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4-Laser Bar Code Reader

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AXIOM™ 400

Bar Code Scanning Solutions

Product Manual

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Lasers • Cameras • RFID • Systems

AXIOM™ 400 Bar Code Scanning Solution User Manual Revision 1.0

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Document Revision Control

This document is under revision control in accordance with Accu-Sort's Quality System. Any addenda or other documents associated with this manual are under separate revision controls. A revision number is changed by 0.1 whenever technical information is changed or added to a document. Any document version with a revision between 0.1 and 0.9 is automatically considered **preliminary**. Our Engineering Change Order (ECO) process is used to manage documents with a revision greater than 0.9.

Copyright Information

Disclaimer Information

The information contained in this manual is subject to change without notice. Supplemental information or documentation may be required for certain applications or usage.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Accu-Sort cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Accu-Sort with respect to use of information, circuits, equipment, or software described in this manual.

In no event will ACCU-SORT® SYSTEMS, INC. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

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Preface

Welcome to **release 1.0** of the **AXIOM™ 400 Product Manual** from Accu-Sort Systems, inc. This Product manual includes the information you need to effectively integrate the **Axiom Bar Code Scanning Solution** with your application. It contains detailed information about the following:

- Product features, capabilities, specifications and accessories
- Safety information
- Installation guidelines and procedures
- Configuring the Axiom for your application
- Maintenance and Troubleshooting

This preface explains how this Product manual is organized and introduces other sources of information that you will find useful.

Intended Audience

You should have a basic understanding of bar code scanning. Equipment installers must be familiar with standard wiring techniques and terminology. Because the Axcess software runs in the Microsoft® Windows® environment, you should know how to use a mouse, choose commands, and work with windows and dialog boxes.

This manual contains some terms that may be unfamiliar. Use the glossary at the back of this manual for assistance.

Thank You

Thank you for using an Axiom bar code scanning solution and this manual.

We value your comments and feedback. Feel free to let us know what you like or dislike about Axiom (or this manual) by e-mailing us at *info@accusort.com*.

You can also mail your comments to our corporate headquarters address or call us directly at (215) 723-0981 or 1-800-BAR-CODE™.

Overview of Contents

This manual includes the following chapters:

- **Chapter 1, "Introduction,"** introduces you to the advanced capabilities that make the Axiom an impressive performer in the laser bar code scanning market. It covers hardware, software, and other features common to all Axiom™ bar code scanning solutions and concludes with an overview of typical Axiom applications.
- **Chapter 2, "Safety,"** addresses the necessary precautions you must observe while installing and operating the Axiom. These include: laser safety, electrostatic discharge control, grounding, and compliance.
- **Chapter 3, "Mechanical Installation,"** discusses key factors that affect reader performance. As an aid to installers, it provides both an installation sequence checklist and easy-to-follow, step-by-step mounting procedures to complete the mechanical installation of single and multi-unit solutions.
- **Chapter 4, "Electrical Installation,"** defines how to use the tables on the Axiom wiring base and the interconnect diagrams found in Appendix D to complete the electrical installation of your reader.
- **Chapter 5, "Setup and Operation,"** contains basic instructions for completing the initial setup configuration of your Axiom reader(s), trigger, tachometer, and communications parameters. It includes cross references to the *Axcess Setup Software Manual*. This chapter also outlines how the Axiom functions during normal operation.
- **Chapter 6, "Maintenance,"** defines recommended cleaning procedures and equipment checks to assure the Axiom provides peak performance.
- **Chapter 7, "Troubleshooting,"** covers the Axiom's advanced diagnostics as well as troubleshooting tables.
- **Chapter 8, "Service,"** provides instructions for the removal and replacement of key "field-replaceable" (FRU) components.
- **Appendix A, "Specifications,"** contains a detailed listing of all Axiom bar code scanning solution specifications, read charts, certifications, options and accessories.
- **Appendix B, "Read Charts,"** provides Axiom standard and high-density read charts for both single readers and dual readers used in X-scanning applications.
- **Appendix C, "Glossary,"** contains a comprehensive listing of terms that are relevant to bar code scanning in general and the Axiom in particular.
- **Appendix D, "Interconnect Drawings,"** provides schematic diagrams for wiring your Axiom for various applications. These diagrams are cross referenced in Chapter 4.

This Product manual is available online.

The **Axiom 400 Product Manual** is available online in Adobe Acrobat PDF format. The paper and online versions of this manual have identical content; use whichever format is most convenient.

The **AXIOM 400 Product Documentation CD** contains PDF versions of each item in the Axiom documentation set. You can search for information, read it on–screen, and print individual pages, sections, or entire publications by using this CD. When you print from Adobe Acrobat, the resulting printouts look just like pages from an Accu-Sort hardcopy manual. We supply this CD with every reader shipment.

NOTE: There may be additional material that was not available when this Product manual was printed. To learn if there is a documentation update for this product, go to our web site's downloads page at www.accusort.com.

Other Sources of Information

You can choose from many information sources, including documentation, training, and support services, to increase your knowledge and understanding of the Axiom bar code scanning solutions. If this manual refers you to other documentation, use only the latest versions unless otherwise specified.

Conventions

WARNINGS or CAUTIONS: This symbol identifies a hazard or procedure that, if incorrectly performed, could cause personal injury or result in equipment damage. It is also used to bring the user's attention to details that are considered **IMPORTANT**.

HIGH VOLTAGE CAUTION: This symbol alerts the user they are about to perform an action involving, either a dangerous level of voltage, or to warn against an action that could result in damage to devices or electrical shock.

LASER CAUTION: This symbol alerts the user they are about to perform an action involving possible exposure to laser light radiation.

ESD CAUTION: This symbol identifies a procedure that requires you take measures to prevent Electrostatic Discharge (ESD) e.g., use an ESD wrist strap. Circuit boards are most at risk. Please follow ESD procedures.

USEFUL TIPS or NOTES: This symbol draws attention to details or procedures that may be useful in improving, maintaining, or enhancing the performance of the hardware or software being discussed.

Customer Service

Training

Accu-Sort Systems offers a complete set of training courses to help you and your staff master Axiom bar code scanning solutions. We can help you develop a training plan that provides thorough training for both your project team and your end users. We will work with you to organize courses appropriate to your job or area of responsibility. Training professionals can show you how to plan your training throughout the implementation process so that the right amount of information is delivered to key people when they need it the most. You can attend courses at our training center, or you can arrange for our trainers to teach at your facility. In addition, we can tailor standard courses or develop custom courses to meet your needs.

Support

From on–site support to central support, our team of experienced professionals provides the help and information you need to keep your Axiom working for you. This team includes your Account Manager and Accu-Sort's large staff of support specialists with expertise in your business area and managing your hardware and software environment.

NOTE: If you have any problems or questions that require Accu-Sort's help, direct your calls to ***Customer Service*** at (215) 723-0981 or 1-800-BAR-CODE™.

To ensure Accu-Sort's response is prompt and accurate, please have the following information ready when calling Customer Service:

- Product Serial Number (located on Axiom Scan Heads and Power Supplies)
- Product Type
- Detailed description of the question or problem
- Customer contact name and phone number

Product Type	Serial Number
Axiom 400	

Axiom400 Serial Tag

Serial Number Breakdown	
The **WWXXXXXX** fields are also bar coded with a Code 128 type bar code on the serial tag.	
WW	Two digit year of manufacture
XXXXXX	Six digit sequential build number
Suffix	Optional suffix(es) that reflect actual catalog options for off-the shelf units. At least 6 digits can be placed on the tag. If "Z" is part of the suffix, this indicates a custom unit requiring an engineering folder. Suffix could be used for special designations

1 Introduction

This section presents a detailed description of the Axiom laser bar code reader. It begins with a product overview. The Axiom features and its' two main components, the wiring base and the scan head, are described in detail.

- Product Overview
- Wiring Base
- Scan Head
- Axcess Setup Software
- Application Solutions
- Ordering Options and Accessories

Product Overview

The Axiom line of laser bar code readers was designed with industrial and manufacturing applications in mind. The Axiom offers high-speed scanning (up to 1400 scans per second) and high reliability, including a rugged IP65 rated industrial enclosure. Its large depth of field provides accurate bar code reading at distances up to 72 inches.

Every Axiom includes a universal wiring base and a plug-in scan head. The scan head is available in standard and high-density versions for high-speed scanning in fast moving applications.

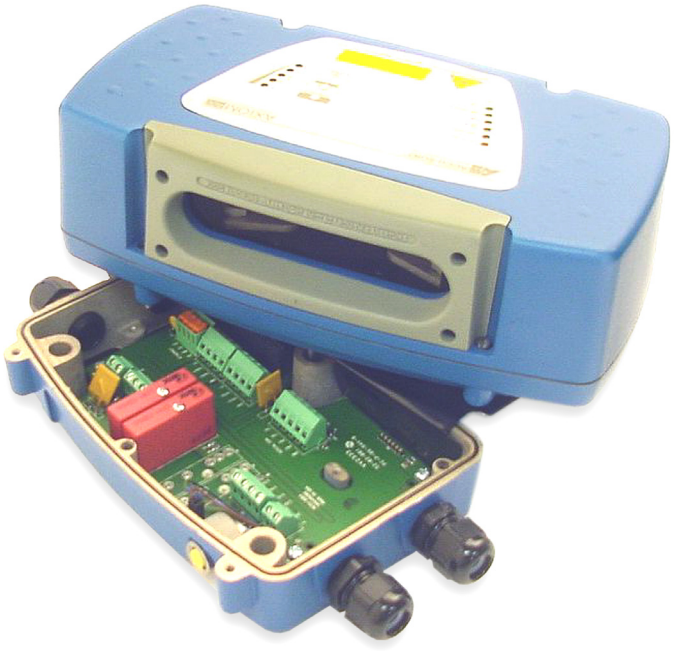


Figure 1-1: Accu-Sort Axiom with Wiring Base (bottom) and Scan Head (top)

Though technologically advanced, the Axiom is designed for easy setup and operation.

Axcess Setup software for the Axiom line of Accu-Sort bar code readers, provides a familiar Windows®-based user interface. Using the **Axcess Wizard** or the **Axcess Explorer**, you can configure your Axiom readers without the need for onsite service.

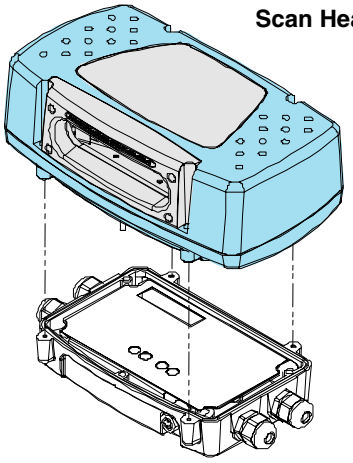
Simply connect to your reader via the setup cable or the on-board Ethernet connection. Specify valid bar code types, groups, and patterns. Pad or strip characters from the decoded string. Define your I/O—including built-in trigger and tachometer signals and up to four solid state relays. When complete, download your application settings to the Axiom and you're ready to go.

These features, along with comprehensive real-time performance monitoring, make the Axiom the leading bar code scanning solution in its class.

The Axiom Scan Head

The Axiom scan head scans package labels and decodes bar code symbols. The integral DRX decoder logic decodes the most common bar code symbologies. The scan and decode functions are configured using the Axcess configuration software on a personal computer. *See Chapter 5, Setup and Operations.*

Scan Head



The Axiom offers unparalleled read rate performance:

- **No focusing or distance measurement required.** The Axiom uses 4 lasers that are always scanning using a combination of alternating scans and 2 sensors. This creates 4 read zones and eliminates the need for distance measurement and focusing. Focusing or switching from one laser to the next can result in lost parcels and lower read rates.
- **Continuous scanning over 4 read zones out to 72 inches.** Bar code labels on parcels of differing heights that are side by side on the transport will be read.
- **Largest read range in class.** The Axiom can read over a 72-inch range.
- **No weak transition between read zones.** Two lasers are always scanning over the boundaries between read zones to ensure that no labels are missed, regardless of the distance from the box to the reader.
- **Improved performance on poor quality/contrast labels.** Two lasers can be configured to read in the same zone, each focused differently, to enable the Axiom to read poorly printed and low contrast bar codes that other readers can't read.
- **1400 scans per second.** The highest scan rate in class, ensures the highest possible read rate on good and poor quality even at high transport speeds.

The Axiom makes diagnostics and service easy.

- **Scan head module is hot-swappable.** Easily change or replace an Axiom scan head from a wiring base without the need to disconnect the unit from its power source.
- **LEDs indicate signal strength.** LEDs can be used to determine how well the Axiom is reading bar codes. *See Chapter 5, Setup and Operations.*
- **User self test mode helps in diagnostic mode.** Used in conjunction with the signal strength LEDs, the self-test mode enables the user to quickly determine if one of the four lasers is faulty.

Bar Code Capabilities

The Axiom is designed to decode the following bar code types:

- Interleaved 2 of 5
- Code 128
- Code 39
- Code 93
- Codabar (including Codabar NSS)
- UPC/EAN (including 2 and 5 character extensions with the ability to specify the character used to separate the code from the extension)

For each bar code type, the quantity of bar codes to be read can be specified. In addition, the user can specify conditions for NO-READ and/or MULTIPLE BAR CODES and assign bar codes to be transmitted together as SETS.

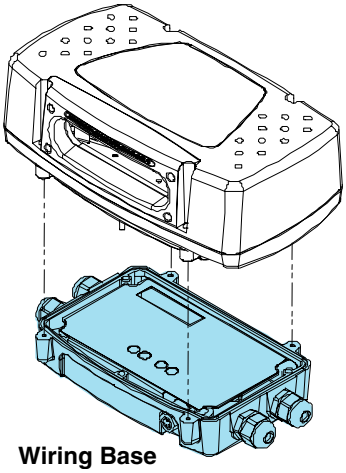
The Axiom decodes bar codes between 1 and 50 characters in length. Also, it supports up to ten different bar code definitions and supports a maximum of 20 different bar codes within a single "trigger."

If you want to check your understanding of basic bar code scanning concepts, go to the Accu-Sort Internet website at http://www.accusort.com/ to view our Bar Code Basics training course.

DRX®

The Axiom uses Accu-Sort Systems' patented DRX decoding logic for decoding bar code data. DRX technology uses partial scans to reconstruct bar codes with 100% accuracy. DRX® enables low-aspect-ratio bar codes to be decoded, and improves read rates on damaged and poorly printed codes.

The Axiom Wiring Base



Wiring Base

All wiring connections to the Axiom are made via the wiring base. Terminal blocks in the Axiom wiring base allow you to wire up easily using common electrician tools—no soldering required. An insulation flap covers the terminal blocks and provides a ready reference for all internal connections. There are four conduit openings for running wires into the base.

The wiring base includes the following:

- **Power supply input/output, 12-30V (2):** The Axiom is easily wired into a 24VDC power supply source. Power output is provided to facilitate daisy-chaining up to three Axioms to a shared power source. These connections include LEDs to indicate power polarity or fault conditions. Power supplies are also available from Accu-Sort. When using Accu-Sort power supplies, each Axiom uses its own supply.
- **Dedicated trigger input (1):** This terminal block connects the contacts of a sensor that detects the presence of a package in the Axiom's scanning area. The trigger can be either an electronic (current sourcing or sinking) or a hard contact type device. Most applications use a photo-reflective sensor. The trigger signal starts and stops decoding and determines when messages are sent or when outputs are energized.

  The Axiom supports three trigger modes: *hardware, software and continuous.* The software supports receipt of user specified start-of-trigger and end-of-trigger messages over a "host" network link or a serial port, which is configured for the host communication.
- **Dedicated tachometer input (1):** This terminal block connects with a *hardware tachometer*, which enables the Axiom to monitor belt speed (or other method of product conveyance). Axiom may also be set up for a *computed* or *user-specified tachometer.*
- **I/O relay sockets, inputs/outputs (4):** Four sets of terminal blocks for connecting the optional input or output modules. Four sockets support any input and output module combination. For example: An output module could be used to activate a diverter/sorter and an input module connected to a photoeye could acknowledge that the diverting was accomplished. *(See specifications in Appendix A.)*
- **Serial communication, RS232/422 (1):** An RS232/422 port allows point-to-point communications with a single device or multiple reader network.
- **Ethernet port (1):** The Axiom is the only laser reader in its class to offer integrated Ethernet TCP/IP. Up to four Axioms can be connected on an Ethernet network. Together, these readers can:
  - Work in a coordinated mode to read multiple bar code symbols on different sides of the same package.
  - Combine data from several readers through a single reader that communicates the data to a host.
  - Pass input and output status information between readers.
  - Communicate, real-time, with a host device.

  - Remote setup and monitoring of reader operations from a host device instead of using a direct-connection between a PC and Axiom (using the programming cable).

- **Parameter Storage Module (1):** The parameter storage module is an EEPROM (Electronically Erasable Programmable Read-Only Memory) chip that stores all of the setup and configuration information for an individual Axiom reader. By using a parameter storage module in both the wiring base and scan head of an Axiom, either component can easily be swapped. Configuration settings can be downloaded from paired modules to eliminate the need to run through the standard set up and configuration.
- **Dedicated external setup port (1):** The setup port, located on the front of the wiring base, allows a personal computer running the *Axcess Setup Software for the Axiom Reader* to download a configuration to one or more readers. The setup port is for temporary use during configuration transfers and system setup. *(See Chapter 5, Setup and Operations.)*
- **40-pin wiring base connector (1):** The 40-pin connector on the bottom of the scan head plugs into this connector. All power and communications with the scan head occurs through this connector.
- **Threaded conduit openings (4):** All permanent connections (i.e., power, trigger, tachometer, and communications) are made to the wiring base, using conduit or cable, through these openings.

AXCESS™ Configuration Setup Software

The *Axcess Setup Software*, a Windows®-based software package, lets you configure an Axiom through a series of intuitive, user-friendly menus, tools and dialog boxes. Context sensitive help is available to assist with use of the software.

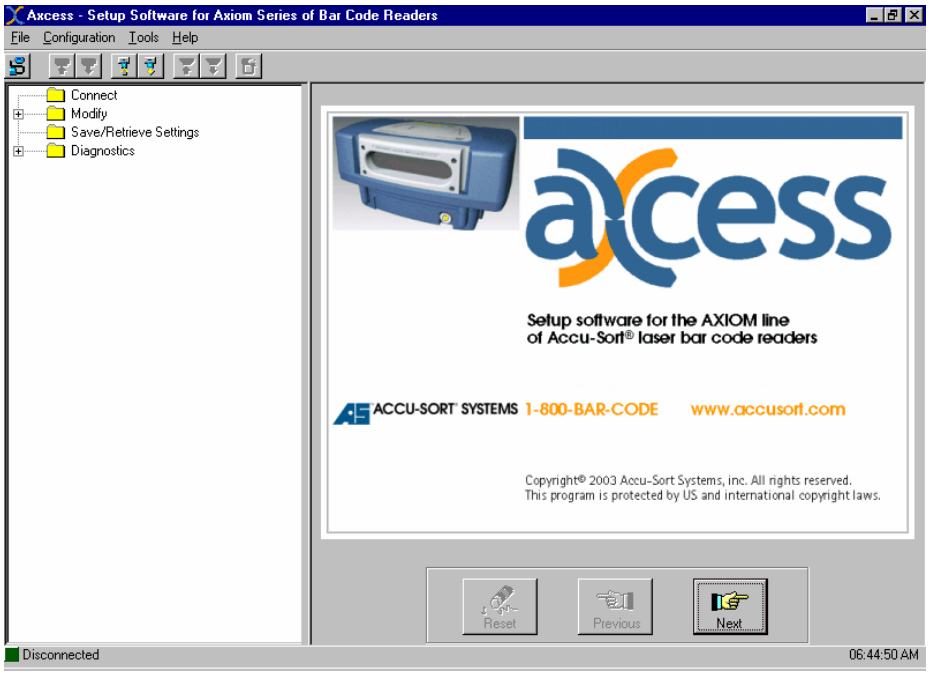


Figure 1-2: Accu-Sort Axcess Setup Software

All Axiom functions are selected from the standard menu bar, **Axcess Explorer**, or the **Axcess Wizard**, providing multiple access points for all setup parameters.

With the *Axcess Setup Software*, you can:

- Integrate Axiom to your system and application without custom software.
- Modify the Axiom output messages to accommodate your system needs.
- Add or modify the bar code symbologies to be read by Axiom.
- Define up to four (4) relay input/outputs.
- Monitor Axiom performance using various diagnostic tools.

You can easily configure your Axiom reader by using the ***Axcess Setup Software*** (PN 1000057488), a PC, and the setup programming cable (PN 1000007308). Setup can also be achieved on a network via communications with the Axiom through its' Ethernet port. One software package and one setup cable are required per installation.

Axiom Bar Code Scanning Solutions

Axiom's flexibility allows you to configure it for a variety of applications.

- **Standalone** – A single Axiom scanning bar codes located on the same side of every package passing the scanning area.
- **Standalone with Tracking** – Similar in function to a standalone application, only a tachometer is used for tracking purposes.
- **X-Scanning** – Two Axiom readers and the X-mounting bracket provide an x-scanning pattern for reading bar codes in various orientations.
- **Multiple-reader network** – A single Axiom is configured as a "controller". By doing this, the Axiom "controller" can gather data from other Axioms (configured as "clients") over an Ethernet network. The Axiom then transfers the collected data to a host via the RS232 or network link.
- **Scanning Array / Tunnel** – Two multi-reader networks are mounted to "blanket" several sides of an application's scanning area to assure that bar codes appearing on various package sides will not make it through the array without being scanned and decoded. Scanning array mounting structures can be custom-engineered to fit your application requirements for up to six-sides.

Options and Accessories

To order *options and accessories* for your ***Axiom Bar Code Scanning Solution***, reference the part numbers provided in *Appendix A*. Contact your sales representative for assistance in determining which options and accessories will be applicable to your application.

If you know which items are needed, contact *Accu-Sort's Customer Service Department* (ask for the *Spare Parts Coordinator*) between 8 AM and 4:30PM (EST) Monday through Friday at 1-800-BAR-CODE (Fax: 215-723-1515).

2 Safety

Please follow the safety precautions and warnings found in this manual when installing, setting up, operating, maintaining, troubleshooting or replacing any Accu-Sort products, parts, or related equipment. Following these precautions will prevent personal injury or damage to the unit. Failure to follow these precautions may also void your warranty.

This section provides important information regarding safety and your Axiom, especially involving issues regarding:

- General Precautions during Mounting and Installation
- Compliance Requirements
- Electrical Safety
- Electrical Grounding Requirements
- Electrostatic Discharge Precautions and Control
- Laser Safety

NOTE: Contact Accu-Sort at 1-800-BAR-CODE™ if you need more information.

Symbols

Throughout this manual, special safety alerts are indicated by the following symbols:

WARNINGS or CAUTIONS: This symbol identifies a hazard or procedure that, if incorrectly performed, could cause personal injury or result in equipment damage.

HIGH VOLTAGE CAUTION: This symbol alerts the user they are about to perform an action involving, either a dangerous level of voltage, or to warn against an action that could result in damage to devices or electrical shock.

LASER CAUTION: This symbol alerts the user they are about to perform an action involving possible exposure to laser light radiation.

ESD CAUTION: This symbol identifies a procedure that requires you take measures to prevent Electrostatic Discharge (ESD) e.g., use an ESD wrist strap. Circuit boards are most at risk. Please follow ESD procedures.

Alerts help you to:

- Identify a hazard and its consequences
- Avoid a hazard by taking adequate safety precautions
- Get the most out of your bar code solution

General Precautions

Installation and Service by Qualified Service Technician Only

WARNING: All procedures involving exposure to the inside of the Axiom wiring base must be performed by a trained technician because of possible exposure to high voltage. There are no user-serviceable parts inside. Do not attempt to open the unit or perform any installation/service procedures unless you are a trained technician!

Refer all servicing and advanced troubleshooting to a qualified service technician. Technical training is available from Accu-Sort Systems.

Furthermore, even trained technicians should always reference the specific product documentation for more detailed service procedures that may not be described in the **AXIOM 400 Product Manual**.

Unpacking, Mounting and Installation Recommendations

CAUTION: Firmly fasten mounting structures in place before installing the equipment to any mounting structure. Avoid using freestanding mounting structures. If your application requires a freestanding mounting structure, avoid making the structure top-heavy.

- Follow all procedures regarding electrical safety, laser safety, and electrostatic discharge safety (ESD) as outlined in this manual.
- Save all packing material in case you have to transport your readers.
- Use steel or aluminum as a mounting structure. An Accu-Sort mounting structure is recommended for optimum system performance.
- Check mounting hardware periodically for tightness and stability.
- Do not use sheet rock, plaster board, wood, or other unstable mounting surfaces.
- Do not use mounting surfaces that are subject to high vibrations.
- Do not create any obstructions of airflow around the modules. Keep the area around the modules clean to provide for cooling. (Refer to specific product manuals for minimum clearances.)
- Avoid dropping the readers during unpacking and installation.
- Do not touch the window glass of the scan head.

Compliance Requirements

FCC NOTICE: The Axiom has been tested and found to comply with the limits for a Class A digital device, pursuant to *Title 47, Part 15* of the *FCC Rules*. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manuals, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING: These are Class A products. In a domestic environment, these products can cause radio interference, in which case the user may be required to take adequate measures. (Ref. CISPR 22 = EN 55 022:1995.)

IMPORTANT: Follow the guidelines below to maintain Electromagnetic Compatibility (EMC) Compliance:

- Interconnecting cables must be twisted pair cables.
- All shielded I/O cables shall have the shield terminated to the chassis.
- **NOTE: DRAIN WIRE SHIELDING IS NOT ADEQUATE.**
- Do not remove the shielding covers.
- Refer to the details on making custom cables as provided in the specific technical manual for the component.

Electrical Safety

Axiom must be installed in accordance with Canadian Electrical Code, Part I, CSA C22.1; CSA C22.2 No. 0; and the National Electrical Code, NFPA 70. For complete requirements, National Electrical Code, ANSI/NFPA 70, Canadian Electrical Code, Part I, C22.1, or other national standard must be consulted.

- **For PERMANENTLY CONNECTED EQUIPMENT/RACK MOUNTED, incorporate a readily accessible disconnect device in the fixed wiring.**
- **For PLUGGABLE EQUIPMENT/RACK MOUNTED, install the socket-outlet near the equipment so it is easily accessible.**
- Make sure that all personnel who work with the equipment know where the disconnect switches or circuit breakers are located.
- Before performing any type of maintenance, turn off power to the unit and disconnect the power cord.
- Be certain your hands and the floor of your work area are dry before touching electrical equipment or connecting cords.
- Routinely check all power cords, plugs, wiring, and cable connections for any signs of exposed wire or deteriorating insulation. If you notice any damage, make arrangements with service personnel to repair or replace the damaged item immediately.

Electrical Grounding Requirements

Before applying power to any device, ALL components MUST be electrically grounded. Follow these precautions:

- Ensure all AC power outlets have a properly grounded receptacle.
- ALL components MUST be properly cabled and grounded with three-conductor AC power cords.
- Use the correct power cord for your country.
- Reference specific grounding instructions for each component.
- Do not use a two-prong adapter.
- Do not cut/remove the round grounding prong from any plug.
- Do not use an extension cord to defeat any ground.

Electrostatic Discharge

ESD CAUTION: Measures must be taken to prevent Electrostatic Discharge (ESD) at all times when handling any product, equipment, unit or part (e.g. use a grounded ESD wrist strap). It should be noted that circuit boards are at greatest risk to damage from ESD. Please follow standard ESD precautions!

Electrostatic discharge (ESD), the transfer of static electricity from one object to another, is an often-unnoticeable hazard to electronic components. Boards and other devices with integrated circuits are particularly sensitive to ESD damage. Product failures may not occur until days or weeks after the component was damaged.

Static damage to units can take the form of upset failures or catastrophic failures (direct and latent).

An upset failure occurs when an electrostatic discharge is not significant enough to cause total failure, but may result in intermittent gate leakage, causing loss of software or incorrect storage of information.

Direct catastrophic failures occur when a unit is damaged to the point where it is permanently damaged.

Basic Rules for ESD Control

Below are some keys to effectively control unnecessary ESD damage when working with ESD-sensitive devices:

- Define an ESD protective area and work on the ESD-sensitive devices in this area only.
- Define static sensitivity of devices to be handled in ESD protective area.

- Establish suitable static control program that limits static generation to less than the damage threshold of the most sensitive device in the environment, and provides a safe, defined path for static charge dissipation.
- Prevent contamination of the protective area by unnecessary non-static controlled materials.
- Audit the ESD protective area regularly to ensure that static control is maintained. Document the findings for future reference.
- Refer to the specific electrostatic discharge precautions for each component.

Laser Safety

The AXIOM 400 uses visible laser diodes and emits a "moving" red beam. Do not stare into the Axiom's exit window at the laser light source. Avoid direct eye exposure. The laser light level does not constitute a health hazard, however staring at the laser light for prolonged periods could result in eye damage.

The following WARNING is molded into the Axiom's exit window frame:
AVOID EXPOSURE – LASER LIGHT EMITTED FROM THIS APERTURE

Figure 2-1: Warning on Axiom Laser Exit Window to Avoid Exposure

WARNING: Use of controls, adjustments, or procedures other than those specified in this document may result in hazardous laser light exposure. The AXIOM 400 is rated as a Class 3R Laser Product by the International Electrotechnical Commission. Compliances are as follows: Class 3R Laser Product (IEC-60825-1), 1993+A1: 1997+A2: 2001, Class II Laser Product (21CFR1040) <5.0 mW peak at 630-700nM).

Safety Labels and Locations

Refer to the following figures for specific label locations and warnings. When operating, repairing, or replacing an Axiom, note all label content on the unit. These labels provide special precautions for operation, usage specifications, product identification, and service information.

Figure 2-2: Label Placement Axiom Scan Head

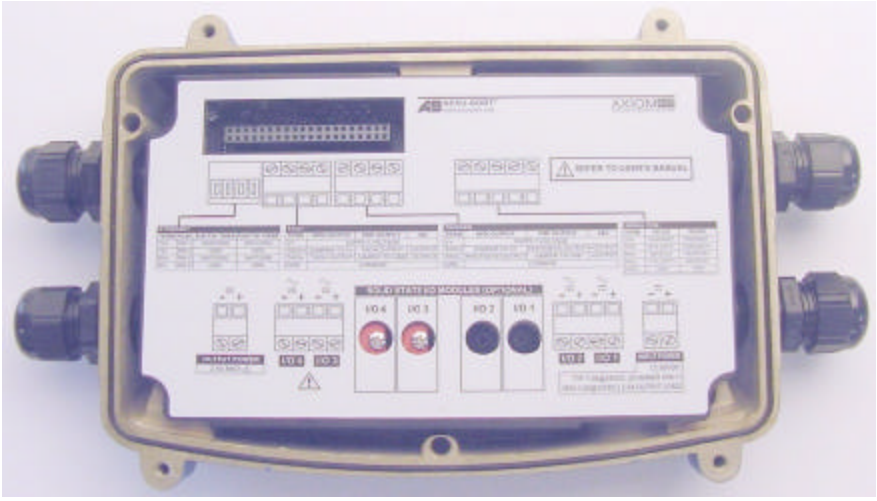


Figure 2-3: Label Placement Axiom Wiring Base

WARNING: The following is molded into the Axiom's exit window frame: **AVOID EXPOSURE – LASER LIGHT EMITTED FROM THIS APERTURE.** *(See Figure 2.1.)*

3 Mechanical Installation

Before you begin your installation, become familiar with the information in this chapter. It defines, step-by-step, a typical Axiom installation, and highlights important details that may affect how the Axiom should be mounted, wired, and configured for optimum performance in your application. Be sure to consider the various factors that affect how the Axiom must be mounted with respect to the scanning area. Typical solutions that maximize the Axiom's capabilities are highlighted.

IMPORTANT: The Axiom is an electronic microprocessor-based unit. To prevent personal injury or damage to the unit (caused by electrostatic discharge (ESD)), please follow the safety precautions and warnings found in *Chapter 2*. Failure to follow these precautions may void your warranty.

Preparing to Install

Before mounting any components, please do the following:

- Read all instructions before beginning your installation.
- Define and confirm the accuracy of your application's requirements. *(See What You Need to Know about Your Application, page 3-3.)*
- Review all installation-specific drawings.
- Review and plan the mechanical installation of all devices used in your application. Be sure to allow adequate clearance for maintenance.
- Review and plan the power requirements for your application.
- Check the contents of the shipping cartons against the packing list.
- Record all product serial numbers on page vi.
- Install the Axcess setup software on your PC. *(See Chapter 5.)*

IMPORTANT: The Axiom packaging is designed to protect the unit(s) during shipment. Do not throw it away. Save all packing material in case you need to transport your unit(s). The scan head and wiring base are shipped in separate packages.

Installation Sequence(s)

USEFUL TIP: Everything should be **MECHANICALLY INSTALLED** before performing any **ELECTRICAL INSTALLATION.** Reference *Chapter 4* for electrical installation details.

Installing a Single Unit

To install a single unit, follow this sequence of steps:

- **Complete mechanical installation.**
  - Review the details of your application's requirements.
  - Determine and mark the reader mounting location.
  - Erect mounting frame or other supporting structures.
  - Attach the Universal Mounting Bracket (UMB) or X-Scanning Mounting Bracket (XMB) to the frame. (UMB, XMB, and mounting frame options are available from Accu-Sort.)
  - Mount the wiring base to the UMB, XMB, or frame.
  - Mount the Accu-Sort power supply to the UMB or XMB (optional).
  - Mount trigger (optional). *(See page 3-14.)*
  - Mount tachometer (optional). *(See page 3-15.)*
  - Mount I/O modules (optional). *(See page 3-16.)*
- **Complete electrical installation.**
  - See Chapter 4.

NOTE: To reduce the possibility of damage to the scan head, install it after the wiring base is mounted, wired, and all wiring is checked for accuracy. Be sure to perform the polarity check before attaching the scan head.

- **Setup your Axiom.**
  - See Chapter 5.
- **Check operations.**
  - See Chapter 5.

Installing multiple units

To mechanically install multiple units, follow the same sequence of steps, per Axiom reader, as defined in *Installing a Single Unit*. Your application will define how the mounting requirements vary for each reader.

Multiple-reader networks may require a different approach to physical location of the power source, trigger photoeye, and tachometer since they are most likely being shared by the group of readers.

What You Need to Know about Your Application

To assure you get optimal performance out of your *Axiom Bar Code Scanning Solution*, it must be installed to meet the complete needs of your application. Therefore, take the time to know the details of your application. The better you know your application, the easier it is to apply the Axiom's capabilities to meet your application's requirements.

Below is what you will need to know before you can begin installation:

- **Bar Code Specifications: Symbologies, Location, and Orientation**
  - What bar code symbologies will be used in your application?
  - What are the code sizes (min/max bar), number of characters, etc.?
  - Where are bar codes located on the products?
  - How are bar codes oriented: Ladder, picket fence, omni-directional?
  - How much does bar code placement on product vary?
  - How many bar codes are on each product?
  - How many of these codes are to be decoded?
  - Which sides of the product will need to be scanned (e.g., top, left/right side, bottom, front, back, all)?
- **Conveyor Specifications**
  - Conveyor type: Belt, roller, tilt tray, cross belt, other?
  - What is the conveyor width?
  - What is the conveyor speed? Does it vary or is it constant?
  - Where is the scanning area to be located on your conveyor?
- **Product Specifications**
  - How many different product sizes will be scanned? Product sizes?
  - Are products justified: toward/away from reader, centered, or variable?
  - How many sides of the products will need to be scanned?
- **Application Specifications**
  - How many Axiom readers will your application need based on the scanning area coverage required?
  - What is the read range for each Axiom? What are the near/far distances, and overall depth of field required?
  - What will be done with the decoded bar code information? How will this information be used in your application?
  - What are your communication requirements?

While it isn't possible to cover all application configurations, the next several pages provide the basics you need to mechanically install your Axiom Bar Code Scanning Solution. If you need additional assistance, feel free to contact your sales representative or customer service.

Orientation Considerations

Consider the important factors that affect how the Axiom reader is oriented in respect to the bar coded packages (products) and their method of conveyance.

Mounting the Axiom for optimum performance depends on these factors:

- **Read Range** defining the distance (and variations) between the reader and packages, including the near/far distances, and overall depth of field
- **Bar Code Orientation** on products (ladder or picket fence) as well as the angle in which codes will appear (skew, pitch and tilt)
- **Reader Positioning** for type of scanning required to accommodate picket fence or ladder bar code orientation (yaw, pitch and roll angles)

Read Range

The Axiom must be positioned in the scanning area to accommodate reading products over a read range specific to your application. Use the following diagram to determine the near/optimum/far read distances. These dimensions result in the overall depth of field your application requires.

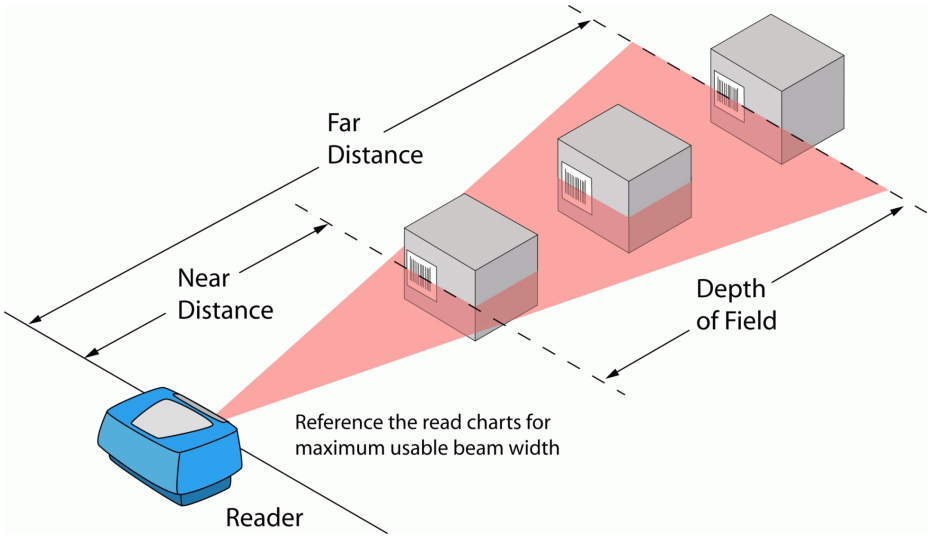


Figure 3-1: Determining Read Range

Bar Code Orientations

Picket Fence or Ladder Orientation Bar code placement usually determines the Axiom's positioning. The Axiom can be mounted to read codes in either a ladder or picket fence orientation.

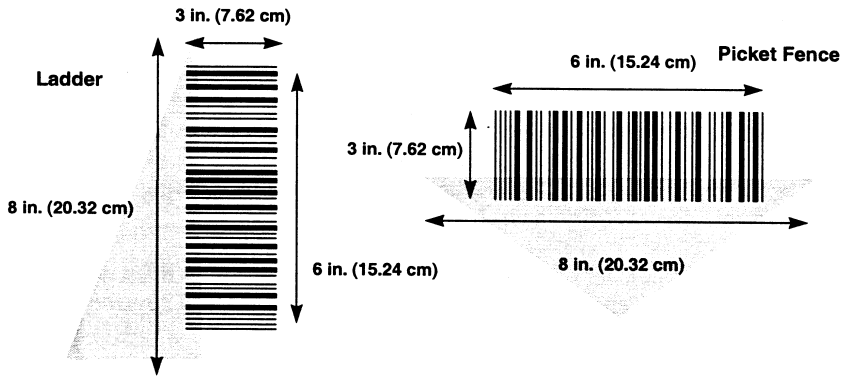


Figure 3-2: Picket Fence and Ladder Orientation Illustrated

Bar Code Skew, Pitch and Tilt These angles affect bar code readability. Bar codes pitched or skewed up to 45 degrees are still readable. Although some skew may occur, it should not exceed 45 degrees.

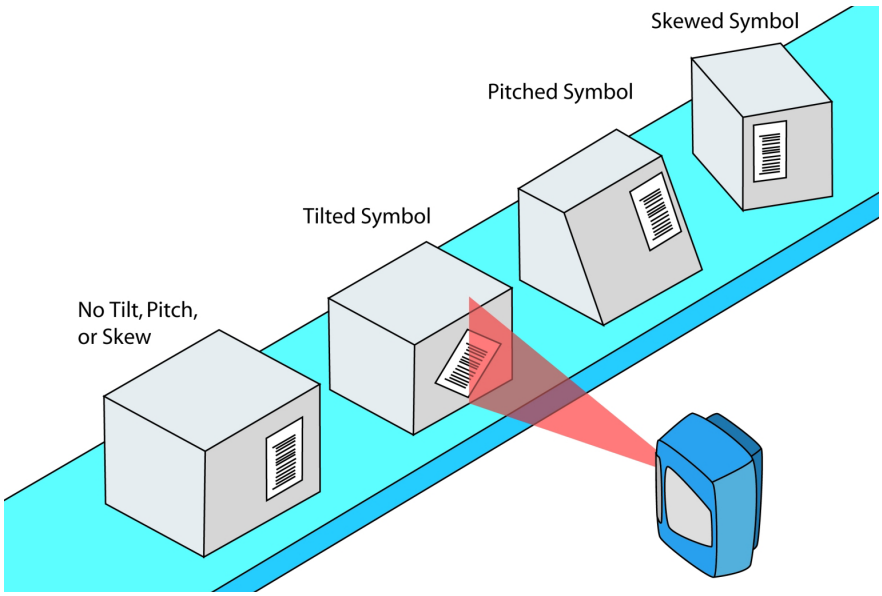


Figure 3-3: Bar Code Tilt, Pitch and Skew Illustrated

Reader Positioning

IMPORTANT: The Axiom is able to decode bar codes at a variety of angles; however significant angular distortion may degrade reading performance. When positioning the reader, remember that the scan beam exits the scan window parallel to the wiring base. *(See Figure 3-4.)*

- When mounting the Axiom, take into consideration your application's bar code orientation.
- Mount the reader so that the scan beam is nearly perpendicular to the bars of the symbol and crosses every element and quite zone.
- *Figure 3-4* represents the Axiom's range of motion when the Universal Mounting Bracket (UMB, PN 0105307002) is used.

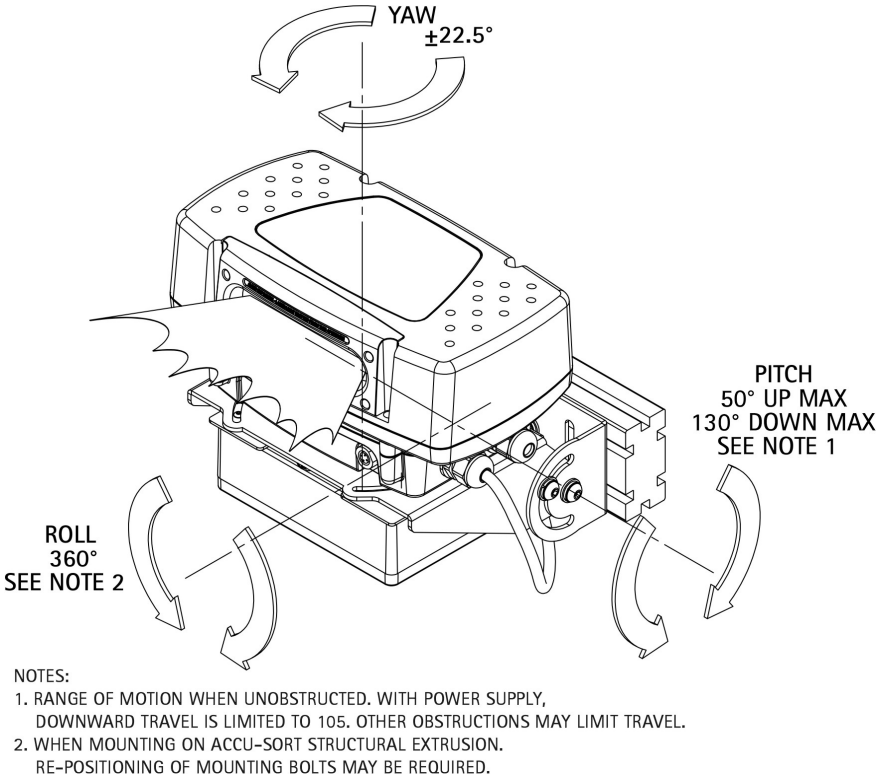


Figure 3-4: Axiom's Range of Motion with UMB

Dimensions and Clearances

The figures that follow provide the overall dimensions of the Axiom when the Universal Mounting Bracket (UMB) is used.

See Appendix A for Axiom dimensions without the Universal Mounting Bracket (UMB) or when using the X-Pattern Mounting Bracket (XMB).

The reader is a sealed, unventilated unit. No specific clearance is required for the purpose of cooling. However, ease-of-access should be considered when locating the mounting position.

USEFUL TIP: For installation, maintenance and service reasons, approximately 8-12 inches of clearance is recommended.

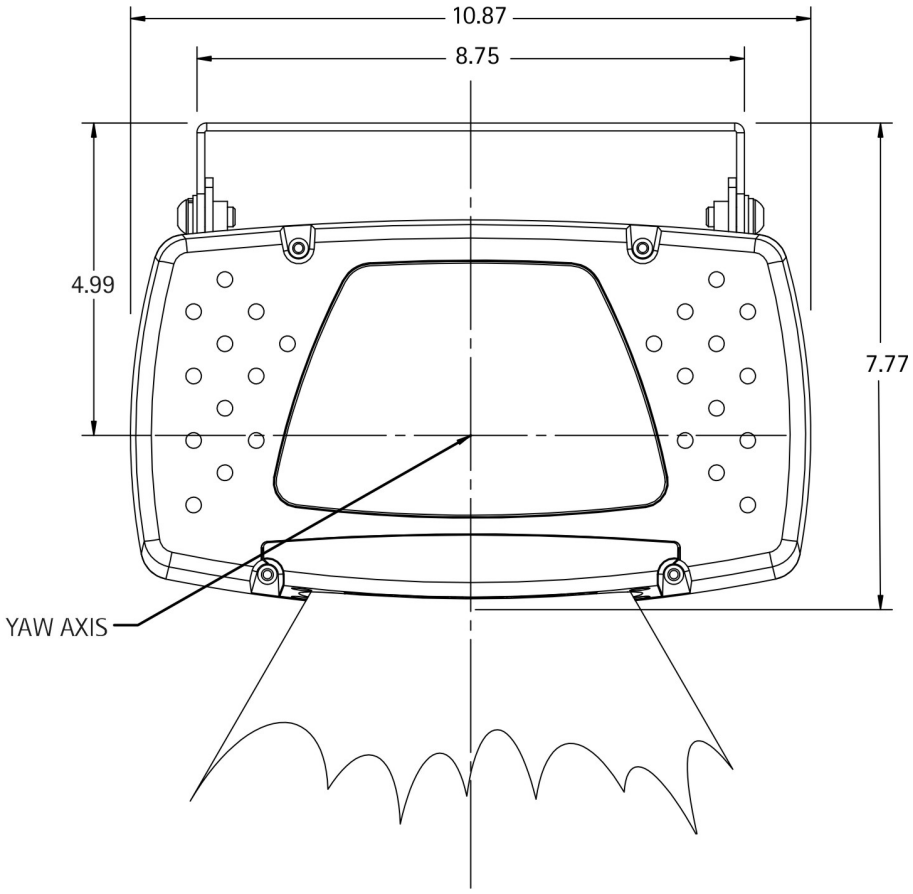


Figure 3-5: Axiom Dimensions – Top View

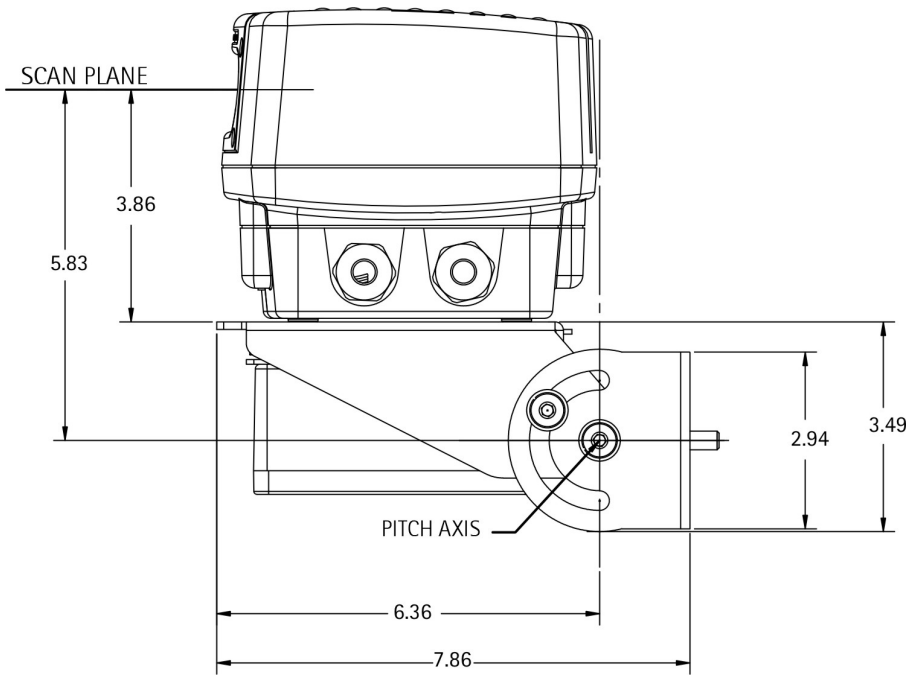


Figure 3-6: Axiom Dimensions – Left Side View

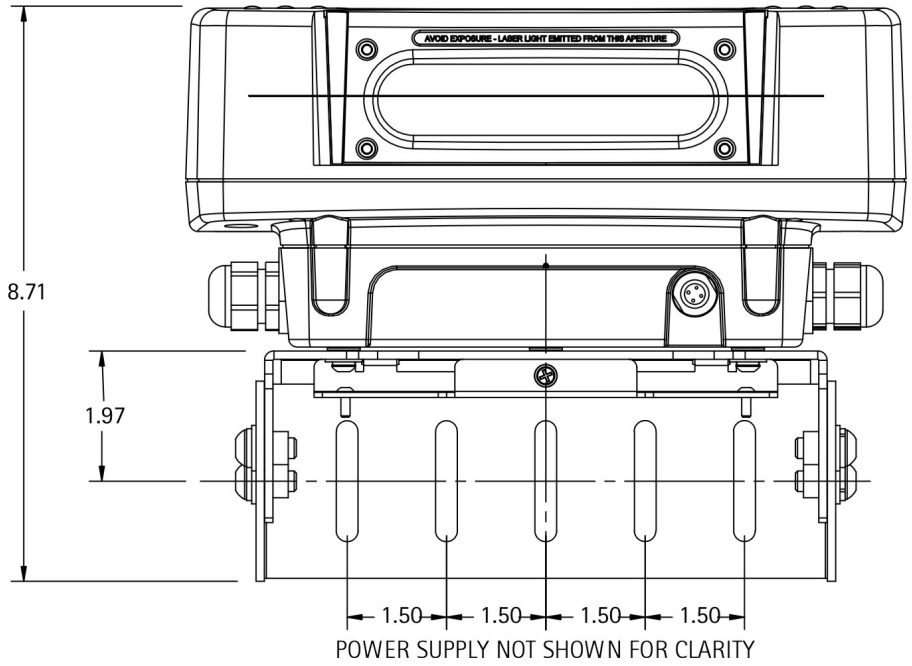


Figure 3-7: Axiom Dimensions – Front View

General Mounting Guidelines

As you plan and install your Axiom bar code solution application, be sure to keep the following mounting guidelines in mind:

- Determine the proper orientation and position of the reader.
- Leave adequate clearances (approximately 8-12 inches) for maintenance and wiring.
- Plan your mechanical installation based on the electrical requirements of your application. *Reference the General Electrical Installation Guidelines in Chapter 4.*

It is important that you follow all safety precautions when installing, setting up, operating, maintaining, troubleshooting or replacing any Accu-Sort products, parts or related equipment. *Reference Chapter 2, Safety.*

Attaching the Wiring Base

If your application is not using the universal or X-pattern mounting brackets (UMB or XMB), mount the wiring base to any flat surface with three mounting screws.

The U.S. version's (0104636001) mounting holes have #10-32 UNF-2B threads. The metric version's (0104636002) mounting holes have M5 x .8-6H threads.

The length of the screws must not be greater than 0.5 inch (12.5 mm) plus the thickness of the mounting surface.

Use the following diagram as a reference to create a mounting template.

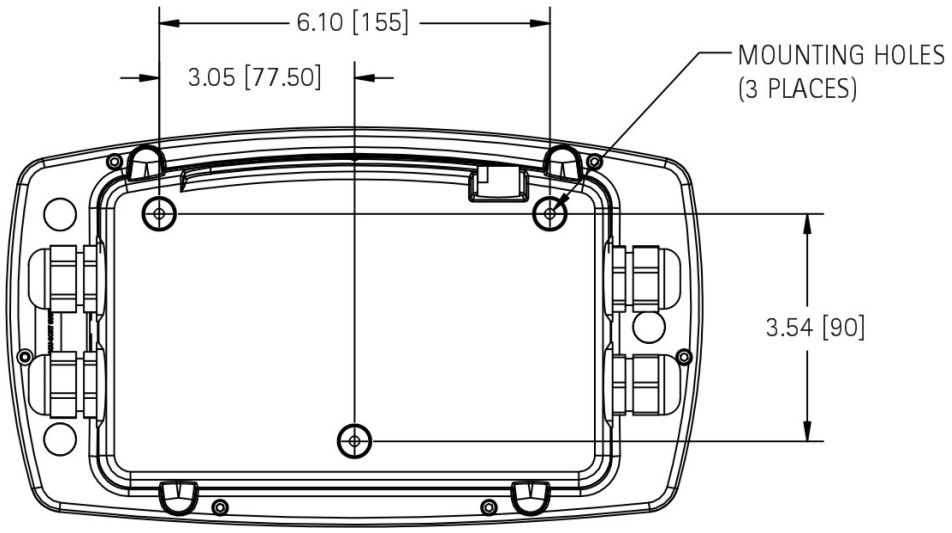


Figure 3–8: Wiring Base Mounting Dimensions (not actual size)

Attaching the Universal Mounting Bracket (UMB)

The Universal Mounting Bracket (PN 0105307002) is an optional accessory that simplifies Axiom mounting and installation. Included with the bracket is the necessary hardware to attach it to the mounting structure.

1. When using this option in your application, follow the assembly instructions provided with the universal-mounting bracket (UMB).
2. Attach the UMB to the mounting structure with the provided hardware.
3. Mount the wiring base to the UMB. *(See Figure 3-9.)* Use the three screws provided with the wiring base.
4. Insert the screws through the UMB into the threaded holes on bottom of wiring base.
5. DO NOT over-tighten screws. Leave the three screws slightly loose to allow for some movement in the wiring base so that final adjustment of the Axiom in relation to scanning area can be made after wiring is completed.

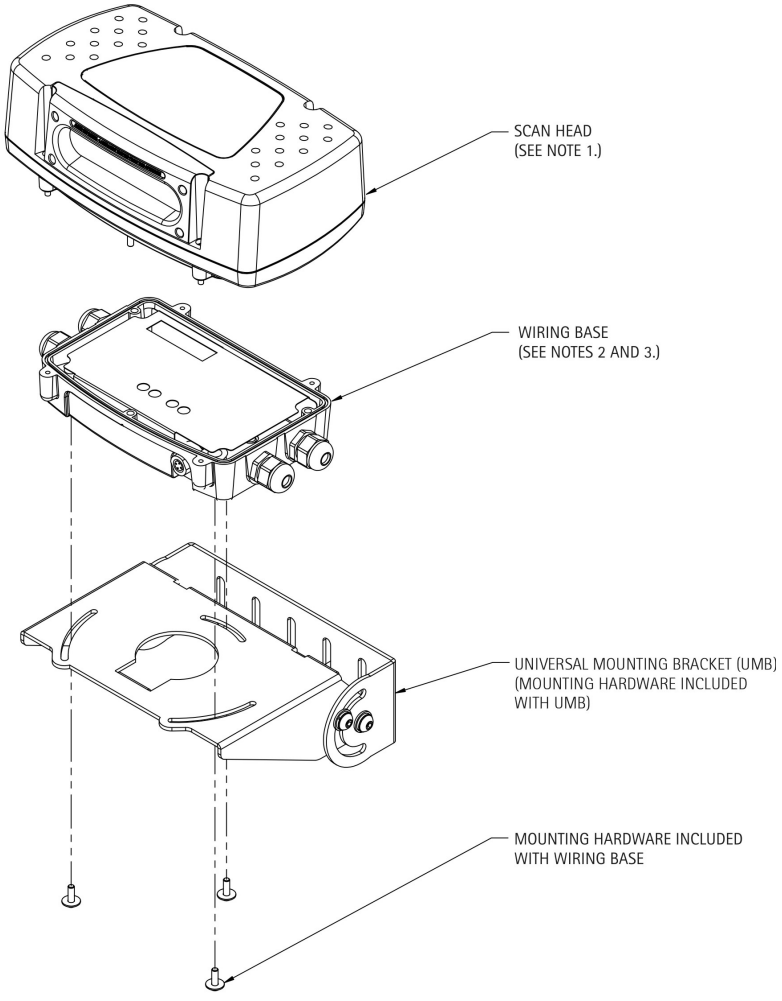


Figure 3-9: Attaching Wiring Base to Universal Mounting Bracket (UMB)

Attaching the Axiom Power Supply to UMB

The Axiom power supply, (PN 0105365001 for 120VAC or 0105365002 for 240VAC), is an accessory to provide power to the Axiom when an alternative DC power source is not available. If the power supply is included for your application, the following diagram illustrates how it attaches to the plate and then to the Universal Mounting Bracket (UMB).

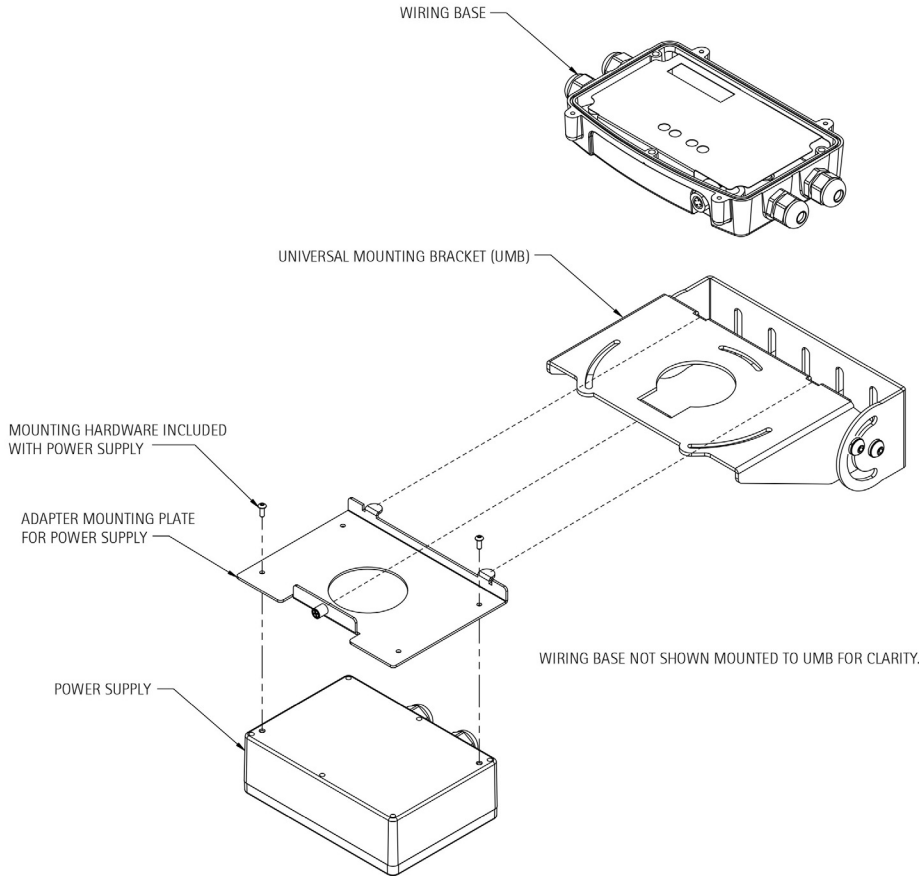


Figure 3-10: Mounting Power Supply Assembly to UMB

1. Mount the power supply to the power supply mounting plate with the provided hardware.
2. DO NOT over-tighten screws that hold the power supply to the adapter mounting plate.
3. Attach the power supply/mounting plate assembly directly to the UMB. Insert the two tabs on the edge of the mounting plate into their corresponding locations on the UMB.
4. If the power supply/mounting plate assembly is properly positioned to the UMB, use the screw (located on the opposite edge of the mounting plate from the two tabs) to lock the assembly in place.

Attaching the X-Pattern Mounting Bracket (XMB)

The X-Pattern Mounting Bracket (PN 0106226002) is an optional accessory that simplifies dual-Axiom-mounting installations to create an x-scanning pattern. *(See Figure 3-11.)*

Included with the bracket is the necessary hardware to attach it to the mounting structure. *(See also: Appendix A, XMB Dimensions.)*

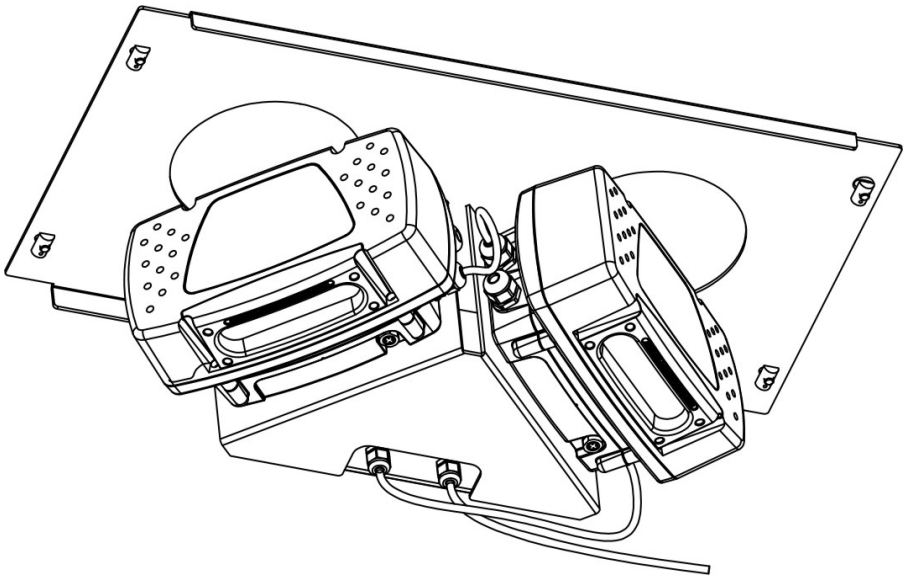


Figure 3-11: X-Pattern Mounting Bracket (XMB) Assembly

In most instances, the XMB is shipped from the factory with the wiring bases and power supply pre-mounted and pre-wired.

If you need to perform this installation yourself, follow the procedure below:

1. Attach XMB to mounting structure with the provided hardware (4 places).
2. Mount both wiring bases to the XMB (2 places). *(See Figure 3-12.)* Use the three screws provided with each wiring base.
3. Insert the screws through the XMB into the threaded holes on bottom of wiring base.
4. DO NOT over-tighten screws.
5. Reference *drawing 17480 in Appendix D* for wiring information.

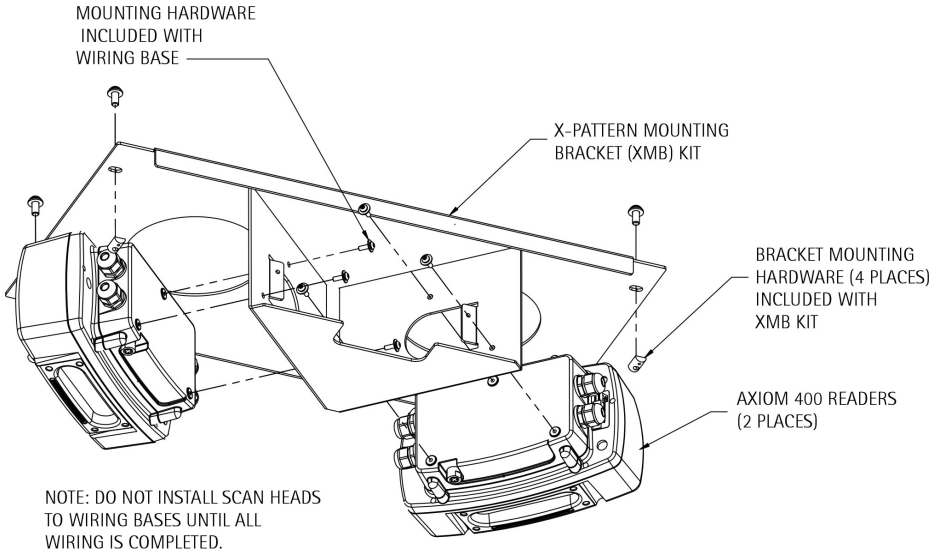


Figure 3-12: Attaching Wiring Base to X-Pattern Mounting Bracket (XMB)

Attaching the Axiom Power Supply to XMB

The Axiom power supply (PN 0105914001 for 120VAC or 0105914002 for 240VAC) is an accessory to provide power to two Axiom readers mounted to an XMB. If the power supply is included for your application, *Figure 3-13* illustrates how it attaches to the X-Pattern Mounting Bracket (XMB).

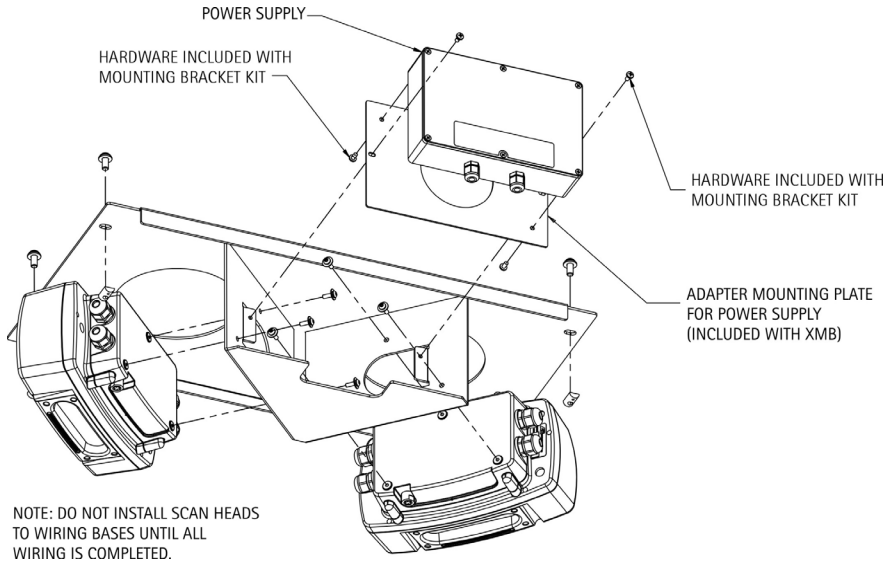


Figure 3-13: Mounting Power Supply Assembly to XMB

1. Mount the power supply to the power supply adapter mounting plate (included with the XMB kit). The XMB kit provides the necessary hardware.
2. DO NOT over-tighten screws that hold the power supply to the adapter mounting plate.
3. Attach the power supply/mounting plate assembly directly to the XMB. Fasten to the two tabs on the XMB as illustrated in *Figure 3-13.*

Mounting the Trigger Photoeye

The standard Axiom photoeye works by bouncing a light beam off a reflector and detecting when something breaks the path of light. Use Figure 3-14 to help you mount your photoeyes. In order for photoeyes to work properly, make sure the following things are done when mounting the trigger photoeye option:

- Mount trigger and reflector so the Axiom reader's scan beam does not strike either of them.
- Mount a reflector directly opposite the photoeye on the other side of the conveyor.
- Install the reflector within the operating range of the trigger photoeye.
- The photoeye must be mounted so the light exit window is perpendicular to the conveyor, facing the reflector.
- The reflector must be mounted perpendicular to the conveyor, facing the photoeye.

IMPORTANT: The trigger photoeye's beam (between photoeye and reflector) must be blocked by a package before the bar code is in position for scanning. The trigger signal should remain active while the symbol is being scanned. This does NOT apply to tracking applications.

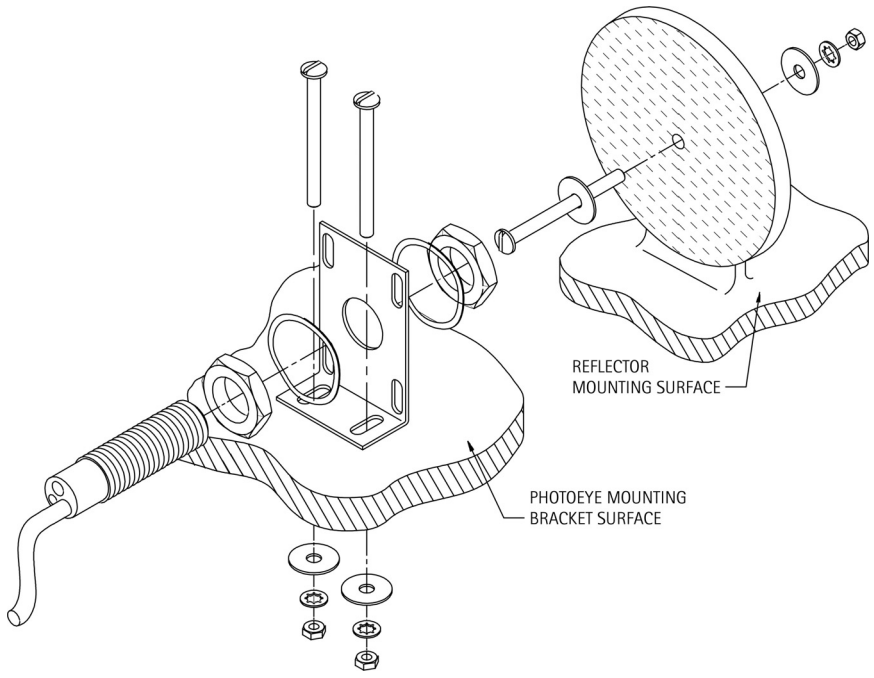


Figure 3-14: Photoeye Mounting Diagram

Mounting the Tachometer

The tachometer (tach) option outputs a set number of pulses for each wheel rotation. This tells the Axiom the precise conveyor speed, allowing it to determine the exact package position. Tracking allows for multiple boxes to be in the scan window at the same time. Bar codes on each box are decoded and assigned to the correct box. Because the exact layout of many conveyors is unique, it is impossible to give you exact directions for mounting your tachometer. Follow the guidelines below as closely as possible when mounting.

- Tachometers are often used in systems with several conveyor belts. Mount the tach on the section of the conveyor the scanning is performed on.
- Mount the tach on the underside of the conveyor, away from areas where the conveyor bows downward. A good place to mount the tach is on one end of the conveyor, underneath the drive shaft.
- Make sure the tach assembly angles in the same direction that the underside of the conveyor travels, as shown in *Figure 3-15*.
- The tach must make good contact with the conveyor.
- Use the general mounting kit (1000020567, *see Figure 3-15*) to make tachometer mounting and setup easier. The extrusion mounting kit (1000020568) is the same as shown here, but also includes mounting hardware for attaching to Accu-Sort mounting structures.
- If you are not using the tachometer mounting kit, create a weight or spring assembly to put tension on the back of the tachometer, ensuring that the wheel makes strong contact with the conveyor.

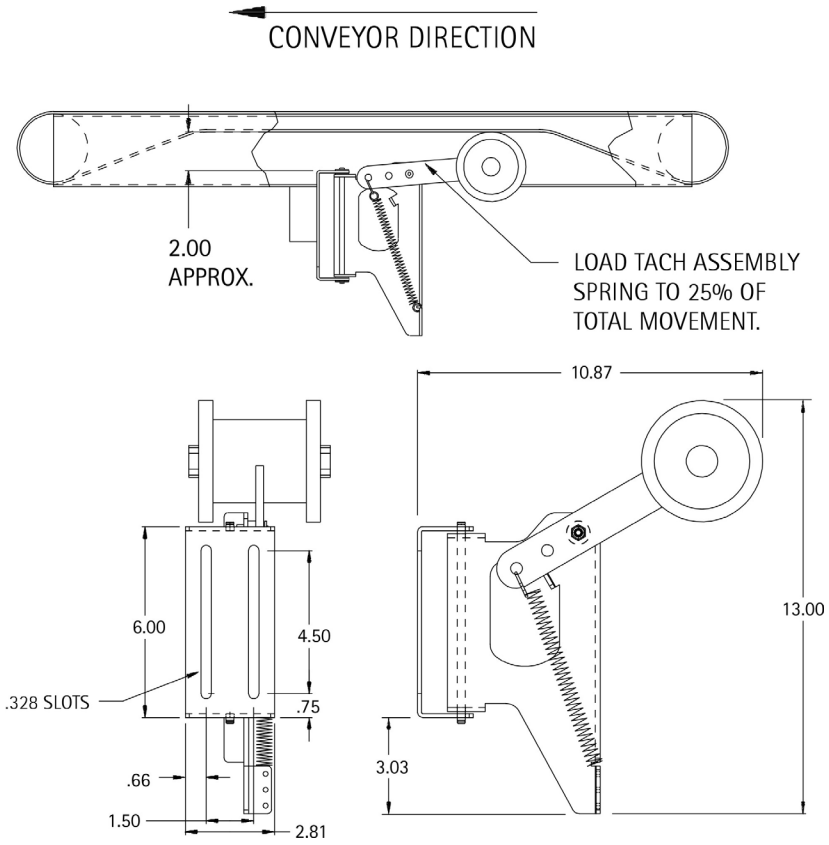


Figure 3-15: Tachometer Mounting Kit Installation

Mounting the I/O Modules

I/O MODULE APPLICATIONS

OUTPUT MODULES

- Activate diverter/sorter for no read, multi-read, match, or no match conditions.
- Activate device (e.g., beacon light) to indicate any of the above conditions.
- Activate device for use as a "life condition' indicator.
- Activate device to follow the trigger condition.
- Activate alarm.

INPUT MODULES

- Additional photoeye input for Start/End Trigger

NOTE: The following input module applications require custom software.

- Transmit photoeye
- Divert Accomplished photoeye
- Reboot signal

The wiring base supports four (4) optional input or output modules that can be used for optional trigger inputs or to operate diverters, alarms, etc. The optional I/O modules are not installed at the factory.

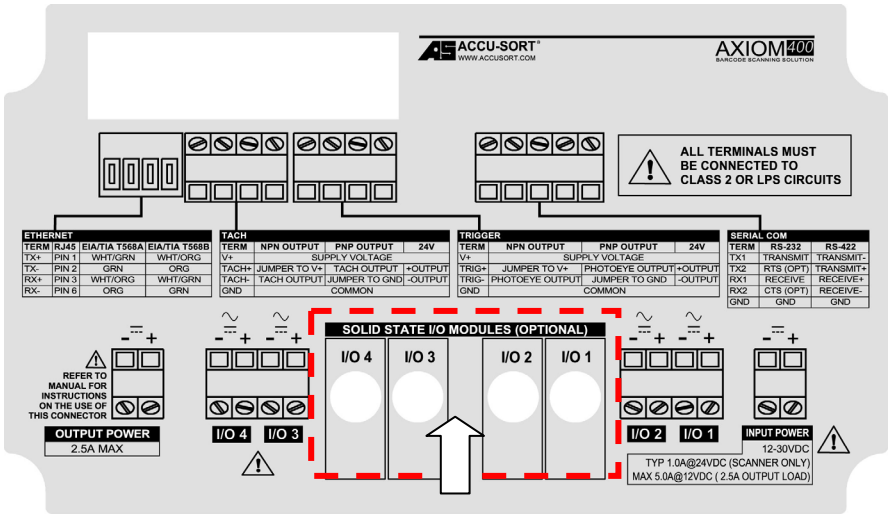


Figure 3-16: I/O Module Location in Wiring Base

To install your optional I/O module(s):

1. Lift the insulating cover (shown in figure above) out of the way to gain access to the wiring base printed circuit board.
2. The I/O modules may be plugged into locations I/O 1 through I/O 4. These locations run right-to-left, as shown on the insulating cover label.
3. Plug the appropriate I/O module directly into the wiring base printed circuit board. *(See Figure 3-17, left photo.)*
4. Using a screwdriver, secure the I/O module by tightening the captive screw (that goes through the module) into the circuit board. DO NOT over-tighten screw. *(See Figure 3-17, right photo.)*

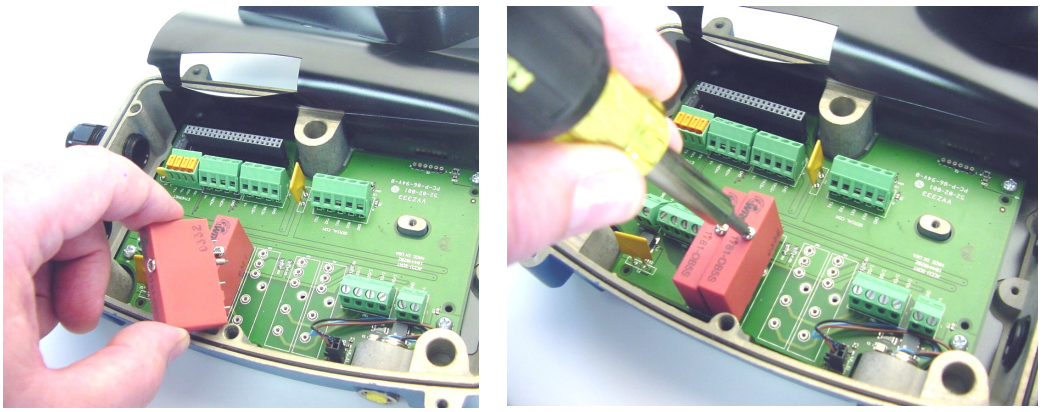


Figure 3-17: Installing an I/O Module

Installing a Scan Head

Perform the electrical installation as outlined in *Chapter 4*. Once all wiring is checked for accuracy, install the Axiom scan head to the wiring base. *(See Figure 3-18.)* You can install the scan head with or without the power disconnected from the wiring base.

To install a scan head:

1. Make sure the insulating cover is in position, so the flap covers the field wiring connections inside the wiring base.
2. Carefully align the 3 scan head alignment pins with the 3 holes in the wiring base. This automatically assures the correct scan head-to-wiring base connector alignment (to avoid bending pins). *(See Figures 3-19, 20.)*
3. Gently, press the scan head down until it firmly connects with the wiring base.

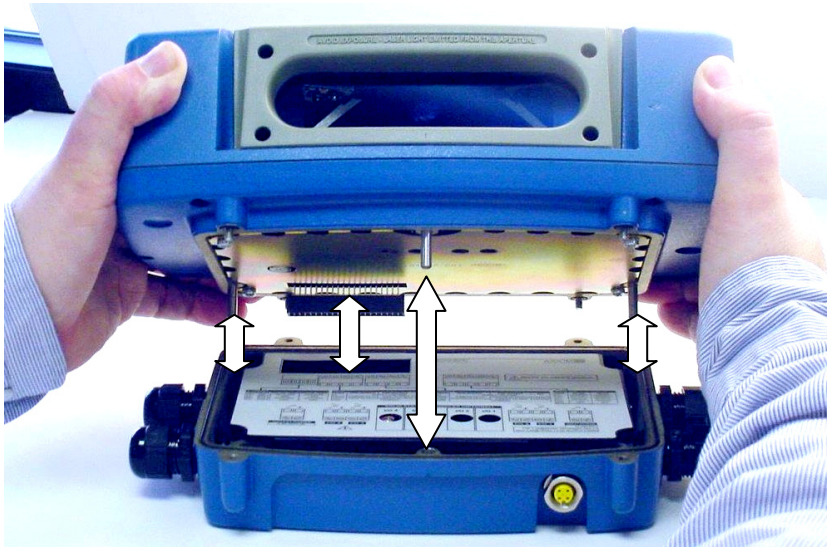
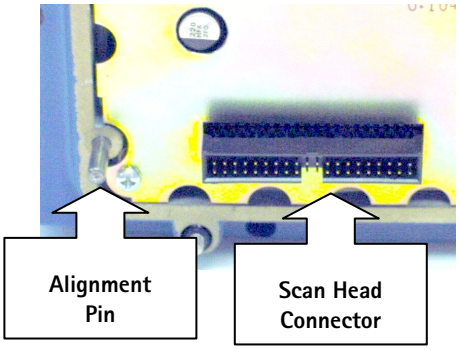


Figure 3-18: Axiom Scan Head Installation on Wiring Base



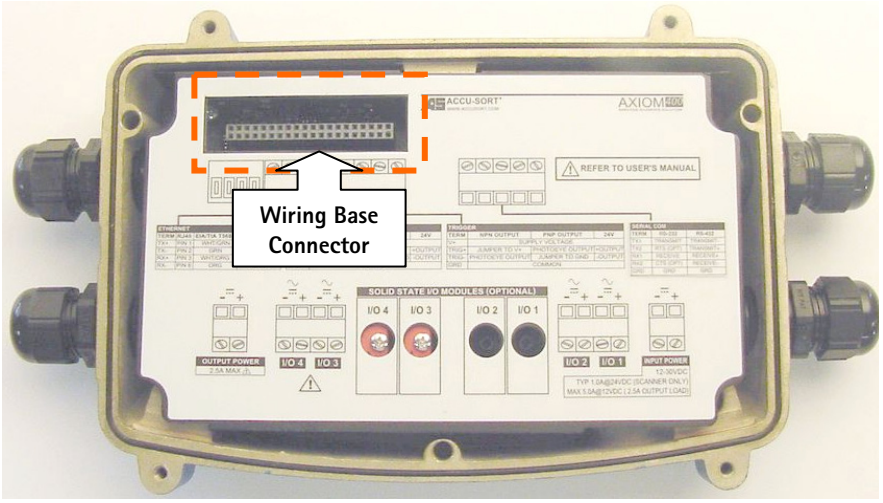


Figure 3-19: Connecting Axiom Scan Head to the Wiring Base

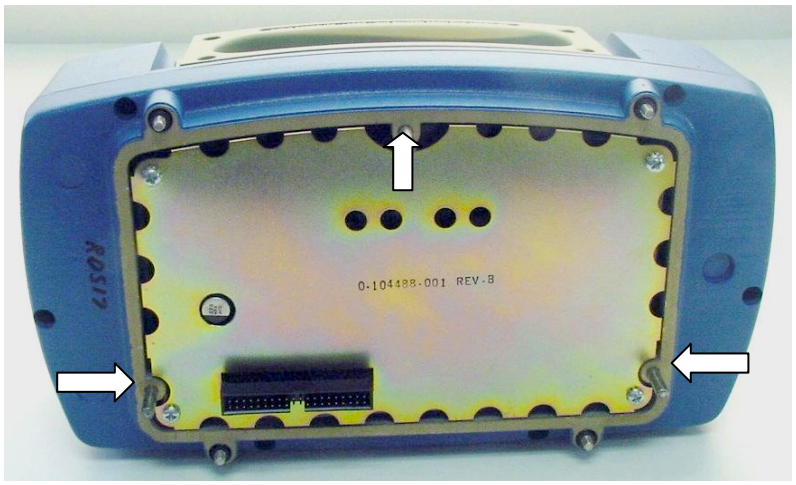


Figure 3-20: Axiom Scan Head Alignment Pin Locations

4. Secure the scan head to the wiring base with the four captive screws.
5. Alternately tighten screws. DO NOT over-tighten screws.

Figure 3-21: Axiom Scan Head Captive Screw Locations

4 Electrical Installation

WARNING: Electrical Installation by Qualified Service Technicians Only! Several procedures involve exposure to voltage inside the wiring base. A trained technician must perform these procedures. Do not attempt to perform any electrical installation procedures unless you are a trained technician.

IMPORTANT: The Axiom is an electronic microprocessor-based unit. To prevent personal injury or damage to the unit (caused by electrostatic discharge (ESD)), please follow the safety precautions and warnings found in *Chapter 2*. Failure to follow these precautions may void your warranty.

Preparing for Electrical Installation

Before mounting any components, please do the following:

- Read all instructions before beginning your installation.
- Define and confirm the accuracy of your application's requirements. *(See What You Need to Know about Your Application, in Chapter 3.)*
- Review all installation-specific drawings.
- Review and plan the power requirements for your application.
- Review and plan the communications requirements for your application.
- Install the Axcess setup software on your PC. *(Reference Axcess Software Manual. See Chapter 2, Getting Started.)*

Installation Sequence(s)

USEFUL TIP: Everything should be **MECHANICALLY INSTALLED** before performing any **ELECTRICAL INSTALLATION.** *Reference Chapter 3 for mechanical installation details.*

Installing a Single Unit

To install a single unit, follow this sequence of steps:

- **Complete mechanical installation.**
  - Reference Chapter 3.
- **Complete electrical installation.**
  - Ground the mounting structure to protective earth (PE) ground. *(See Figure 4-3.)*
  - Ground the wiring base to protective earth (PE) ground.
  - Connect the power supply to wiring base.
  - CHECK POLARITY. *(See page 4-10.)*
  - Connect trigger to wiring base. *(See page 4-11.)*
  - Connect tachometer to wiring base. *(See page 4-12.)*
  - Connect necessary communications to wiring base. *(See page 4-13.)*
  - Connect wiring for I/O module(s) to wiring base. *(See page 4-15.)*
  - Attach scan head to wiring base. *(See page 4-17.)*

NOTE: To reduce the possibility of damage to the scan head, install it after the wiring base is mounted, wired, and all wiring is checked for accuracy. Be sure to perform the polarity check before attaching the scan head.

- **Setup your Axiom.**
  - Reference Chapter 5.
- **Check operations.**
  - Reference Chapter 5.

Installing Multiple-Readers

For electrical installation, multiple-reader networks will require a different approach to wiring, since the power source, trigger photoeye, and tachometer are most likely being shared by the group of readers. *(Reference drawings 107480 and 107481 in Appendix D.)*

Special instructions for functional set-up of a multi-reader network are provided in *Chapter 5.*

General Electrical Installation Guidelines and Precautions

It is important that you follow these general precautions when installing, setting up, operating, maintaining, troubleshooting or replacing any Accu-Sort products, parts or related equipment.

CAUTION: The Axiom uses Class 3R lasers IEC, (Class II CDRH). Avoid staring at the laser light source. While laser light does not constitute a health hazard, staring at the laser for prolonged periods could result in eye damage.

As you plan and install your Axiom bar code solution application, be sure to keep the following guidelines in mind:

- Determine the reader is in the proper orientation and position as outlined in Chapter 3.
- Leave adequate clearances (approximately 8-12 inches) for wiring.
- The wiring base has four conduit openings. Seal unused openings. Use cord grips with rubber grommets on cables that enter the wiring base.
- Route wires carefully to reduce or minimize electrical noise. When power and communication wiring must cross, make their intersection perpendicular.
- Proper grounding of the wiring base limits the effects of noise due to Electromagnetic Interference (EMI).

Wiring the Axiom

After completing mechanical installation, use this section to properly wire you Axiom for optimal performance in your application. All wiring connections to the Axiom are made via the wiring base.

Use the four conduit openings for running wires into the base. Route your cabling for input/output power, tachometer, trigger, communications, and I/O, through the recommended conduit openings. *(See Figure 4-1.)*

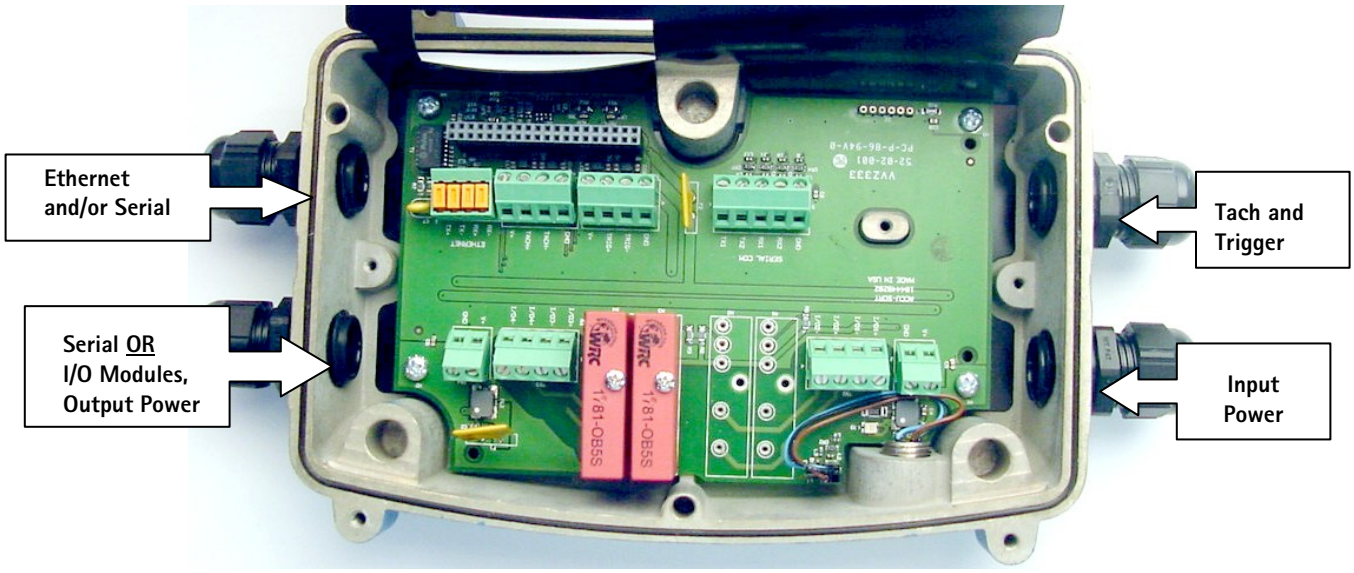


Figure 4-1: Recommended Cabling to Axiom Wiring Base

Wiring tables, printed on the wiring base insulation cover, help simplify installation. *(See Figure 4-2.)* Remember: Wire to the terminal blocks, left-to-right, coordinating your wiring with the table, top-to-bottom.

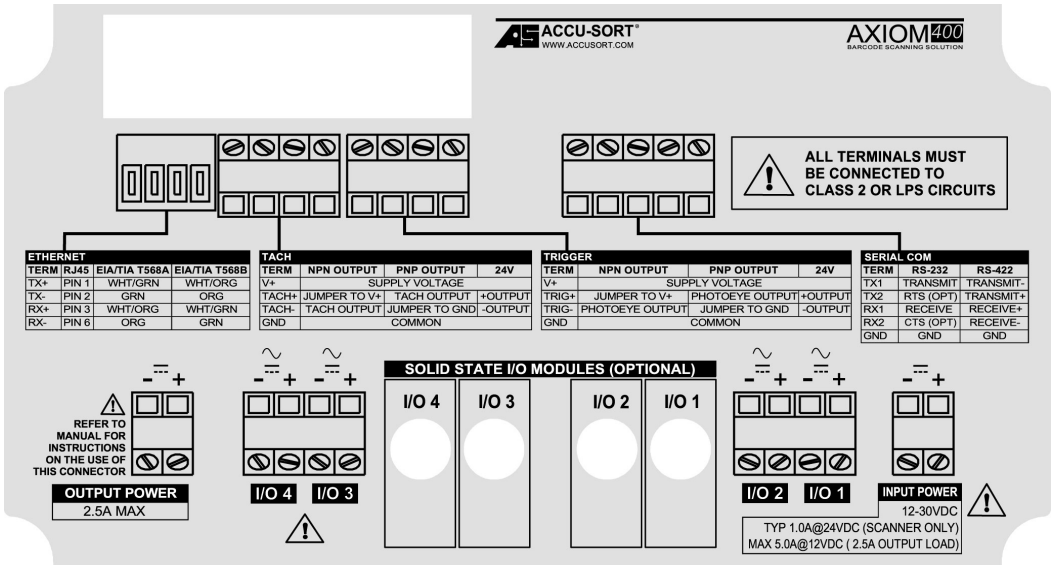


Figure 4-2: Wiring Tables on Wiring Base Insulating Cover

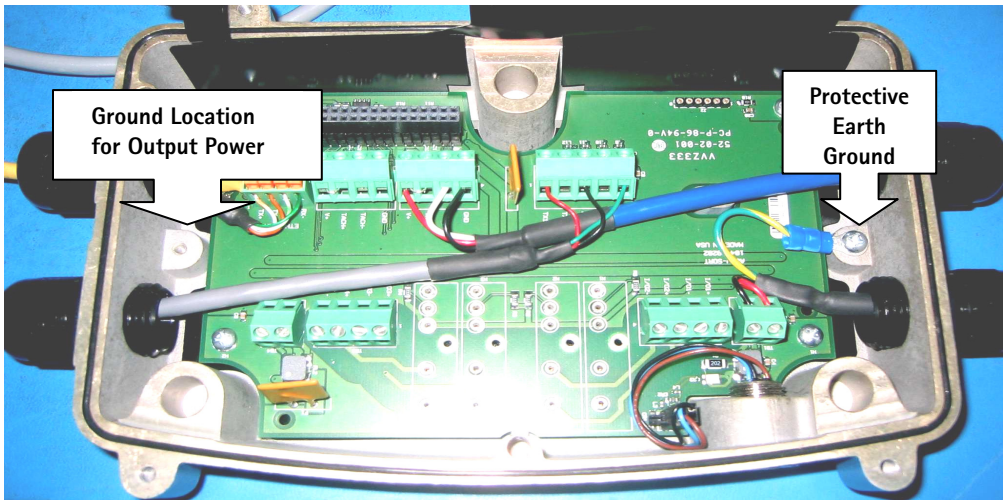


Figure 4-3: Example of Proper Wiring

WARNING: To assure no ESD damage will occur, be sure to observe the precautions outlined in *Chapter 2, Safety*.

IMPORTANT: Ground the wiring base to safety ground (protective earth ground (PE)) as shown in *Figure 4-3*. Reference wiring recommendations for safety ground. *(See Table 4-1.)*

Only use connectors designed for connecting to aluminum. Reference:

- UL 486B Wire Connectors for use with Aluminum Conductors,
- UL 486C Splicing Wire Connectors, and
- UL 486E Equipment Wiring Terminals for use with Aluminum and/or Copper Conductors

Cable and Conduit Connections

Determine the wiring connections needed for your application. All permanent connections are made to the wiring base with either cables or through conduit. Wiring bases are shipped with four (4) cord grips and three (3) hole plugs. Be sure to follow Accu-Sort's wiring recommendations. *(See Figure 4-1 and Table 4-1.)*

Table 4-1: Wiring Recommendations

Connection	Recommended Wiring Type	Max. Length
Safety Earth Ground	For 15-20 Amp branch circuit, use #18 AWG min. For 16-25 Amp branch circuit, use #14 AWG min. For 26-32 Amp branch circuit, use #12 AWG min.	
Power	#20 AWG minimum	
RS232	#24 AWG minimum	50' [15.2]
RS422	#24 AWG minimum	1000' [300]
Ethernet	#24 AWG CAT5 UTP (unshielded twisted pair)	330' [100]
Tach / Trigger	#24 AWG minimum	
I/O Modules	Depends upon module rating. See **Appendix A**.	

NOTE: ALL external wiring must be UL listed or recognized rated VW-1 or FT-1 and conforming to NEC ANSI/NFPA 70.

Cord Grips	Recommended Wiring Diameters
Small Diameter	Accommodates 0.191 to 0.354 inches (4.9 to 9.0 mm)
Large Diameter	Accommodates 0.236 to 0.472 inches (6.0 to 12.0 mm)

Cable Connections to Wiring Base

- Where the cabling enters the wiring base, use the supplied cord grips with rubber grommets. *(See Figure 4-4, left illustration.)*
- Each cord grip comes with two different size grommets. Use the grommet size that provides the tightest fit.

NOTE: To maintain an IP65 rating, only one cable may be run through each conduit opening. If running two or more cables into one opening, use a plumbing "T" connector to assure the Axiom will be watertight.

- Make sure you use Teflon tape (or other thread sealant) to maintain an IP65 rating.
- Once all cabling is completed, plug all unused wiring base openings.

Conduit Connections to Wiring Base

- Where the conduit meets with the wiring base, you will need to supply the correct conduit fittings. *(See Figure 4-4, right illustration.)*
- Use flexible conduit whenever possible to allow for Axiom range of motion adjustments, especially when the UMB is used.
- Once all conduit connections are completed, plug all unused wiring base openings.

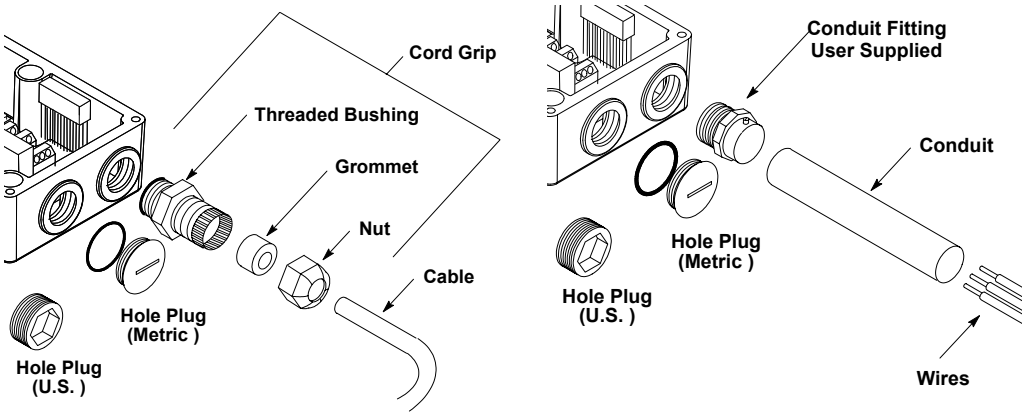


Figure 4–4: Cabling, Conduit, and Hole Plugs on Axiom Wiring Base

Plug Unused Wiring Base Openings

- Three (3) wiring base **hole plugs** are supplied. Use these plugs on unused openings. All unused openings MUST be plugged to maintain IP65 rating. Use Teflon tape (or other thread sealant) when inserting the hole plug in the conduit opening.
- **U.S. version wiring base** (PN 0104636001) conduit openings have 1/2-14 NPSC threads. Use an NPSC threaded plug on all unused conduit openings. Tighten hole plug(s) with a 3/8" hex wrench.
- **Metric version wiring base** (PN 0104636002) conduit openings have PG13.5-18 threads. Use a threaded hole plug on all unused conduit openings. Tighten hole plug(s) with a flat-blade screwdriver.

Power Requirements

IMPORTANT: When planning your installation wiring, remember all power connections must be quick-disconnect. For PERMANENTLY CONNECTED EQUIPMENT (i.e., Axiom using DC power) a readily accessible disconnect device must be incorporated in the building installation wiring. For PLUGGABLE EQUIPMENT (i.e., Axiom using AC power supply with non-detachable power cord), the socket-outlet must be installed near the equipment and must be easily accessible.

Power Supply Connections

CAUTION: While performing the following wiring connection procedures, be sure to follow all safety procedures regarding high-voltage as outlined in *Chapter 2, Safety*. No power should be applied to any device until all wiring is completed and checked for accuracy.

REMEMBER: The socket-outlet must be installed near the Axiom's power supply. The outlet must be a readily accessible disconnect device.

Using Accu-Sort Power Supplies

Single Reader The Axiom reader requires 30 watts (maximum) of power. Two Accu-Sort power supplies are available. These power supplies are IP65 rated for industrial environments.

- **120 VAC Power Supply** (PN 0105365001) plugs directly into a standard wall electrical socket.
- **240 VAC Power Supply** (PN 0105365002) supplied with an IEC 320 molded connector power cord.

1. Connect the power supply wiring to the terminal block inside the wiring base. The arrow on the figure below indicates the location of the terminal block.
2. Make sure wiring cannot come loose.
3. DO NOT over-tighten screws on terminal blocks.
4. The proper location for ground is shown on *Figure 4-3*.

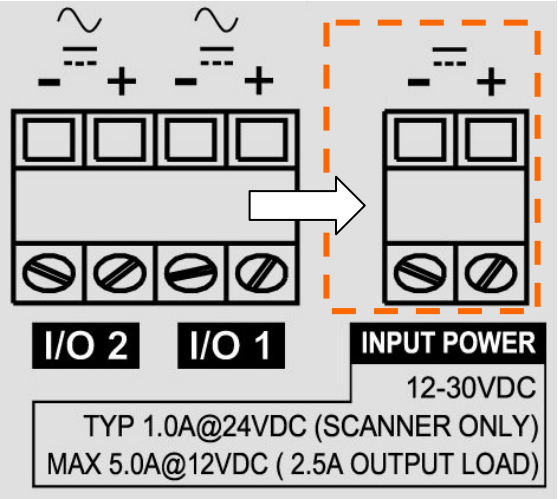


Figure 4-5: Input Power Wiring (Power Supply)

CAUTION: The INPUT POWER wiring table indicates 2.5A output load. This is for applications using other power supplies. The Accu-Sort power supply can handle an output load of 250mA.

Multiple Readers When a multiple reader application uses Accu-Sort power supplies, each Axiom is powered by a separate power supply. DO NOT connect power supplies in parallel. *(Reference drawing 107481 in Appendix D.)*

Axiom X-Pattern Applications When using two Axioms and the X-pattern mounting bracket (XMB), a 110W supply is available from Accu-Sort that provides power to both readers. *(Reference drawing 107480 in Appendix D.)*

Power Connections Using Other Power Supplies

IMPORTANT: All non Accu-Sort power supplies, whether for single or multiple reader applications, must be an LPS or Class 2 power supply. The supply must provide 30 watts (12-30 VDC) of power to *each* Axiom.

Single Reader When a single reader application uses *a non Accu-Sort supply*, follow the INPUT POWER wiring table to assure proper wiring.

Multiple Readers When using *a non Accu-Sort supply* with multiple readers:

1. Follow the INPUT POWER wiring table to assure proper wiring to the first Axiom in the wiring daisy-chain.
2. By using the OUTPUT POWER terminal block (shown in the figure below), a total of three Axiom readers may share a power source. NO MORE than three Axiom readers may be daisy-chained to one power source.
3. Wire a cable from the OUTPUT POWER of the first Axiom to the INPUT POWER of the second Axiom.
4. Wire a cable from the OUTPUT POWER of the second Axiom to the INPUT POWER of the third Axiom.
5. Wiring MUST be grounded at both ends of the INPUT POWER and OUTPUT POWER connection. *(See Figure 4-3.)*

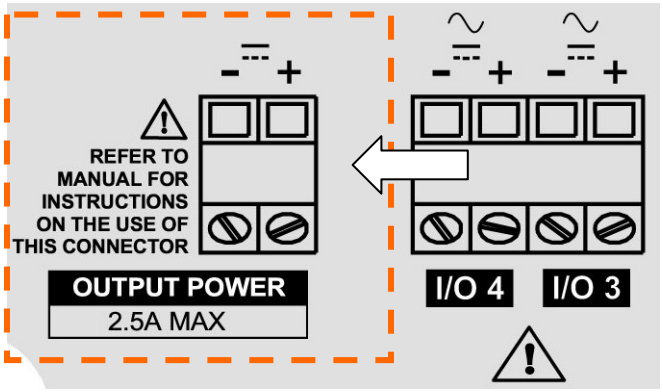


Figure 4–6: Output Power Wiring

CAUTION: The OUTPUT POWER wiring table indicates a maximum 2.5A output load. This is only for applications using other power supplies providing a minimum of 86.5 W of power.

Polarity Check

After completing the power connection, and before connecting other devices to the wiring base, be sure to perform a polarity check. When power is applied to the Axiom wiring base, other devices wired to the Axiom (i.e., tachometer and photoeye) could be damaged if the power polarity is reversed.

ATTENTION: While performing the polarity check, be sure to follow all safety procedures regarding high-voltage as outlined in *Chapter 2, Safety*. Before correcting a polarity problem, be sure to disconnect the power source.

IMPORTANT: After completing power connections, check Polarity LED inside the wiring base. A GREEN LED indicates polarity is correct. When more than one Axiom are daisy-chained together, check polarity in the correct sequence.

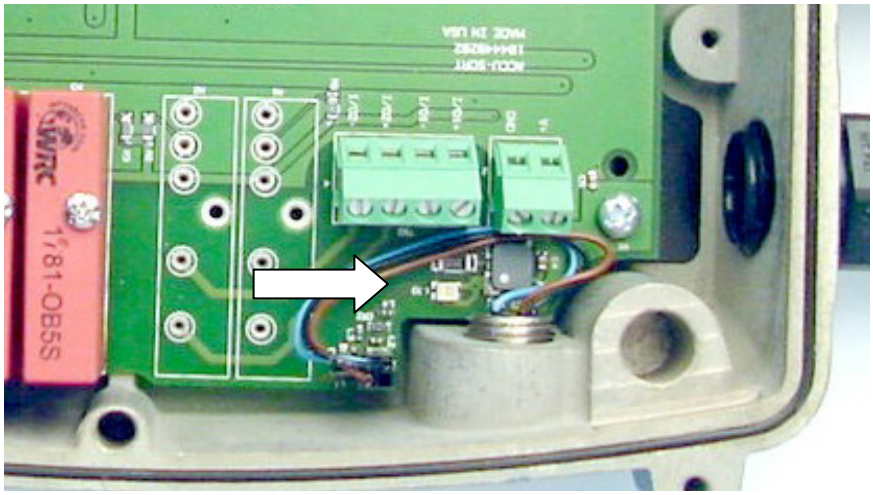


Figure 4-7: Location of Polarity LED in Wiring Base

1. Apply power.
2. Check that all Polarity LEDs are GREEN. If multiple Axiom are daisy-chained together, check the polarity of the first unit in the chain (i.e., unit wired directly to power source), then the second, then the third. If all Polarity LEDs are GREEN, polarity is correct.
3. If any Polarity LEDs are **RED**, polarity is reversed and must be corrected.
4. Disconnect from power source.
5. Correct wiring. For single units, simply swap the wiring at the INPUT POWER terminal block of any unit that had a RED polarity indication. In a daisy-chain, correct the wiring on the first unit in the daisy-chain that had a RED polarity indication.
6. Reconnect to power source.
7. Apply power.
8. Check polarity to assure wiring has been corrected.
9. If all Polarity LEDs are GREEN, polarity check is complete.

USEFUL TIP: In daisy-chained power applications, if the first or second unit's Polarity LED is RED and the last unit's LED is GREEN, you need to swap the INPUT POWER wiring of the first unit with RED LED and the OUTPUT POWER wiring of the last unit with RED LED.

Trigger Connections

The Axiom supports three trigger modes: hardware, software, and continuous. When using hardware trigger, one or more input signals "trigger" the reader. Software trigger is accomplished by sending a specific ASCII message via serial or network communications. Continuous trigger requires no external trigger.

When a hardware trigger (i.e., package detector) is required, Accu-Sort's retro-reflective photoeye (PN 100020569) is recommended.

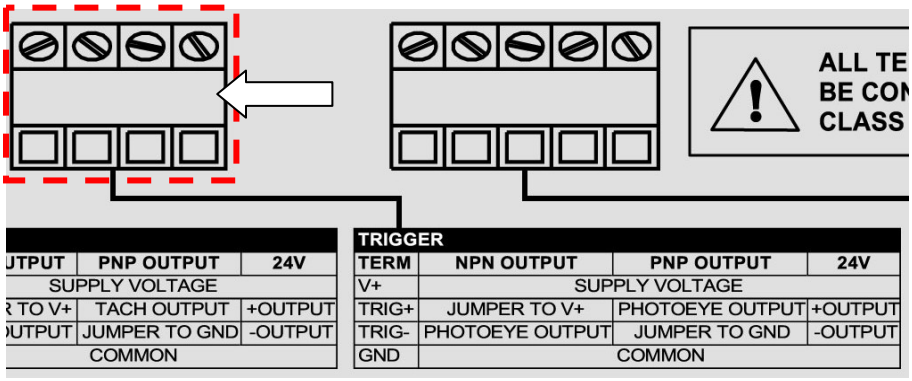


Figure 4-8: Wiring Trigger to Axiom Wiring Base

Connect trigger wiring to the wiring base terminal blocks. *(See Figure 4-8.)* Wire the Accu-Sort photoeye as indicated in shaded area of Table 4-2. *(Wire colors indicated for standard NPN Output, shown in shaded areas.)*

Table 4-2: Trigger Photoeye Wiring

WIRE COLOR	TERM	NPN OUTPUT	PNP OUTPUT	24V
RED	V +	Supply Voltage	Supply Voltage	
(Jumper to V+)	TRIG +	Jumper to V+	Photoeye Output	+ Output
WHITE	TRIG -	Photoeye output	Jumper to GND	- Output
BLACK	GND	Common	Common	

If your application uses a photoeye other than the one available from Accu-Sort, follow the TRIGGER wiring table to assure proper wiring. The trigger must be able to operate using the +24V DC source (24V) and not draw more than 100mA. The trigger input must be able to sink (or source) 10mA at +24V DC.

USEFUL TIP: To confirm the Trigger photoeye is functioning properly, watch the Trigger LED while the photoeye's beam is blocked. *(See Chapter 5 for details.)* The Accu-Sort photoeye also includes a status LED.

Multiple Readers When an application incorporates multiple readers wire the trigger photoeye to the Axiom Controller. *(Reference drawings 107480 and 107481 in Appendix D.)*

Tachometer Connections

In applications where product tracking is required, a tachometer is typically used. Connect the tachometer wiring to the wiring base terminal blocks. *(See Figure 4-9.)*

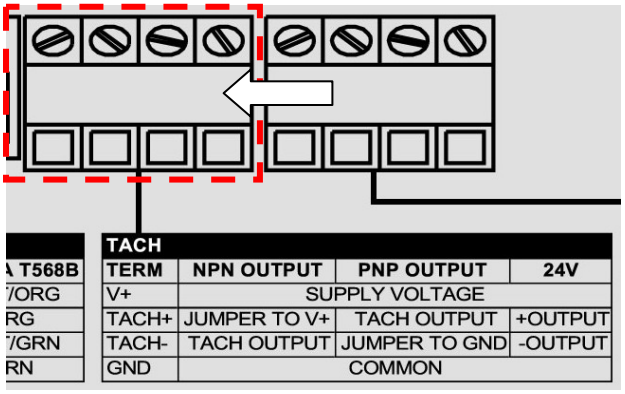


Figure 4-9: Wiring Tachometer Input to Axiom Wiring Base

When a tachometer is required, Accu-Sort tachometer (PN 1000019875) is recommended. Wire this tachometer as indicated in shaded area of Table 4-3. *(Wire colors indicated for standard NPN Output, shown in shaded areas.)*

Table 4-3: Tachometer Wiring

TACH WIRE COLOR	TERM	NPN OUTPUT	PNP OUTPUT	24V
WHT/ORG	V +	Supply Voltage	Supply Voltage	
(Jumper to V+)	TACH +	Jumper to V+	Tach Output	+ Output
WHT/BLU	TACH -	Tach Output	Jumper to GND	- Output
BLU/WHT+ORG/WHT	GND	Common	Common	

The shielding for the tachometer wiring MUST be terminated to earth ground. *(See Figure 4-10.)* Otherwise, belt static could result in a system failure.

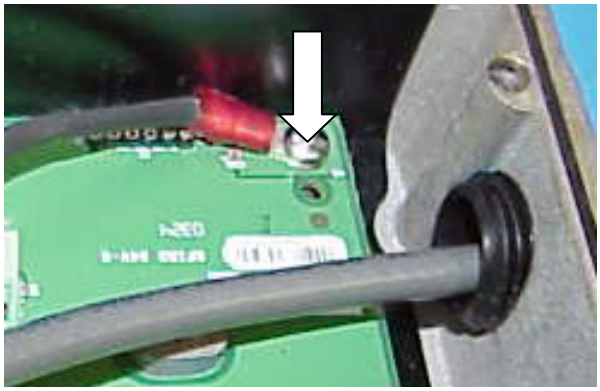


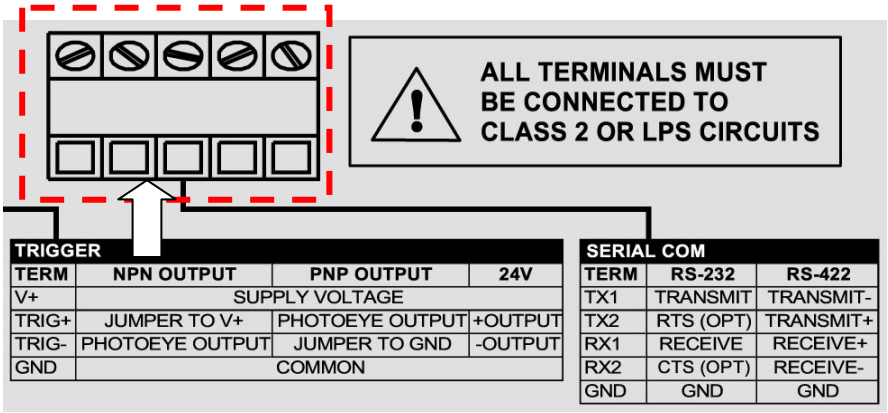
Figure 4-10: Tachometer Shielding Terminated to Earth Ground

If your application uses a tachometer other than the one available from Accu-Sort, follow the TACH wiring table to assure proper wiring.

Multiple Readers When an application incorporates multiple readers wire the tachometer to the Axiom Controller. *(Reference drawings 107480 and 107481 in Appendix D.)*

RS232/422 Communications Connections

The wiring base provides an RS232/RS422 terminal block for serial point-to-point communications. Typically, network communications will use Ethernet.



TRIGGER			
TERM	NPN OUTPUT	PNP OUTPUT	24V
V+	SUPPLY VOLTAGE		
TRIG+	JUMPER TO V+	PHOTOEYE OUTPUT	+OUTPUT
TRIG-	PHOTOEYE OUTPUT	JUMPER TO GND	-OUTPUT
GND	COMMON		

SERIAL COM		
TERM	RS-232	RS-422
TX1	TRANSMIT	TRANSMIT-
TX2	RTS (OPT)	TRANSMIT+
RX1	RECEIVE	RECEIVE+
RX2	CTS (OPT)	RECEIVE-
GND	GND	GND

Figure 4–11: Serial Communications Wiring (RS232/422)

RS232 Connections

Use RS232 for a direct connection to a controller, personal computer, or other device. RS232 provides point-to-point communications at distances up to 50 feet (15.2 meters). If longer cable lengths are needed, use RS422. RS232 connections are made to the **SERIAL COM** terminal block. Follow the SERIAL COM / RS232 wiring table to assure proper wiring.

IMPORTANT: Before attempting to use RS232 communications with RTS/CTS, contact Accu-Sort Customer Service for additional information.

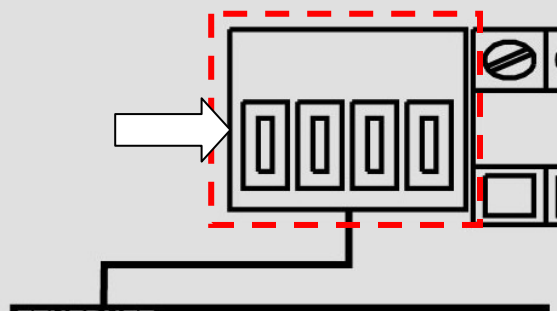
RS422 Connections

Use RS422 for a direct connection to a controller, personal computer, or other device. RS422 provides point-to-point communications at distances up to 1000 feet (300 meters). RS422 connections are made to the **SERIAL COM** terminal block. Follow the SERIAL COM / RS422 wiring table to assure proper wiring.

Line Termination The end devices on an RS422 point-to-point connection must be terminated. A termination resistor is pre-installed in the wiring base. The HOST end of the connection must also be terminated using a 120-ohm resistor between the RECEIVE+ and RECEIVE- terminals.

Ethernet Communications Connections

Use Ethernet for network/host communications or multiple-reader networks. Ethernet communications cabling can be run up to 330 feet (100 meters). Ethernet connections are made to the ETHERNET terminal block. Follow the ETHERNET wiring table to assure proper wiring.



ETHERNET			
TERM	RJ45	EIA/TIA T568A	EIA/TIA T568B
TX+	PIN 1	WHT/GRN	WHT/ORG
TX-	PIN 2	GRN	ORG
RX+	PIN 3	WHT/ORG	WHT/GRN
RX-	PIN 6	ORG	GRN

Figure 4-12: Ethernet Connections to Wiring Base Terminal Block

IMPORTANT: Do not strip wires before inserting them into the Ethernet terminal block.

For additional details on Ethernet and EtherNet/IP communications, reference the *Axcess for Axiom Software Manual, Appendix A: Guide to Axiom Networking.* Another useful source of information is the ODVA official web site *(www.odva.org).*

USEFUL TIP: To simplify your network installation, Accu-Sort offers the following options:

- RJ45 adapter cables (10 and 20 ft. lengths)
- a 5-port Ethernet switch (Linksys) and
- an 8-port dual speed Ethernet switch (10/100).

(See the Options and Accessories listed in Appendix A.)

Multiple Readers Most multi-reader applications will use Ethernet or EtherNet/IP communications. Reference the following drawings in *Appendix D* for wiring details:

- 107480 - Controller/Client with tachometer
- 107481 - Controller/Client/Client with tachometer

I/O Module Connections

The wiring base supports up to four (4) optional input or output (I/O) modules. Any of the modules shown in Table 4-4 may be used. These modules function like switches; they do not supply a voltage. *(See Appendix A.)*

Connect I/O wiring to the correct terminal blocks. When using DC modules, observe the polarity of the connections illustrated on insulating cover label.

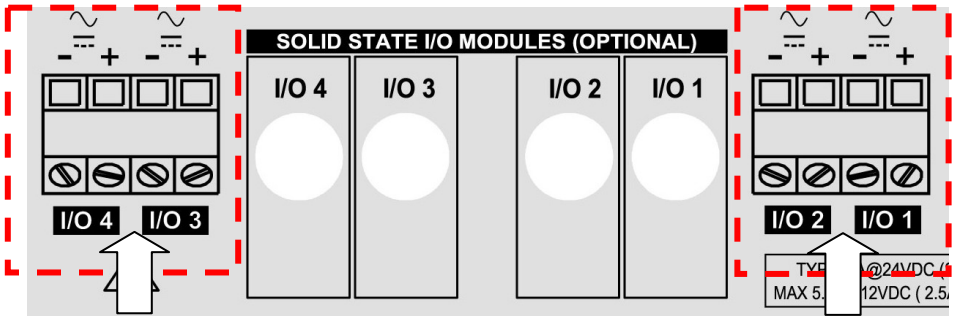


Figure 4-13: I/O Module Wiring

Table 4-4: Available I/O Modules for use with Axiom

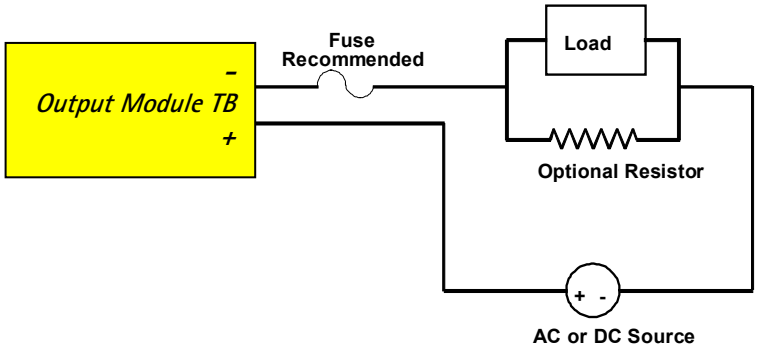
Part Number	Description	Color	Rating	Current Range
1000056135	DC Input Module	white	3.3 to 32 VDC	32 mA
1000056136	DC Output Module	red	3 to 60 VDC	3 A max. *
1000056137	AC Output Module	black	12 to 42 VAC	3 A max. *

NOTE: Relay modules are only for connection to SELV, LPS power source.

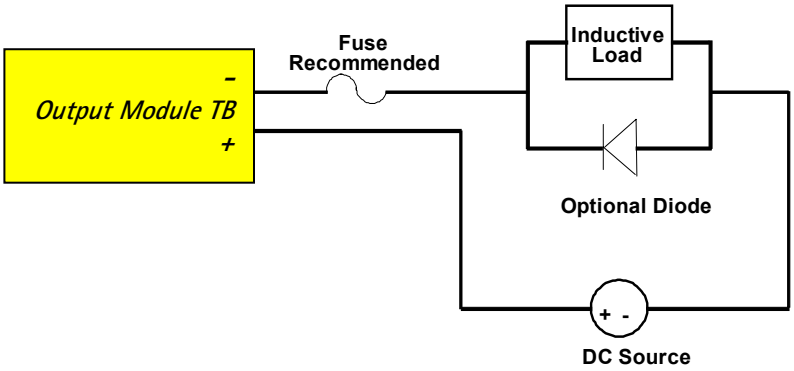
* Derate 33mA/deg above 25C.

Output Module Application

Shown below is a typical output module application. When connecting high impedance loads, you may need to add a resistor in parallel with the load. This resistor (typically 300 to 6,000 ohms) provides a continuous minimum current flow (10 mA DC or 50 mA AC) through the output module in the closed state.



Back Electromotive Force (EMF) is sometimes generated when an inductive load is switched off. Back EMF may damage the output module. A diode in parallel with the inductive device dissipates the back EMF.



An example output module application is the use of a Stack Light. The Axiom could use three output modules. Each module will send an output signal to the stack light to visual indication specific conditions (e.g., green = read, yellow = multiple codes, red = no read). *(Reference drawing 107483 in Appendix D.)*

Input Module Application

Input module 1000056135 is most often used for an END TRIGGER photoeye application. *(Reference drawing 107482 in Appendix D for wiring details.)*

NOTE: Any other input module application requires custom software. Contact Accu-Sort Customer Service for more information.

Installing a Scan Head

Once all wiring is completed and checked for accuracy, install the Axiom scan head to the wiring base. *(See Chapter 3.)* You can install the scan head with or without the power disconnected from the wiring base.

Check Axiom Installation

After completing the installation of your Axiom:

- Confirm that the Axiom has been properly installed mechanically and electrically. Use the *Installation Sequence* at the beginning of this chapter and your application specifications to check your installation.
- Configure the Axiom's parameters to meet the needs of your application. *(See **Axcess Setup Software Manual** and online help for details.)*
- See Chapter 5 for details regarding ***first-time startup*** and an ***operations checklist***.

Notes:

5 Setup and Operations

This chapter provides details on how the Axiom bar code scanning solution functions during normal operation. It also outlines how you can verify optimal performance through several methods:

- Become more familiar with your Axiom application
- Step-by-step start-up operations checklist
- Status Indicator LEDs
- Diagnostics to confirm normal operations (using Axcess)

After configuring your Axiom reader using the **Axcess Setup Software,** use the operations checklist to verify normal operations. *(Reference Chapter 4 of the Axcess Software Manual.)*

First-time Startup

On initial power-up, the Axiom performs a series of self-diagnostic and LED tests. The complete power-up sequence takes about 30 seconds.

When the STATUS LED flashes and turns a steady green the power-up sequence is complete. The Axiom is now operational.

USEFUL TIP: When an application uses multiple Axiom readers, you can provide each reader with a *unique* reader name using the Axcess setup software. This makes it easier to keep track of reader parameter changes when working with several readers on a network. *(Reference Chapter 4 of the Axcess Software Manual for details.)*

Default Parameters

The Axiom is shipped from the factory with these defaults:

- Connection Mode: Setup Cable
- Reader Name: Axiom
- Control Panel Buttons Enabled
- Code 128 (10-30 characters)
- IP address 192.0.0.100

Perform the following setup procedure using these defaults or configure your Axiom with your application's parameters using the *Axcess Setup Software*.

First-time Setup

Every application is unique. Axiom is designed for ease-of-setup, allowing you to program the reader to fit your application seamlessly.

Axcess Setup Software for Axiom, functioning under the familiar Windows® operating system on your PC, is the tool you will use to define operating parameters, set bar code type / length, and construct output messages, including filtering, stripping and padding capabilities. Axcess enables you to easily configure, fine-tune, and monitor your Axiom's operations.

Axcess provides ease-of-use regardless of your experience with bar code readers. A beginner follows basic setup procedures for a standard configuration. If you are more experienced, use the advanced setup features that allow access to more complex options. In either case, the user-friendly Axcess Wizard efficiently guides you through a sequence of screens until the Axiom is configured to fit your application.

Reference the Axcess for Axiom Setup Software Manual for further information.

First-time Setup Procedure

To setup your AXIOM 400 bar code reader:

1. Install Axcess on the PC you will use to setup your Axiom.
2. Connect the programming setup cable to the Axiom.
3. Connect the programming setup cable to your PC.
4. Apply power to Axiom.
5. Set configuration parameters using Axcess for bar code symbologies, trigger, tracking, and communications (serial, Ethernet, and I/O). Reference *Axcess Software Manual, Chapter 2, Getting Started*.
6. Check operations using the Test Mode.

Check Operations using Test Mode

NOTE: Perform the following test using a bar code that matches the default parameters. Or you may wish to perform this test after configuring the Axiom to your specifications. If the default parameters have been changed, you must enable the control panel buttons and the other parameters listed on page 5-1. *Reference Axcess Software Manual, Chapter 4. See Modify > Axiom Configuration and Modify > Bar Code Setup.*

To quickly check the operation of an Axiom:

1. Apply power to the Axiom.
2. Position a test bar code symbol approximately 20 inches (0.5 meter) from the reader. Skew the bar code symbol slightly.
3. Press the Test/Diagnostics button on the control panel to initiate test. *(See Figure 5-1, button C.)*

4. The scan beam should be scanning continuously.
   (Observe the laser safety warnings in Chapter 2.)
5. Observe the bar graph LEDs on the Axiom control panel. The bar graph LEDs illuminate when the reader is scanning and decoding the bar code symbol. *(See page 5-4.)*
6. Using the programming setup cable, connect your PC to the Axiom setup connector. You may also connect via a network. *(Reference Axcess Software Manual, Chapter 3.)*
7. Run the Axcess setup software and establish a connection with the Axiom.
8. Using Axcess Explorer, go to the **Diagnostics > Axiom Monitor**.
9. During operations, use the **Axiom Monitor** to confirm the reader's status, read quality, code quality, and messages via the on-screen indicators. *(Reference Axcess Software Manual, Chapter 6.)*
10. Close the connection to the Axiom.
11. Disconnect setup cable.

Operations Checklist

- Check trigger photoeye LED for proper operation.
- Test Axiom parameters to assure optimal operation.
- Observe the Axiom's Status Indicator LEDs during power-up. *(What to watch for is outlined on page 5-4.)*
- Using Axcess Explorer, select **Diagnostics > Axiom Monitor**. *(See Axcess Software Manual, Chapter 6.)*
- Pass test label in scanning beam.
- Adjust mounting as needed for optimal performance.
- Modify Axiom parameters as needed for optimal performance.
- Save parameters to scan head.
- Backup parameters from scan head to wiring base. *(See Table 5-3.)*
- Backup parameters to disk (optional, but recommended).

Axiom Control Panel Indicators

The LEDs provide the following indications during normal operations.

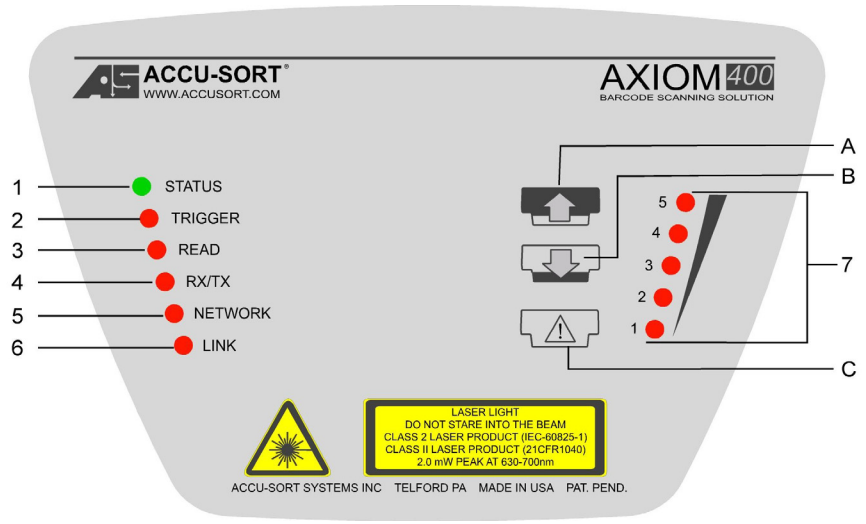


Figure 5-1: Axiom Control Panel (on scan head)

Table 5-1: Using LED Indicators to Check Normal Operations

Ref	LED	Description
1	Status	GREEN to indicate the overall "health" of the reader. (If RED, see *Chapter 7, Troubleshooting*.)
2	Trigger	Indicates the trigger input. The LED is activated upon trigger input regardless of trigger source (incl. software trigger).
3	Read	Flashes red or green based upon the software criteria.
4	RX/TX	LED for serial port 1. GREEN = Transmitting data RED = Receiving data
5	Network	Flashes red or green to indicate connection status. ▪ For a **Single TCP/IP** connection, it indicates that a "host" connection has been made to the reader. ▪ For **EtherNet/IP** connection, it indicates "network" connection status. This LED is software controlled. ▪ For a **Controller/Client** multi-reader connection, it indicates that all inter-reader communications (connections between readers) are correctly functioning. *(See Table 5-2.)*
6	Link	This LED is LINK indicator for Ethernet. Flashes GREEN when connected to a network.
7	Bar Graph (LED 1 - 5)	Scan quality indicator. Also flashes whenever copying parameters to/from wiring base.

Table 5-2: Network LED during Normal Operations

Mode	Description
Single TCP/IP	Solid **GREEN** – Axiom connected to a host. **NOTE**: If both Host 1 and Host 2 are used, the LED will be solid **GREEN** if either port is connected. Off – No host connection. **NOTE**: If UDP messaging is used (unconnected messages) the Network LED will be off.
EtherNet/IP	Solid **GREEN** – Axiom made a connection to the PLC Flashing **GREEN** – No connection made with the network Flashing **RED** – Lost network connection
Controller/Client	**Controller** Solid **GREEN** – The correct number of client(s) with the same group number have been found. Flashing **RED** – All the client(s) with the same group number have NOT been found **Client** Solid **GREEN** – Connected to a controller with the same group number. Off – Not connected to a controller with the same group number.
NOTE: The mode indicated by the Network LED is dependent on the Axiom configuration you are using. Ethernet/IP is the highest priority, Single TCP/IP mode operation is the lowest.	

Table 5-3: Using Control Panel Buttons to Check Normal Operations

Ref	Button	Description
A	Upload to Axiom	Uploads parameters from Wiring Base to Scan Head ▪ Button must be pressed twice to initiate action. ▪ The bar graph LEDs flash when pressed once. ▪ The bar graph LEDs strobe from 1 to 5 when pressed the second time, indicating the parameters are being uploaded from the wiring base to scan head.
B	Backup to Base	Downloads parameters from Scan Head to Wiring Base ▪ Button must be pressed twice to initiate action. ▪ The bar graph LEDs flash when pressed once. ▪ The bar graph LEDs strobe from 5 to 1 when pressed the second time, indicating the parameters are being backed up from the scan head to the wiring base.
C	Test /Diagnostic	Enables the Axiom test mode. (Test mode can also be selected remotely using Axcess *Tools > Axiom Commands > Test Mode*.)

REMEMBER: Axiom's control panel buttons can be enabled/disabled through the use of the Axcess setup software. *(Reference Axcess Software Manual. See Modify > Axiom Configuration, Enable Axiom Control Panel Buttons.)*

Checking Operations with Axcess

The **Axcess Diagnostics > Axiom Monitor** enables you to evaluate the operational performance of your Axiom by providing vital statistics via status indicators, real-time read quality monitoring, and box information. Outgoing and incoming messages are also monitored.

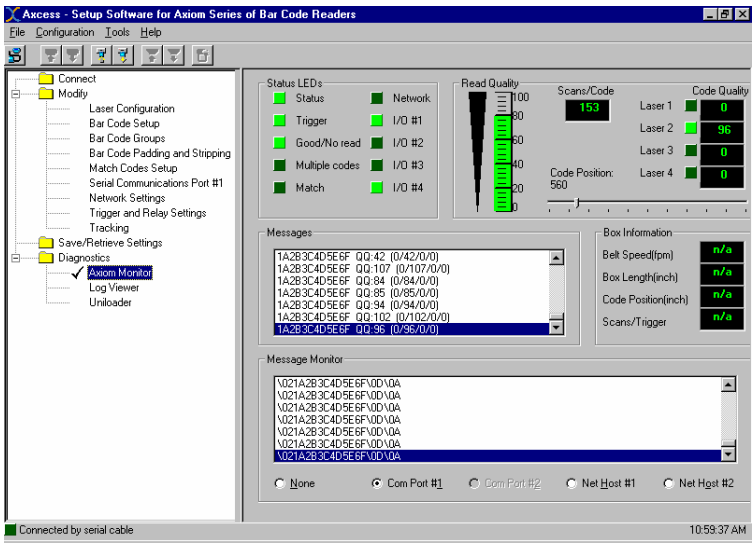


Figure 5-2: Axcess Diagnostics > Axiom Monitor Window

Checking Multi-Reader Network with Axcess

From the Axiom Controller, check **Diagnostics > Log Viewer > Read Rate**. This simple diagnostic allows you to check bar codes read, by laser, for each Axiom Client in the network. Each client is identified in the Read Rate Log by the unique name and IP address assigned to it using Axcess.

Reference the *Axcess Software Manual* and online help for more information.

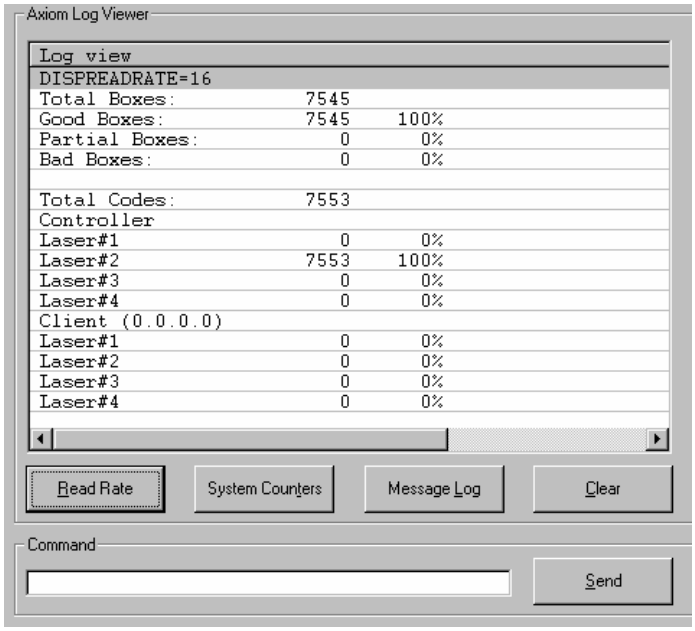


Figure 5-3: Example Read Rate Log for Multi-Reader Network

Standalone Operation

In a typical standalone setup, a single Axiom scans bar codes on one side of packages as they move down a conveyor. A photoeye is used to trigger the Axiom to begin searching for valid bar codes. Bar code data is transmitted to a host device.

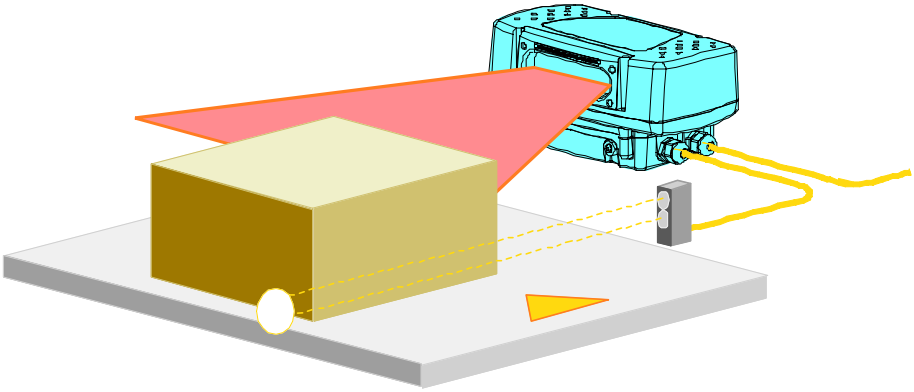


Figure 5-4: Typical Single-Unit Axiom Application

A simplified schematic diagram of the required items is shown below:

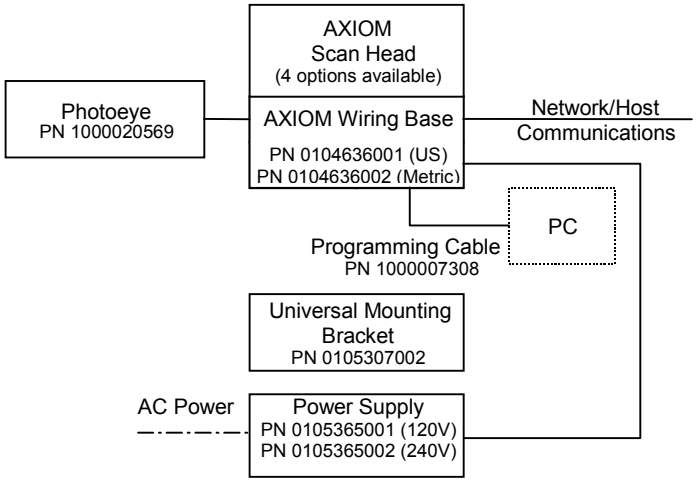


Figure 5-5: Schematic Diagram of Typical Single-Unit Axiom Installation

Tracking Operation

By utilizing the tracking capabilities of the Axiom, you can configure your application to monitor the progress of packages on the conveyance system. Tracking enables the Axiom to track bar codes and the packages to which they belong. Your reader may scan more than one package with more than one code at a time within its read zone. Tracking allows the reader to accurately associate the correct bar code(s) with the correct packages.

Typical tracking configurations use a tachometer to monitor conveyor speed.

A simplified schematic diagram of the required items for a tracking application is shown below:

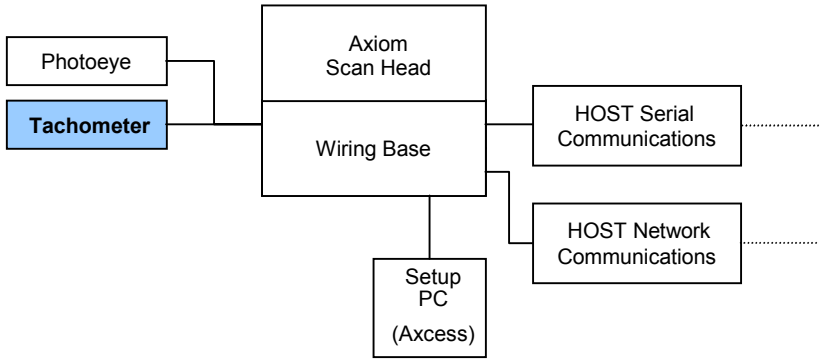


Figure 5-6: Schematic Diagram of Axiom Tracking Installation

Setup Functions for Axiom Tracking Operation

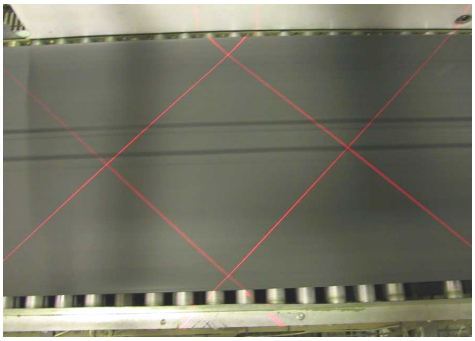
- Modify > Tracking – Tachometer (define tach type)
- Modify > Tracking – Axiom Mounting
- Modify > Tracking – Transmit
- Modify > Tracking – Track Config

Reference the *Axcess Software Manual* and online help for details.

X-Scanning Operation

In X-scanning applications, two Axioms mounted to an XMB bracket are used to create a single "X" scanning pattern. Two XMB brackets and four Axioms can be used to create a dual-X scanning pattern, as shown in *Figure 5-7*.

View from conveyor (looking up)



Dual X-pattern created by four Axiom

Figure 5-7: Dual X-Scanning Application

A simplified schematic diagram of the required items for an X-scanning configuration is shown below:

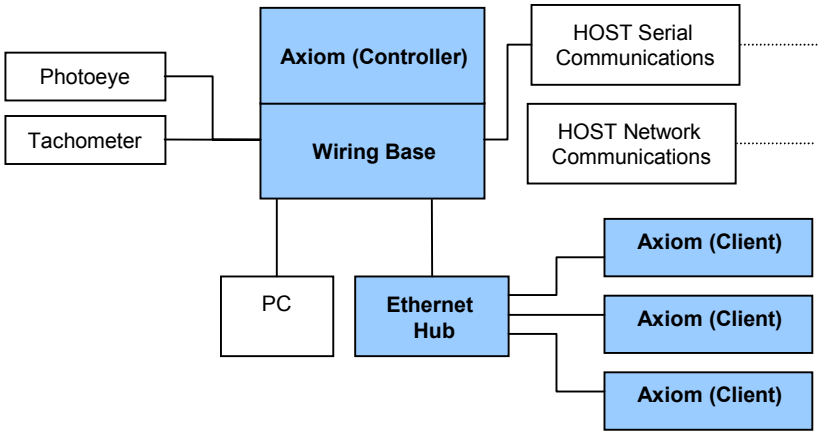


Figure 5-8: Schematic Diagram of Axiom X-Scanning Installation

Setup Functions for Axiom Controller

- Modify > Axiom Configuration - Reader Name (Controller)
- Network Settings - # of Client Readers, IP address, and Group #

Setup Functions for Axiom Clients

- Modify > Axiom Configuration - Reader Name (Client 1,2,3)
- Network Settings – IP address and Group #

Reference the *Axcess Software Manual* and online help for details on setting up a multi-reader network.

Multiple-Reader Network Operation

In multiple-reader applications, from two to six Axioms can be networked together. A single Axiom is configured as a *Controller* for a multiple-reader network. The Axiom Controller gathers data from other Axioms (up to five, configured as *clients*) over an Ethernet network. The Axiom Controller then collects and transfers the collected data over a serial communications or network link to the host.

A simplified schematic diagram of the required items for a multiple-reader configuration is shown below:

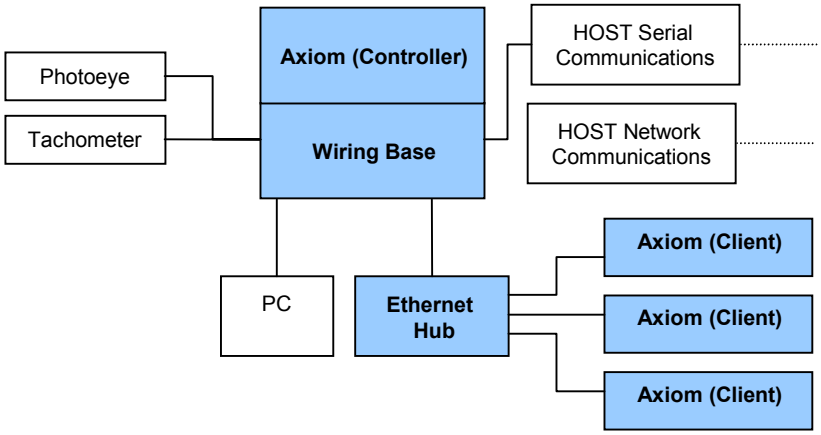


Figure 5-9: Schematic Diagram of Multiple-Reader Axiom Installation

Setup Functions for Axiom Controller

- Modify > Axiom Configuration - Reader Name (Controller)
- Network Settings - # of Client Readers, IP address, and Group #

Setup Functions for Axiom Clients

- Modify > Axiom Configuration - Reader Name (Client 1,2,3)
- Network Settings – IP address and Group #

Reference the *Axcess Software Manual* and online help for details on setting up a multi-reader network.

Scanning Array / Tunnel Operations

When two multi-reader networks are coupled to function in the same scanning area, the entire application is called a scanning array or tunnel array. Due to the complexity of these applications, tunnel arrays are typically custom-engineered to your specifications. Figure 5-10 illustrates a scanning array that uses ten Axiom readers in a six-sided tunnel configuration.

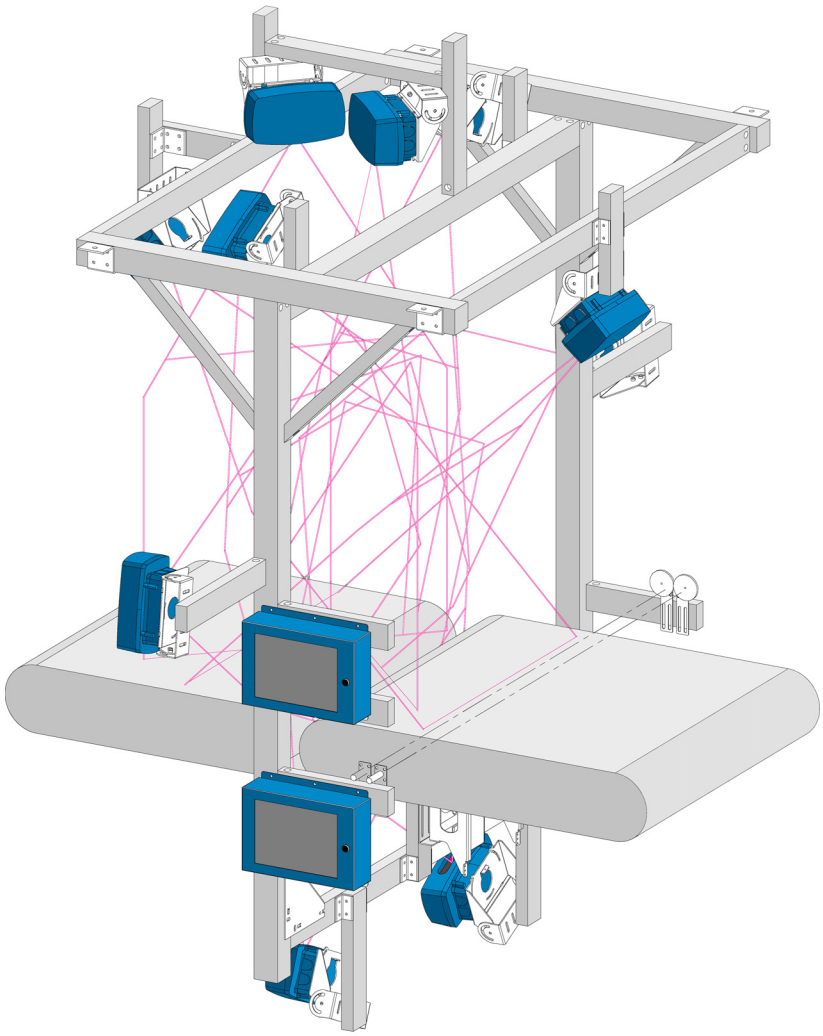


Figure 5-10: Scanning Array / 6-sided Tunnel Application

Setup Functions for Axiom Controller

- Modify > Axiom Configuration - Reader Name (Controller)
- Network Settings - # of Client Readers, IP address, and Group #

Setup Functions for Axiom Clients

- Modify > Axiom Configuration - Reader Name (Client 1,2,3,4,5)
- Network Settings – IP address and Group #

Reference the *Axcess Software Manual* and online help for details.

Notes:

6 Maintenance

This chapter provides instructions for maintaining optimum performance and life for your Axiom. It provides specific information on:

- Maintenance Procedures
- Exterior Cleaning
- Mounting Hardware Checks
- Wiring Connection Checks

Table 6-1: Tools and Materials Required

Item	Description
Soft-bristle brush	For cleaning the Axiom's exterior
Clean soft cloths	For cleaning the Axiom's exterior
Cleaning solutions	Mild detergent solution for cleaning the Axiom's exterior.
	70% denatured alcohol, 30% de-ionized water solution for cleaning exit window
Soft cotton swabs or lint-free cloth	Use to clean Axiom reader's exit window

Maintenance Tasks

Perform the maintenance tasks on an "as needed" basis to assure proper operation of the Axiom. Task schedule frequency depends upon the application environment conditions. It only requires a few minutes to complete each maintenance task.

Exterior Cleaning

WARNING: Shut down the Axiom before performing this maintenance task. Do not stare into the Axiom's exit window at the laser light. Avoid direct eye exposure. The laser light level does not constitute a health hazard, however staring at the laser light for prolonged periods could result in eye damage.

CAUTION: Do not use any chemical on the Axiom that is unsafe for plastics, such as benzene, acetone, or similar products. Before performing this maintenance task, be sure to shutdown the Axiom.

The exterior cleaning procedure may be performed without removing the reader from the mounting structure.

1. Turn off the Axiom.
2. Clean the exterior (except the exit window) with a clean, soft-bristle brush. Be sure not to brush any dust, dirt, or debris onto the exit window.
3. Carefully remove any debris in or around the exit window.
4. Wipe the exterior (except the exit window) with a clean, soft cloth dampened slightly with a mild detergent solution.
5. The exit window should be cleaned after this task is completed.

Cleaning the Exit Window

WARNING: Shut down the Axiom before performing this maintenance task. Do not stare into the Axiom's exit window at the laser light. Avoid direct eye exposure. The laser light level does not constitute a health hazard, however staring at the laser light for prolonged periods could result in eye damage.

CAUTION: Never apply cleaning solution directly to the exit window. Always apply the solution to a cloth, and then the cloth to the window. Do not use any chemical on the Axiom that is unsafe for plastics, such as benzene, acetone, or similar products.

The exit window cleaning procedure may be performed without removing the reader from the mounting structure if it is possible to do so.

1. Turn off the Axiom.
2. Follow the exterior cleaning procedure before cleaning the exit window
3. Check the exit window surface for any dust, dirt, or smudges. If the window needs to be cleaned, proceed to Step 4.
4. Make a solution of seven parts denatured alcohol and three parts water.
5. Apply the cleaning solution to a cotton swab or lint-free cloth.
6. Apply the cleaning solution to the exit window.
7. Remove any streaks or remaining moisture from the exit window with a dry, soft, lint-free cloth or lens paper.
8. Verify Axiom reader operation. Follow the Operations Checklist procedure in Chapter 5.

Cleaning the Trigger Photoeye

If your application uses the photoeye option as a hardware trigger, be sure to clean the photoeye periodically as outlined below.

1. Turn off the product transport.
2. Turn off the Axiom reader(s).
3. Clean the photoeye's lens using the denatured alcohol solution and a cotton swab or lens paper.
4. Check the reflector on the opposite side of the transport. Clean as necessary.
5. Verify photoeye operation. Follow the procedure on page 6-7.

Cleaning the Tachometer

If your application uses the tachometer option for tracking purposes, be sure to clean the tachometer wheels periodically as outlined below.

1. Turn off the product transport.
2. Turn off the Axiom reader(s).
3. Using a clean, soft cloth, wipe the wheels of the tachometer clean using a mild detergent solution.
4. Before restarting the system, be sure the tachometer is making good contact with the product transport.
5. Verify tachometer operation. Follow the procedure on page 6-7.

Tighten Mounting Hardware

1. Check all Axiom reader mounting hardware. Tighten as necessary. Do not over-tighten. Be sure not to disturb the reader's alignment as it relates to the product transport.
2. Check the mounting hardware of the photoeye and tachometer (if these options are being used). Tighten as necessary. Do not over-tighten.

Checking Wiring Base Connections

All wiring connections to the Axiom are made through the wiring base. Specific wiring instructions are located on the insulation flap inside the wiring base. (Reference Chapter 3, Installation.)

1. Check all wiring connections to the wiring base terminal blocks. Tighten as necessary. Do not over-tighten.
2. Check all cabling/conduit for signs of wear/damage. Repair/replace any damaged cable connections as necessary.

Verify Reader Operation

Follow the Operations Checklist procedure defined in Chapter 5.

If the Axiom parameters were changed to read bar codes other than the factory defaults, simply use a good quality bar code to assist in verifying proper operations. There is no need to return the reader to the default parameters to perform this test.

Verify Photoeye Operation

1. Block the photoeye beam to confirm it is aligned properly with the reflector.
2. If the LED on the photoeye changes status, the photoeye is functioning properly.
3. Verify that the Trigger LED on Axiom is green when photoeye beam is blocked.
4. If the photoeye's LED does not change status, adjust the photoeye so that it is properly aligned with the reflector.
5. If the Trigger LED on the Axiom is not green when the photoeye's beam is blocked, check the cabling between the photoeye and Axiom wiring base for damage.

Verify Tachometer Operation

There are two ways to verify tachometer operations.

Use Axcess Setup Software

1. Connect Axiom to a PC.
1. Start the Axcess setup software.
2. Go to **Diagnostics > Axiom Monitor**.
3. Verify the **Belt Speed** is accurate when the conveyor is running.

Use Tach LED in Wiring Base

1. Remove the scan head from the wiring base.
2. Slowly spin the tachometer wheel while verifying the tach LED in the wiring base is flashing.

Notes:

7 Troubleshooting

This chapter provides instructions for diagnosing, troubleshooting and correcting Axiom performance issues. It provides specific information on:

- Test Mode
- Indicators
- Diagnostics
- Troubleshooting (Problem/Cause/Solution)

Test Mode

In test mode, the Axiom displays the read rate on the Axiom control panel's bargraph LEDs. The Axcess **Diagnostics > Axiom Monitor** window also provides a read quality bargraph that enables you to monitor the test mode remotely from a PC connected to your network. Additional details can be obtained by monitoring from this diagnostic window while the reader is in test mode.

When test mode is selected, either by using the control panel button or Axcess software, it will "time out" after three minutes.

Status Indicators

The Axiom provides several status indicators that you can use to troubleshooting performance during operations. They are found at two locations:

- Axiom Control Panel
- Axcess Diagnostics > Axiom Monitor screen

Axiom Control Panel Indicators

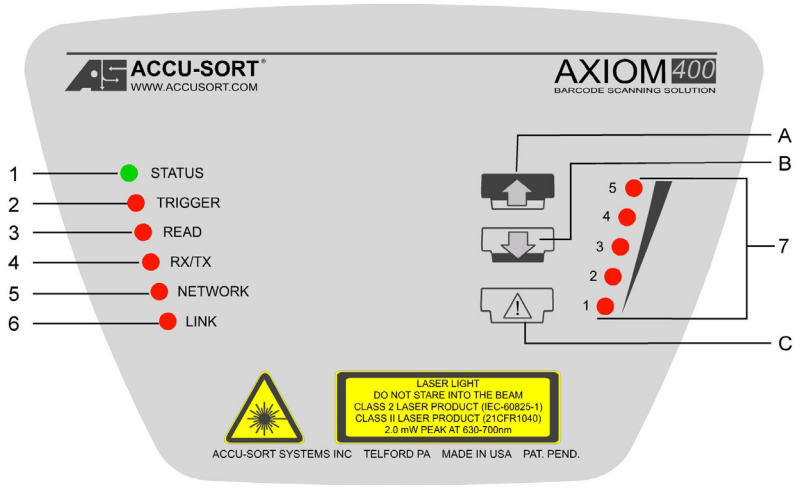


Figure 7-1 Axiom Control Panel (on scan head)

Table 7-1: Axiom Control Panel LED Fault Detect Descriptions

Ref.	LED	Description
1	Status	**RED** indicates a problem regarding the overall "health" of the reader.
2	Trigger	Indicates the trigger input. The LED is controlled through software no matter the trigger source (including software trigger).
3	Read	**RED** identifies a No Read condition. Check bar code print quality, trigger configuration, and bar code parameters.
4	RX/TX	If bar codes are being read, but the LED is NOT illuminated, data is not being transmitted on serial port 1.
5	Network	*(See Table 7-2 for Network LED – Fault Detection.)*
6	Link	If the LED is not flashing, there is no network connection.
7	Bar Graph (LED 1 – 5)	Read quality indicator (5 = Good, 1 = Poor). 5 = 81-100% 4 = 61-80% 3 = 41-60% 2 = 21-40% 1 = 00-20% **NOTE**: Also flashes during parameter upload/backup.

Table 7-2: Network LED – Fault Detection Only

Mode	Description
Single TCP/IP	LED is Off – No host connection or UDP messaging is used. **NOTE**: If UDP messaging is used (unconnected messages) the Network LED will be off.
EtherNet/IP	Flashing **GREEN** – No connection made with the network Flashing **RED** – Lost network connection
Controller/Client	**Controller** Flashing **RED** – All the client(s) with the same group number have NOT been found or a client's tracking does not match the controller. **Client** Off – Not connected to a controller with the same group number. Match the client to the controller's group number. Solid **RED** – Client's tracking does not match the controller.
NOTE: The mode indicated by the Network LED is dependent on the Axiom configuration you are using. Ethernet/IP is the highest priority, Single TCP/IP mode operation is the lowest.	
NOTE: Reference Figure 5-2 for *Network LED during Normal Operations.*	

Table 7-3: Control Panel Buttons – Uses during Troubleshooting/Service

Ref.	Button	Description
A	Upload to Axiom	Use to upload a backup set of parameters from the wiring base to a replacement scan head. **NOTE**: This only works if the Backup to Base button has been used earlier to assure the correct parameters are stored in the wiring base.
B	Backup to Base	When it becomes necessary to replace a scan head, be sure to use this button to download a backup set of parameters from the scan head to the wiring base. By doing this, it is easy to configure your replacement scan head by using the Upload to Axiom button.
C	Test /Diagnostic	Enables the Axiom test mode. (Test mode can also be selected remotely using *Axcess Tools > Axiom Commands > Test Mode On.*)

NOTE: Keep in mind that the buttons on the Axiom's control panel can be enabled/disabled through the use of the Axcess setup software. *(For details, reference the Axcess Software Manual, Modify > Axiom Configuration in Chapter 4.)*

Wiring Base Status Indicator LEDs

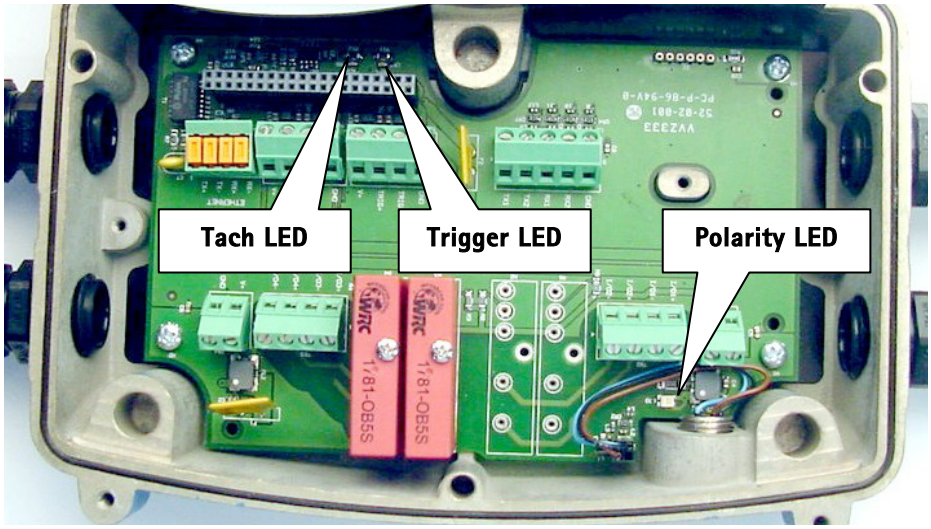


Figure 7-2: Wiring Base Status LED Locations

Table 7-4: Wiring Base Status LED Descriptions

Status LEDs	Location / Definition
Polarity	Near input power TB. Also referred to as Power LED. **RED** if power polarity is reversed. **GREEN** if power polarity is correct. OFF indicates no power. DO NOT install the Axiom scan head if this LED is **RED**.
Tach	On outside edge of circuit board, behind scan head connector. If tachometer wheel is slowly rotated, the Tach LED will flash **GREEN**. *(See Verify Tachometer Operation procedure in Chapter 6.)*
Trigger	On outside edge of circuit board, behind scan head connector. When the trigger photoeye is blocked, the Trigger LED will light **GREEN**. *(See Verify Photoeye Operation procedure in Chapter 6.)*

Diagnostics

Axcess for Axiom Diagnostics

Axcess includes comprehensive diagnostic capabilities that monitor Axiom reader operation, triggering, conveyor speed, bar code readability, scan rates and message output. These vital statistics display on a single **Axiom Monitor** screen. The **Axiom Monitor** screen is the primary tool you will use to monitor the reader's operation and bar code readability in real-time, enabling you to efficiently detect and troubleshoot any problems that may occur in your scanning application.

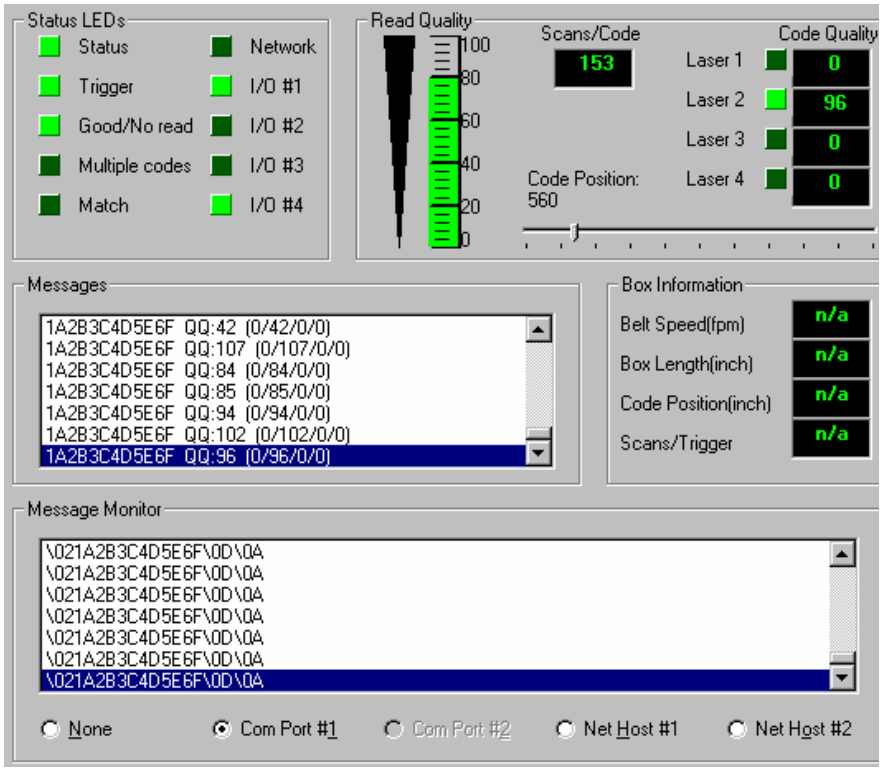


Figure 7-3: Axcess Diagnostics > Axiom Monitor

Table 7-5: Axiom Monitor Screen Descriptions

Screen Segment	Description
Status LEDs	These LEDs reflect the same conditions as those on the Axiom control panel, as well as some additional LEDs (Match and I/O LEDs).
Read Quality	Provides information regarding the bar code that was read.
Box Information	Availability of information is based on the type of tracking used. Information is updated when a trigger occurs.
Messages	View diagnostic messages from the reader. This is primarily information on each bar code read. **Right-click** this area for clearing, starting, stopping and logging options.
Message Monitor	View messages being sent from any of the reader's host ports (either serial or network). **Right-click** this area for clearing, starting, stopping and logging options.

USEFUL TIP: If EtherNet/IP communications are being used, message monitoring for Net Host #1 is not available. *Reference the Axcess Software Manual, Chapter 6.*

Troubleshooting

The following PCS (problem/cause/solution) tables are designed to assist you in troubleshooting the more common events that may occur during installation and operation of your Axiom Bar Code Scanning Solution.

Table 7-6: PCS Troubleshooting

Problem	**The POLARITY LED in the wiring base is RED.**
Cause(s)	Wiring from the power supply to the INPUT POWER terminal block is incorrectly wired.
Solution(s)	**IMPORTANT**: DO NOT install the scan head if polarity LED is **RED**. 1. Correct the polarity problem by swapping the wires at the INPUT POWER terminal block. 2. Confirm power polarity is correct (**GREEN** LED). 3. Install the scan head. *(See page 3-16.)*

Problem	**There is no laser light exiting from the Axiom when power is activated.**
Cause(s)	No power is provided to the Axiom.
Solution(s)	1. Check to ensure power is properly connected. 2. Check to see if Axiom Status LED turns ON. 3. Confirm power supply functioning. 4. Remove Axiom scan head from wiring base. 5. Verify Power LED in wiring base is **GREEN**. *(See Figure 7-2.)* 6. If Power LED is **RED**, polarity is swapped. 7. If Power LED is OFF, check wiring at the INPUT POWER terminal block. 8. Replace the power supply if wiring was correct. 9. Reassemble Axiom scan head to wiring base.

Problem	**The Axiom is not reading bar codes.**
Cause(s)	Code type is not enabled or wrong code length. Code passes by at too large an angle (tilt, pitch, skew). All codes have very poor print quality.
Solution(s)	1. Enable code type or correct code length. 2. Make sure Axiom laser beam is ON when code passes by. 3. Verify correct bar code parameters are enabled. 4. Enable TEST MODE. (Use either the Axiom control panel button or Axcess *Tools > Axiom Commands > Test Mode On*.) 5. Hold code in the scan line. 6. Verify the Axiom is reading the code. 7. Correct any tilt, pitch, or skew problems. 8. Remedy bar code printing problems.

Table 7-6: *PCS Troubleshooting (continued)*

Problem	**The Axiom is experiencing poor read rate.**
Cause(s)	Poorly printed bar codes. Scan head window is dirty. Codes passing by at too large an angle (tilt, pitch, skew).
Solution(s)	1. Confirm the quality of bar code printing is good enough to read. Correct any print quality issues. 2. Clean scan head window as defined on page 6-3. 3. Check reading distance with a known good quality sample bar code. 4. Enable TEST MODE. (Use either the Axiom control panel button or Axcess *Tools > Axiom Commands > Test Mode On.*) 5. Hold code in the scan line. 6. Verify the Axiom is reading the code. 7. Correct any tilt, pitch, or skew problems.

Problem	**The Axiom is experiencing poor read rate in hardware trigger.**
Cause(s)	Photoeye is not adjusted properly or requires alignment.
Solution(s)	1. Verify that the photoeye is blocked the entire time the Axiom's laser is scanning the bar code. 2. Adjust the photoeye as necessary. *(See Verify Photoeye Operation in Chapter 6.)* **NOTE**: For non-tracking applications only.

Problem	**HOST is not receiving serial host message.**
Cause(s)	Improper wiring between host and reader. Incorrect configuration settings.
Solution(s)	1. Is the Axiom's RX/TX LED flashing GREEN? 2. If yes, check the serial cable wiring at the wiring base's SERIAL COM terminal block and at the HOST. 3. If no, verify Axiom trigger input and trigger configuration. 4. View the **Message Monitor** to verify the Axiom is transmitting data from the SERIAL COM port. *(Reference the Axcess Software Manual, Chapter 6 for details on the **Diagnostics > Axiom Monitor**.)*

Problem	**Axiom reads bar codes, but transmits a NO READ message. (Tracking Applications Only)**
Cause(s)	Improper tracking configuration
Solution(s)	1. Check for "Code Lost" messages using Axcess diagnostics. 2. If "Code Lost" messages are present, check the tracking configuration. *(Reference Axcess Software Manual, Tracking.)* 3. Correct as needed.

Problem	**Cannot connect configuration PC running Axcess to the Axiom's Ethernet port.**
Cause(s)	Improperly configured Ethernet port on configuration PC
Solution(s)	1. Verify network port configuration on PC. 2. Port on PC must be configured for a static IP address.

Notes:

8 Service

There are a limited number of field-replaceable components that are part of the *Axiom 400 Bar Code Scanning Solution*. In most cases, it is recommended that the component be replaced with a matching recommended spare part (RSP). These field-replaceable units (FRUs) are:

- Scan Head
- Wiring Base
- I/O Module
- Power Supply
- Photoeye
- Tachometer

The part numbers for these items are provided in *Appendix A, Accessories and Options.*

Replacement Procedures

CAUTION: This symbol indicates you are about to perform an action involving, either a dangerous level of voltage, or to warn against an action that could result in damage to devices or electrical shock. Please follow necessary procedures as outlined in *Chapter 2, Safety*.

ESD CAUTION: This symbol identifies a procedure that requires you take measures to prevent Electrostatic Discharge (ESD) e.g., use an ESD wrist strap. Circuit boards are most at risk. Please follow ESD procedures as outlined in *Chapter 2, Safety*.

Replacing a Scan Head

IMPORTANT: If you are installing more than one scan head on a network, install each scan head one at time and set/change the IP address before installing the next scan head.

1. Save configuration parameters from scan head to wiring base or disk.
2. Loosen the four (4) screws that secure the scan head to the wiring base.
3. Pull the scan head straight up from the wiring base. When replacing a scan head, it is not necessary to disconnect the power.
4. Install the replacement scan head by aligning the connector on the scan head with the connector on the wiring base and pressing the scan head down firmly. In applications that are using more than one scan head option, be sure to install the correct scan head by confirming the part number. *(See Chapter 3, Installing a Scan Head.)*
5. Tighten the four screws that secure the scan head to the wiring base.
6. Set a (unique) IP address for the reader using the Axcess configuration software. The initial default address is defined in *Appendix B*.
7. Download the correct reader configuration to the scan head. This can be done in one of three ways:
   - If the parameters from the previous scan head have been saved to the wiring base, you can use the appropriate Toolbar button to restore them. *(Reference Axcess Software Manual. See Chapter 4, Restore Axiom Parameters from Wiring Base.)*
   - Download a parameter set you have saved to disk directly through the Axiom Configuration Port Connector using Axcess and the setup cable.

Replacing a Wiring Base

1. Remove power from Axiom.
2. Unplug power supply from source.
3. Remove the scan head from wiring base.
4. Disconnect all cabling from wiring base terminal blocks.
5. Remove wiring base from UMB/mounting structure.
6. Install wiring base replacement to UMB/mounting structure.
7. Re-connect all wiring to terminal blocks in replacement wiring base.
8. Check power polarity (LED in wiring base).
9. Optional, if used: Check photoeye operation (LED in wiring base).
10. Optional, if used: Check tachometer operation (LED in wiring base).
11. Install the scan head to wiring base.
12. Follow procedure in Chapter 5 to confirm operation.
13. Optional: Backup scan head parameters to wiring base. This assures the parameters are available if the scan head ever needs to be replaced.

Replacing an I/O Module

1. Remove power from Axiom.
2. Disconnect any other power sources connected to the I/O terminal blocks.
3. Remove the scan head from wiring base.
4. Remove I/O module from wiring base.
5. Install replacement I/O module to correct location on wiring base. (Reference the parts list in *Appendix A*.)
6. Secure I/O module to wiring base.
7. Install the scan head to wiring base.
8. Test operation of device connected to the I/O module.

Replacing a Power Supply

1. Remove power from Axiom.
2. Unplug power supply from source.
3. Remove the scan head from wiring base.
4. Disconnect power supply wiring from INPUT POWER terminal blocks.
5. Mount replacement power supply in same location as faulty unit.
6. Install replacement power supply wiring through correct conduit opening.
7. Connect wiring to INPUT POWER terminal blocks.
8. Confirm power polarity (LED in wiring base).
9. Install the scan head to wiring base.

Replacing a Trigger Photoeye

1. Remove power from Axiom.
2. Remove the scan head from wiring base.
3. Disconnect photoeye wiring from Trigger terminal blocks.
4. Mount replacement photoeye in same location as faulty photoeye.
5. Install replacement photoeye wiring through correct conduit opening.
6. Connect wiring to Trigger terminal blocks.
7. Confirm photoeye operation (LED in wiring base).
8. Install the scan head to wiring base.

Replacing A Tachometer

1. Remove power from Axiom.
2. Remove the scan head from wiring base.
3. Disconnect tachometer wiring from TACH terminal blocks.
4. Mount replacement tachometer in same location as faulty tachometer.
5. Install replacement tachometer wiring through correct conduit opening.
6. Connect wiring to TACH terminal blocks.
7. Confirm tachometer operation (LED in wiring base).
8. Install the scan head to wiring base.

Notes:

A Specifications

This appendix provides detailed specifications for the Axiom 400. It provides specific information on:

- Characteristics
- Options and Accessories
- Dimensions
- Certifications

Technical Specifications

Axiom 400

Characteristic	Description
Name/Part Number	Visible Laser Bar Code Reader, Axiom 400 Reference options/part numbers on *Options and Accessories table in this appendix.*
Dimensions	L 6.23" [158.14 mm] x W 10.87" [276.22 mm] x H 5.19" [131.83 mm]
Weight	10 lbs. [0.66 kg]
Temperature	Operating: 0° to +50° C (+32° F to +122° F) Storage: -20° to +70° C (-4° to +158° F)
Relative Humidity	10-90% non-condensing
Enclosure	Powdered-Coated Cast Aluminum, Rated for IP 65
Power Requirements	Input: 12-30 VDC, Typ. 1.0A@24VDC (Axiom only), Max. 5.0A@12VDC Output: Max. 2.5A Load
Power Consumption	< 40 W
Laser Type	Visible laser diode <5.0 mW peak at 630-700 nM (standard) Class 3R Laser Product (IEC-60825-1, 1993+A1: 1997+A2: 2001), Class II Laser Product (21CFR1040)
Depth of Field	15-72" max. *See read charts in Appendix B.*
Scan Rate	700 SPS (1 video channel, laser pairs alternate) 700 SPS (2 video channels, laser pairs alternate) 1400 SPS (2 video channels, lasers always on)
Bar Code Types	All standard 1D symbologies including: I 2 of 5, Code 128, Code 39, Code 93, Codabar, Codabar NSS, UPC/EAN
Visual Indicators	LEDs – Status, Trigger, Read, RX/TX, Network, Link, and Read Quality (LEDs 1-5)
Connections	Dedicated Setup Port: requires Axcess Setup Programming Cable Terminal Blocks for : Input Power, Output Power, Trigger Input, Tachometer Input, and Communications (Ethernet, Serial, 4 I/O relays)
Communications	Standard: On-board EtherNet/IP, Ethernet TCP/IP, Serial RS-232, RS-422, and 4 programmable I/O relays Optional: DeviceNet, ProfiBus
Software	Axiom Scanning and Decoding Software with DRX (Data Reconstruction) Axcess Setup Software for Axiom (Windows-compatible)
Options	6 Axiom Scan Head Versions – (3) Standard, (3) High-density X-scanning bracket (supports 2 Axiom and power supply) 120 VAC or 240 VAC Power Supply *See the Options and Accessories table in this appendix.*
Warranty	1-year limited, part and labor; available Blue Ribbon Extended Service Plan (BRES)
Service Options	Installation assistance and training available from Accu-Sort.
Compliance	UL, cUL, FCC (Class A), CE *(See Compliance table in this appendix.)*
Note: Accu-Sort reserves the right to change product specifications without notice.	

Power Supplies for Axiom

Characteristic	Description
Name/Part Number	Axiom Power Supply (24V versions)
Dimensions	L 6.73" [171 mm] x W 4.76" [121 mm] x H 2.16" [55 mm]
Weight	3.0 lbs. [1.4 kg]
Temperature	Operating: 0° to +50° C (+32° F to +122° F) Storage: -20° to +70° C (-4° to +158° F)
Relative Humidity	10-90% non-condensing
Enclosure	Powdered-Coated Cast Aluminum, Rated for IP65
Power Requirements	Input: 90-264 VAC / 0.2A typical, 1.0A max. @ 120 VAC Output: Max. 2.5A Load
Power Consumption	< 40 W
Connections	Male IEC
Compliance	*pending (See Compliance table in this appendix.)*
Note: Accu-Sort reserves the right to change product specifications without notice.	

Characteristic	Description
Name/Part Number	Dual Axiom Power Supply for use with XMB (X-Pattern Mounting Bracket)
Dimensions	L 8.76" [222 mm] x W 5.76" [146 mm] x H 2.18" [55 mm]
Weight	4.0 lbs. [1.8 kg]
Temperature	Operating: 0° to +50° C (+32° F to +122° F) Storage: -20° to +70° C (-4° to +158° F)
Relative Humidity	10-90% non-condensing
Enclosure	Powdered-Coated Cast Aluminum, Rated for IP65
Power Requirements	90-264 VAC / 0.5A typical, 2.5A max. @ 120 VAC
Power Consumption	< 110 W
Connections	Male IEC
Compliance	*pending (See Compliance table in this appendix.)*
Note: Accu-Sort reserves the right to change product specifications without notice.	

Output Modules

Part Number	1000056136	1000056137
Nominal Line Voltage	--	120 VAC
Maximum Line Voltage	60 VDC	140 VAC
Minimum Line Voltage	3.0 VDC	12 VAC
Maximum Peak Off State Voltage	60 VDC	400 V peak
Maximum Peak Off State Leakage	1.0 mA	2.5 mA RMS
Static off–state dv/dt	--	200 V/usec
Maximum On–State Current	0.5 A DC	0.5 A RMS
Minimum On–State Current	10 mA DC	50mA RMS
Maximum 1 Cycle Surge	--	4 A peak
Maximum 1 Second Surge	1.5 A DC	--
Peak On–State Voltage	1.5 V DC	1.6 V peak

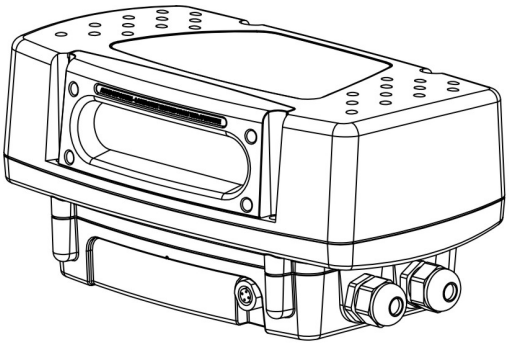
Input Modules

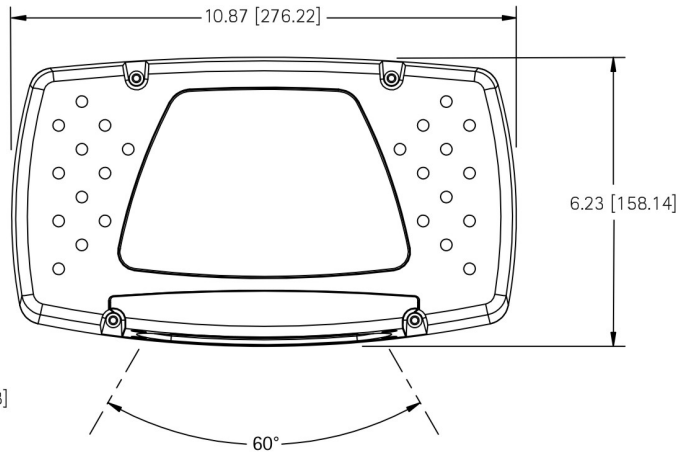
Part Number	1000056135 *
Maximum Input Voltage	32 VDC
Minimum Input Voltage	3.3 VDC
Input Resistance	1 k ohm
Maximum Input Current	32mA DC@ 32 VDC
Drop Out Current	1.0 mA DC
Allowable Off–State Input Current	1.0 mA DC
Allowable Off–State Input Voltage	2.0 VDC
* Note: Compatible with TTL level voltages.	

Options and Accessories

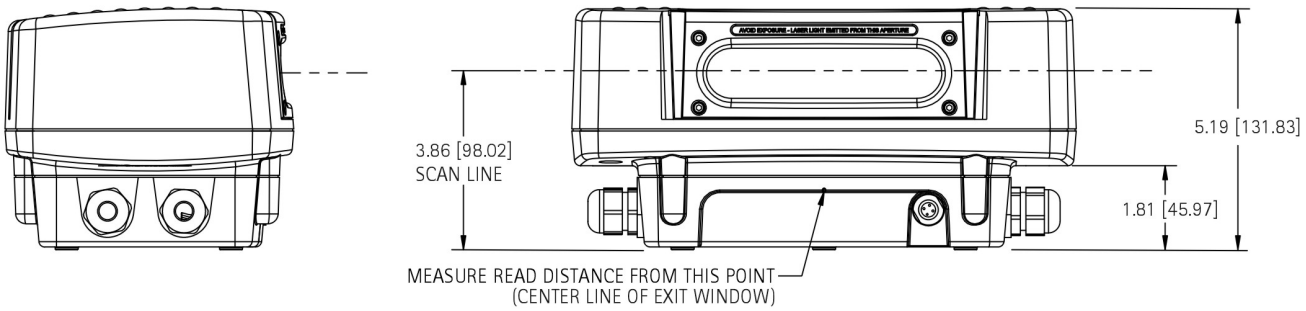
Part Number	Description		
Axiom Scan Head Options			
Scan Head PN	Minimum Bar	Depth of Field	Scans Per Second
1000052800	15 mil +	15-72" DOF	500-700 SPS
1000052801	10 mil +	16-42" DOF	500-700 SPS
1000052802	15 mil +	22-58" DOF	500-700 SPS
1000052803	10 mil +	22-35" DOF	500-700 SPS
1000052804	15 mil +	30-72" DOF	1100-1400 SPS
1000052805	10 mil +	26-42" DOF	1100-1400 SPS
Axiom Wiring Base Options			
0104636001	Axiom Wiring Base (U.S. Version)		
0104636002	Axiom Wiring Base (Metric Version)		
Axiom Accessories (PTO 1000052806)			
1000007308	Programming Cable, 8 ft., use for setup using Axcess software		
1000059304	Ethernet 5-Port Switch (Linksys)		
1000051873	Ethernet 8-Port Dual Speed Switch (10/100)		
1000051570	Ethernet Cable, 10 ft. CAT5-RJ45M to RJ-45M cross-over gray network		
1000051571	Ethernet Cable, 20 ft. CAT5-RJ45M to RJ-45M cross-over blue network		
0105307002	Axiom Universal Mounting Bracket Kit (UMB) with power supply mounting plate		
0106226002	Dual-Axiom X-Pattern Mounting Kit (XMB) with power supply mounting plate		
1000020569	Photoeye Kit (flying leads)		
1000019875	Tachometer (8-30 VDC) with 20' cable (flying leads)		
1000020567	Tachometer Mounting Kit (General Mounting)		
1000020568	Tachometer Mounting Kit (Extrusion Mounting)		
0105365001	120 VAC Power Supply 40W/24V (U.S. Version)		
0105365002	240 VAC Power Supply 40W/24V (Export Version)		
0105914001	Power Supply for Dual-Axiom used in X-Scanning 110W (NEMA 5-15P) (U.S. Version)		
0105914002	Power Supply for Dual-Axiom used in X-Scanning 110W (Male IEC) (Export Version)		
1000056135	DC Input Module (3.3 – 32 VDC, White)		
1000056136	DC Output Module (3 – 60 VDC, Red)		
1000056137	AC Output Module (12 – 42 VAC, Black)		
0106318001	Blower Assembly (120 V) – Use in bottom read application to keep scan window clean		
0106318002	Blower Assembly (230 V) – Use in bottom read application to keep scan window clean		
1000059400	AXIOM 400 Bar Code Reader Documentation CD		
1000055015	AXIOM 400 Bar Code Reader Manual (bound hardcopy)		
1000057488	Axcess Installation Software and Documentation CD		
1000057289	Axcess Software Manual (bound hardcopy)		

Dimensions





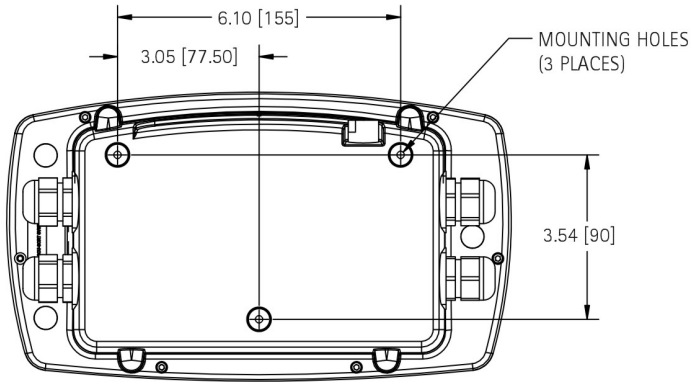
AXIOM WEIGHT: 10LBS [0.66KG]
DIMENSIONS: L 6.23 [158.14] x W 10.87 [276.22] x H 5.19 [131.83]
ALL DIMENSIONS SHOWN IN BRACKETS [ ] ARE IN MILLIMETERS



WIRING BASE MOUNTING HOLE THREAD SPECIFICATIONS:
U.S. VERSION PN 0104636001 #10-32 UNF-2B
METRIC VERSION PN 0104636002 M5 x .8-6H

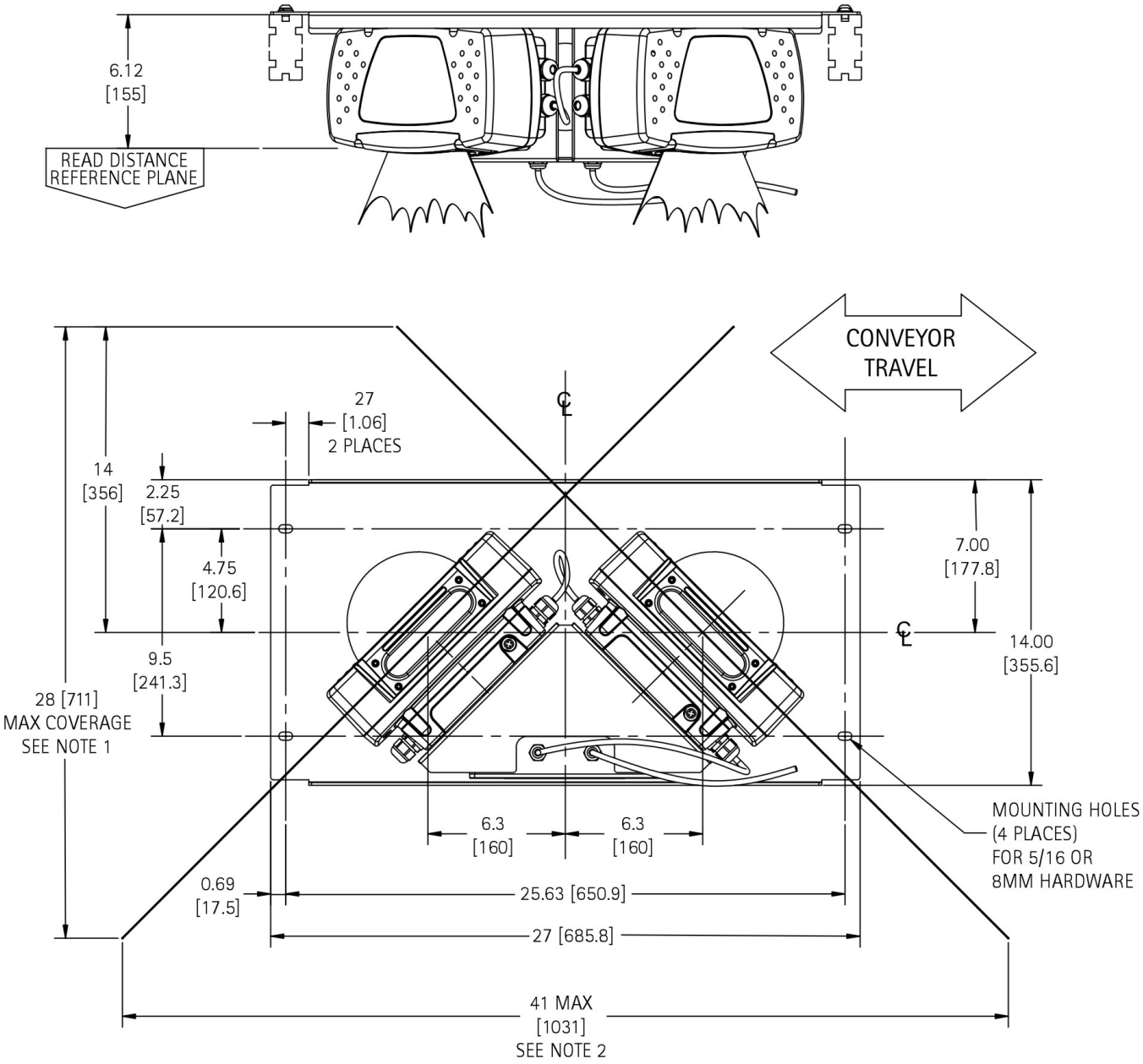
NOTE: SCREW LENGTH NO GREATER THAN 0.5 [12.5] PLUS THE THICKNESS OF THE MOUNTING SURFACE.

UNIVERSAL MOUNTING BRACKET (PN 0105307001) AVAILABLE.



XMB Dimensions

The following illustration provides additional dimensional references for applications that utilize the dual-Axiom X-Pattern Mounting Bracket (XMB, PN 0106226002) as part of the mounting structure.



NOTES:

1. "X" SCAN PATTERN WIDTH (ACROSS CONVEYOR) IS NOMINALLY 70% OF STANDARD AXIOM 400 COVERAGE. REFERENCE THE STANDARD AXIOM 400 READ CHARTS, APPENDIX A.
2. "X" SCAN PATTERN LENGTH (IN DIRECTION OF CONVEYOR TRAVEL) IS 146% OF PATTERN WIDTH. (SEE NOTE 1.)

Certifications

UL Listing 	UL Listed
c 	UL Listed to Canadian safety standards
FCC 47 CFR, Part 15, subpart B, "Unintentional Radiators"	CLASS A Radiated Emissions and CLASS B Conducted Emissions
CE	Standards to which conformity is declared: 1 EN60950: Test Spec: IEC 60950 3RD Edition / (2000) (Information Technology Equipment (I.T.E.), Including Electrical Business Equipment 2 EN 55022:1998 (CISPR 22:1997/A1:2000) Information Technology Equipment (I.T.E.) CLASS A Radiated Emissions and CLASS B Conducted Emissions FCC 47 CFR, Part 15, subpart B, "Unintentional Radiators": CLASS A Radiated Emissions and CLASS B Conducted Emissions 3 EN 61000-6-2: 1999, Electromagnetic Compatibility - Generic Standards - Immunity for industrial environments. (Test Spec EN 61000-4-2:1995, "Electromagnetic compatibility (EMC), Electrostatic discharge immunity test") EN 61000-4-3: 1995, "(EMC), Part 4 -Section 3: Radiated, radio-frequency electromagnetic field test" ENV 50204: 1995, "(EMC), Radiated, Electromagnetic Field From Digital Radio Telephones-Immunity Test" EN 61000-4-4:1995, "(EMC), Electrical fast transient/burst immunity test" EN 61000-4-5:1995, "(EMC), Part 4 -Section 5 Surge immunity test" EN 61000-4-6:1996, "(EMC), Part 4 -Section 6 Immunity to conducted disturbances, induced by radio-frequencies IEC 61000-4-11: 1994, "(EMC), Part 4 -Section 11 Voltage dips, short interruptions & variations immunity IEC 61000-3-2 A14, 3/2000 and 61000-3-3: Harmonic current emissions Fluctuating and Steady State Harmonics)

B Read Charts

AXIOM 400 Scan Rate Explained

The AXIOM 400 scan head can be configured with either one or two modules.

Each module has the option of having one or two lasers installed, but each module only ever has one mirror wheel and one receiving sensor.

When two lasers are installed in one module, they share the same mirror wheel and sensor. In order to do this, they alternate on and off, and each laser uses every other mirror facet. (Reference the read charts. This configuration refers to part numbers 1000052800, 1000052801, 1000052802, and 1000052803.)

The Axiom maximum scan rate when two lasers are installed in one module is 700 scans per second (SPS). The standard scan rate is 550 SPS. The read charts are applicable to the standard SPS only.

When one laser is installed in each module, that laser has exclusive use of the mirror wheel and receiving sensor. The one laser is on all the time and uses every facet of the mirror wheel. (Reference the read charts. This configuration refers to part numbers 1000052804 and 1000052805.)

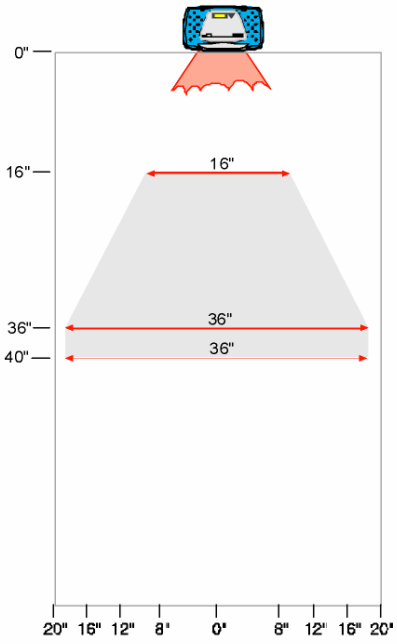
The Axiom maximum scan rate when one laser is installed per module is 1,400 SPS. The standard scan rate is 1,100 SPS. The read charts are applicable to standard SPS only.

The scan rate is not additive. When you have two modules in the Axiom each with one laser (as in the case of part number 1000052804 and 1000052805) each laser is reading over a different zone and the scan rate in that zone is still 1,400 SPS or 1,100 SPS.

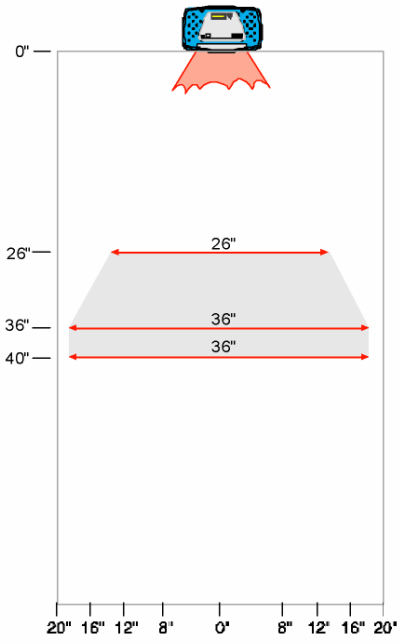
AXIOM™ 400 High-Density Configurations

(10 mil code size)

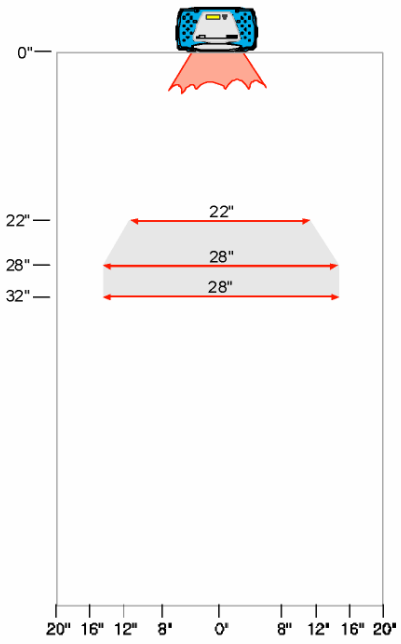
4-Laser 2-Module Version
Standard - PN 1000052801



2-Laser 2-Module Version
Standard - PN 1000052805



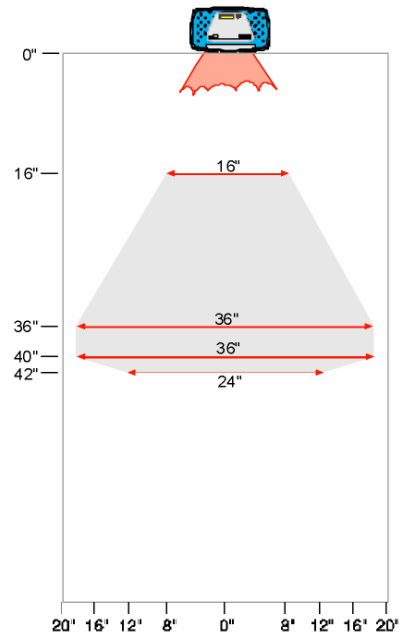
2-Laser 1-Module Version
Standard - PN1000052803



AXIOM™ 400 High-Density Configurations

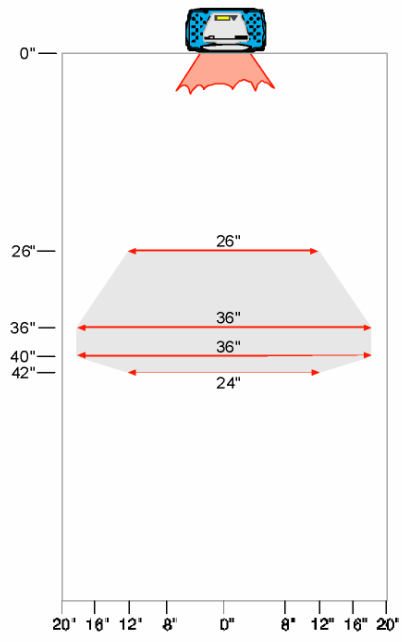
(12 mil code size)

4-Laser 2-Module Version
Standard - PN 1000052801



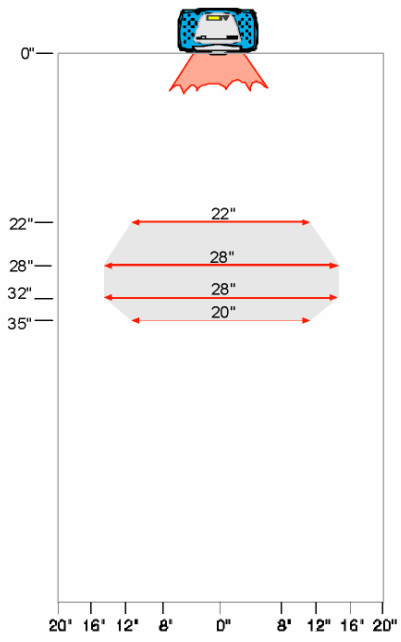
- 550 scans per second (standard) throughout DOF
- Using 2 receiving sensors, one per module
- Laser pairs alternate on/off every other scan
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- Tilt not greater than +/- 45 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

2-Laser 2-Module Version
Standard - PN 1000052805



- 1,100 scans per second (standard) throughout DOF
- Using 2 receiving sensors, one per module
- Each laser always on
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- Tilt not greater than +/- 45 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

2-Laser 1-Module Version
Standard - PN1000052803



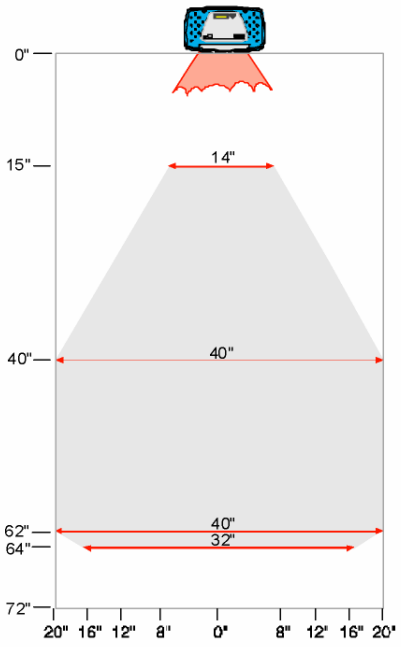
- 550 scans per second (standard) throughout DOF
- Using 1 receiving sensor
- Laser pairs alternate on/off every other scan
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- Tilt not greater than +/- 45 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

AXIOM™ 400 Standard Configurations

(15 mil code size)

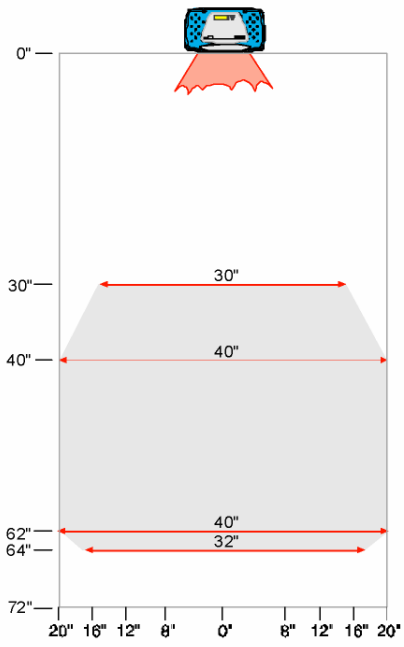
4-Laser 2-Module Version

Standard - PN 1000052800



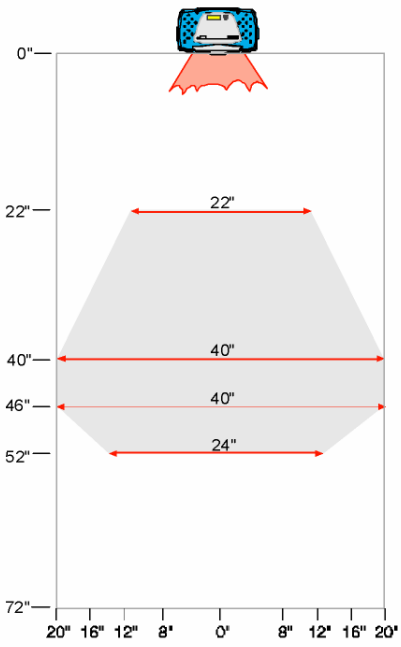
2-Laser 2-Module Version

Standard - PN 1000052804



2-Laser 1-Module Version

Standard - PN1000052802

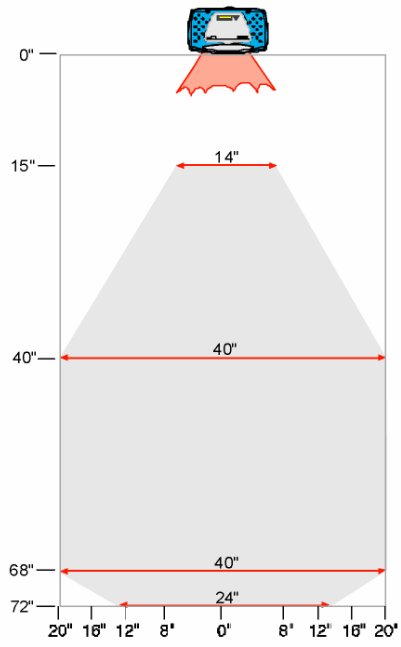


AXIOM™ 400 Standard Configurations

(20 mil code size)

4-Laser 2-Module Version

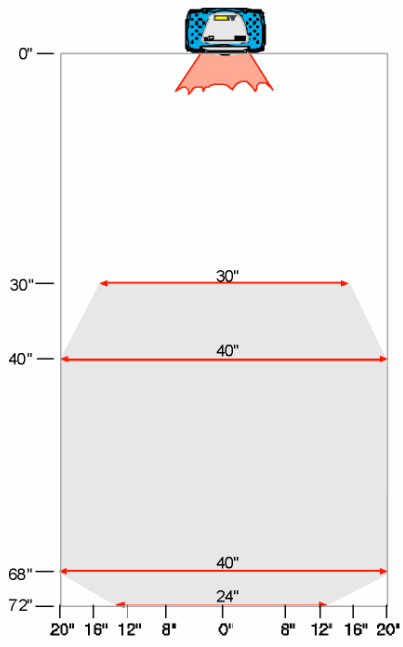
Standard - PN 1000052800



- 550 scans per second (standard) throughout DOF
- Using 2 receiving sensors, one per module
- Laser pairs alternate on/off every other scan
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- Tilt not greater than +/- 45 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

2-Laser 2-Module Version

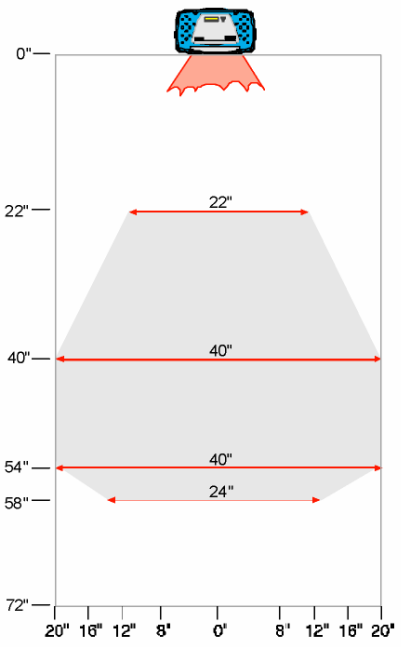
Standard - PN 1000052804



- 1,100 scans per second (standard) throughout DOF
- Using 2 receiving sensors, one per module
- Each laser always on
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- Tilt not greater than +/- 45 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

2-Laser 1-Module Version

Standard - PN1000052802



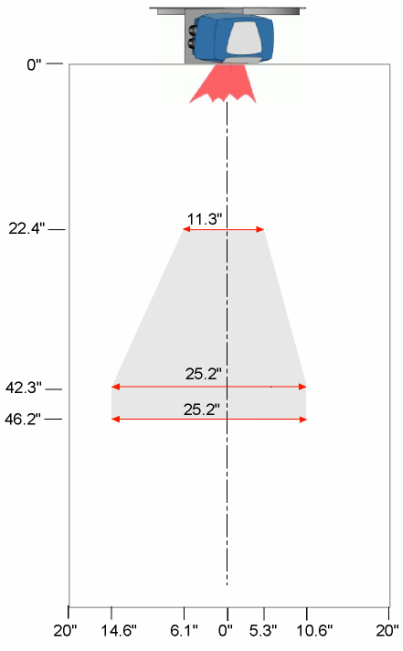
- 550 scans per second (standard) throughout DOF
- Using 1 receiving sensor
- Laser pairs alternate on/off every other scan
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- Tilt not greater than +/- 45 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

AXIOM™ 400 X-Scanning Application
High-Density Configurations

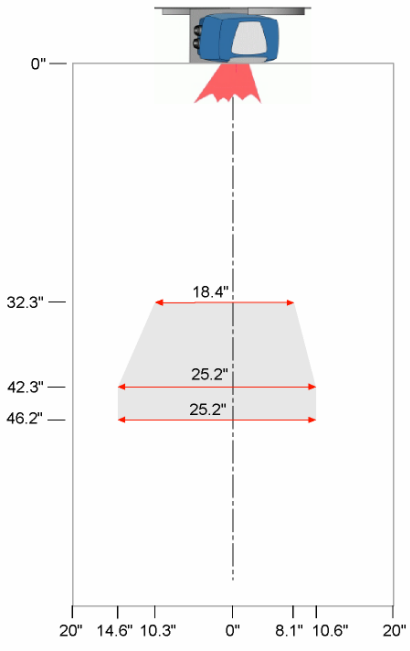
Omni-directional scanning using (2) AXIOM 400 and X-Pattern Mounting Bracket (XMB)

(10 mil code size)

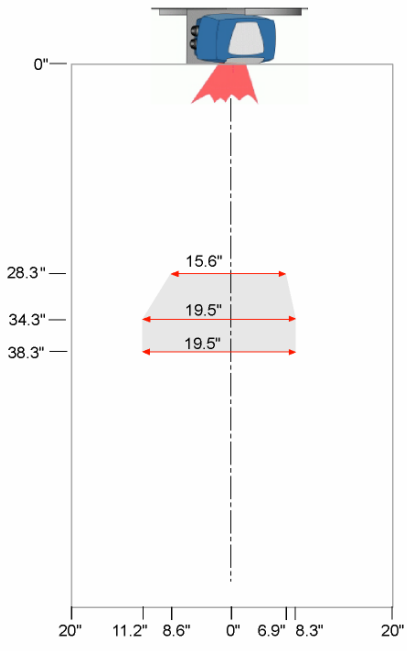
(2) 4-Laser 2-Module Version using XMB
Standard - PN 1000052801



(2) 2-Laser 2-Module Version using XMB
Standard - PN 1000052805



(2) 2-Laser 1-Module Version using XMB
Standard - PN 1000052803

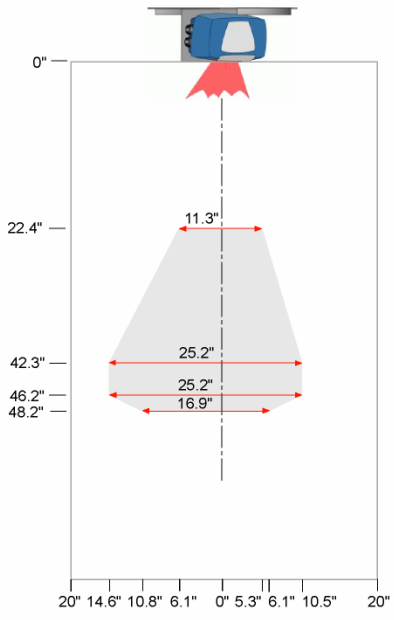


AXIOM™ 400 X-Scanning Application
High-Density Configurations

Omni-directional scanning using (2) AXIOM 400 and X-Pattern Mounting Bracket (XMB)

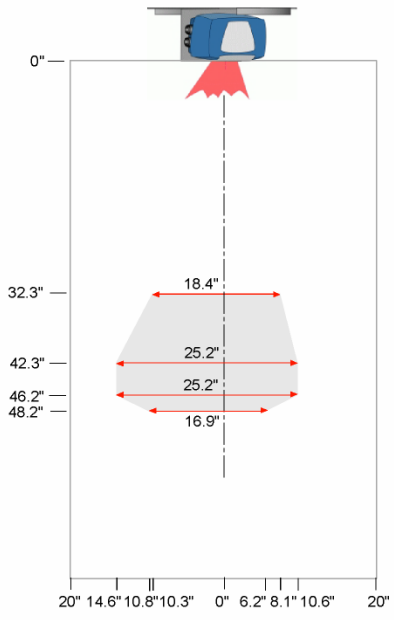
(12 mil code size)

(2) 4-Laser 2-Module Version using XMB
Standard - PN 1000052801



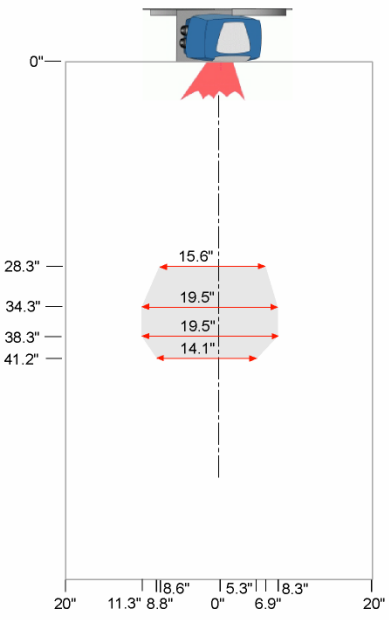
- 550 scans per second (standard) throughout DOF
- Using 2 receiving sensors, one per module
- Laser pairs alternate on/off every other scan
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

(2) 2-Laser 2-Module Version using XMB
Standard - PN 1000052805



- 1,100 scans per second (standard) throughout DOF
- Using 2 receiving sensors, one per module
- Each laser always on
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

(2) 2-Laser 1-Module Version using XMB
Standard - PN 1000052803



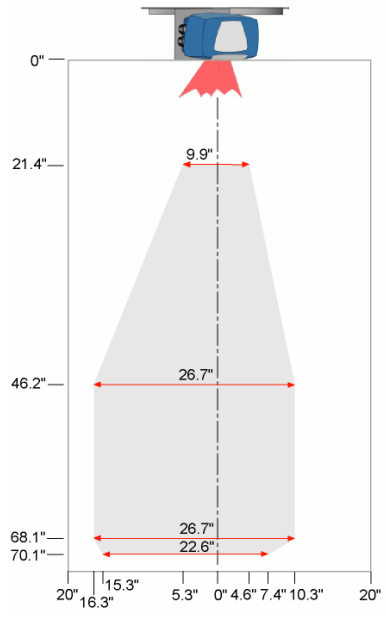
- 550 scans per second (standard) throughout DOF
- Using 1 receiving sensor
- Laser pairs alternate on/off every other scan
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

AXIOM™ 400 X-Scanning Application Standard Configurations

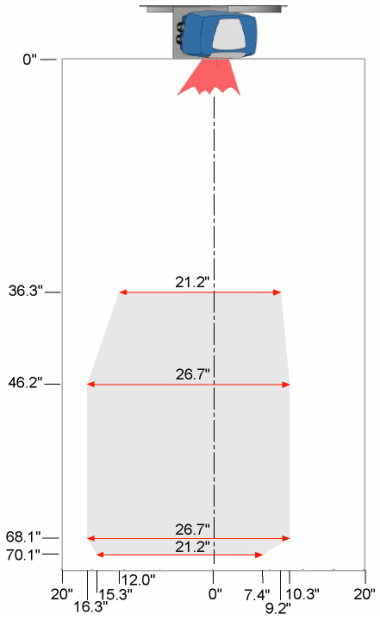
Omni-directional scanning using (2) AXIOM 400 and X-Pattern Mounting Bracket (XMB)

(15 mil code size)

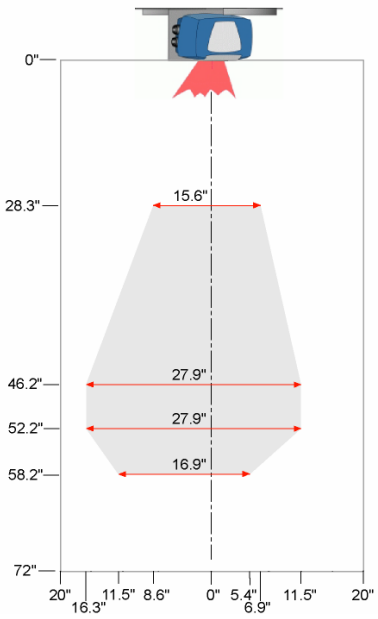
(2) 4-Laser 2-Module Version using XMB
Standard - PN 1000052800



(2) 2-Laser 2-Module Version using XMB
Standard - PN 1000052804



(2) 2-Laser 1-Module Version using XMB
Standard - PN 1000052802

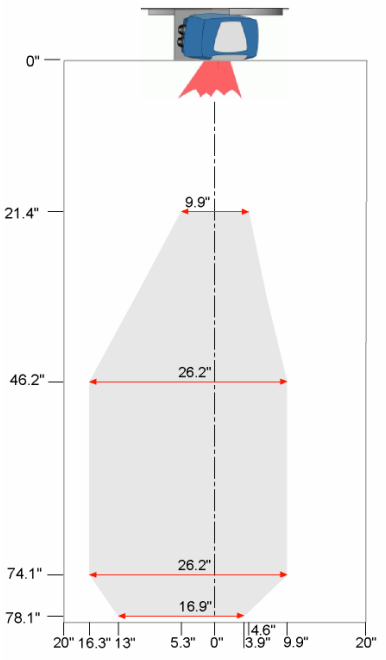


AXIOM™ 400 X-Scanning Application Standard Configurations

Omni-directional scanning using (2) AXIOM 400 and X-Pattern Mounting Bracket (XMB)

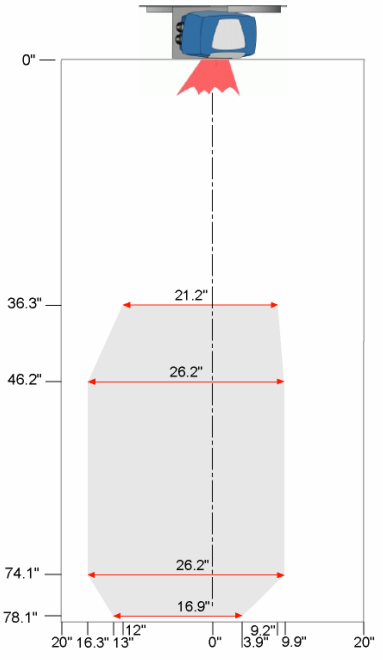
(20 mil code size)

(2) 4-Laser 2-Module Version using XMB
Standard - PN 1000052800



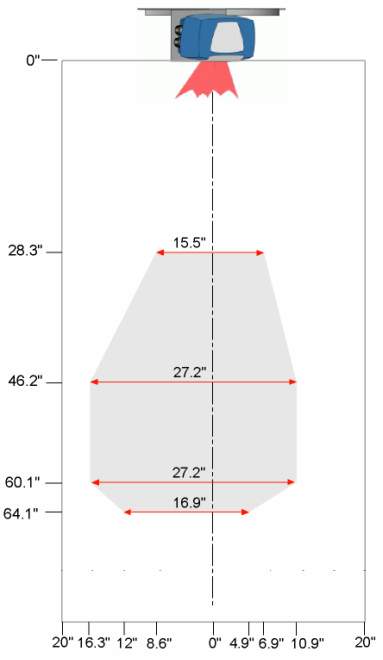
- 550 scans per second (standard) throughout DOF
- Using 2 receiving sensors, one per module
- Laser pairs alternate on/off every other scan
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

(2) 2-Laser 2-Module Version using XMB
Standard - PN 1000052804



- 1,100 scans per second (standard) throughout DOF
- Using 2 receiving sensors, one per module
- Each laser always on
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

(2) 2-Laser 1-Module Version using XMB
Standard - PN 1000052802



- 550 scans per second (standard) throughout DOF
- Using 1 receiving sensor
- Laser pairs alternate on/off every other scan
- Pitch not greater than +/- 15 degrees
- Skew not greater than +/- 15 degrees
- ANSI Contrast Grade 84% or greater
- ANSI Grade A Print Quality

Notes:

C Glossary

ACK
A control character sent to acknowledge that a transmission block has been received.

address
A unique designation for the location of data or the identity of a smart device; allows each device on a single communications line to respond to its own message.

AEL (Accessible Emission Limit)
The average power limitations of electronic radiation from a laser light source as defined by the CDRH.

AIM
Automatic Identification Manufacturers, Inc.

alignment
The position of a scanning or detection device in relation to the target scanning area or receiving element. Both the reader and photoeye require proper alignment to assure optimal performance.

alphanumeric
Consisting of letters, numbers, and symbols.

ambient light
The lighting conditions in the scanning area. Ambient light can interfere with successful scanning of bar codes.

ANSI (American National Standards Institute)
The principle standards development group in the U.S. A non-profit, non-governmental group supported by over 1000 trade organizations, professional societies, and companies. Member body to the ISO (International Standards Organization).

aperture
Term used on the required CDRH warning labels to describe the laser exit window.

application
A use to which something is put, or how it is used.

ASCII (American Standard Code for Information Interchange)
Pronounced *as-kee*. A standard seven bit plus parity code, representing 256 characters, established by ANSI to achieve compatibility between data services.

aspect ratio
The ratio of height to width of a bar code symbol. A code twice as high as wide would have an aspect ratio of 2; a code twice as wide as high would have an aspect ratio of ½ or 0.5.

asynchronous transmission
Transmission in which the time intervals between transmitted characters may be of unequal length. Transmission is controlled by start and stop bits at the beginning and end of each character.

autodiscrimination (autodistinguish)
The ability of bar code reading equipment to recognize and correctly decode more than one bar code symbology and process the data without operator intervention. This is a prerequisite feature of linear bar code scanners employed in open systems.

Axcess
The Windows®-based primary user interface that provides all the necessary functions to set up, monitor, and diagnose the operations of an Axiom.

bar
The dark elements of a printed bar code symbol. Referred to as elements in 2D symbologies.

bar code
An array of rectangular bars/elements and spaces arranged in a predefined pattern to represent elements of data referred to as characters.

bar code character
A single group of bars and spaces that represent an individual number, letter, or other symbol.

bar code density
The number of characters that can be represented in a linear unit of measure. Bar code density is often referred to in characters per inch (CPI).

bar code label
A label that carries a bar code and can be affixed to an article.

bar code reader, reader
A single device that performs two functions: 1. examines a printed spacial pattern (bar code) and then, 2. decodes the encoded data.

bar code symbol
A group of bars that represent a character or group of characters whose width and spacing is determined by a set of rules. In most cases, human readable characters are printed below the bars.

bar height
The height of the shortest bar in a bar code.

bar length
The bar dimension perpendicular to the bar width.

bar width
The thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.

baud rate
A unit used to measure communications speed or data transfer rate; represents the number of discrete conditions or events per second.

BCC (Block Check Character)
Used to check transmission accuracy, a character transmitted by the sender after each message block and compared with a block check character computed by the receiver.

bed width
The width of the conveyor bed measured in inches (centimeters).

belt width
The width of the conveyor belt measured in inches.

bidirectional
A bar code symbol capable of being read successfully independent of scanning direction.

bit (binary digit)
The contraction of binary digit, the smallest unit of information in the binary system; a one or zero condition.

bottom read
When the scanner is mounted under the conveyor to read codes on the bottom of the boxes or on the front or back of the boxes. If used there is not enough clearance for a standard front or back read.

BPS (Bits Per Second)
Unit of data transmission rate. *See baud rate.*

bridge
An interface between links in a communication network that routes messages from one link to another when a station on one link addresses a message to a station on another link.

buffer
A temporary storage device used to compensate for a difference in data rate and data flow between two devices (typically M).

bus
An internal pathway along which electronic signals travel between the components of an electronic device.

button
A graphic user interface that allows users to select a given software function. Instead of physically pressing a button, the user simply clicks on the desired button to access a menu, tab screen, or function.

button menu
A graphic user interface that offers several buttons. The Axcess Main Window Toolbar offers a menu of buttons that include Save, Retrieve, Backup, Restore, and Default functions. Instead of physically pressing a button, the user simply clicks on the desired button to access a menu, tab screen, or function.

byte
A binary element string functioning as a unit, usually shorter than a computer "word". Eight-bit bytes are most common. Also called a "character".

CART, See Trigger

CDRH (Center for Devices and Radiological Health)
This organization (a service of the Food and Drug Administration) is responsible for the safety regulations governing acceptable limitations on electronic radiation from laser devices. Accu-Sort is in compliance with the CDRH regulations.

character
A single group of bars and spaces in a code that represent an individual number, letter, punctuation mark or other graphic element. Used as part of the organization, control, or representation of data.

character self-checking
The feature that allows a bar code reader to determine if a scanned group of elements is a valid symbol character. If a symbology is described as character self-checking, a single printed defect (edge error) in any symbol character does not produce a valid character.

character set
Those characters available for encodation in a particular automatic identification technology.

check character
A character (usually at the end of the code) that is used to perform a mathematical check to ensure the accuracy of a scan of the bar code.

Codabar
For details, see Symbologies

Code 128
For details, see Symbologies

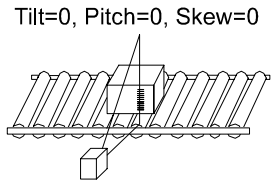
Code 39
For details, see Symbologies

Code 93
For details, see Symbologies

code length
The length of the bar code measured from the start of the first bar to the end of last bar.

code orientation
The relationship of the bar code with reference to the scan head's reading zone. Typical code orientations are Ladder and Picket Fence.

code placement
Variation in code placement affects the ability of a scanner to read a code. The terms Tilt, Pitch, and Skew deal with the angular variations of code placement in the X, Y and Z axes. Variations in code placement affect the pulse width and therefore the decoding of the code. Pulse width is defined as a change from the leading edge of a bar or space to the trailing edge of a bar or space over time. Pulse width is also referred to as a transition. Tilt, pitch, and skew impact the pulse width of the code.



Changes to this code presentation cause the bar codes to appear smaller to the scanner which results in a smaller pulse width. Each of these variation has a different effect on a scanner reading these codes and the combination of the variations leads to more complicated effects.

code quality
The number of scans successfully decoded during a read cycle.

code set
The specific assignment of data characters to symbol characters.

communications protocol
The rules governing exchange of information between devices connected together on the same communications line.

configuration
The arrangement and interconnection of hardware components within a system, and the hardware (switch and jumper) and software selections that determine the operating characteristics of the system.

configuration file
A set of attributes that belongs to and defines the operation of a single physical device.

constant tach
Use for belt speed timing instead of using a tachometer. Axiom systems can be setup to generate a belt speed automatically for applications where belt speed does not vary more than 5%. This is generated when the function is selected from the *Axcess Modify > Tracking window*.

continuous code
A bar code symbology where all spaces within the symbol are parts of the characters (Interleaved 2 of 5). There is no interactive gap in a continuous bar code symbology.

continuous trigger
This form of trigger requires no input signal. The reader is continuously attempting to decode bar codes. When a reader is in "continuous trigger", there is no way of determining if there is a package present or a NO-READ

conveyor speed
The speed that the conveyor is moving measured in feet per minute. Conveyor speed directly impacts the time that the code is in front of the reader; therefore, it affects the number of reads that are possible. Scanning systems require consistent conveyor speeds to assure accuracy.

CPI
Characters per inch. See density.

CR (Carriage Return)
An ASCII or EBCDIC control character that moves the cursor or print mechanism to the left margin.

CRC (Cyclic Redundancy Check)
A CRC is generated by treating a message as a single, large binary number and dividing it by a specific number and keeping the remainder, which becomes the CRC.

CTS (Clear to Send)
The Modem interface signal that indicates to the DTE device to begin transmission.

data verification
There are three data verification options available when defining the host message via Axcess: None, BCC, and CRC. (See *Modify/ Communications*.)

decode
The process of translating a bar code into data characters using a specific set of rules for each symbology.

decoder
As part of a bar code reading system, the electronic package that receives the signals from the reader, performs the algorithm to interpret the signals into meaningful data and provides the interface to other devices.

decoder logic
The electronic package that receives signals from the scan head, interprets the signals into useful data, and provides the interface to other devices.

default(s)
Original parameters as programmed by Accu-Sort at the factory. Axcess can be used to review the default settings and modify them, when necessary.

delimiter between codes
The separator used between multiple bar codes decoded and transmitted to the host in the same message. The delimiter is set in Axcess. (See *Modify / Communications*.)

depth of field (DOF)
The distance between the maximum and minimum plane in which a symbol can be read. This range is from the specified optical throw to the far reading distance.

density
The number of data characters that can be represented in a linear unit of measure. Bar code density is often expressed in characters per inch (CPI).

diagnostics
Refers to the various features of the Axcess software that enable a trained and qualified technician to monitor and troubleshoot the operation of an Axiom reader.

discrete code
A bar code or symbol where the space between characters, intercharacter gap, are not part of the code as with Code 39. See continuous code.

downloading
The process of sending configuration parameters, operating software or related data from a central source to remote stations.

drop-down menu
A graphical user interface that allows the user to select from a list of options that is displayed when a specific function has been selected. This options list "drops down" from the selected function. A list of drop-down menus can be found across the top of the Axcess Main Window.

DSR (Data Set Ready)
An RS232 modem interface control signal which indicates that the terminal is ready for transmission.

DSR (Data Terminal Ready)
Modem interface signal which alerts the modem that the DTE device is ready for transmission.

duplex transmission
See full duplex and half duplex.

EAN
European Article Number System. The international standard bar code for retail food packages.

EDI (Electronic Data Interchange)
A method by which data is electronically transmitted from one point to another.

EIA-232
Interface between data terminal equipment and data communication equipment employing serial binary data interchange.

EIA-422
Electrical characteristics of balanced-voltage digital interface circuits.

EIA-485
The recommended standard of the Electronic Industry Association that specifies the electrical characters of generators and receivers for use in balanced digital multipoint systems.

element
Dimensionally the narrowest width in a character – bar or space.

element width
The thickness of an element measured from the edge closest to the symbol start character to the trailing edge of the same element.

emitter/receiver pair
An emitter sends a light beam to a receiver that detects when the beam from the emitter is interrupted. Typically used in applications where tape or lamination on an object on the transport could mimic the reflector used in a retroreflective pair. Can be used as a TRIGGER.

encoded area
The total linear dimension consisting of all the characters of a code pattern, including start and stop characters and data.

ENQ (Enquiry)
A transmission control character used as a request for a response from a remote station. (^E)

ESC (Escape)
A control character which is used to provide additional control functions. It alters the meaning of a limited number of continuously following bit combinations. (^[)

error
A discrepancy between a computed, observed or measured value or condition and the true, specified or theoretically correct value or condition.

ETX (End of Text)
A transmission control character that terminates a text.

even parity
A data verification method in which each character must have an even number of on bits.

far distance
The distance (in inches) from the face of the scanner to the farthest point at which a code can be successfully scanned.

feet per minute (FPM)
Typically used to define the speed of a conveyor. Conveyor speed may also be defined in meters per second.

flying lead
A lead that exits the back of the connector hood on the outside of the cable jacket. It is normally attached to the drain wire or shield and connected to the chassis of the switch, modem, etc. It can also be a hardware control lead.

front read
The scanner is mounted to read bar codes on the leading edge of a box as it passes the scanner. In a front read application, the scanner can be mounted above or on the side of the conveyor.

front/top read
The camera is mounted to read the front and top of packages as they pass through the scanning area. In a front/top read application, the camera is usually mounted above the conveyor positioned at a 45 degree angle to enable it to scan both the front and top of packages

full duplex (FDX)
Simultaneous, two-way, independent transmission in both directions.

gateway
A device used to connect networks using different protocols so that information can be passed from one system or network to the other(s). (See s*ubnet mask*.)

gateway address
Like all other devices on a network, the device serving as the Gateway must also have an IP address so that devices wishing to communicate with devices outside its own network can fine the Gateway which will forward its data. Like all other addresses, it is displayed in the "dotted-decimal" format.

guard bars
1) The bars at the ends and center of a UPC and EAN symbol that ensure a complete scan of the bar code. 2) The optional bars outside the quiet zone of an I 2 of 5 symbol that ensure a complete scan of the bar code.

Half Duplex (HDX)
Transmission in either direction, but not simultaneous.

handshaking
Exchange of predetermined signals between two devices establishing a connection. Usually part of a communications protocol.

hardware trigger
This is an electrical signal from a relay, photoeye, or proximity switch indicating that an object is passing by the reader.

header
A means of identifying the beginning of a message to be sent to the host. One example is <STX> or Start of Text.

height of scan
The maximum vertical scanning dimension of a moving beam scanner at a specific distance from the face of the scanner.

hexadecimal
A base-16 numbering system that uses the symbols 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F.

host
1) A central controlling computer in a network system. 2) Any device on a network system that provides a controlling function to another device on the network. 3) Any intelligent device for which another device is providing a communication interface to a network.

hot-swappable
The ability to change or replace an Axiom scan head from a wiring base without the need to disconnect the unit from its power source.

induct photoeyes
The cart cycle begins when the start of cart photoeye is blocked and continues until the cart photoeye is unblocked. Blocking the INDUCT photoeye causes relay decisions and data communication. For this placement the distance between the CART and INDUCT photoeyes must be less than the minimum box size plus the minimum box spacing.

input/output modules, I/O modules
OPTICALLY ISOLATED INPUT/OUTPUT MODULES. Flexible modules that allow the reader to control high voltage outputs that are susceptible to noise. Since they are isolated from each other the noise is not picked up in the reader.

The modules come in both input and output versions. The output versions are controlled by a 5VDC input. The output of the modules can range from 24VAC - 140VAC or 3VDC - 200VDC. Foreign voltage ranges are available. The maximum current that the modules can supply is limited by the output voltage and the module type. The input versions are controlled by either a DC or AC input ranging from 3VDC - 32VDC or 90VAC - 140VAC. Foreign voltage ranges are available. The output of the modules is a 5VDC level. The maximum current is limited by the input modules. These output modules are commonly used to control diverters, alarms, external relays, etc. The input modules can be used for photoeye inputs.

intercharacter gap
The space between two adjacent bar code characters in a discrete code.

interface
A shared boundary defined by common physical interconnection characteristics, signal characteristics and meanings of interchanged signals.

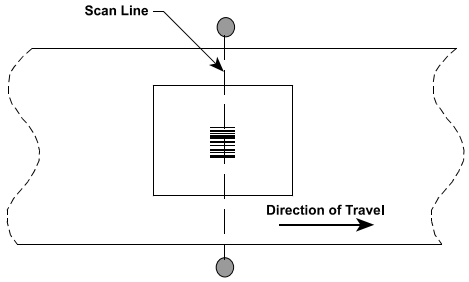
interleaved bar code
A bar code in which characters are paired together using bars to represent the first character and spaces to represent the second.

I/O
The abbreviation for input/output. The keyboard and a printer, are examples of I/O devices. I/O activity is different from computational activity. When a program sends a document to the printer, it is engaging in I/O activity; when the program sorts a list of terms, it is engaging in computational activity.

IP address (Internet Protocol Address)
IP Address is the numeric address given to a network card which enables other devices on a network to find it. For readability, this number is displayed in "dotted-decimal" format (e.g.: 127.0.0.1) as opposed to the binary equivalent (e.g.: 01111111000000000000000000000001).

jumper
A wire that connects a number of pins on one end of a cable only, such as looping back Request to Send from Clear to Send pins 4 and 5.

ladder orientation
When the bar code's bars are positioned horizontally on the product, causing them to appear as a ladder. The ends of all bars will enter the scan window first.



LAN
The acronym for local area network. A LAN system is usually confined to the same building or a few nearby buildings, with all equipment linked by wiring dedicated specifically to the LAN.

laser scanner
An optical bar code scanning device using a low energy laser light beam as its source of illumination. A laser scanner or scan head sends the information it collects to the decoder.

LED (Light Emitting Diode)
A semiconductor generally made from gallium arsenide, that can serve as a visible or near infrared light source when voltage is applied continuously or in pulses. LEDs have extremely long lifetimes when properly operated.

LF (Line Feed)
An ASCII control character that moves the cursor or print mechanism to the next line. (^J)

linear bar codes
Also referred to as 1D or 1-dimensional symbologies. Examples: Code 39, I2of5, UPC.

mA
The abbreviation for milliampere(s).

match
A condition in which decoded data matches data in the match entry.

match entry
An output condition in which decoded data matches and the data in a match entry configuration.

memory
A computer can contain several forms of memory, e.g., RAM, ROM, and video memory. The term *memory* is generally used to define RAM. When a computer has 8 MB of memory, it actually has 8 MB of RAM.

memory address
A specific location, usually expressed as a hexadecimal number, in the computer's RAM.

message
1) A meaningful combination of alphanumeric characters that establishes the content and format of a report. 2) In a communication network, the unit of exchange at the application layer.

message buffer
Storage register for the temporary storage of data that allows decoding to continue while the host is retrieving data from the serial port.

message buffer warning
An output condition that occurs when the message buffer has used a defined amount of the message buffer.

MHz
The abbreviation for megahertz.

microprocessor
The primary computational chip inside the computer, referred to as the "brain". The microprocessor contains an arithmetic processing unit and a control unit. Software written for one microprocessor must usually be revised to run on another microprocessor.

mil
One thousandth of an inch (0.001 inch). Bars and spaces of codes are commonly referred to as being a certain number of mils wide.

misread
The scanner incorrectly decodes a bar code as it passes through the scan zone.

Modulo check digit or character
A calculated character within a data field used for error detection. The calculated character is determined by a modulus calculation on the sum or the weighted sum of the data field contents.

mouse
A pointing device that controls the movement of the cursor on a screen. Mouse-aware software allows the user to activate commands by clicking a mouse button while pointing at objects displayed on the screen.

moving-beam
Rather than using a stationary laser beam and relying on product movement for a single scan, a multi-facet mirror wheel and motor is used to 'move' the beam across the code several times while in motion itself.

moving-beam bar code scanner
A device that dynamically searches for a bar code symbol by sweeping a moving optical beam through a field of view called the scanning zone. Automatic bar code reader that reads codes by sweeping a moving optical beam through a field of view. Moving-beam scanners are usually mounted in a fixed position and read codes as they pass by.

MTBF
The abbreviation for mean time between failures.

multidrop line
A single communications circuit that interconnects many stations, each of which contains terminal devices. *See EIA-485.*

NAK (Negative Acknowledgment)
A control character used to indicate that the previous transmission block was in error and the receiver is ready to accept retransmissions.

Narrow Bar (NB)/Narrow Space (NS)
Smallest code element, bar or space, in the bar code symbol. Also known as the X dimension.

NCDRH (National Center for Devices and Radiological Health)
This organization (a service of the Food and Drug Administration) is responsible for the safety regulations governing acceptable limitations on electronic radiation from laser devices. Accu-Sort is in compliance with the NCDRH regulations.

near distance
The distance (in inches) from the face of the scanner to the closest point at which a code can be successfully scanned.

NEMA
In order to rate the quality of an enclosure the National Electrical Manufacturers Association (NEMA) has developed a system for rating all enclosures. A partial list of the NEMA enclosures is shown below along with what particles it is designed to restrict.

Ratings

3 Enclosures are intended for indoor or outdoor use primarily to provide protection against windblown dust, rain, and sleet, and is undamaged by the formation of ice on the enclosure.

4 Enclosures are intended for indoor or outdoor use primarily to provide protection against windblown dust and rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure.

4X Enclosures are intended for indoor or outdoor use primarily to provide protection against corrosion windblown dust and rain, splashing water, and hose directed water; undamaged by the formation of ice on the enclosure.

6 Enclosures are intended for use indoors or outdoors where occasional submersion is encountered.

12 Enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping non-corrosive liquids.

13 Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, non-corrosive coolant.

net mask
A numeric value that is used by devices to determine whether the device it wishes to communicate with is on the same network. If not, the data must be forwarded via a Gateway. May also be referred to as Subnet Mask. (See *gateway, gateway address*.)

network
A series of stations (nodes) connected by some type of communication medium. A network may be made up of a single link or multiple links.

NVC
The acronym for non-valid code. Defines the condition that occurs when an object has been scanned and no bar code could be decoded. Usually, this indicates that either no code was on the object or the code was badly damaged and could not be decoded.

node
The connection point at which media access is provided.

no-match
An output condition in which decoded data does not match an entry in the match code table.

no-read
When the reader is unable to decode a bar code as it passes through the scan zone.

non-read
The absence of data at the reader output after an attempted scan due to no code, defective code, scanner failure or operator error.

odd-parity
A data verification method in which each character must have an odd number of on bits.

omni-directional
Orientation is unpredictable and can be ladder, picket fence, or any angle in between. A single scan line is not sufficient to scan bar codes oriented omnidirectionally.

one-dimensional symbologies
Also referred to as linear codes. Examples: Code 39, I2of5, and UPC are all 1D or linear bar codes.

operating range
The sum of the scanner's optical throw and depth-of-field. Also referred to as the read zone or read range.

optical throw
Measured distance from the scanner's window to the near reading distance of the depth of field. Typically, this is the closest a bar code can be to the scanner's window and still be properly decoded.

optimum reading distance
Typically, the center of the depth of field.

orientation
The alignment of the code's bars and spaces to the scan head. Often referred to as vertical (picket fence) and horizontal (ladder).

output counter
A counter that is associated with each output condition. The counter increments by 1 each time the condition occurs.

oversquare
Used to describe bar codes that are taller (from top to bottom of the bars) than they are wide (from first to last bar).

package spacing
This is the spacing between items on a conveyor. Package spacing is measured one of two ways: Leading edge of one box to leading edge of the next or trailing edge of one box to trailing edge of the next. Package spacing is critical to system operations.

parameter
A value or opinion that you specify to a program. A parameter is sometimes called a *switch* or an *argument*. All parameters for Axiom can be configured using the Axcess software.

parameter file, PAM file
File of Axiom parameters that can be modified via Axcess. Parameters that are changed using the series of *Modify* functions will only be saved when the save or backup functions are used. It is recommended that copies of these files be kept on the system PC or network.

parameter storage module
EEPROM (Electronically Erasable Programmable Read-Only Memory) chip where the parameter (PAM) file is stored in both the scan head and wiring base.

parity bit
A bit that is set at "0" or "1" in a character to ensure that the total number of 1 bits in the data field is even or odd.

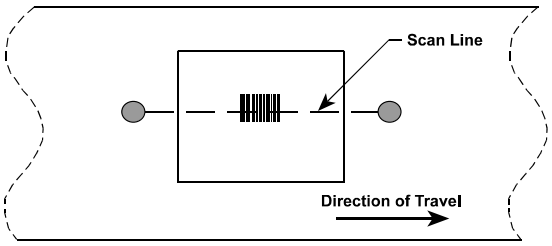
percent good reads
The number of successful reads per refresh period. This is valid only when the refresh period is set to 0.

performance indicator
A bar code decoder function that counts the number of decodes during a trigger period. When the period = 0, the performance indicator provides the number of decodes (up to 100 attempts). Use the performance indicator to provide a general indication of bar code symbol quality or verify proper setup of the scanner.

peripheral device
An internal or external device, such as a printer, a disk drive, or a keyboard, connected to a computer.

photoeye
Used as a presence detector (trigger) to identify objects in the bar code reading zone. The photoeye emits a beam and is used with a reflector to create a photoelectric circuit. When an object blocks the beam, breaking the circuit, a signal called TRIGGER is sent to the reader. *(See also: emitter/receiver pair.)*

picket fence orientation
When the bar code's bars are positioned vertically on the product, causing them to appear as a picket fence. The first bar will enter the scan window first.



pitch
Rotation of a code pattern about the X-axis. The normal distance between center line or adjacent characters.

polarized laser
A specialized laser source used in high glare environments.

polling
A means of controlling devices on a multipoint line.

port
Refers to the physical connections located on the Axiom and other devices. The Axiom ports include: INPUT and OUTPUT POWER, TRIGGER, TACH, COM (serial and Ethernet), I/O (1-4).

protocol
A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.

Pulses Per Inch (PPI)
Defines the number of pulses per inch of transport travel as provided by the tachometer.

pulse width
A change from the leading edge of a bar or space to the trailing edge of a bar or space over time. Pulse width is also referred to as a transition.

queue
A buffer used to hold data in order until it is used or transmitted.

quiet zone
Required distance before the first bar and after the last bar of the code that must be free of marks or printing.

Radio Frequency Identification Device, RFID
Non-optical automatic identification devices that use radio waves to transmit data.

read-only
A read-only file is one that you are prohibited from editing or deleting. A file can have read-only status if:
- Its read-only attribute is enabled.
- It resides on a physically write-protected diskette.
- It is located on a network in a directory to which the system administrator has assigned read-only rights to you.

read range, read zone
Anywhere the reader can "see" and decode bar codes. The usable length of the scan line throughout the depth of field (DOF) perpendicular to the DOF. Any codes that appear too close or too far away from the reader are considered outside the read zone. Also referred to as *scan window*.

reflectance
The amount of light returned from an illuminated surface.

relative reader angle
The mounting angle of the reader as it relates to the conveyor surface and direction of travel.

relay
Relays are simply electrical switches that are typically used to control external diverts, alarms, etc. Relay types available are FORM A and FORM C. FORM C type relays have both normally open and normally closed contacts available while FORM A type relays have only normally open contacts available.

relay output duration
This is the time (in seconds) after the relay is energized that it should be turned off.

relay output delay
The time lapse between an event and the energizing of the relay.

Request To Send (RTS)
An RS232 modem interface signal which indicates that the DTE has data to transmit.

resolution
The narrowest element dimension which can be distinguished by a particular reading device or printed with a particular device or method.

response time
The elapsed time between the generation of the last character of a message at a terminal and the receipt of the first character of the reply. It includes terminal delay and network delay.

retroreflective pair
An emitter bounces a light beam off the reflector and detects when the beam is broken. Often referred to as a photoeye or PE. Typically used as a TRIGGER.

ROM
The acronym for read-only memory. The computer contains programs essential to its operation in ROM. A ROM chip retains its contents even after you turn off your computer.

RPM
The abbreviation for revolutions per minute.

RS-232
Interface between data terminal equipment and data communication equipment employing serial binary data interchange.

RS-422
The Electronic Industries Association standard that specifies the electrical characteristics of balanced voltage digital interface circuits.

RS-485
The Electronic Industries Association standard that specifies the electrical characters of generators and receivers for use in balanced digital multipoint systems.

scan
A single pass of the laser beam over the code or a portion of the code. The search for a bar code symbol that is to be optically recognized.

scan area
The area intended to contain a symbol, or the location of the conveyor that is being scanned by the reader for bar codes.

scan window
The usable length of the scanning beam that may detect the bar codes. The scan window is perpendicular to the depth of field (DOF).

scanner
An electronic device that optically converts printed information into electrical signals. These signals are sent to the decoder logic.

scanner orientation (reader orientation)
Relationship of the scan head with reference to the bar code's location on products. The scan head must be set up to insure that all code bars and spaces are bisected at the same time. Typically, either side read or top read is used for picket fence or ladder code orientations.

self-checking
A bar code or symbol using a checking algorithm that can be independently applied to each character to guard against undetected errors.

sensor
A device that detects or measures something and generates a corresponding electrical signal to an input circuit of a controller.

serial transmission
The most common transmission mode; serial, information bits are sent sequentially on a single data channel.

serial asynchronous transmission of data
The following are common communications interfaces: RS232, RS422, RS485, and 20mA current loop.

When data is transmitted serially from a communications port, the information is transferred between the two devices one data bit at a time. The data flow can follow one of three different communications modes: simplex, half duplex, or full duplex. Each character of data within the data flow is transported in a binary bit frame called the asynchronous data frame.

The start bit begins each frame. A low voltage signal on the data communications line marks the beginning of the start bit, at which point the receiving device begins looking for binary zeros and ones (0's and 1's).The following five to eight data bits (the number depends on the format used) comprise the binary character. For error detection, an optional parity bit can define whether the total number of zeros or ones was even or odd. There are five different parity selections as shown below:

ODD
last data bit is a logical 0 if the total number of logical 1's in the first seven data bits is odd.

EVEN
last data bit is a logical 0 if the total number of logical 1's in the first seven data bits is even.

MARK
last data bit is always a logical 1 (i.e.: high/mark).

SPACE
last data bit is always a logical 0 (i.e.: low/space).

OFF (NONE)
last data bit is not present.

The method used to catch errors by using parity bits is as follows: When the transmitter frames a character, it tallies the number of 0's and 1's within the frame and attaches a parity bit. (The parity bit varies according to whether the total is even or odd.) The receiving end then counts the 0's and 1's and compares the total to the odd or even recorded by the parity bit. If a discrepancy is noticed by the receiving end, it can flag the error and request a retransmission of the data.

A stop bit is used to signal the end of the character. (Stop bits are typically one or two bits in length. The slower the transmission speed, the more stop bits required for recognition of the end of the data frame.)

In addition to the direction of data flow and the data framing, there are other considerations to insure uniform transmissions. Certain operating parameters must be followed to prevent the loss of valuable data.

The first consideration is the speed of transmission, known as baud rate. Serial data transmission is measured in bits per second (BPS). The baud rate selections typically available are: 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200. To enable two devices to interact, they must both be transmitting/receiving data at the same baud rate. If it is not possible to do this, there must be a buffer (typically additional storage memory) that accommodates the differences in communications speed.

Many serial communications links also use a flow control system to handle data transmission in addition to memory buffers.

X-ON/X-OFF protocol
A common type of flow control is the X-ON/X-OFF protocol. When a receive buffer nears its memory capacity, the receiving device sends an ASCII X-OFF signal to the transmitting device, telling it to stop sending data. When the memory buffer has enough space to handle more data, the X-ON signal is sent to the transmitting device, telling it to start sending data again.

ACK/NAK protocol
Another common protocol is ACK/NAK protocol. When the device transmits a message to the host, the host responds with either an ACK (06H) or a NAK (15H). If the host transmits an ACK to the device, the device deletes its transmit message and the communication sequence is complete. If the host transmits a NAK, the device will retransmit. The device resends data a maximum of three times. Optionally this may be changed to 1, 2, 3, or infinite retransmits by the user. If the device receives a fourth NAK, it will delete the data in its transmit buffer and display "MAX REXMITS".

A transmitting device ignores ACK and NAK characters received during data transmission. If, for example, a device receives a NAK during a data transmission, it will not resend the data at the completion of the transmission.

The device also has a retransmit timer. This timer is activated each time the device transmits data to the host. If the timer runs for two seconds (this is also changeable) and the device does not receive an ACK or NAK from the host, a timeout occurs and the device retransmits its data. Each time the device retransmits because of a timeout, it treats the timeout the same as receiving a NAK from the host computer. If the device does not receive an ACK before the end of the fourth timeout, it will delete the data in its transmit buffer and display "MAX REXMITS". The device deletes data in its transmit buffer and displays the error message when any combination of four timeouts and NAKs from the host occurs.

When the device receives a message from the host, it calculates the BCC for the message and compares the calculated BCC to the received BCC. If the two values match, the device transmits an ACK, ending the communication. If the values do not match, the device transmits a NAK to the host and waits for the host to retransmit the message. The host, like the device, should retransmit a maximum of three times.

The sequence number starts at zero (30H) and is incremented each time a device transmits a new message. When the sequence number reaches nine (39H), it wraps around to one (31H). If the sequence number skips a number, the receiving device knows that a message was lost. If the same sequence number is received on two sequential messages, the second message is responded to with an ACK or NAK (as appropriate) and ignored.

shielding
Protective covering that eliminates electromagnetic and radio frequency interference.

side read
The scanner is mounted to read the side of a box as it passes by the head.

signal
An impulse or fluctuating electrical quantity (i.e.: a voltage or current) the variations of which represent changes in information.

skew
Rotation about the Y-axis. Rotational deviation from correct horizontal and vertical orientation; may apply to single character, line or entire encoded item.

slider bar
A graphical user interface that enables the user to select an ascending/descending value for a definable parameter by clicking on the slider bar and then sliding (via the mouse) until the desired value is shown.

software trigger
A serial message from an external device that controls the trigger cycle.

space
The lighter elements of a bar code symbol formed by the background between bars.

specular reflections
A condition when the laser light is reflected back from the code's surface at an angle equal, or nearly equal, to the angle of incidence of the laser light. This condition makes it difficult for the scan head to detect the differences in light variation caused by the code's bars and spaces.

spot
The undesirable presence of an area of low reflectance in a space. start and stop characters

start bit
In asynchronous transmission, the first bit or element in each character, normally a space, that prepares the receiving equipment for the reception and registration of the character.

start and end of trigger photoeyes
The trigger cycle begins when the start of trigger photoeye is blocked and continues until the end of trigger photoeye is unblocked. Relay decisions and data communication take place after the end of triggeer photoeye is unbroken.

stop bit
The last bit in an asynchronous transmission, used to indicate the end of a character, normally a mark condition, which serves to return the line to its idle or rest state.

STX (Start of Text)
A transmission control character that precedes a text and is used to terminate a heading. (^B)

symbol
A combination of characters including start/stop and checksum characters, as required, that form a complete scannable bar code.

symbologies
Codabar
Self-checking, numeric bar code encoding numbers and several characters (e.g.: $, -, +, ?) with a slightly higher density than Code 39. Includes two bar/space sizes.

Code 39
A bar code with a full alphanumeric character set, a unique start and stop character, and three other characters. The name is derived from its code structure, which is three wide elements out of a total of nine elements. The nine elements consist of five bars and four spaces.

Code 93
Similar to Code 39 but requires two check characters. Code 93 was designed to provide a higher density symbology with higher security than Code 39. Although code 93 is a higher density, it is not self-checking and therefore requires two checksums.

Code 128
A bar code symbology capable of encoding the full ASCII 128 character set. It encodes these characters using fewer code elements per character resulting in a more compact code. It features a unique start and stop character for bidirectional and variable length decoding, both bar and space character parity for character integrity, a check character for symbol integrity, a function character for symbol linking, and spare function characters for unique application definition and/or future expansion.

EAN
European Article Numbering System used in retail industry (a superset of UPC) used on product packaging to uniquely identify a product and manufacturer.

Interleaved 2 of 5 (I 2of5)
A bar code with a numeric character set with different start and stop characters. The name is derived from the method used to encode two characters. In the symbol, two characters are paired together using bars to represent the first character and the spaces to represent the second. This interleaved structure allows information to be encoded in both the bars and the spaces. A start character, bar and space arrangement, at one end, and a different stop character bar and space arrangement at the other end, provide for bidirectional decoding of this symbol.

UPC
Acronym for Universal Product Code. The standard bar code type for retail packaging in the United States and Canada.

syntax
The rules dictating how you must type a command or instruction so the computer will understand it.

tach (tachometer)
Hardware device used to provide conveyor speed information to the scanner or camera in x pulses per inch.

tag
A collection of information associated with a single variable or I/O point.

TCP/IP
An industry standard suite of protocols providing communications in a heterogeneous network environment. TCP/IP stands for Transport Control Protocol/Internet Protocol.

two-width symbology
A bar code symbology whose bar and spaces are characterized simply as wide or narrow. Codabar, Code 39, and Interleaved 2 of 5 are examples of two-width symbologies.

terminal program
Computer software that sends, receives, and displays serial data.

tilt
Rotation around the Z axis. Used to describe the position of the bar code with respect to the laser scan line.

tracking
Process of keeping track of packages as they travel through the scanning area. Tracking can be done based on the leading edge or trailing edge of packages. Belt speed (as monitored via the TACH signal) and reader mounting also figure into the tracking process. Several methods of tracking are available. (*See Axcess Modify > Tracking screen.*)

trailer
A means of identifying the end of a message sent to the host. One example is <ETX> or End of Text.

transmit point
The time it takes to transmit the decoded results from the time the object is first sensed (by PE or light curtain) until the completion of transmission to the host. Transmit point is shorter (faster) for cameras because it is not required to accommodate a scanning pattern length.

trigger
A signal, typically provided by a photoeye or proximity switch, that informs the scan head of the presence of an object within its reading zone. Sometimes referred to as CART signal.

trigger cycle
The time during which the reader is attempting to read the bar code.

two-dimensional symbologies
More complex bar code capable of containing much larger amounts of data in a smaller image size because of using either a stacked or matrixed construction when compared to the 1D codes. Example 2D codes: DataMatrix, MaxiCode, and PDF417. Axiom does not read 2D codes.

UCC (Uniform Code Council)
The organization which administers the UPC and other retail standards.

undersquare
Used to describe bar codes that are longer (from the first to last bar) than they are high (from the top to bottom of the bars).

Uniloader
Diagnostic feature of Axcess that is used to reload reader firmware.

UPC
Acronym for Universal Product Code. The standard bar code type for retail food packaging in the United States.

UPS
The abbreviation for uninterruptible power supply. A battery-powered unit that automatically supplies power to your computer in the event of an electrical failure.

utility
A program used to manage system resources including memory, disk drives, and printers.

verifier
A device that makes measurements of the bars, spaces, quiet zones and optical characteristics of a symbol to determine if the symbol meets the requirements of a specification or standard.

visible laser diode
A light source used in scanners to illuminate the bar code symbol. Generates visible red light at wavelengths between 660 and 700 nM. Replaced Helium-Neon tubes in most scanners because diodes are small and consume less power.

void
The undesirable presence of an area of high reflectance in a bar.

Wide Bar (WB)/Wide Space (WS)
Widest code element, bar or space, in the bar code symbol.

wide to narrow ratio
Dividing the size of the wide elements by the size of the narrow elements of a bar code yields the bar and space ratios. Bar and space ratios can differ. NOTE: If the narrow bar and narrow spaces are equal and the wide bar and wide spaces are equal then you calculate only one ratio.

window (scan head, reader, or graphical user interface)
1) The physical location on the scan head where the sensor receives reflected laser light from the surface of products. 2) The physical location on a scan head from which the laser light exits the device. Often referred to as the exit window. 3) A software graphical user interface that appears on a monitor with which the users interacts (via keyboard and/or mouse) to operate various user-definable functions. In Axcess, there are several buttons and drop-down menus available from the *Main Window*.

word
A unit of data which contains two bytes (16 bits).

write-protected
Read-only files are said to be *write-protected*. You can write-protect a 3.5-inch diskette by sliding its write-protect tab to the open position.

"X" dimension
The dimension of the narrowest bar and narrowest space in a bar code.

XON
A control character sent by the receiving device to signal the transmitting device to begin sending data.

XOFF
A control character sent by the receiving device to signal the transmitting device to stop sending data.

D Interconnect Drawings

AXIOM 400 Interconnect Drawings

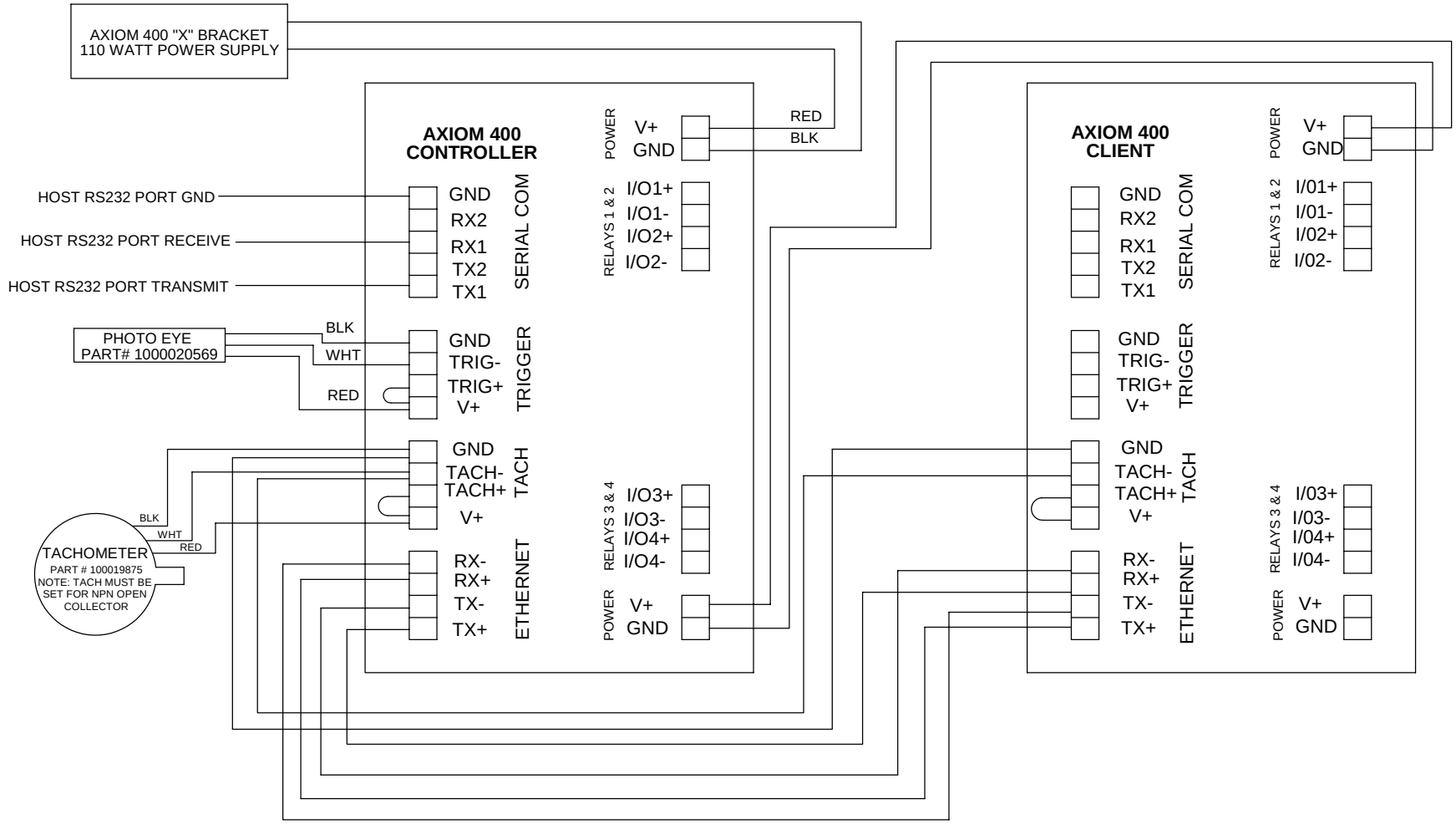
The interconnect drawings provided in this appendix are useful when wiring your AXIOM 400 for the following applications:

- Controller/Client with Tachometer (107480)
- Controller/Client/Client with Tachometer (107481)
- Start/End Trigger Photoeyes (107482)
- Stack Light with Internal Relays (107483)

Notes:

NOTES:
1. TACHOMETER MUST BE CONFIGURED FOR NPN OPEN COLLECTOR OUTPUT.
2. TO KEEP DRAWING SIMPLER, CABLE SHIELDS ARE NOT SHOWN.

REVISION			
REV	ECO	BY	DATE
1	INITIAL DESIGN	RAD/TCS	11.7.04



APPLICATION EXAMPLE:

TWO UNIT CONTROLLER / CLIENT TRACKING CONFIGURATION.
THIS CONFIGURATION IS TYPICAL OF A X PATTERN READ STATION.
SERIAL PORT FROM CONTROLLER AXIOM WILL TRANSMIT DATA FROM READ STATION TO A SORTATION CONTROLLER.
AXIOM SCANNERS ARE CONFIGURED BY ATTACHING SERIALLY TO THE SETUP ON THE WIRING BASE.

PART NO. 0107480000

THIS IS NOT A CONTROLLED COPY UNLESS STAMPED "CONTROLLED COPY" IN RED

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES [MILLIMETERS]
ALL ANGLES ARE 90°
ALL C-CINKS ARE 82° INCLUDED ANGLE
ALL BEND RELIEFS TO SUIT
TOLERANCES:

INCH	[METRIC]	ANGULAR
.X±.1000	[X±2.500]	X±1.00°
.XX±.0200	[.X±0.500]	.X±0.10°
.XXX±.0050	[.XX±0.130]	.XX±0.01°
.XXXX±.0005	[.XXX±0.013]	

FRACTIONS ±1/4
FT.,IN ±1"
REMOVE SHARP EDGES AND BURRS

DRAWN	TCS	DATE	11.7.04
CHKD	RAD	DATE	11.7.04
ENGR	RAD	DATE	11.7.04
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

ACCU-SORT® SYSTEMS, inc.
TELFORD, PA 18969 USA

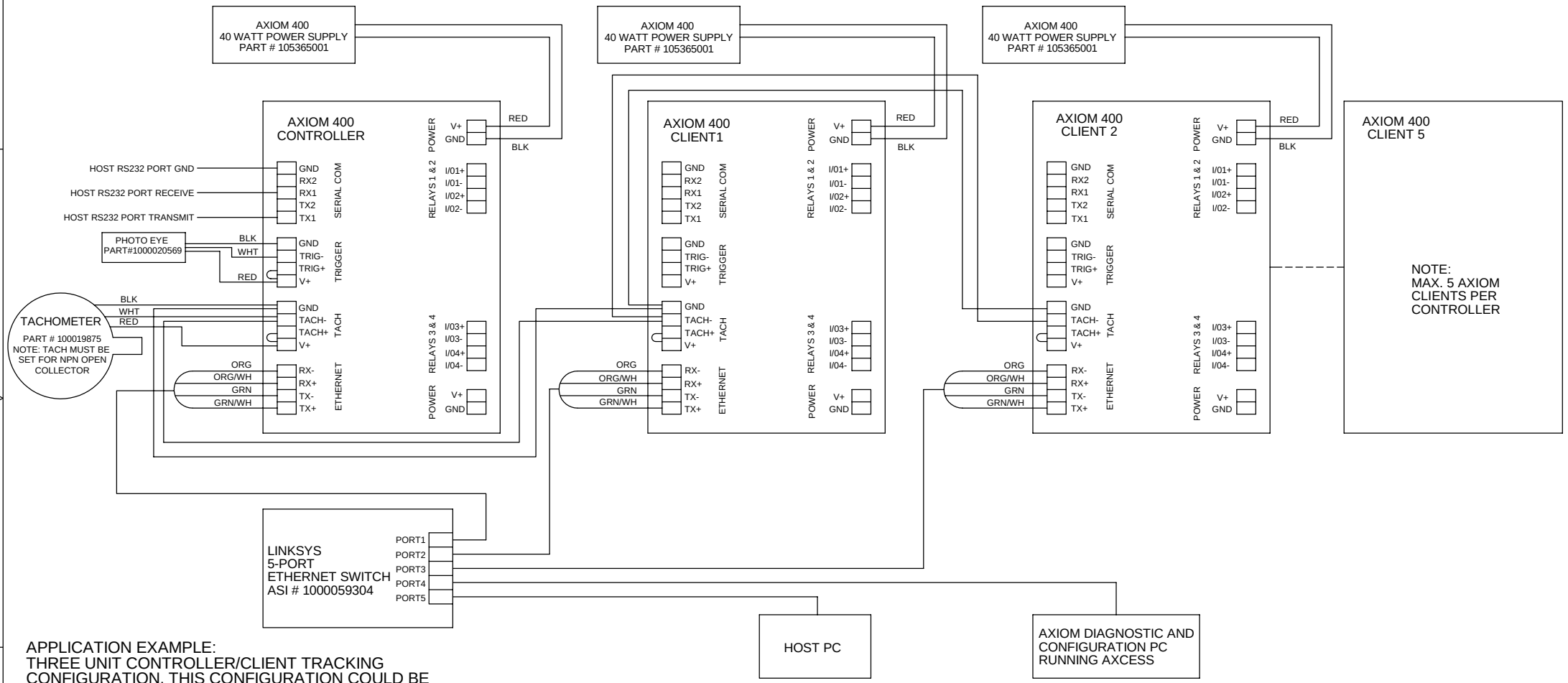
INTERCONNECT DRAWING,
CONTROLLER/CLIENT W/TACH,AXIOM 400

SIZE	CAGE CODE	DWG. NO.	
B	53830	107480	
SCALE	NONE	CAD SYS. SOLIDWORKS	SHEET 1 OF 1

Notes:

NOTES:
1. TACHOMETER MUST BE CONFIGURED FOR NPN OPEN COLLECTOR OUTPUT.
2. TO KEEP DRAWING SIMPLER, CABLE SHIELDS ARE NOT SHOWN.

REVISION			
REV	ECO	BY	DATE
2	UPDATED	RAD/TCS	02.02.05



APPLICATION EXAMPLE:
THREE UNIT CONTROLLER/CLIENT TRACKING CONFIGURATION. THIS CONFIGURATION COULD BE A X PATTERN TOP READ WITH A SINGLE FRONT READ AXIOM. SERIAL PORT FROM CONTROLLER AXIOM WILL TRANSMIT DATA FROM READ STATION TO A SORTATION CONTROLLER. HOST PC ATTACHED TO ETHERNET SWITCH COULD BE USED FOR DATA COLLECTION. AXIOM DIAGNOSTIC AND CONFIGURATION PC CAN BE USED TO MONITOR PERFORMANCE OF INDIVIDUAL AXIOM SCANNERS IN READ STATION. ALL 3 SCANNERS COULD BE MONITORED BY OPENING 3 INSTANCES OF ACCESS AND ATTACHING TO THE IP ADDRESSES OF THE INDIVIDUAL SCANNERS IN THE READ STATION.

PART NO. 0107481000

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES [MILLIMETERS]
ALL ANGLES ARE 90°
ALL C-CINKS ARE 82° INCLUDED ANGLE
ALL BEND RELIEFS TO SUIT
TOLERANCES:

INCH	[METRIC]	ANGULAR
.X±.1000	[X±2.500]	X±1.00°
.XX±.0200	[.X±0.500]	.X±0.10°
.XXX±.0050	[.XX±0.130]	.XX±0.01°
.XXXX±.0005	[.XXX±0.013]	

FRACTIONS ±1/4
FT.,IN ±1"
REMOVE SHARP EDGES AND BURRS

DRAWN	TCS	DATE	11.06.04
CHKD	RAD	DATE	11.06.04
ENGR	RAD	DATE	11.06.04
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

ACCU-SORT® SYSTEMS, inc.
TELFORD, PA 18969 USA

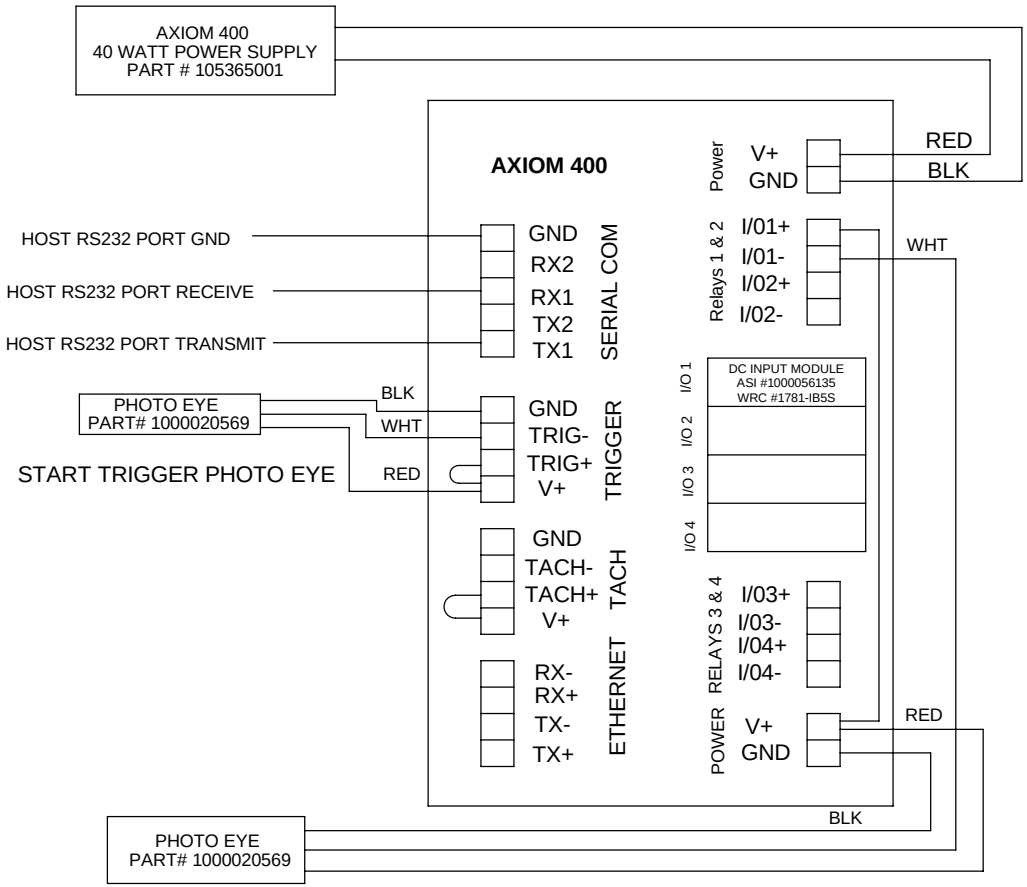
INTERCONNECT DRAWING,
CONTROLLER/CLIENT/CLIENT W/TACH, AXIOM 400

SIZE	CAGE CODE	DWG. NO.	
B	53830	107481	
SCALE	NONE	CAD SYS. SOLIDWORKS	SHEET 1 OF 1

Notes:

NOTES:
1. TO KEEP DRAWING SIMPLER, CABLE SHIELDS ARE NOT SHOWN

REVISION			
REV	ECO	BY	DATE
2	UPDATED	RAD/TCS	02.02.05



END TRIGGER PHOTO EYE

APPLICATION EXAMPLE:

WRING SHOWN IS OF BOTH NONTRACKING START / END TRIGGER APPLICATIONS AND TRACKING "COMPUTED TACH"/ START - END APPLICATIONS. SERIAL PORT FROM AXIOM WILL TRANSMIT DATA TO SORTATION CONTROLLER. AXIOM SCANNERS ARE CONFIGURED BY ATTACHING SERIALLY TO THE SETUP PORT ON THE WIRING BASE.

PART NO. 0107482000

THIS IS NOT A CONTROLLED COPY UNLESS STAMPED "CONTROLLED COPY" IN RED

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES [MILLIMETERS]
ALL ANGLES ARE 90°
ALL C-CINKS ARE 82° INCLUDED ANGLE
ALL BEND RELIEFS TO SUIT
TOLERANCES:

INCH	[METRIC]	ANGULAR
.X±.1000	[X±2.500]	X±1.00°
.XX±.0200	[.X±0.500]	.X±0.10°
.XXX±.0050	[.XX±0.130]	.XX±0.01°
.XXXX±.0005	[.XXX±0.013]	

FRACTIONS ±1/4
FT.,IN ±1"
REMOVE SHARP EDGES AND BURRS

DRAWN	TCS	DATE	11.07.04
CHKD	RAD	DATE	11.07.04
ENGR	RAD	DATE	11.07.04
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

ACCU-SORT® SYSTEMS, inc.
TELFORD, PA 18969 USA

INTERCONNECT DRAWING,
START/END TRIGGER PHOTOEYES,AXIOM 400

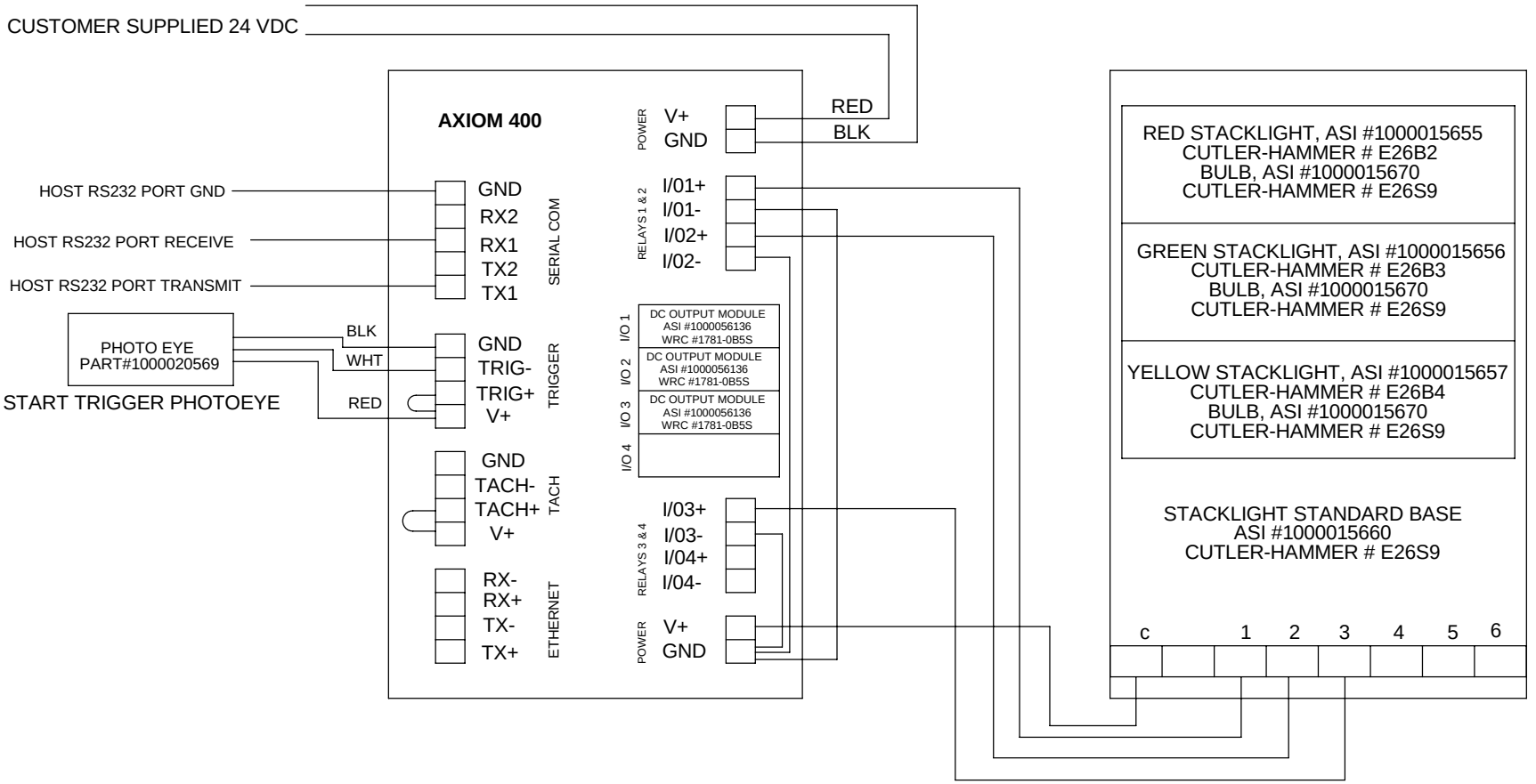
SIZE	CAGE CODE	DWG. NO.	
B	53830	107482	

SCALE NONE | CAD SYS. SOLIDWORKS | SHEET 1 OF 1

Notes:

NOTES:
1. TO KEEP DRAWING SIMPLER, CABLE SHIELDS ARE NOT SHOWN
2. IF ASI POWER SUPPLY PART NUMBER 105365001 IS USED ONLY 1 LAMP CAN BE ILLUMINATED
3. CUTLER-HAMMER EXTENSION TUBE # E26BJU AND A 3/4 " NPT FEMALE TO 1/2" NPT MALE ADAPTER CAN BE USED TO MOUNT THE STACK LIGHT DIRECTLY TO THE WIRING BASE OF THE AXIOM.
4. CURRENT DRAW OF EACH LAMP IS 250mA.

REVISION			
REV	ECO	BY	DATE
2	UPDATED	RAD/TCS	02.02.05



APPLICATION EXAMPLE:

WIRING SHOWN IS TYPICAL OF APPLICATION REQUIRING 3 INDICATOR LAMPS. LAMPS ARE POWERED BY SAME 24 VDC SUPPLY THAT POWERS THE SCANNER. SERIAL PORT FROM AXIOM WILL TRANSMIT DATA TO SORTATION CONTROLLER. AXIOM SCANNERS ARE CONFIGURED BY ATTACHING SERIALLY TO THE SET UP PORT ON THE WIRING BASE.

PART NO. 0107483000

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES [MILLIMETERS]
ALL ANGLES ARE 90°
ALL C-CINKS ARE 82° INCLUDED ANGLE
ALL BEND RELIEFS TO SUIT
TOLERANCES:

INCH	[METRIC]	ANGULAR
.X±.1000	[X±2.500]	X±1.00°
.XX±.0200	[.X±0.500]	.X±0.10°
.XXX±.0050	[.XX±0.130]	.XX±0.01°
.XXXX±.0005	[.XXX±0.013]	

FRACTIONS ±1/4
FT.,IN ±1"
REMOVE SHARP EDGES AND BURRS

DRAWN	TCS	DATE	11.07.04
CHKD	RAD	DATE	11.07.04
ENGR	RAD	DATE	11.07.04
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

ACCU-SORT® SYSTEMS, inc.
TELFORD, PA 18969 USA

INTERCONNECT DRAWING,
STACK LAMP W/INTERNAL RELAYS,AXIOM 400

SIZE	CAGE CODE	DWG. NO.	
B	53830	107483	
SCALE NONE	CAD SYS. SOLIDWORKS	SHEET 1 OF 1	

Notes:

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