	J	11	3 beeps
Magnetic Interference	none	none	none

Unreadable (U) error codes:

0 Auxiliary On-Us field error (not bounded by On-Us symbols)
1 Invalid EPC character
2 Missing transit symbol
3 Wrong number of digits in transit field
4 Mod 10 check digit failure
5 More than 24 characters in On-Us field
6 No On-Us symbol in On-Us field
7 No On-Us field
8 Wrong number of digits in amount field
9 Missing amount symbols

A.7.2 Pre-Canned Format 10 - Error Code Reporting

The SCANTEAM 8310 has a selection of nine “pre-canned” host interface output data formats. (Refer to the SCANTEAM 8310 Programming Menu, MICR Data Formatter section, for a list of “pre-canned” output formats.) The pre-canned formats provide additional status information which can be sent to the host device. The host application must be capable of supporting the error codes as defined, since they are not configurable in the check reader. If a pre-canned format with extended status and error reporting is selected, the error and status codes cannot be modified, and the codes in the table on page A−22 are sent to the host.

The MICR Data Formatter output format number 10 provides detailed MICR document status and error reporting capabilities which are not currently available in any other output data formats.

The format of the output data sent to the SCANTEAM 8310's host device when "Format 10" is selected is as follows:

TTTTTTTTTAAAAAAAAAAAAAAAAAASSSSSRR

Where T . . . . . T = 9 digit ABA number
A . . . . . A = 18 digit account number, symbols suppressed, pad left with zeros
S . . . . . S = 5 digit check sequence number, pad left with zeros
R . . . . . R = Return code (listed below)

	Return Code Sent to Host	Description	Search Order
bad checks	**09**	No MICR	1
	10	Low signal	2
	06	Bad data/unreadable character	3
	11	Parsing error/Non-North American format	4
	05	Invalid ABA check digit	5
good checks	**00**	Good personal check	6
	01	Canadian check	7
	03	No account number	8
	08	Business check (unless Canadian)	9
	12	Travelers check	10
	02	No sequence number (unless Travelers check)	11
	15	Serial number is less than 300	12
	04	Old U.S. Check	13

Note: *If the SCANTEAM 8310 detects more than one Return Code for a good check, the last Return Code encountered in the search order appears on the host display. For example, if a check is Canadian (code 01) but has no account number (code 03), the 03 code is displayed on the host terminal. This is because the no account number (code 03) is 8th in the search order and the Canadian check (code 01) is 7th in the search order.*

INTRODUCTION TO MICR CHECK READING AND MICR TECHNOLOGY

B

B.1 MICR Definition and Techniques

MICR is an acronym for Magnetic Ink Character Recognition. A check reader's function is to read the information printed on the bottom of a business check or personal check and to transmit that information to a host device. This line of information is called the "MICR Line" because the ink used to print the MICR characters contains iron particles and is magnetic. The characters printed with the magnetic ink are read using Magnetic Ink Character Recognition technologies.

Check readers read the characters using either optical character recognition technology (OCR), or magnetic read head technology. Early check readers intended for retail point of sale applications used OCR techniques to read the MICR line. The ability to defraud an OCR check reader using a pen or pencil has caused this technique to be rejected by the market due to the susceptibility to fraud.

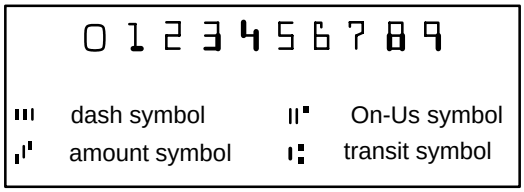
All the popular check readers sold today for retail applications are based on a technique which uses a magnetic read head to pick up a signal from a document containing magnetic ink which is passed beneath the read head.

B.2 MICR Fonts

B.2.2 The E13-B Character Set

The character font used for checks and other MICR documents in North America and many European countries is referred to as the E13-B font. This font consists of ten numeric characters and four control symbols. The E13-B font is specified in an ANSI (American National Standards Institute) standard for print size, quality, and location. A listing of the applicable ANSI standards covering MICR check reading is on page B−6.

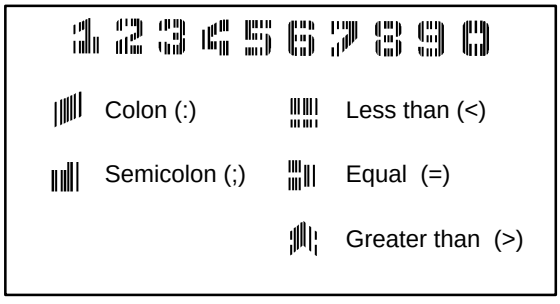
The E-13B Character Set



B.2.3 The CMC-7 Character Set

The MICR character font used on MICR documents in most of Latin America and Europe is referred to as the CMC-7 character set. The techniques used to read CMC-7 characters are identical to those used to read E13-B characters. As with E13-B MICR readers, the use of magnetic read head techniques are preferred to optical techniques for reading CMC-7 characters.

The CMC-7 Character Set and ASCII Output



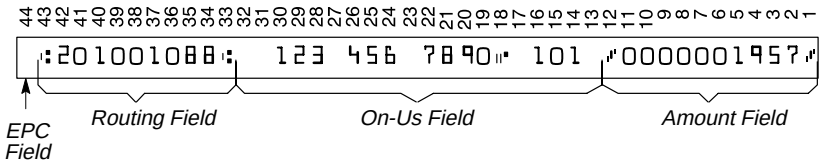
B.3 Information Fields on an E13-B Character Based Check

There are standards which govern the placement and format of *some* information fields printed on the MICR line of a check, but not all the fields. This presents a problem for automatic check readers which must rely on software algorithms to identify the various fields of information on a check.

The process of inspecting the MICR line information and separating particular fields of information (such as the bank routing field or the amount field) is referred to as "parsing." The SCANTEAM 8300/8310 uses a set of parsing rules to separate various information fields on a check whose MICR line format follows industry conventions. Special parsing rules are applied to checks which are printed with non-conventional MICR lines. In the SCANTEAM 8300/8310, these special parsing rules are contained in the MICR Exception Table. (Please see page 5−2 for further information about the MICR Exception Table.) The key to this table is the bank routing field read from the MICR line.

An example of the MICR line on a six inch personal check is shown below. The character position numbers are displayed across the top. Note that in the following example, the check serial number, 101, is embedded in the On-Us field.

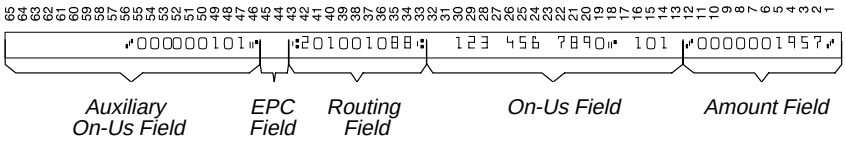
Character Position Numbering and Information Field Names on a Six Inch Personal Check



Please refer to page B−5 for descriptions of each of these fields.

In addition to the four fields of information contained on a personal check, a fifth field referred to as the “Auxiliary On-Us” field is contained on some commercial checks. The location of the Auxiliary On-Us field is to the left of the Routing and External Processing Code (EPC) fields as shown below.

Character Position Numbering and Information Field Names on a Commercial Check



Please refer to page B−5 for descriptions of each of these fields.

When referring to numbered character positions of a check, character position number one is in the lower right corner of the check. Note in the examples above, the Amount symbol (⑈) is printed in the first character position.

B.3.1 MICR Line Fields - Location and Content

Auxiliary On-Us Field

- Found on business checks.
- Field is always bounded by the E13-B On-Us symbols.
- Field content is unspecified but generally contains the check serial number.
- Occupies character positions 45 (or 46) through 65.

External Processing Code (EPC) Field

- A one digit field.
- Use of this field is optional.
- Use indicates requirement for special processing.
- Use of the field requires permission from ANSI X9B.
- Occupies character positions 44 or 45, but not both.

Routing Field

- An eleven digit field which identifies the check's issuing institution's unique identification code. It also contains information on the bank's Federal Reserve district and home office code.
- Use of this field is mandatory.
- This field contains a mod-10 check digit for error detection.
- Field is always bounded by E13-B Transit symbols.
- Occupies positions 33 through 43.

On-Us Field

- Up to 18 total characters may be included in this field (up to 19 characters if position 32 is used).
- The field structure is unspecified.
- This field contains the account number and, sometimes, the check serial number.
- Characters in this field are located between, and possibly in positions 14 through 31 (or through 32 if used).

Amount Field	• A twelve digit field containing the dollar amount of the check. • Structure of data in this field is completely specified by standards. • Field is always bounded by E13-B Amount symbols. • Field occupies character positions 1 through 12.

B.4 Reference Documents

The following standards cover the MICR character fonts and the location of MICR information on financial documents.

ANSI X9.13	American National Standard Specifications for Placement and Location of MICR Printing - May 1990
ANSI X9/TG-2	ANSI Technical Guideline; Understanding And Designing Checks, Guidelines for the standardization of check writing, check design, and data element location - 1990
ANSI X9.27	American National Standard Specifications for Print Specifications for Magnetic Ink Character Recognition (MICR) - August 1988
ISO 2033-1983	Information Processing - Coding of Machine Readable Characters (MICR & OCR)
ISO 1004-1977	Information Processing - Magnetic Ink Character Recognition - Print Specifications

These ANSI and ISO specifications are available from:

American National Standards Institute
1430 Broadway
New York, NY 10018
Tel: (212) 642 4900 / FAX: (212) 302 1286

INDEX

Numbers

60ms Timeout Protocol, 4–7

A

AAMVA Driver's License, Decoding, 4–12

Aux Port Functionaltiy, Serial RS–232, 4–5

Auxiliary RS–232 Ports, 3–5

B

b, Display Definition, SCANTEAM 8300, 5–8, A–20

Bar Code Scanner, Symbology, 4–12

Bar Code Scanner Port, 3–6

Bar Codes, MICR Character Equivalents, 5–6

C

C
- Display Definition, SCANTEAM 8300, 5–8, A–20
- Displayed After Power Up, 2–17

California Driver's License, Decoding, 4–12

Card Reader, Magnetic Stripe, 4–11

Check Reading, Procedure, 2–16

CMC–7 Character Set, B–2

Communication Protocols
- SCANTEAM 8300, 4–6
- SCANTEAM 8310, A–15

Configuration
- SCANTEAM 8300–1, 4–2
- SCANTEAM 8300–2, 4–3
- SCANTEAM 8300–4, 4–3

D

DB–15 Pin Assignment
- Model 8300–1, 3–2
- Model 8300–2, 3–3
- Model 8300–4, 3–4

DB–15F Host Port Connector
- SCANTEAM 8300, 3–1
- SCANTEAM 8310, A–13

Disassembly
- SCANTEAM 8300, 2–10
- SCANTEAM 8310, A–8

E

E, Display Definition, SCANTEAM 8300, 5–8, A–20

E–13B Character Set, B–2

E–13B Check, Information Fields, B–3

End of Record Protocol, 4–7

Error Codes, SCANTEAM 8300, 5–8, A–20

Error Condition Reporting
SCANTEAM 8300, 5–7
SCANTEAM 8310, A–19

F

F, Display Definition, SCANTEAM 8300, 5–8, A–20

FCC, Compliance Statement, 1–1

Format, Output Data, 5–4

H

H, Display Definition, 5–8, A–20

Hardware Interface, Description
SCANTEAM 8300, 3–1
SCANTEAM 8310, A–13

Help Desk, 7–3

Host Command Protocol, 4–10

Host Port, Connector
SCANTEAM 8300, 3–1
SCANTEAM 8310, A–13

Host Port Interface Compatibility, 4–1

I

Illustrations
Feeding an MICR Document, 2–16
List, vi
Product
bottom view, SCANTEAM 8300, 2−4
PC Board
SCANTEAM 8300, 2−12–2−14
SCANTEAM 8310, A−10–A−12
rear view, SCANTEAM 8300, 2−3
SCANTEAM 8300, 2−2
SCANTEAM 8310, A−2

Installation, 2–5
Externally–Powered
SCANTEAM 8300, 2−9
SCANTEAM 8310, A−6
Host–Powered
SCANTEAM 8300, 2−6
SCANTEAM 8310, A−5

Introduction, 1–1

J

J, Display Definition, SCANTEAM 8300, 5–8, A–20

L

L, Display Definition, SCANTEAM 8300, 5–8, A–20

M

Magnetic Stripe Card Reader, 4–11

Magnetic Stripe Card Reader Input Port, 3–6

Maintenance, 6–1
Magnet Stripe Card Reader, 6–1

Paper Transport and MICR Read Head, 6–1
Plastic Cabinet, 6–1

MICR
Character Equivalents to Bar Codes, 5–6
Character Recognition, 5–1
Data Formatter, 5–3
Data Processing, 5–1
Format Exception Table, 5–2
Line Data Parsing, 5–1
Non–Conventional, 5–2
Signal Strenth Testing, 5–7

MICR Check Reading/Technology, Introduction, B–1

MICR Definition and Techniques, B–1

MICR Fonts, B–2

MICR Line Fields, Location and Content, B–5

MICR Line Formatter, Standard Output Data Formats, 5–4

N

n, Display Definition, SCANTEAM 8300, 5–8, A–20

O

O, Display Definition, SCANTEAM 8300, 5–8, A–20

Output Data Formatter, 5–4

P

P, Display Definition, SCANTEAM 8300, 5–8, A–20

Part Number/Revision Level, Displaying
SCANTEAM 8300, 4–12
SCANTEAM 8310, A–18

Physical Description, Specifications
SCANTEAM 8300, 2–1
SCANTEAM 8310, A–1

Ports
Auxiliary RS–232, 3–5
Bar Code Scanner, 3–6
Magnetic Stripe Card Reader Input, 3–6

Power Jumper, Placement for SCANTEAM 8300, 2–13–2–15

Power Requirements, 3–8

Power Up, Setting Parameters, SCANTEAM 8300, 2–17

Product Illustrations
SCANTEAM 8300, 2–2
SCANTEAM 8310, A–2

Protocols
60ms Timeout, 4–7
End of Record, 4–7
Host Command, 4–10
Tranz 330, 4–8

Q

Quick*Load
for the 8300, 4–13

for the 8310, A–18

R

Reference Documents, B–6

Return Codes, Pre–Canned Format 10, A–22

Revision Level, Displaying
SCANTEAM 8300, 4–12
SCANTEAM 8310, A–18

RS–232, Aux Port Functionaltiy, 4–5

S

Service and Repair, 7–1

Set–Up
Externally–Powered Installation
SCANTEAM 8300, 2−9
SCANTEAM 8310, A−6
Host–Powered Installation
SCANTEAM 8300, 2−6
SCANTEAM 8310, A−5

Set–up and Installation, 2–5

Software Operation, 4–1
SCANTEAM 8310, A–14

Specifications
Physical
SCANTEAM 8300, 2−1
SCANTEAM 8310, A−1
Summary, 8–1

Status Check
SCANTEAM 8300, 4–12
SCANTEAM 8310, A–18

T

Tranz 330 Protocol, 4–8

U

U, Display Definition, SCANTEAM 8300, 5–8, A–20

Unpacking Check Reader, 2–5

W

Warranty Information, 1–1

Y

Y, Display Definition, SCANTEAM 8300, 5–8, A–20

8300/TM Rev E

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