DATALOGIC

AXIOM™ / AXIOM-X™

Product Line Manual

AXIOM / AXIOM-X Product Line Manual   Revision 1.0

PN 1000067320 1.0 | CMS 09-0024-11 | 2009.08.12 | LSM

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.

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.

IMPORTANT: Due to continuous product improvements, addenda content may have been added to the back of this manual that supersedes some of the manual content. Please review any addenda content first.

Contents

5 Setup

Appendices

Index

Preface

The **AXIOM™ / AXIOM-X™ Product Line Manual** from Accu-Sort Systems, Inc. includes the information you need to effectively integrate the **AXIOM / AXIOM-X 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 readers for your application
- Maintenance and Troubleshooting

This preface explains how this user 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 the product (or this manual) by e-mailing us at *info.automation.us@datalogic.com*.

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

NOTE: There may be additional material that was not available when this product manual was produced. To learn if there is a documentation update, go to our web site's corresponding product page at www.datalogic.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.

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.

NOTE REGARDING DIMENSIONAL REFERENCES: This manual provides all dimensional references in inches. Metric references are provided in millimeters and enclosed in brackets. For example: 10 inches [254 mm].

Customer Service

Training

Accu-Sort Systems offers a complete set of training courses to help you and your staff get the most out of your investment. 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 equipment 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 assistance, direct your calls to *Customer Service* at 1-800-BAR-CODE™ or (215) 723-0981.

1 Introduction

This chapter presents an introductory description of the *AXIOM / AXIOM-X* laser bar code reader product line including:

- AXIOM Product Line Overview
- AXCESS User Interface

AXIOM Product Line Overview

The AXIOM line of laser bar code readers is designed with industrial and manufacturing applications in mind. The AXIOM line scanners offer high-speed scanning and high reliability in a rugged industrial enclosure. An omnidirectional reader, the AXIOM-X, is also available. The entire AXIOM product line offers a large depth of field that provides accurate bar code reading at distances greater than 60 inches.

AXIOM Line Scanner   *AXIOM-X Omnidirectional Scanner*

Though technologically advanced, the AXIOM product line is designed for easy setup using AXCESS Setup software. AXCESS provides a familiar Windows®-based user interface. Using the **AXCESS Wizard** or the **AXCESS Explorer**, you can configure your readers without the need for onsite service.

Simply connect to your reader via setup cable or on-board Ethernet. Specify valid bar code types, groups, match patterns, and 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.

NOTE: Throughout this manual, unless there is a need to differentiate between the *AXIOM line scanner* and *AXIOM-X omnidirectional scanner*, the references AXIOM, reader or scanner will be used.

AXCESS™ Configuration Setup Software

AXCESS Setup Software is a Windows®-based software package that 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.
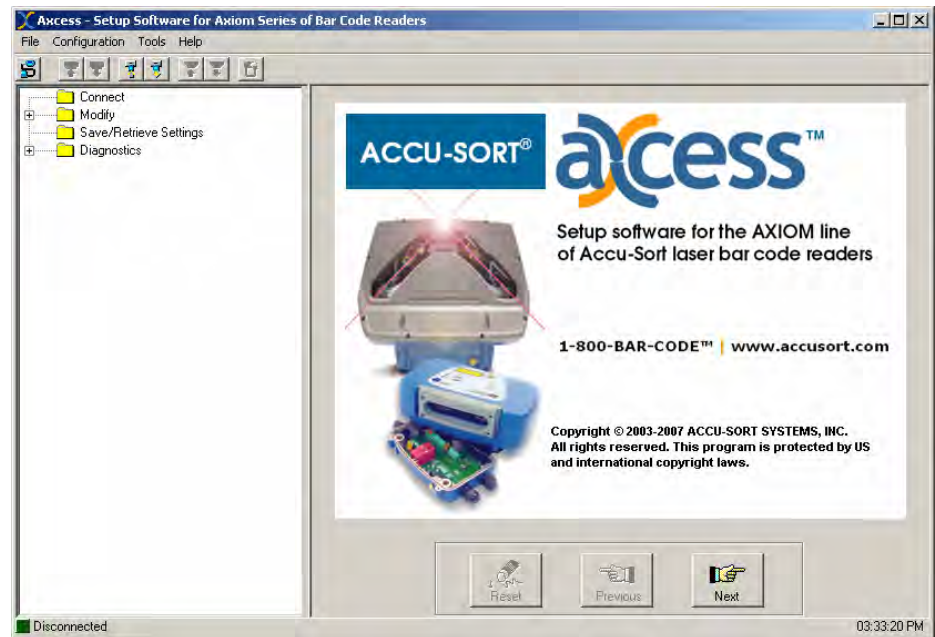
All AXIOM functions are selected from the standard menus, toolbar, **AXCESS Explorer**, or the **AXCESS Wizard**, providing multiple access points for all setup parameters.

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*, a desktop or laptop computer, and the setup programming cable. 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.

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

▪ Elec   trical Safety

▪ Electrical Grounding Requirements

▪ Electrostatic Discharge Precautions and Control

▪ Laser   Safety

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 readers 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/AXIOM-X 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.
- Use proper lifting techniques to avoid back injury.

Compliance Requirements

FCC NOTICE: The AXIOM product line 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 products 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 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 ESD precautions for each component.

Laser Safety

The AXIOM 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 unintentional exposure to laser light whenever possible. 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 exit window frames:
AVOID EXPOSURE – LASER LIGHT EMITTED FROM THIS APERTURE

Warning on AXIOM Laser Exit Window to Avoid Exposure
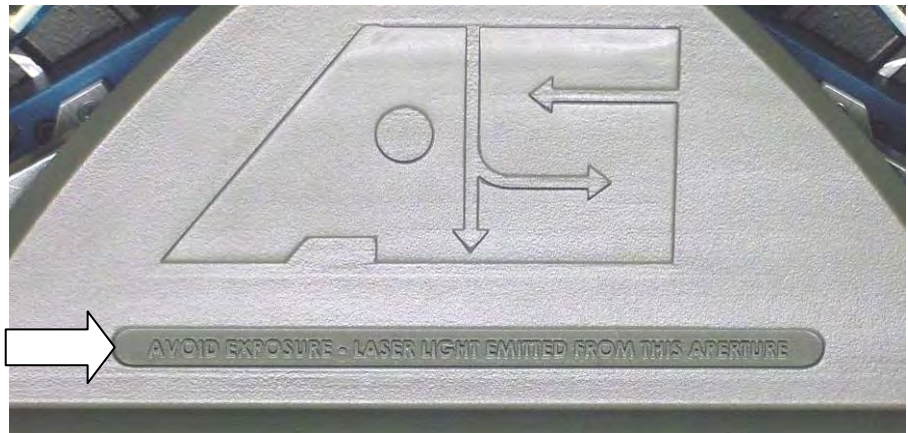
Warning on AXIOM-X Laser Exit Window to Avoid Exposure

WARNING: Use of controls, adjustments, or procedures other than those specified in this document may result in hazardous laser light exposure.

The **AXIOM Line Scanning Bar Code Reader** 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).

The **AXIOM-X Omnidirectional Bar Code Reader** is rated as a **Class 1** Laser Product by the International Electrotechnical Commission. Compliances are as follows: Class 1 Laser Product (IEC-60825-1), 1993+A1: 1997+A2: 2001, Class II Laser Product (21CFR1040) <5.0 mW peak at 630-700nM).

Before performing any maintenance or service procedures, perform the laser shutoff procedure provided in Chapter 6.

Safety Labels and Locations

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

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

LASER LIGHT
AVOID DIRECT EYE EXPOSURE
CLASS 3R LASER PRODUCT
(IEC-60825-1): 1993+A1: 1997+A2: 2001
CLASS II LASER PRODUCT (21CFR1040)
<5.0 mW PEAK AT 630-700nm

Label Placement AXIOM Scan Head

CLASS 1 LASER PRODUCT
(IEC-60825-1:2001)
COMPLIES WITH 21CFR1040.10 AND
21CFR1040.11 WITH DEVIATIONS
PURSUANT TO LASER NOTICE 50
DATED JULY 26, 2001

CAUTION - CLASS 3R
LASER RADIATION WHEN
OPEN AVOID DIRECT
EYE EXPOSURE
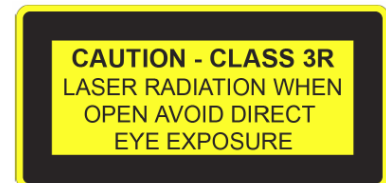
Label Placement AXIOM-X Scan Head (Top and Front)

3   Mechanical Installation

This chapter defines a typical AXIOM / AXIOM-X installation and highlights important details that may affect how the reader should be mounted, wired, and configured for optimum performance in your application. Be sure to consider the various factors that affect how the reader must be mounted with respect to the scanning area.

IMPORTANT: The AXIOM / AXIOM-X contain electronics that may be affected by electrostatic discharge (ESD). To prevent personal injury or damage to the unit, please follow the safety precautions and warnings found in *Chapter 2*. Failure to do so 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.
- 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.
- Install the AXCESS setup software on your desktop or laptop computer*. (See Chapter 5.)*

IMPORTANT: The reader's 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)

NOTE: Everything should be MECHANICALLY INSTALLED before performing any ELECTRICAL INSTALLATION. See *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) to the frame. (UMB and mounting frame options are available from Accu-Sort.)
    - Mount the wiring base to the UMB or frame.
    - Mount the Accu-Sort power supply to the UMB (optional).
    - Mount Trigger Photoeye (optional).
    - Mount Height Tracking Photoeyes (optional).
    - Mount tachometer (optional).
    - Mount I/O modules (optional).
- **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 reader.**
    - See Chapter 5.
- **Check operations.**
    - See Chapter 6.

Installing multiple units

To mechanically install multiple units, follow the same sequence of steps, per 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.

Orientation Considerations

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

Mounting the reader 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 / AXIOM-X 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 and far read distances. These dimensions result in the overall depth of field your application requires.
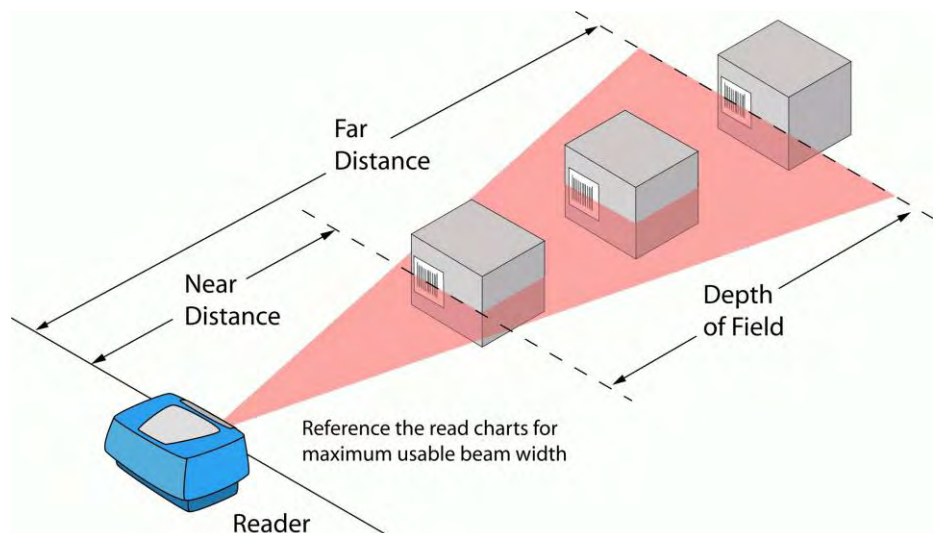
Determining Read Range *(AXIOM line scanner shown)*

Bar Code Orientation to Scanning Area (AXIOM)

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.

Picket Fence Orientation   *Ladder Orientation*
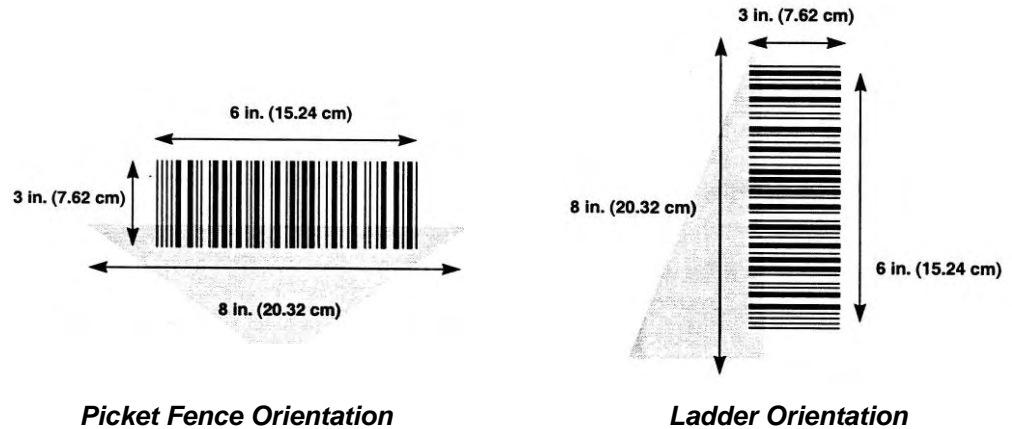
Bar Code Skew, Pitch and Tilt   These angles affect bar code readability. Bar codes pitched or skewed up to 45 degrees are still readable. Although some skew may occur, it should not exceed 45 degrees.
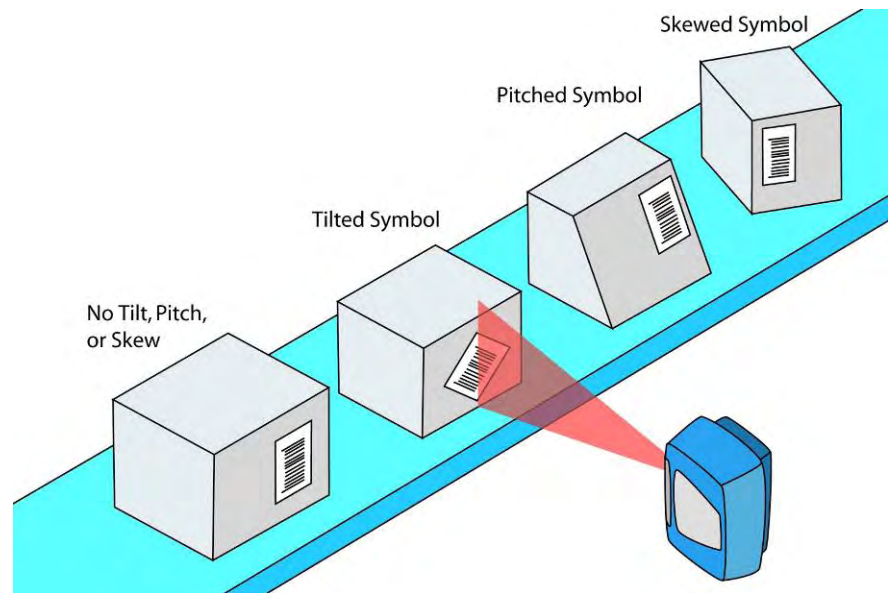
Bar Code Tilt, Pitch and Skew Illustrated (AXIOM line scanner shown)

Bar Code Orientation to Scanning Area (AXIOM-X)

The AXIOM-X is an omnidirectional bar code reader equipped with DRX technology; bar code orientation limitations that affect readability (e.g., picket fence or ladder) are not issues as they are with typical line scanners.

Bar code placement and product orientation requirements are as follows:

- Product surfaces containing bar codes should be positioned to face the reader.

- Bar codes should be of good quality. Partially damaged codes can still be decoded as long as all the bars and spaces are visible to the reader.

- If more than one product surface contains bar codes to be read, multiple readers are needed.

- Depending on package spacing (i.e., distance between packages as they travel through the scanning area), Height Tracking Photoeyes may be required.
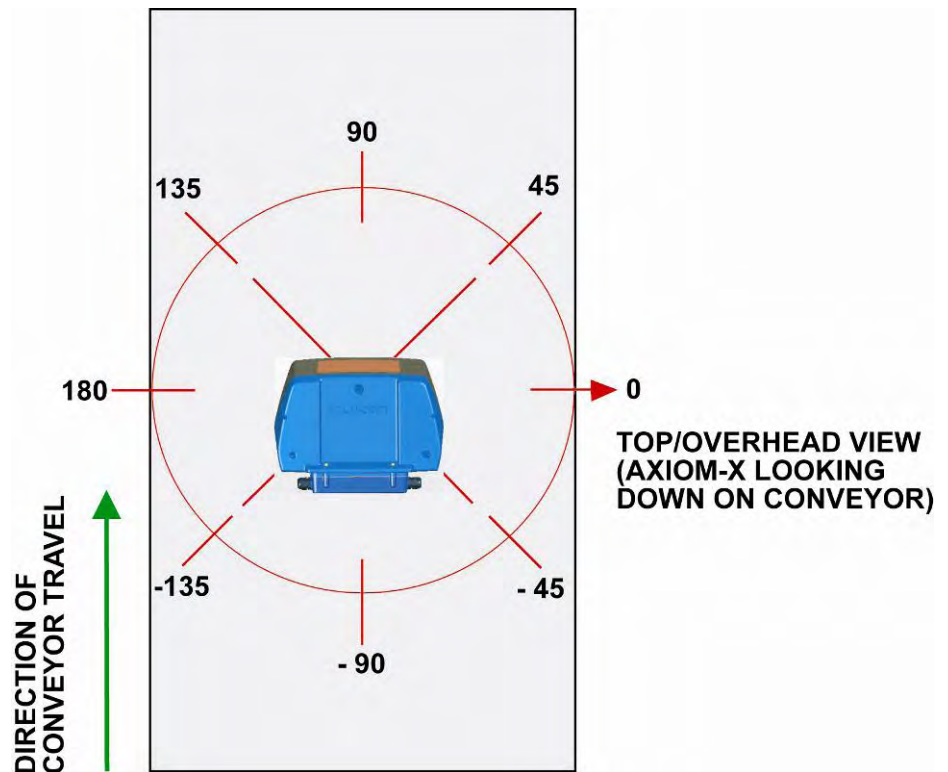
AXIOM-X Orientation with Reference to Conveyor Travel

> ⚠️ **IMPORTANT:** There are several parameters associated with the mounting of the AXIOM-X that must be configured to the application. For details, reference *Chapter 5. See Modify > Tracking – AXIOM Mounting.*

General Mounting Guidelines

As you plan the installation for your application, keep the following in mind:

- Determine the proper orientation and position of the reader.
- Allow approximately 8-12 inches [203-305 mm] of clearance.
- Plan mechanical installation based on the application's electrical requirements. *See General Electrical Installation Guidelines, Chapter 4.*
- Follow all safety precautions when installing, setting up, operating, maintaining, troubleshooting or replacing any Accu-Sort products, parts or related equipment. *See Chapter 2, Safety.*

Reader Positioning

IMPORTANT: The AXIOM readers are able to decode bar codes at a variety of angles; however significant angular distortion may degrade reading performance. When positioning a reader, be aware of how the scanning beam exits the scan window in relation to the wiring base.

When mounting the AXIOM readers, take into consideration:

- The bar code orientation
- The reader's scanning beam must intersect entire bar code
- Range of motion allowed by the Universal Mounting Bracket (UMB)
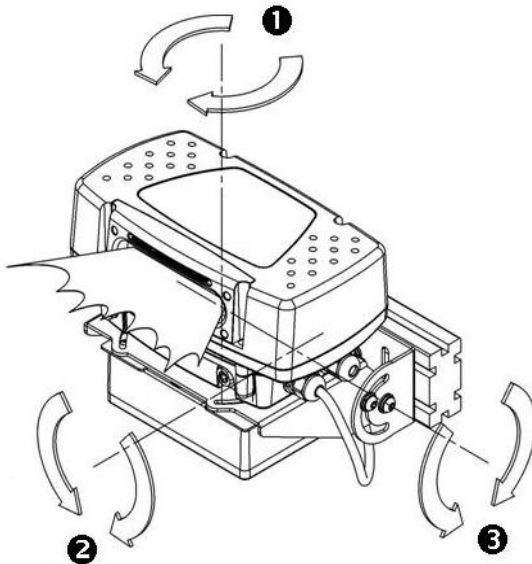
AXIOM Range of Motion with UMB   **AXIOM-X Range of Motion with UMB**
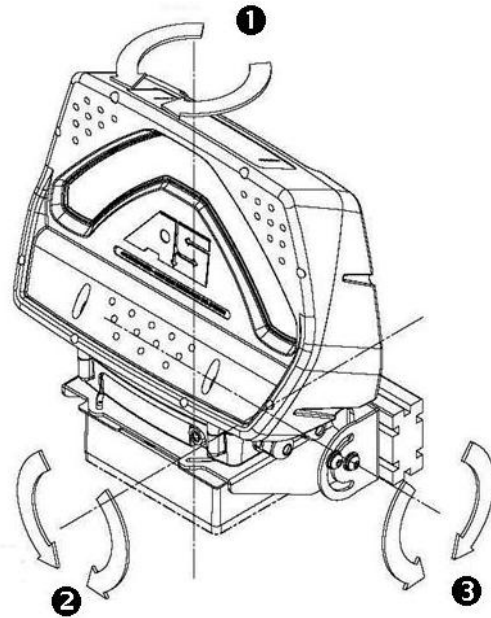
❶ *Yaw +/- 22.5°*

❷ *Roll 360° Range of motion when unobstructed with power supply.*
   Downward travel is limited to 105°. Other obstructions may limit travel.

❸ *Pitch 50° up (max) 130° down (max)*
   When on an Accu-Sort mounting structure, re-positioning of mounting bolts may be required.

Dimensions and Clearances

The overall dimensions of the AXIOM / AXIOM-X when the Universal Mounting Bracket (UMB) is used are shown on the mechanical specification drawings provided in *Appendix E*.

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.

NOTE: For installation, maintenance and service, approximately 8-12 inches [203-305 mm] of clearance is recommended.

Attaching the Wiring Base

The wiring base and universal mounting bracket may ship pre-assembled. If your application is not using the UMB, mount the wiring base to any flat surface with three mounting screws.

The mounting holes in the wiring base have #10-32 UNF-2B threads. The length of the screws must not be greater than 0.5 inch [12.7 mm] plus the thickness of the mounting surface.

Create a mounting template using the following diagram.
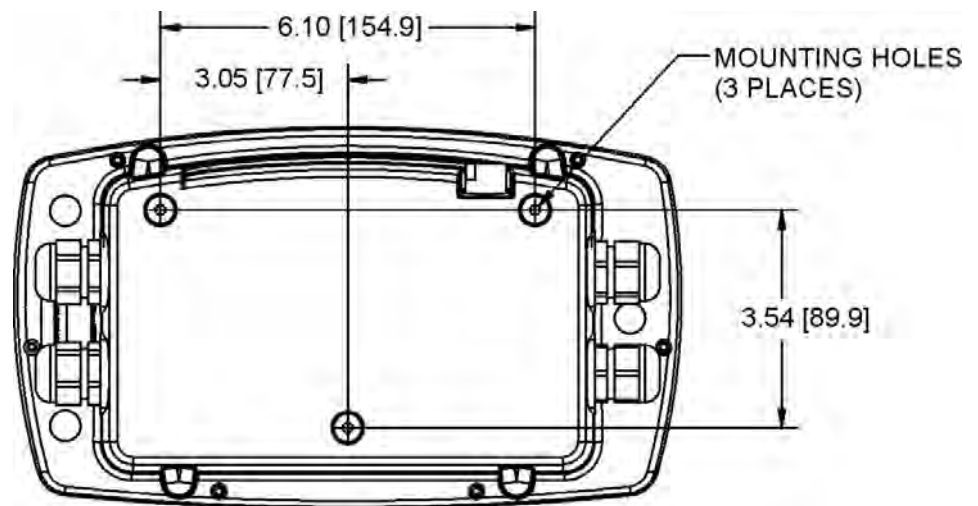
Wiring Base Mounting Dimensions *(not actual size)*

Attaching the Universal Mounting Bracket (UMB)

The Universal Mounting Bracket (UMB) simplifies reader mounting and installation. The AXIOM / AXIOM-X both use the same wiring base and UMB. They must be assembled and attached to the mounting structure before beginning wiring procedures.

1. Typically, the UMB and wiring base are pre-assembled.
   If assembly is required, follow the instructions provided with the UMB.

2. Mount the wiring base (1) to the UMB (3).
   Use the three screws (4) provided with the wiring base.

3. Insert the screws through the UMB into the threaded holes on bottom of wiring base. Leave the three screws slightly loose. This allows for final adjustment of the reader in relation to the scanning area after wiring is completed.

4. Attach the UMB/wiring base assembly to the mounting structure with the provided hardware (2).

5. DO NOT install the scan head until wiring is complete.

6. Leave slack in cabling/conduit to allow for adjustment. *(See Chapter 4.)*
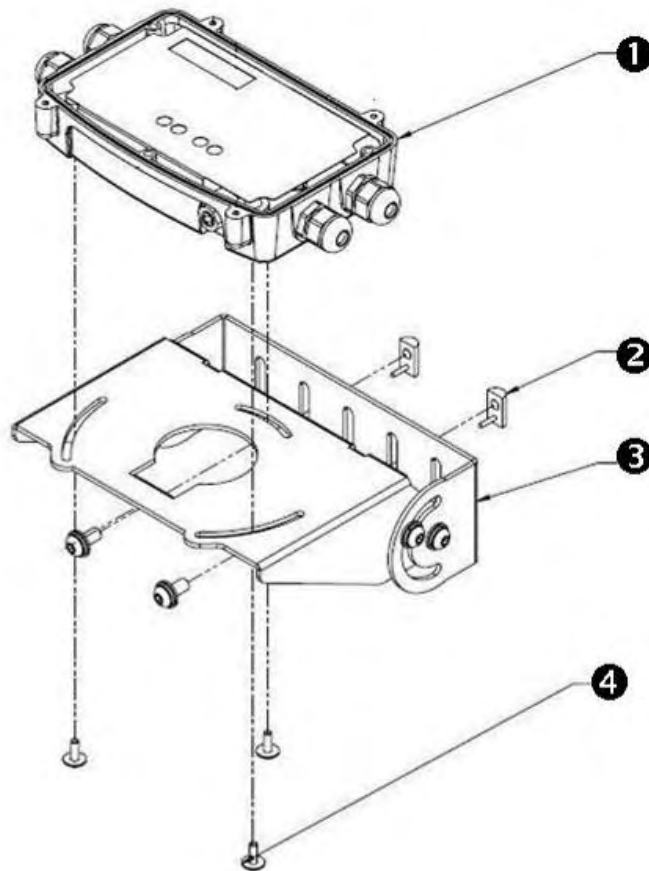
Attaching the Power Supply to UMB

The power supply accessory is used when an alternative DC power source is not available. Power supplies are available in IP40 and IP65 ratings for both domestic and international applications.

The supply and wiring base ships pre-assembled from the factory. If the power supply and UMB have not been pre-assembled, use the correct procedure for the supply provided.

Installing the IP40-rated power supply:

1. Plug the AC power cord into the power supply's IEC connector.

2. Insert the power supply (2) into the mounting bracket (1).

3. Make sure the wires are guided through the wiring notch in the bracket.

4. Use an Allen wrench to attach the power supply mounting bracket (1) to the power supply mounting plate (3) using the four 10-32 hex socket head cap screws (4). DO NOT over-tighten screws.

5. Attach the power supply/mounting plate assembly directly to the UMB (5). Insert the two tabs on the edge of the mounting plate into their corresponding locations on the UMB.

6. 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.

7. Continue with the electrical installation. *(See Chapter 4.)*
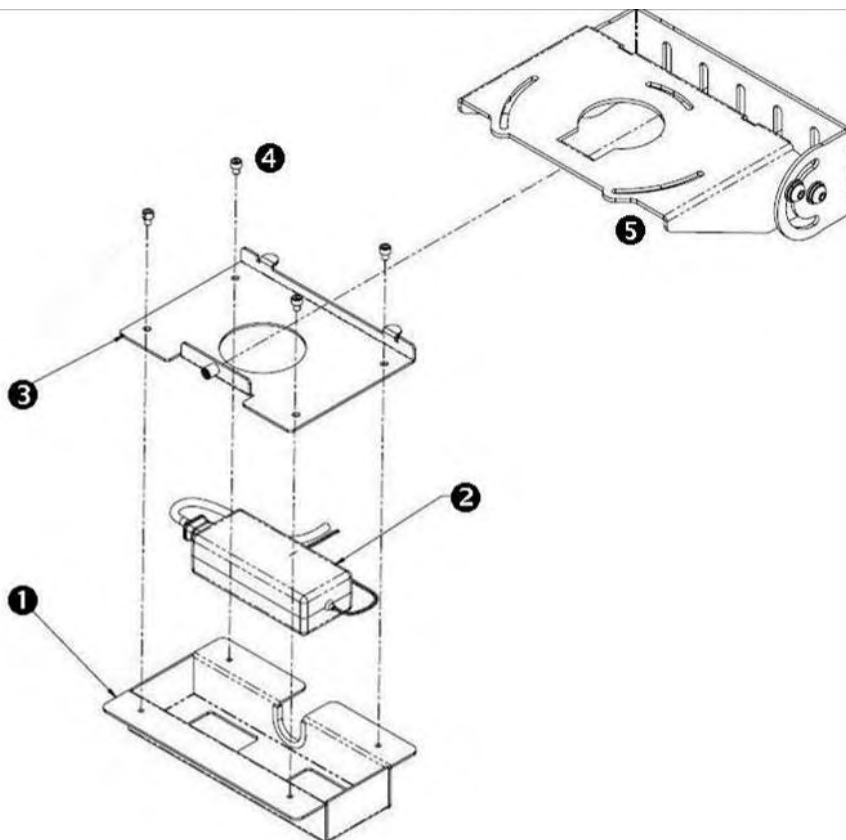
Installing the IP65-rated power supply:

1. Mount the power supply (1) to the power supply mounting plate (2) with the provided hardware (3).

2. DO NOT over-tighten screws that hold the power supply to the adapter mounting plate.

3. Attach the wiring base/UMB assembly to the mounting structure.

4. Attach the power supply/mounting plate assembly (from step 2) directly to the UMB (4). Insert the two tabs on the edge of the mounting plate into their corresponding locations on the UMB.

5. 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.

6. Continue with the electrical installation. *(See Chapter 4.)*
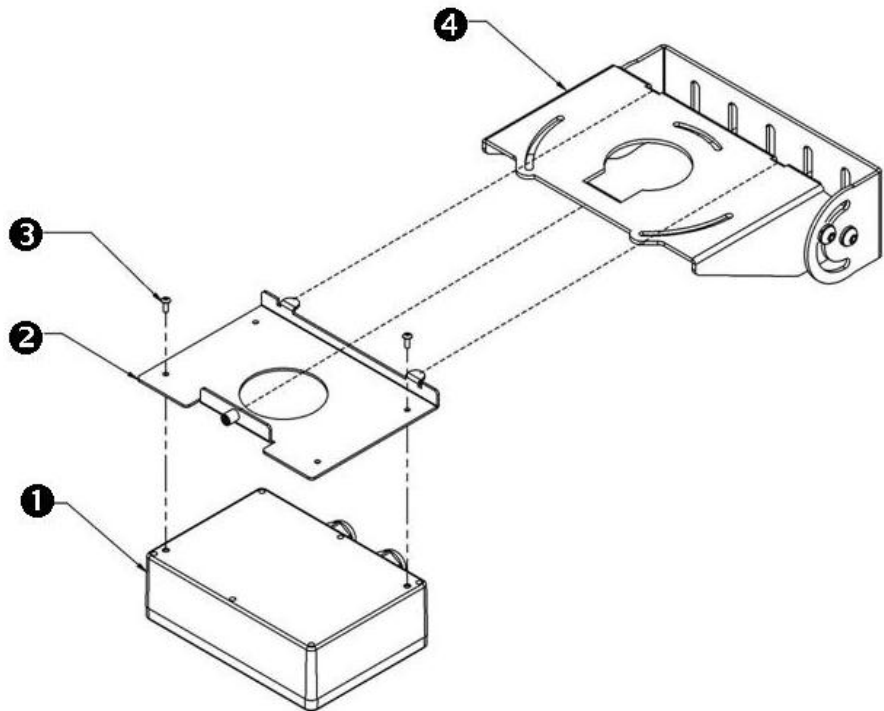
Mounting IP65-rated Power Supply to UMB

Attaching the X-Pattern Mounting Bracket (XMB, AXIOM Only)

The **X-Pattern Mounting Bracket** (XMB, part number 0106226002) is an optional accessory that simplifies dual-AXIOM mounting where it is necessary to create an x-scanning pattern.
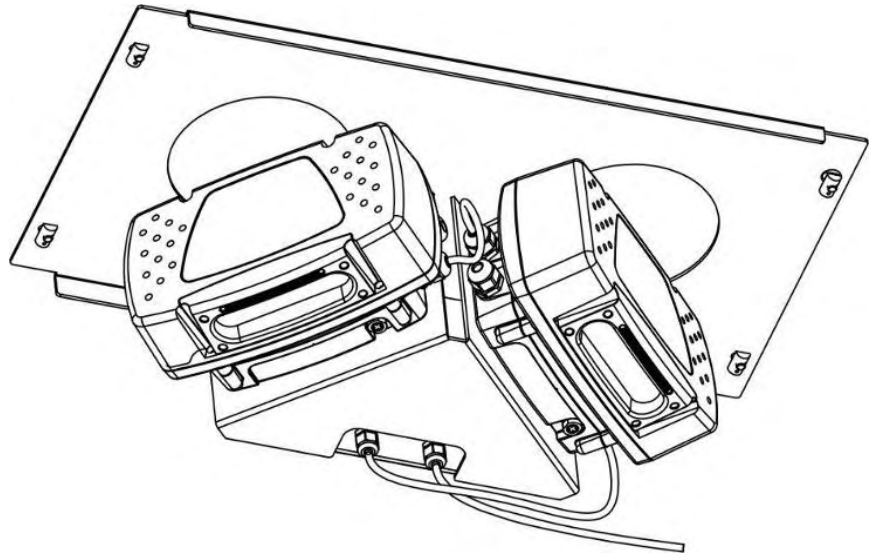
IMPORTANT: The correct read distance reference plane is from the mounting edge of the XMB and not the AXIOM exit window.
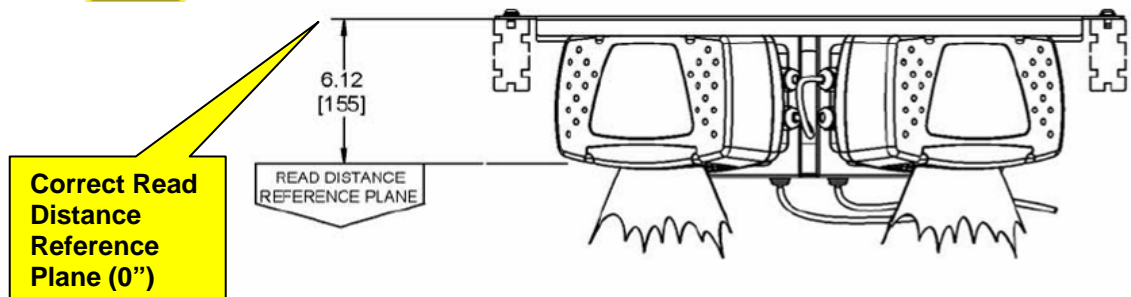
In most instances, the XMB is shipped from the factory pre-assembled.

Mount wiring bases to XMB:

1. Attach XMB (1) to mounting structure with the provided hardware (2).

2. Mount both wiring bases (3) to the XMB.
   Use the three screws (4) provided with each wiring base.

3. Insert the screws through the XMB into the threaded holes on bottom of wiring base. DO NOT over-tighten screws.

4. Continue with mounting the power supply to the XMB. *(See page 29.)*
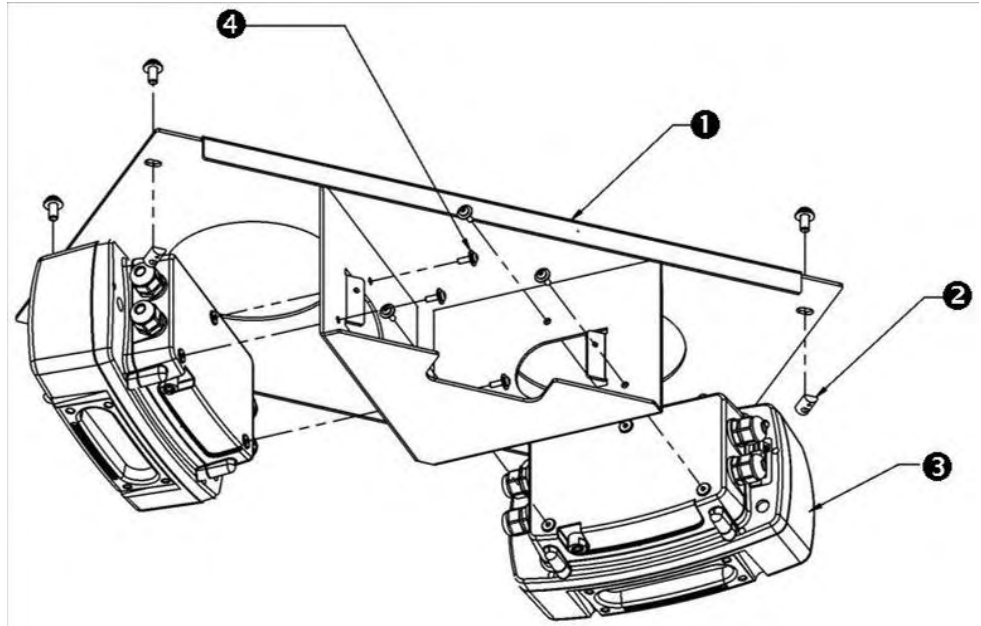
IMPORTANT: Do not install scan heads to wiring bases until all wiring is completed.

Mount Power Supply to XMB:

1. Mount the power supply (1) to the power supply adapter mounting plate (4) (included with the XMB kit). The XMB kit provides the necessary hardware (2).

2. Attach the power supply/mounting plate assembly directly to the XMB using the provided hardware (3). Fasten to the two tabs on the XMB as shown. DO NOT over-tighten the screws.

3. Continue with the electrical installation. *(See Chapter 4.)*
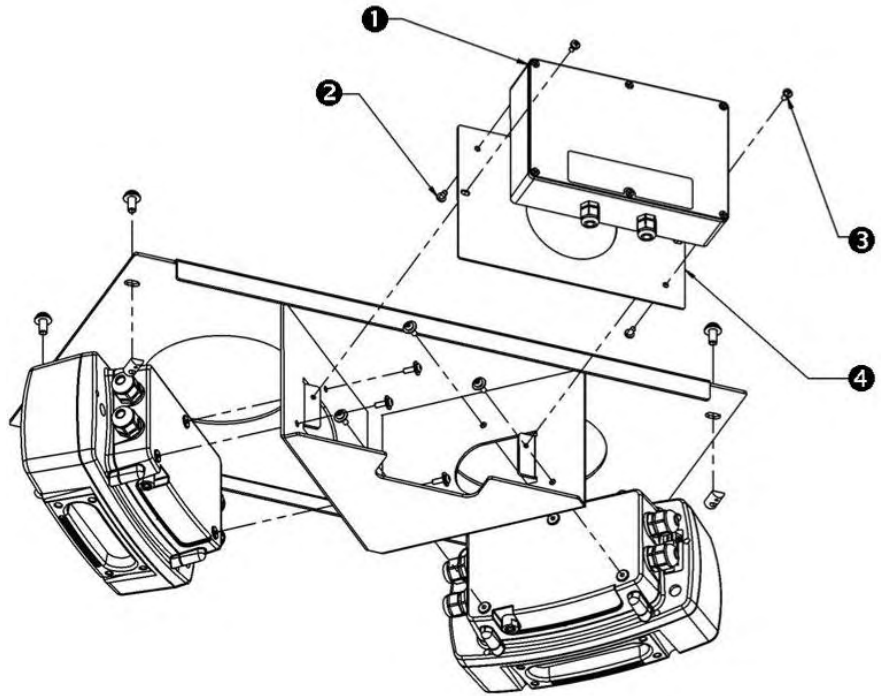
IMPORTANT: Do not install scan heads to wiring bases until all wiring is completed.

Mounting the Trigger Photoeye

The standard photoeye works by bouncing a light beam off a reflector and detecting when something breaks the path of light. 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 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.
- When mounting the photoeye to an Accu-Sort structure, see drawing 41222 in Appendix E.

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.

REFLECTOR
MOUNTING SURFACE

PHOTOEYE MOUNTING
BRACKET SURFACE
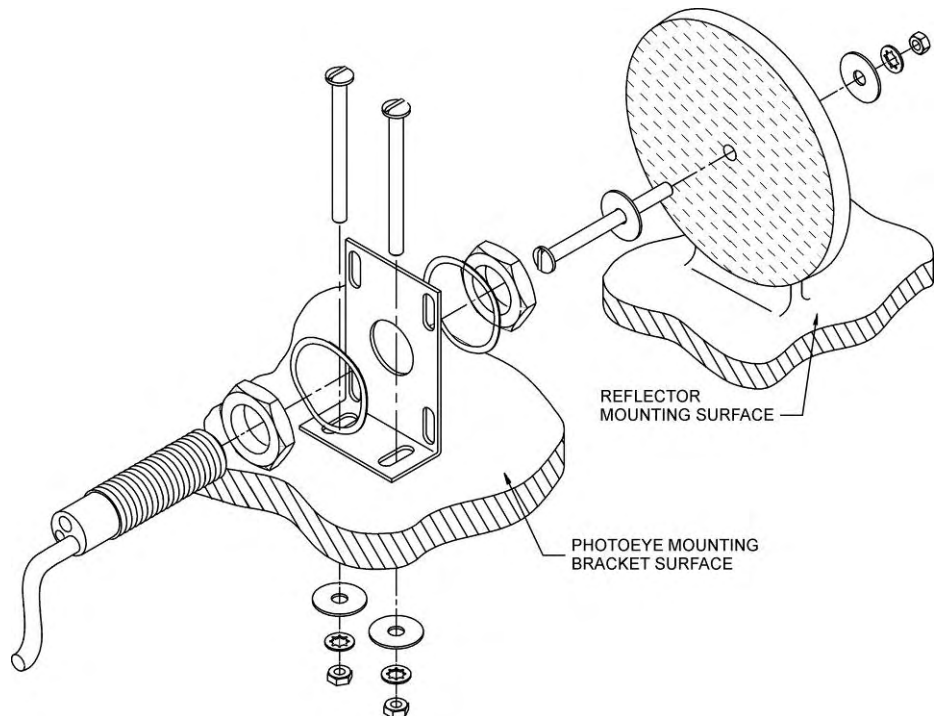
NOTE: The Trigger Photoeye can also be used in a Start/End Trigger application as the Start Trigger Photoeye. In this instance, an End Trigger Photoeye Kit (with DC input module) is also required.

Mounting the Height Tracking Photoeyes

Height Tracking Photoeyes are required when *package spacing* (i.e., distance between packages traveling through the scanning area) is under 1/3 of the total depth of field (DOF). Each additional photoeye cuts the package spacing requirement in half, down to a minimum of 2 inches [50.8 mm]. Up to three photoeyes can be used to divide the DOF into four zones. The following figures illustrate how to divide a 40 inch DOF into four zones to reduce the package spacing requirement to 3.5 inches [88.9 mm].
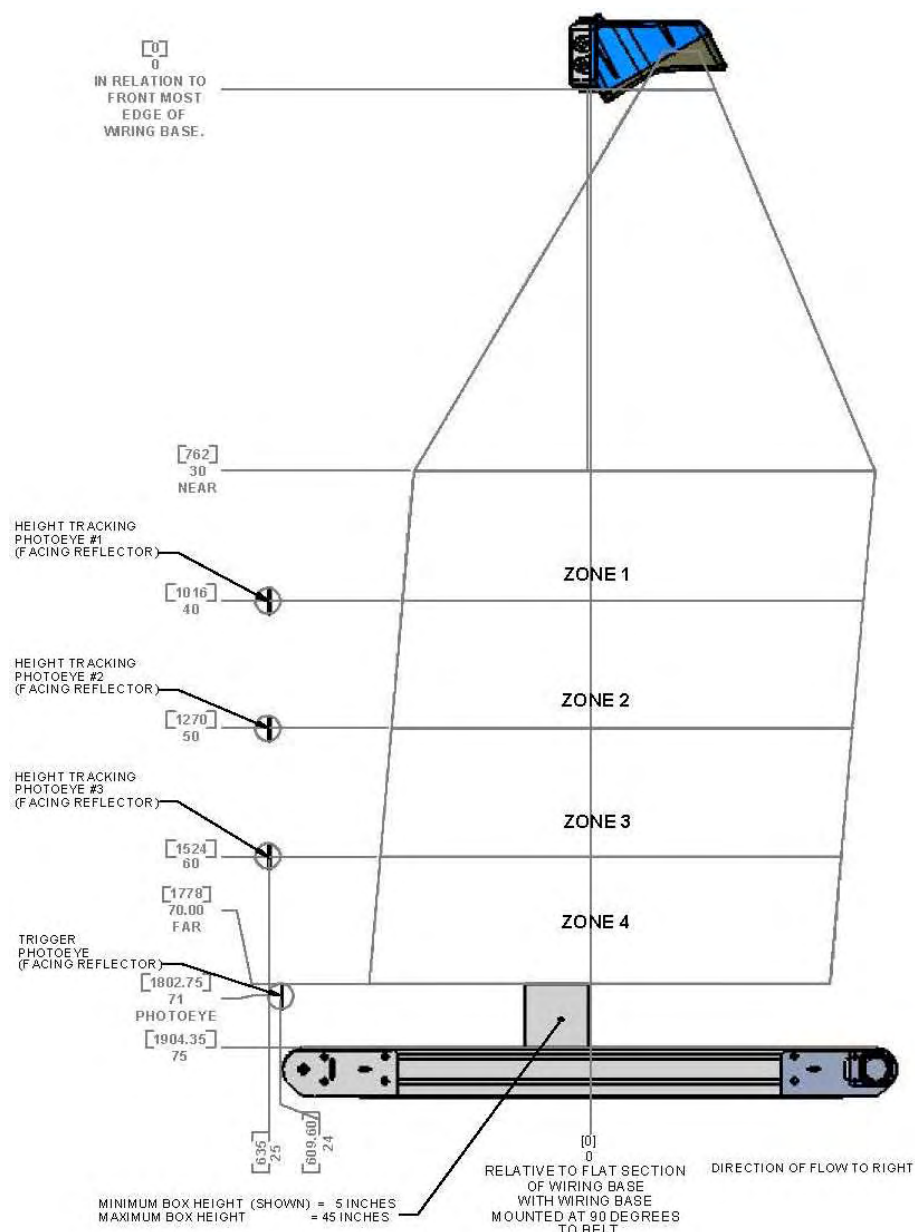
Height Tracking Photoeyes (Side View)

For example: An application with a 30 inch [762 mm] DOF requires minimum package spacing of 10 inches [254 mm]. By adding one Height Tracking Photoeye, this is reduced to 5 inches [127 mm] minimum spacing requirement. Two photoeyes allows spacing of 2.5 inches [63.5 mm].

Three photoeyes allows spacing of 2 inches [50.8 mm] which is the minimum allowable package spacing.

IMPORTANT: Contact Accu-Sort's Application Engineers for applications requiring package spacing less than two inches [50.8 mm].
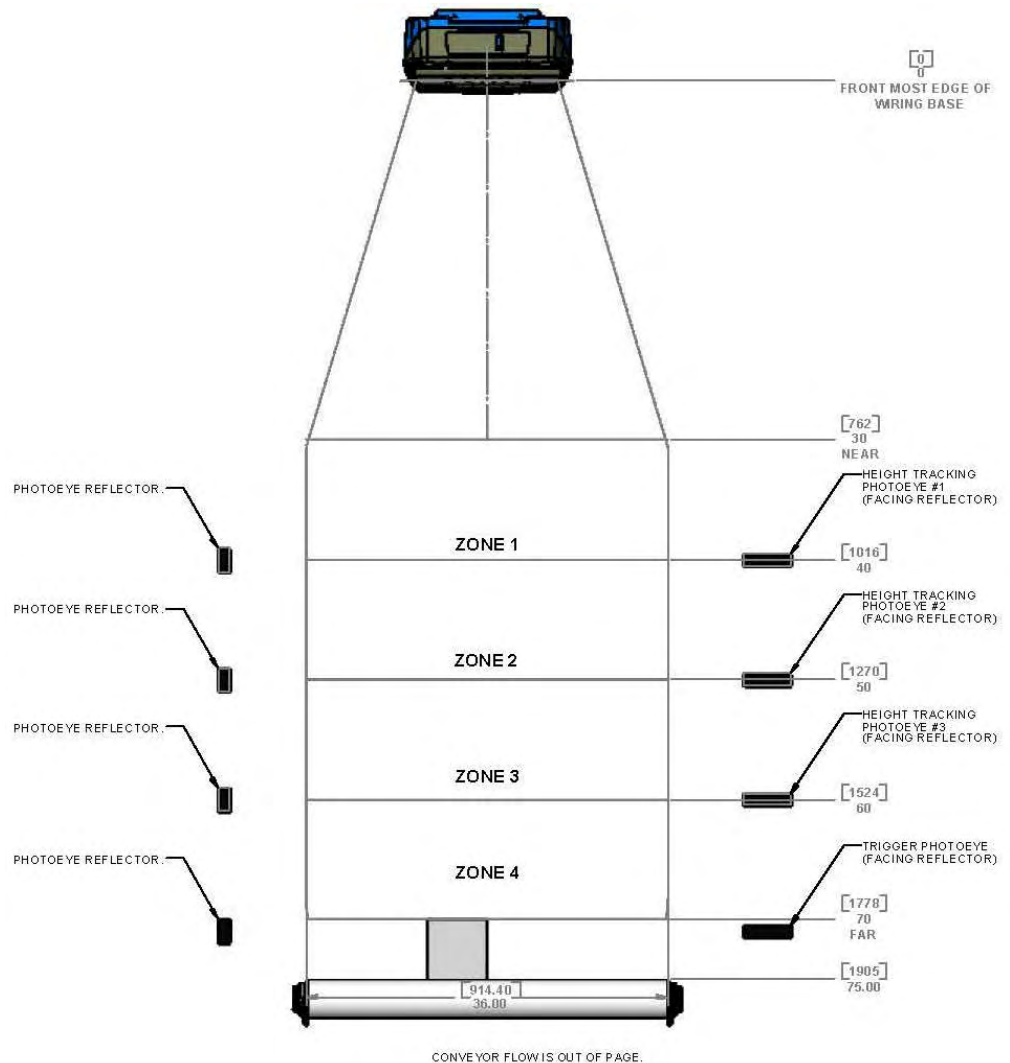
Height Tracking Photoeyes (Front View)

NOTE: The Height Tracking Photoeye kit includes a DC Input Module that must be installed in the wiring base. *See Mounting the I/O Modules.*

A Height Photoeye Mounting Adapter is also available.
(See drawing 112697 in Appendix E.)

After electrical installation, settings must also be made in AXCESS. Set the near/far distances in **Modify > Tracking**. Set the Height Tracking Photoeye distances in **Modify > Trigger and Relay Settings**. *(See Chapter 5.)*

Mounting the Tachometer

The tachometer (tach) option outputs a set number of pulses for each wheel rotation. This tells the reader 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 most conveyors are unique, providing exact directions for tachometer mounting is difficult. Follow the guidelines below as closely as possible when mounting.

- Mount the tach on the conveyor section where scanning is performed.
- 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 underneath the drive shaft.
- Make sure the tach assembly angles in the same direction that the underside of the conveyor travels.
- The tach must make good contact with the conveyor.
- The **general mounting kit** makes tachometer mounting and setup easier. The **extrusion mounting kit** (same as shown here) 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.
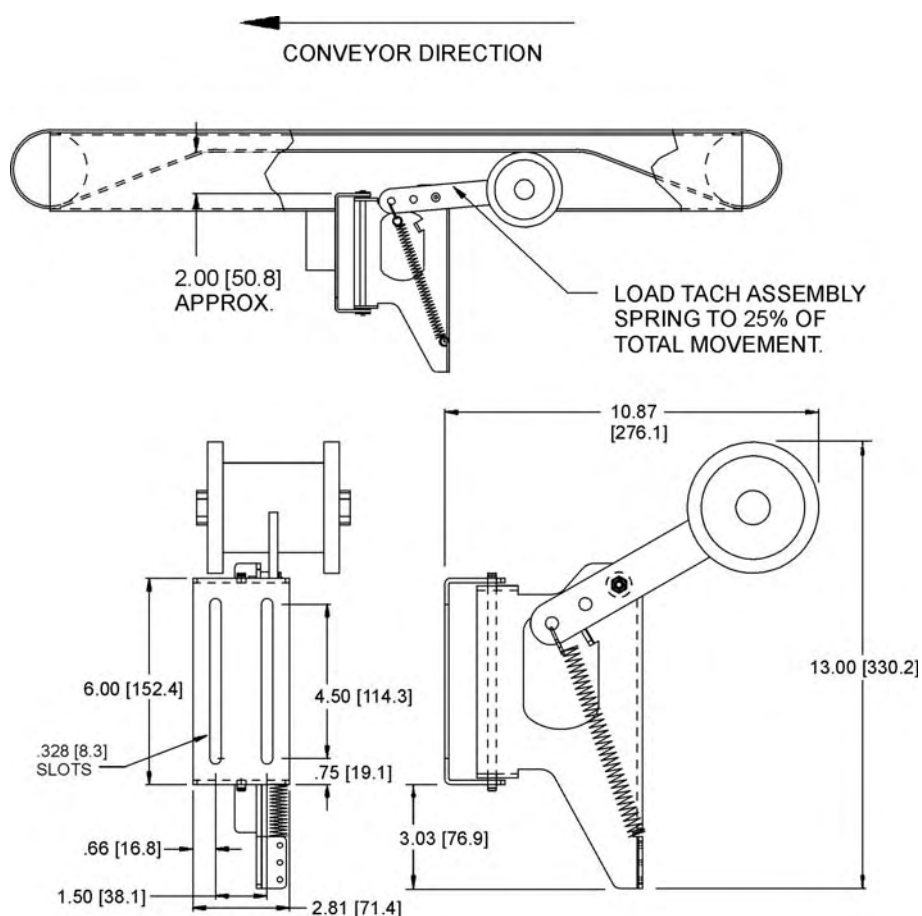
Mounting the I/O Modules

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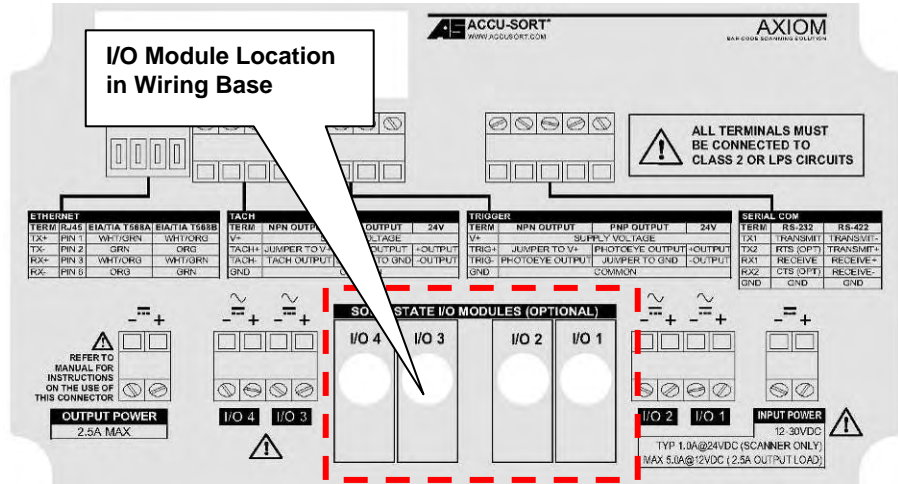
I/O Module Applications

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

- Additional photoeye input(s) for Height Tracking Photoeyes (up to three)

NOTE: The following input module applications require custom software.

- Transmit   photoeye
- Divert Accomplished photoeye
- Reboot signal

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

1. Lift the insulating cover to gain access to the wiring base.

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 circuit board.

4. Secure the I/O module by tightening the captive screw into the circuit board. DO NOT over-tighten screw.

Check Scan Head Excessive Shock Indicator

⚠️ **IMPORTANT:** AXIOM / AXIOM-X scan heads may have been equipped with an excessive shock indicator. The purpose of this indicator is to assure that scan heads that have experienced *shock in excess of 75G* are not installed at product scan points.

To check the shock indicator before installation:

1. Locate the shock indicator.

AXIOM Scan Head
Shock Indicator Location
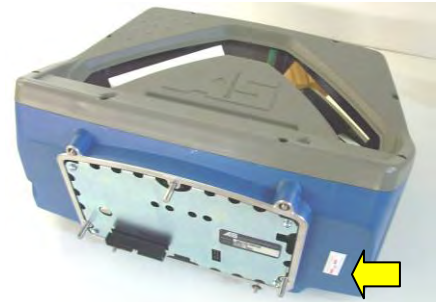
AXIOM-X Scan Head
Shock Indicator Location

2. Confirm if there has been any excessive shock.
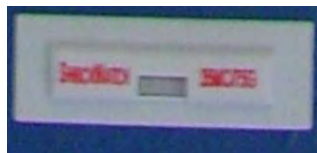
GOOD Indicator
(no shock, good to install)

BAD Indicator
(excessive shock, DO NOT install!)

3. If the indicator is **GOOD**, the scan head can be installed.

4. If the indicator is **BAD**, the scan head has experienced excessive shock. **DO NOT install the scan head.**

⚠️ **IMPORTANT:** Contact Accu-Sort's Customer Service department at 1-800-BAR-CODE as soon as possible.

Installing an AXIOM Scan Head

Perform the electrical installation as outlined in *Chapter 4*. Once all wiring is checked for accuracy, install the scan head to the wiring base. The scan head can be installed 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.
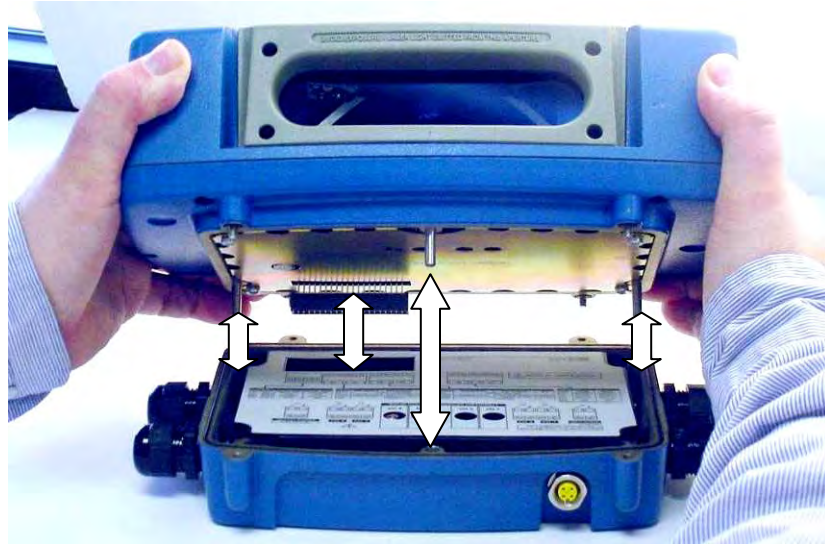
2. Carefully align the 3 scan head alignment pins with the 3 holes in the wiring base. This automatically assures the correct scan head-to-wiring base connector alignment (to avoid bending pins).

Alignment Pin

Scan Head Connector

Wiring Base Connector
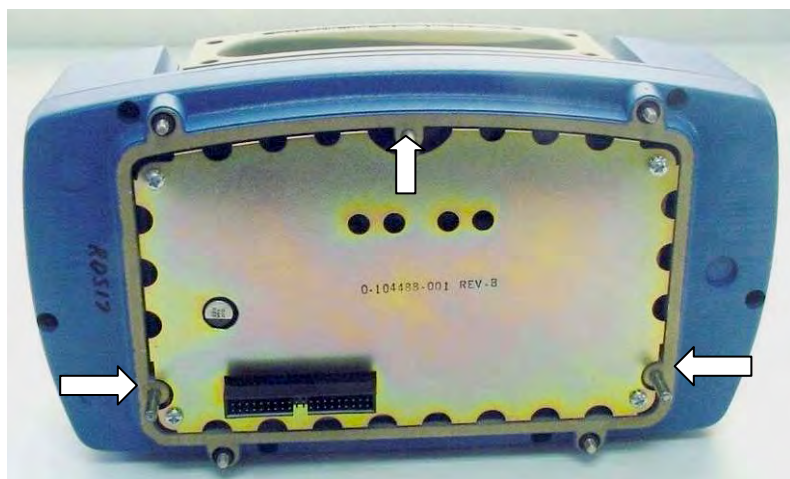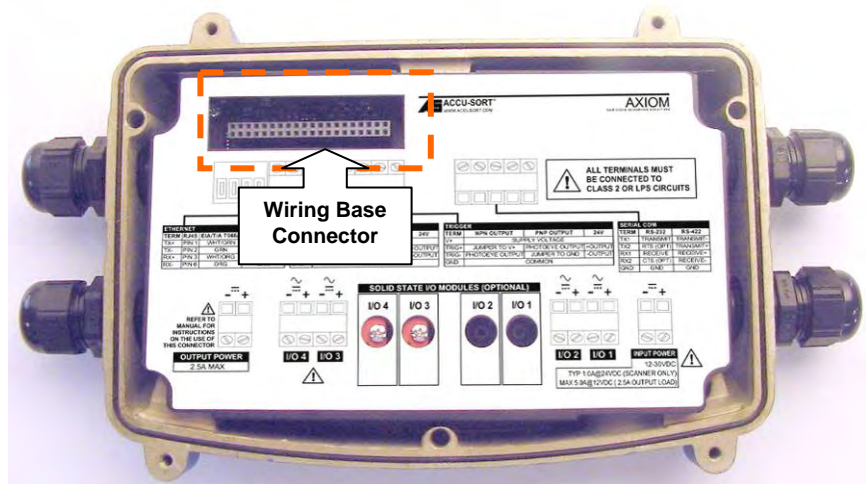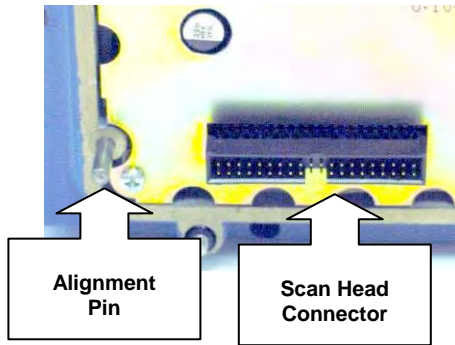
3. Gently press the scan head down until it firmly connects with the wiring base.

4. Secure the scan head to the wiring base with the four captive screws.

5. Alternately tighten screws. DO NOT over-tighten screws.

Installing an AXIOM-X Scan Head

Perform the electrical installation as outlined in *Chapter 4*. Once all wiring is checked for accuracy, install the AXIOM-X scan head to the wiring base. 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.
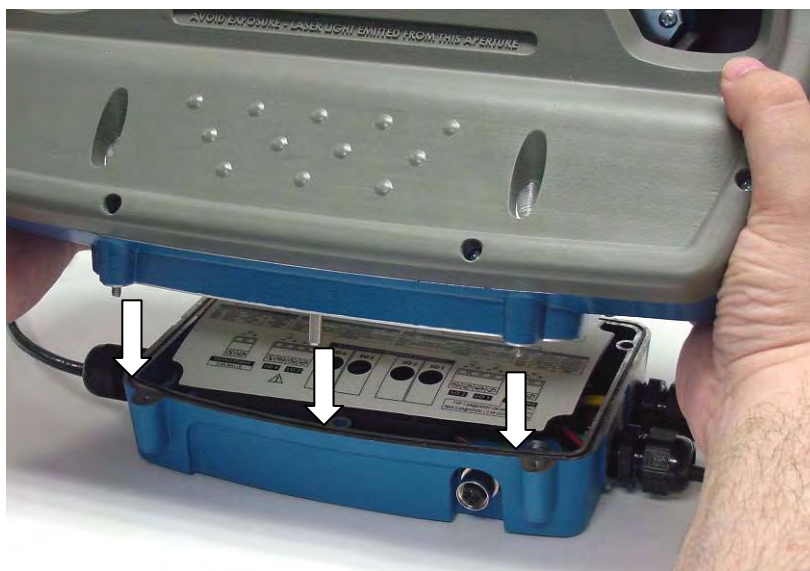
2. Use   the *Safety during AXIOM-X Scan Head Installation* procedures.

3. Carefully align the scan head alignment pins with the 3 holes in the wiring base. This assures the correct scan head-to-wiring base connector alignment (to avoid bending pins).
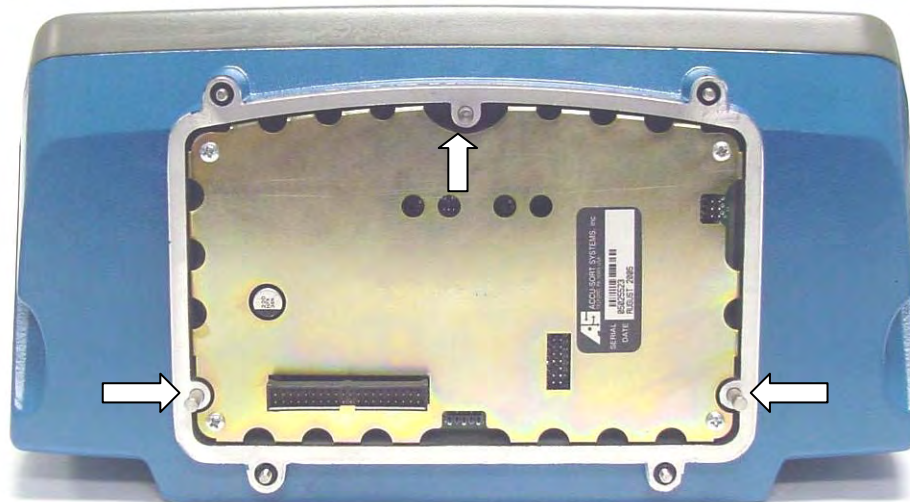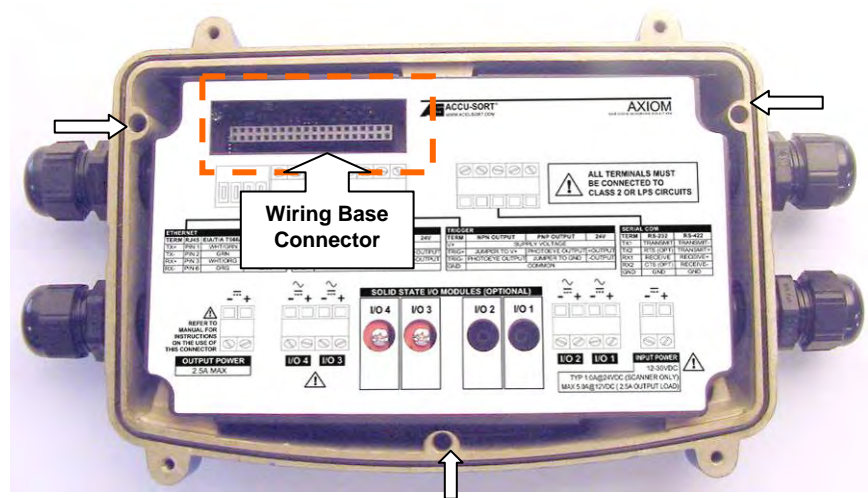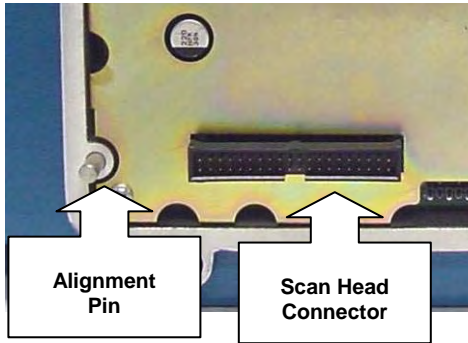
4. Gently press the scan head down until it firmly connects with the wiring base.

5. Secure the scan head to the wiring base with the four captive screws.

6. Alternately tighten screws. DO NOT over-tighten screws.

Safety during AXIOM-X Scan Head Installation

⚠️ **CAUTION:** Although the scan head only weighs 14.5 lbs [6.6 kg] proper lifting techniques are still required to avoid the potential for back injuries.

Top Read Installation with Overhead Space

1. Install scan head onto wiring base with the mounting bracket adjusted as shown.

2. Tighten the four screws that hold the scan head to the wiring base.

3. Adjust mounting bracket angle *downward* to meet the required application setup.

Direction of Conveyor Travel
(Top Read)

Top Read Installation with Limited Overhead Space

1. Install scan head onto wiring base with the mounting bracket adjusted as shown.

2. *Use upper body to stabilize scan head* as you tighten the four screws that hold it to the wiring base.

3. Adjust mounting bracket angle to required application setup.
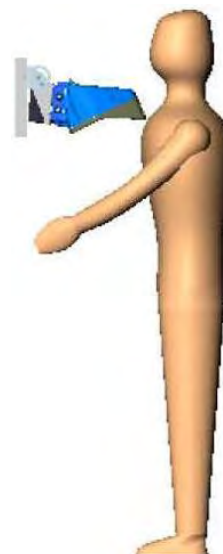
Direction of Conveyor Travel
(Top Read, limited space)

Side Read Installation

1. Install scan head onto wiring base with the mounting bracket adjusted as shown.

2. *Use upper body or torso to stabilize scan head* as you tighten the four screws that hold it to the wiring base.

3. Adjust mounting bracket angle to required application setup.
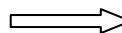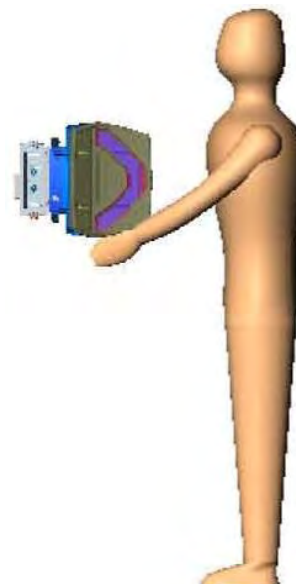
Direction of Conveyor Travel (Side Read)

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 / AXIOM-X contain electronics that may be affected by electrostatic discharge (ESD). To prevent personal injury or damage to the unit, 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.
- Review the electrical installation drawings provided in *Appendix E.*
- 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 laptop or desktop computer. *(See Chapter 5, Getting Started.)*

Installation Sequence(s)

NOTE: Everything should be MECHANICALLY INSTALLED before performing any ELECTRICAL INSTALLATION. *See Chapter 3 for mechanical installation details.*

Installing a Single Unit

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

- **Complete mechanical installation.**
  - See Chapter 3.
- **Complete electrical installation.**
  - Ground the mounting structure to protective earth (PE) ground.
  - Ground the wiring base to protective earth (PE) ground.
  - Connect the power supply to wiring base.
  - CHECK   POLARITY.
  - Connect trigger to wiring base.
  - Connect tachometer to wiring base.
  - Connect communications to wiring base.
  - Connect wiring for I/O module(s) to wiring base.
  - Attach scan head to wiring base.

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 / AXIOM-X.**
  - See Chapter 5.
- **Check operations.**
  - See Chapter 6.

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.

(See drawings 107480 and 107481 in Appendix E.)

Special instructions for functional set-up of a multi-reader network are provided in *Chapters 5 and 6.*

General Electrical Installation Guidelines

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 / AXIOM-X use lasers for bar code scanning. Do not view directly with optical instruments (binoculars or telescopes). Avoid unintentional exposure to laser light whenever possible.

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.
- Allow approximately 8-12 inches [203-305 mm] of clearance 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 / AXIOM-X

After completing mechanical installation, use this section to properly wire you AXIOM reader for optimal performance in your application. All wiring connections 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.
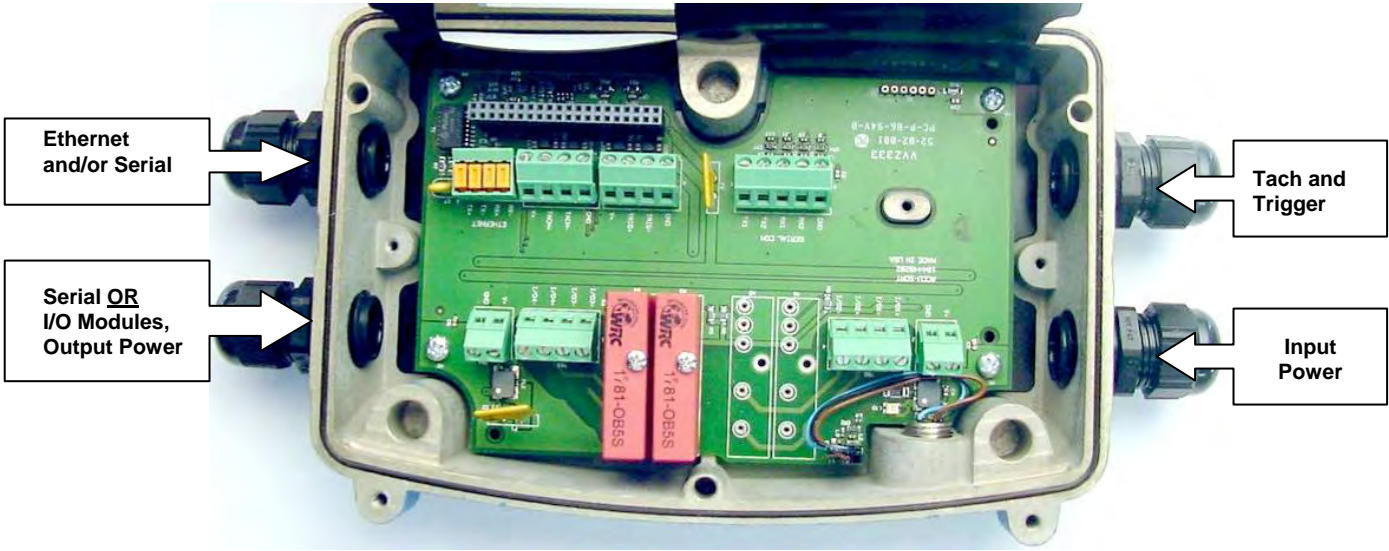
Wiring tables, printed on the wiring base insulation cover, help simplify installation. Remember: Wire to the terminal blocks, left-to-right, coordinating your wiring with the table, top-to-bottom.
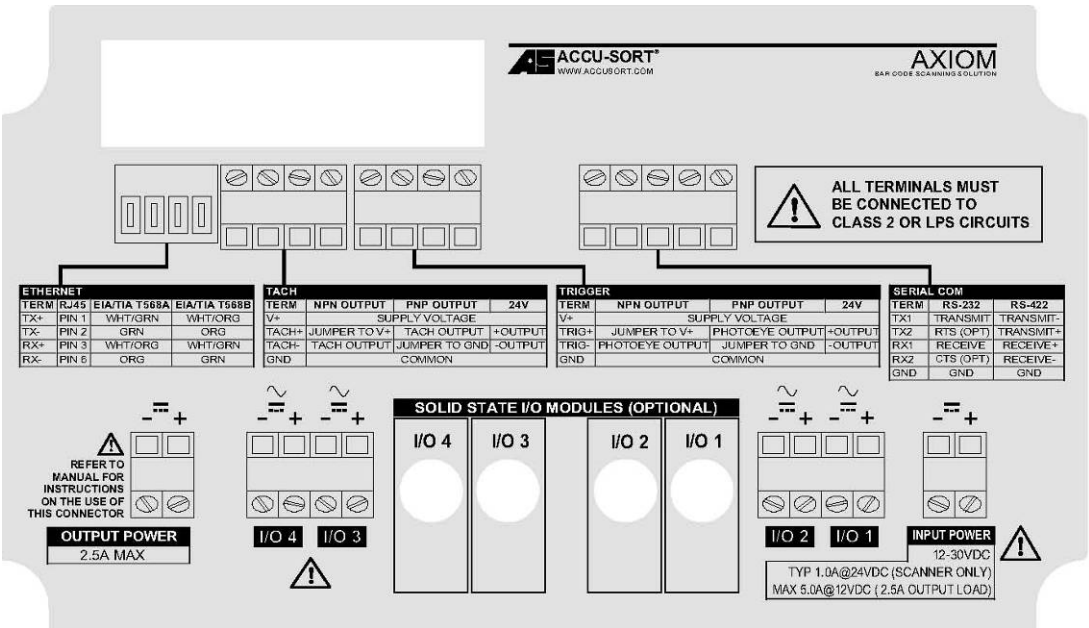
WARNING: To assure no ESD damage will occur, be sure to observe the precautions outlined in *Chapter 2, Safety*.

IMPORTANT: Ground the wiring base to safety ground (protective earth ground (PE)). See wiring recommendations for safety ground.
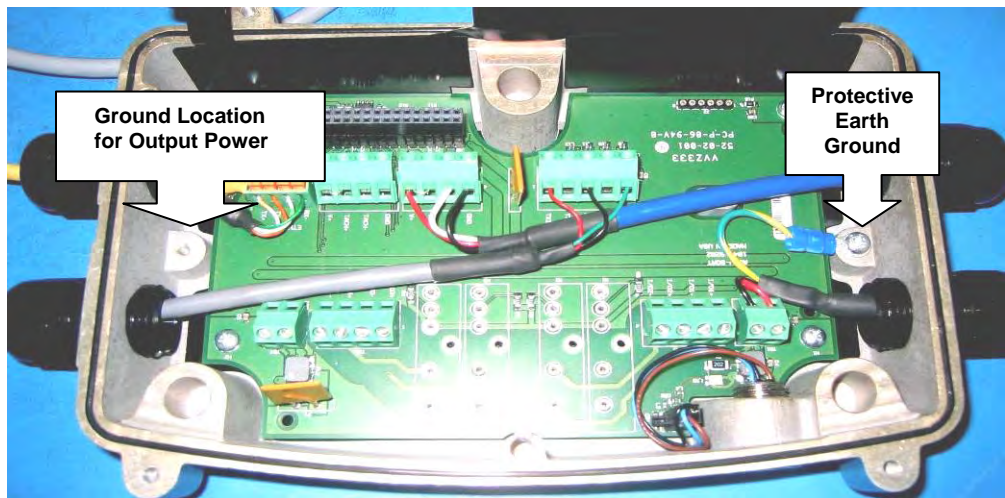
Example of Proper Wiring

Only use connectors designed for connecting to aluminum.
See also:
- 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. Follow Accu-Sort's 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.
- Each cord grip comes with two different size grommets. Use the grommet size that provides the tightest fit.

NOTE: To maintain the unit's IP 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 reader will be watertight.

- Make sure you use Teflon tape (or other thread sealant) to maintain the reader's IP rating. (AXIOM is IP65, AXIOM-X is IP54.)
- Once all cabling is completed, plug all unused wiring base openings.
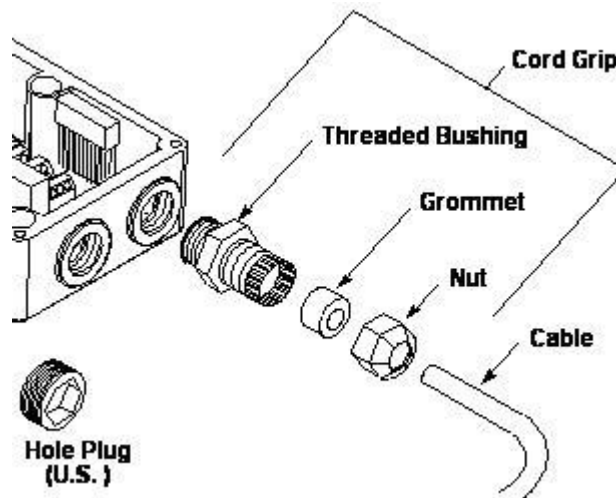
Conduit Connections to Wiring Base

- Where the conduit meets with the wiring base, you will need to supply the correct conduit fittings.

- Use flexible conduit whenever possible to allow for range of motion adjustments, especially when the UMB is used.

- Once all conduit connections are completed, plug all unused wiring base openings.
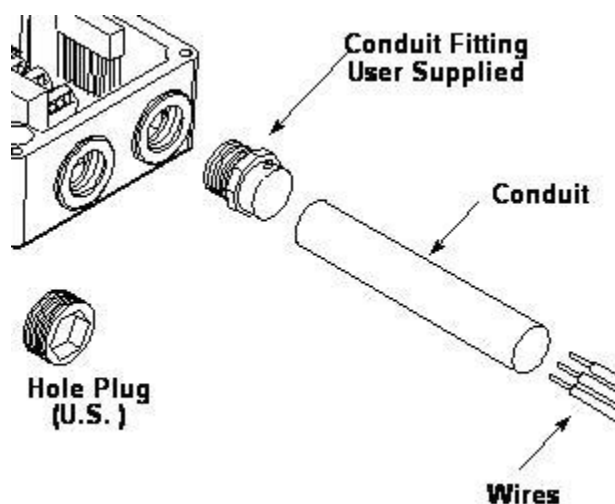
Plug Unused Wiring Base Openings

- Three (3) wiring base **hole plugs** are supplied. Use these plugs on unused openings. All unused openings MUST be plugged to maintain IP54 rating. Use Teflon tape (or other thread sealant) when inserting the hole plug in the conduit opening.

- 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.

How to Maintain an IP65 Rating

⚠️ **IMPORTANT:** Use the Teflon tape provided with the AXIOM / AXIOM-X wiring base to assure the unit maintains its IP65 rating.

1. Wrap the cord grips with Teflon tape.

2. Install the cord grips into the wiring base openings.

3. Assure that the Teflon tape is threaded through the opening.

4. After wiring to the terminal blocks, secure the cables by tightening the cord grip. (Cables should be tight with no slipping when pulled.)

5. Wrap hole plugs with Teflon tape. Seal any unused openings.
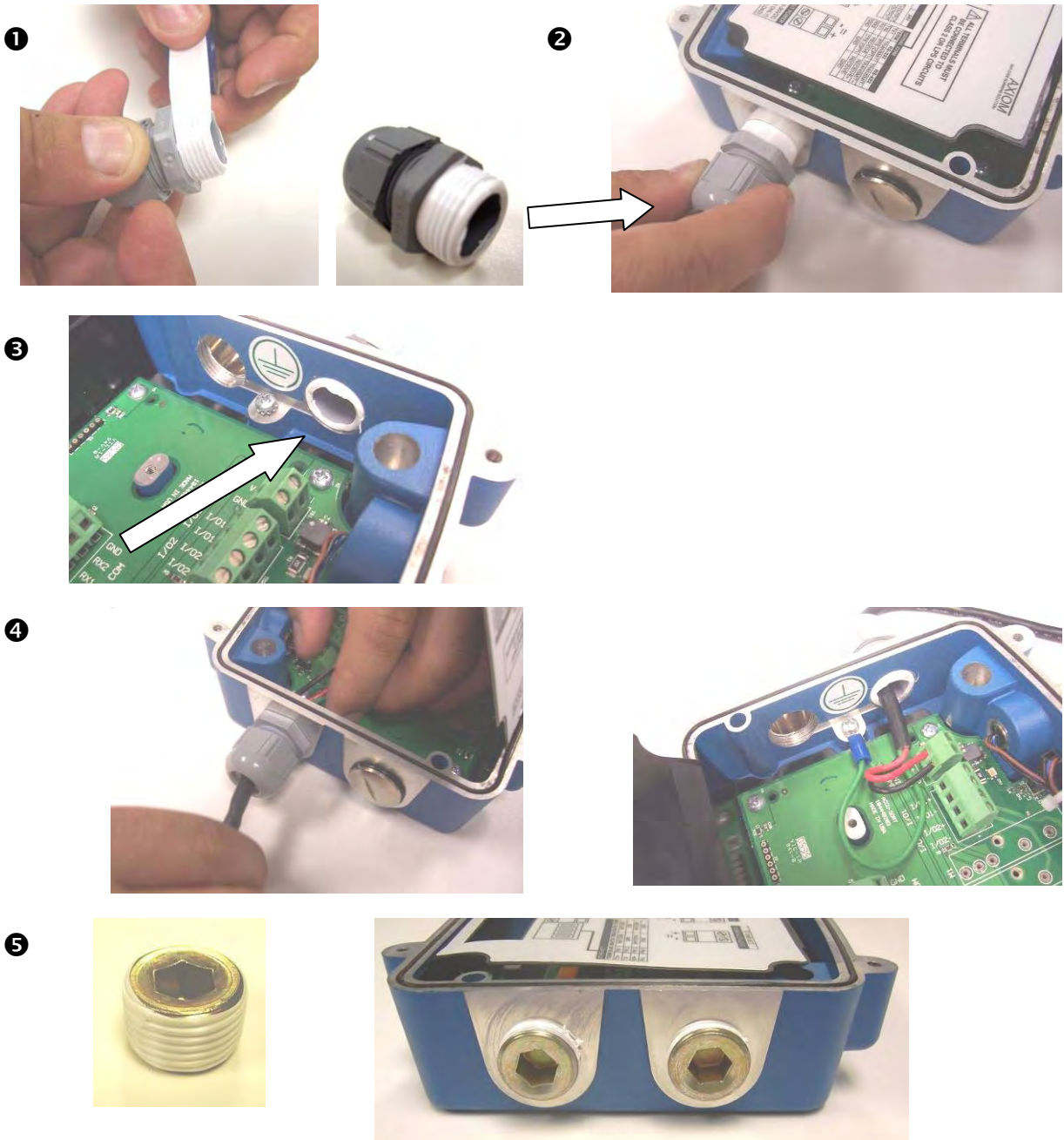
Power Supply Connections

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.

IMPORTANT: All power connections must be quick-disconnect. For PERMANENTLY CONNECTED EQUIPMENT (i.e., reader using DC power) a readily accessible disconnect device must be incorporated in the building installation wiring. For PLUGGABLE EQUIPMENT (i.e., reader using AC power supply with non-detachable power cord), the socket-outlet must be installed near the reader's power supply. The outlet must be a readily accessible disconnect device.

Using Accu-Sort Power Supplies

Single Reader The AXIOM readers require 30 watts (maximum) of power. Accu-Sort power supply options are available for either domestic or international installations and are rated for IP40 and IP65 environments.

1. Connect the power supply to the wiring base's **INPUT POWER** terminal blocks. The arrow on the figure below indicates the location of the TBs.

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 *page 47*.
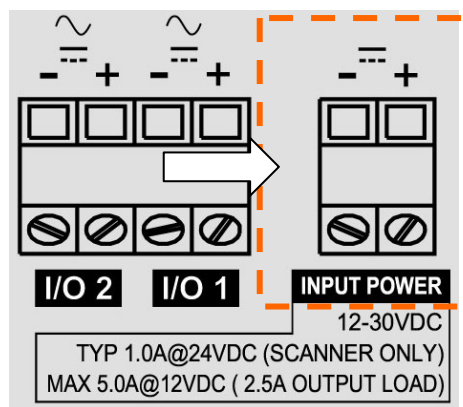
CAUTION: The **INPUT POWER** wiring table indicates 2.5A output load. This is for applications using other power supplies. The Accu-Sort power supply can handle an output load of 250mA.

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

AXIOM X-Pattern Applications When using two AXIOMs and the X-pattern mounting bracket (XMB), an Accu-Sort 110W supply is available that provides power to both readers. *(See drawing 107480 in Appendix E.)*

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* reader.

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 reader in the wiring daisy-chain.

2. By using the OUTPUT POWER terminal block, a total of three readers may share a power source. NO MORE than three readers may be daisy-chained to one power source.

3. Wire a cable from the OUTPUT POWER of the first reader to the INPUT POWER of the second reader.

4. Wire a cable from the OUTPUT POWER of the second reader to the INPUT POWER of the third reader.

5. Wiring MUST be grounded at both ends of the INPUT POWER and OUTPUT POWER connection.
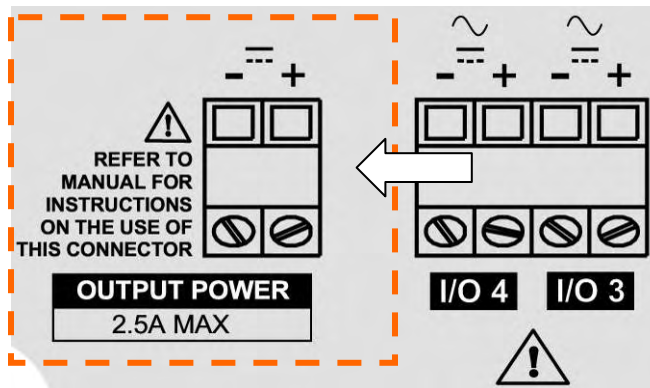
Output Power Wiring

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 wiring base, other devices wired to it (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-X are daisy-chained together, check polarity in the correct sequence.
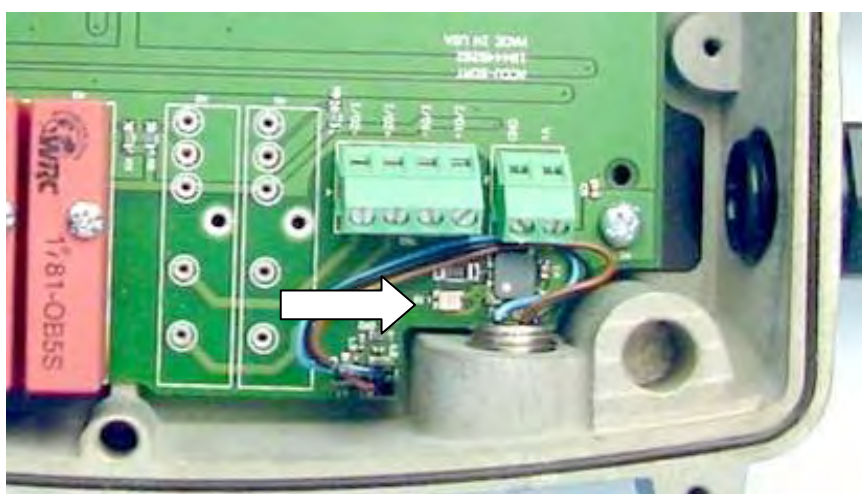
Location of Polarity LED in Wiring Base

1. Apply power.
2. Check that all Polarity LEDs are **GREEN**. If multiple AXIOM-X 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.

NOTE: 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

AXIOM readers support 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.

UTPUT	PNP OUTPUT	24V	TRIGGER			
			TERM	NPN OUTPUT	PNP OUTPUT	24V
SUPPLY VOLTAGE			V+	SUPPLY VOLTAGE		
R TO V+	TACH OUTPUT	+OUTPUT	TRIG+	JUMPER TO V+	PHOTOEYE OUTPUT	+OUTPUT
UTPUT	JUMPER TO GND	-OUTPUT	TRIG-	PHOTOEYE OUTPUT	JUMPER TO GND	-OUTPUT
COMMON			GND	COMMON		
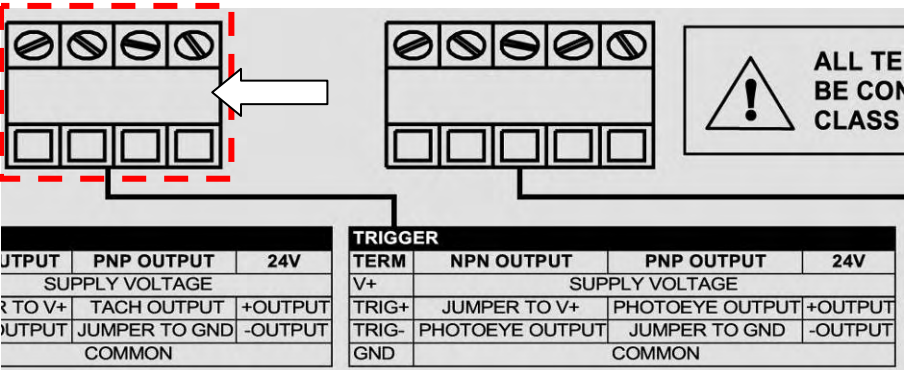
Wiring Trigger to Wiring Base

Connect trigger wiring to the wiring base terminal blocks. Wire the Accu-Sort photoeye as indicated in shaded area of the table below. *(Wire colors indicated for standard NPN Output, shown in shaded areas.)*

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 +24VDC source (24V) and not draw more than 100mA. The trigger input must be able to sink (or source) 10mA at +24VDC.

NOTE: 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-X Controller. *(See drawings 107480 and 107481 in Appendix E.)*

Tachometer Connections

In applications where product tracking is required, a tachometer is typically used. Connect the tachometer wiring to the wiring base terminal blocks.

TACH TERM	NPN OUTPUT	PNP OUTPUT	24V
V+	SUPPLY VOLTAGE		
TACH+	JUMPER TO V+	TACH OUTPUT	+OUTPUT
TACH-	TACH OUTPUT	JUMPER TO GND	-OUTPUT
GND	COMMON		
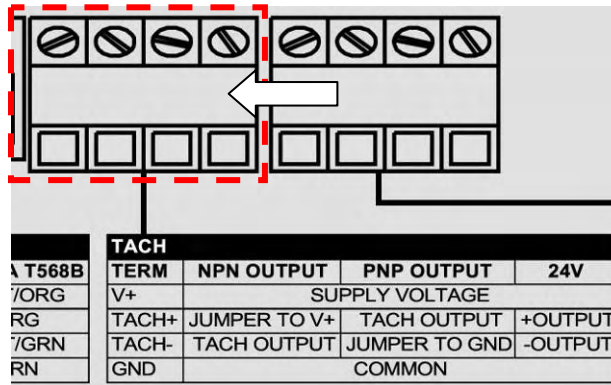
Wiring Tachometer Input to Wiring Base

When a tachometer is required, the Accu-Sort tachometer is recommended. Wire this tachometer as indicated in shaded area of the table below. *(Wire colors indicated for standard NPN Output, shown in shaded areas.)*

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		

WARNING: The maximum tachometer current should not be more than 0.3 amps @ 24 volts.

The shielding for the tachometer wiring MUST be terminated to earth ground. Otherwise, belt static could result in a system failure.

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 / AXIOM-X Controller. *(See drawings 107480 and 107481 in Appendix E.)*

Using Ferrite Clamps when Wiring Tachometer

In order to absorb transient currents generated by motors and belts, two ferrite clamps should be added to the TACH cable as shown below. Doing this prevents external noises from damaging the wiring base and scan head.

Close-up of Ferrite Clamp
in the open position
(included with the wiring base)

Proper positioning of ferrite clamps on tachometer cable
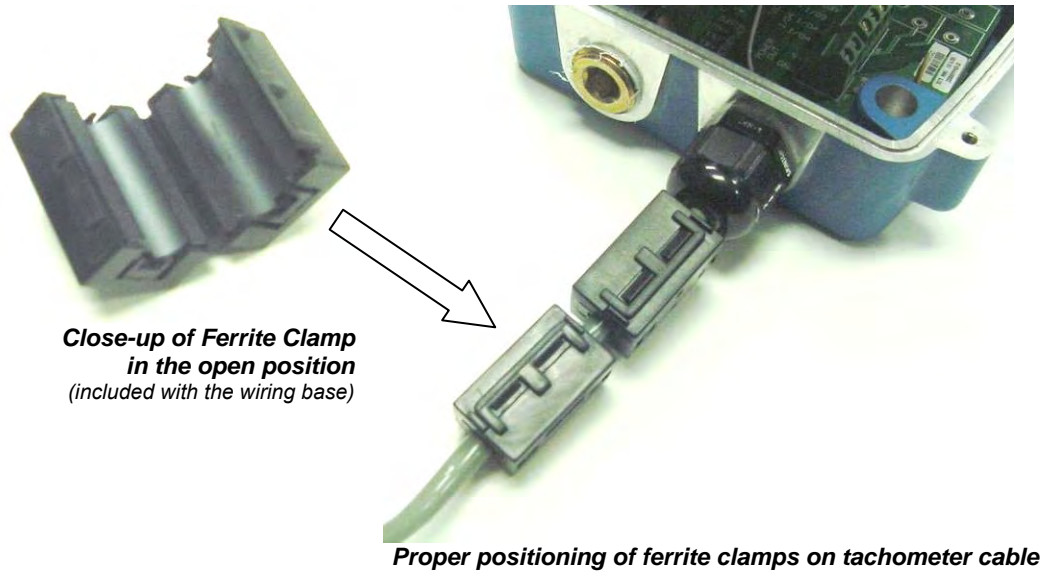
RS232/422 Communications Connections

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

TRIGGER				SERIAL COM		
TERM	**NPN OUTPUT**	**PNP OUTPUT**	**24V**	**TERM**	**RS-232**	**RS-422**
V+	SUPPLY VOLTAGE			TX1	TRANSMIT	TRANSMIT-
TRIG+	JUMPER TO V+	PHOTOEYE OUTPUT	+OUTPUT	TX2	RTS (OPT)	TRANSMIT+
TRIG-	PHOTOEYE OUTPUT	JUMPER TO GND	-OUTPUT	RX1	RECEIVE	RECEIVE+
GND	COMMON			RX2	CTS (OPT)	RECEIVE-
				GND	GND	GND
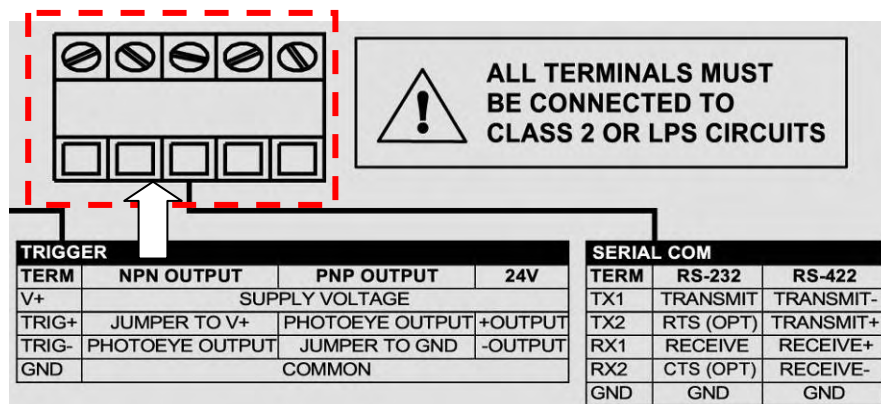
RS232 Connections

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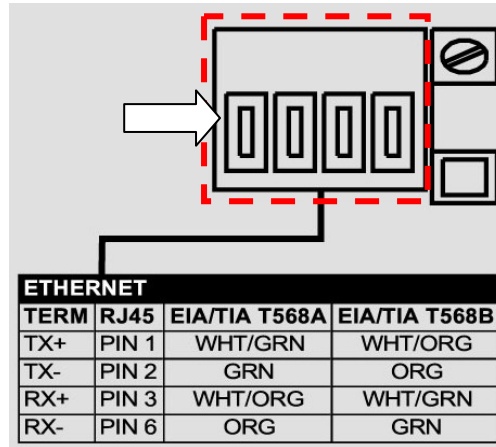
IMPORTANT: Do not strip wires before inserting them into the Ethernet terminal block.

For additional details on Ethernet and EtherNet/IP communications, go to *Appendix C: AXIOM Networking Guide.* Another useful source of information is the ODVA official web site *(www.odva.org).*

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

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

Multiple Readers   Most multi-reader applications will use Ethernet or EtherNet/IP communications. See the following drawings on the documentation CD 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. *(See table below.)* 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.
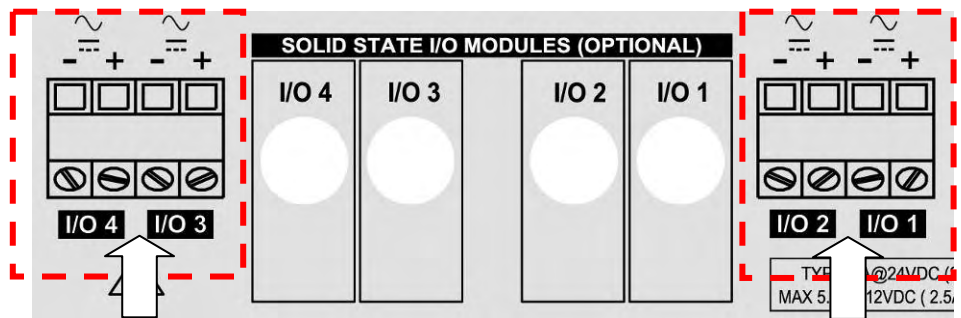
Part Number	Description	Color	Rating	Current Range
1000056135	DC Input Module	white	3.3 to 32 VDC	32 mA
1000056136	DC Output Module	red	3 to 60 VDC	3 A max. *
1000056137	AC Output Module	black	12 to 42 VAC	3 A max. *

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

* Derate 33mA/deg above 25C.

Proper I/O module wiring is shown for the following applications on drawings found in *Appendix E*:

- 107482 – End Trigger Photoeye
- 109364 – Height Tracking Photoeyes (for AXIOM-X)
- 107483 – Stack Light

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.
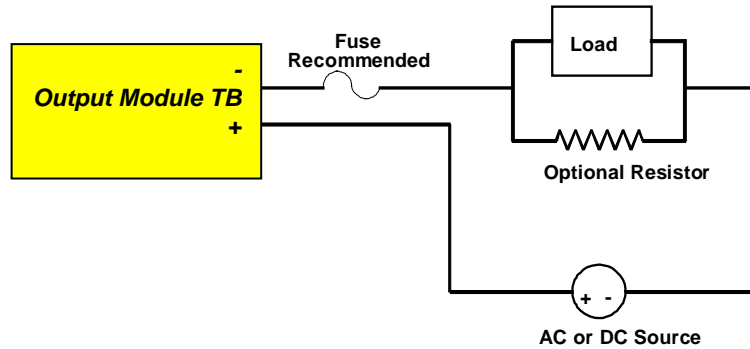
Optional Resistor for High Impedance Loads

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.
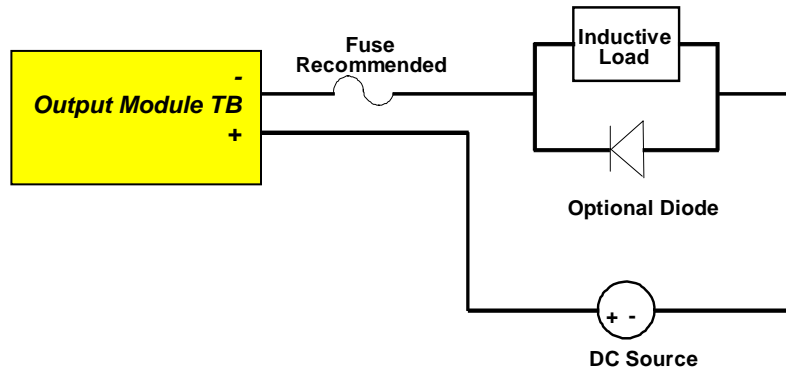
Optional Diode to Dissipate Back EMF

An example output module application is the use of a Stack Light with three output modules. Each module will send a signal to the stack light to visually indicate specific conditions (e.g., green = read, yellow = multiple codes, red = no read). *(See drawing 107483 in Appendix E.)*

Input Module Application

Input module 1000056135 is most often used for an **End Trigger Photoeye** application. *(See drawing 107482 in Appendix E.)* It can also be used for **Height Tracking Photoeyes**. *(See drawing 109364 in Appendix E.)*

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 or AXIOM-X 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 Installation

After completing the installation of your AXIOM / AXIOM-X:

- Confirm that the reader 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 reader's parameters to meet the needs of your application. *(See Chapter 5 and online help for details.)*

- See Chapter 5 and 6 for details regarding **first-time startup** and an **operations checklist**.

Notes:

5 Setup

Getting Started

The AXIOM bar code readers are designed for ease-of-setup so they can be seamlessly configured for your application.

AXCESS Setup Software for AXIOM is the tool you will use to define operating parameters, determine bar code read quality, and construct output messages, including filtering, stripping and padding capabilities. Functioning under the familiar Windows® operating system on your computer, AXCESS enables you to easily configure, fine-tune, and monitor your AXIOM's operations.

AXCESS provides ease-of-use for any operator level. A beginner operator follows basic setup procedures for a standard configuration. More experienced operators may 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.

To download the latest version of AXCESS for AXIOM:

1. Go to the Accu-Sort website (www.datalogic.com)

2. Select   **Support > Downloads** in the drop-down menus.

3. Complete   the **Downloads Request Form**.

4. On   the **Downloads** page, scroll down to **Scanner Setup Software**.

5. Download the AXCESS for AXIOM ZIP file. (Save the file *Install_AXIOM_AXCESS_x-x-x.zip* to a folder on your computer.)

6. A   **Download** dialogue box will show a progress bar until the *"Download complete"* message is displayed.

NOTE: The latest version of the **AXIOM/AXIOM-X Product Line Manual** can also be downloaded from the Accu-Sort website.

To install the AXCESS for AXIOM software:

1. If you are installing AXCESS immediately after downloading it, click **"Open Folder".** If installing later, you will need to locate the ZIP file you downloaded to your computer.

2. Double-click the ZIP icon.
    (A window opens showing the AXCESS files.)

3. Drag and drop the files into a folder on your computer's hard disk.
    (Recommended: C:\Program Files\Accu-Sort\AXIOM-AXCESS)

4. Double-click   the **Setup.exe** icon.

5. Follow   the **AXCESS Setup Wizard** prompts to install the *AXCESS Setup Software* on your computer.

6. After   the *"AXIOM AXCESS setup was completed successfully"* message is displayed, click **"OK".**

To start the AXCESS for AXIOM software:

AXCESS

1. Locate the AXCESS program icon on your computer.

2. Double-click the icon to launch.

3. After starting the AXCESS program, the first window you see is the Main window.

4. You are ready to begin. Your next steps are to:

    - Explore the AXCESS user interface
    - Establish a connection with an AXIOM
    - Use AXCESS to configure an AXIOM

AXCESS User Interface Basics

This chapter introduces you to the AXCESS user interface and teaches you a few simple concepts and functions you need to start working with AXCESS.

Specifically, this chapter describes how to:

▪ Use **AXCESS Wizard's** step-by-step approach to configuring a reader.

▪ Navigate around the application using **AXCESS Explorer** window functions.

To use AXCESS effectively, you need to understand its user interface. The figures in this chapter show AXCESS running in a Window environment, displaying windows typically seen when using Windows 98-2000.

AXCESS Main Window

Drop-down Menus

Option Group

Drop-down List

Button

Toolbar

AXCESS Explorer

Modal Window

Status Line

Region

AXCESS Wizard

AXCESS User Interface
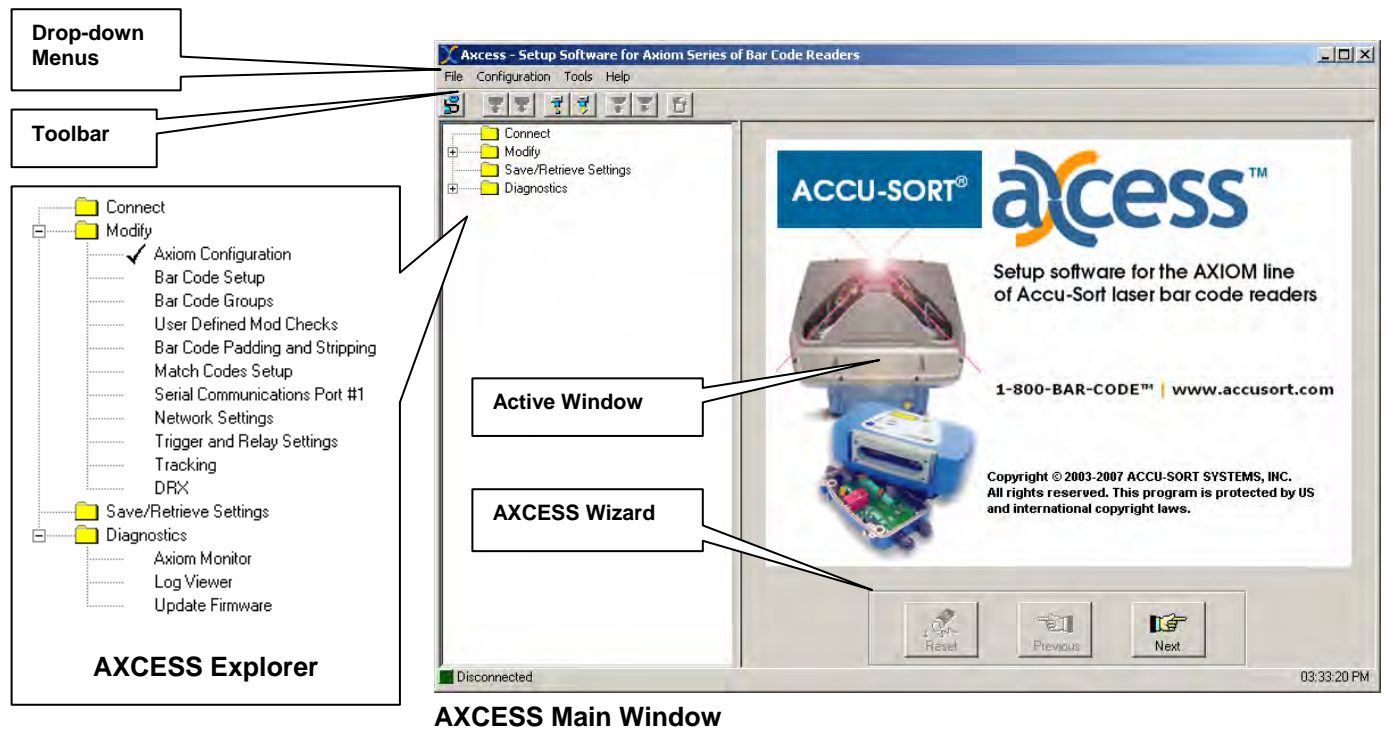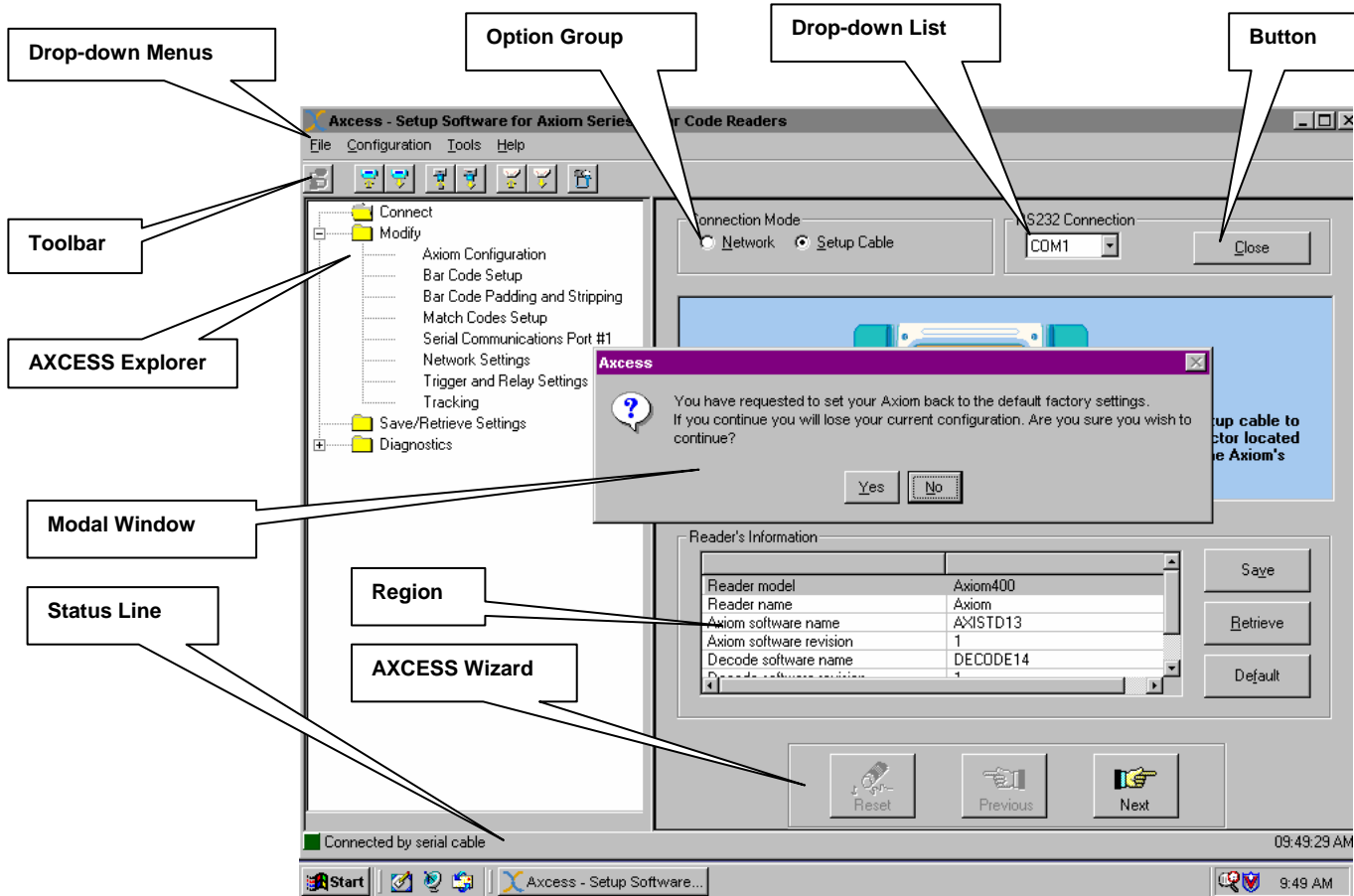
AXCESS Setup Software User Interface Terms

| Term	Definition
Screen	Represents the information display area of your computer monitor. Also referred to as a desktop.
Window	A window is a box around a set of related information on your screen. Many windows can appear on your screen simultaneously and can overlap, appear adjacent to, or on top of each other. You can move a window to a different location on your screen.
AXCESS Window Title	Each window title is identified by the highlighted folder or check-marked selection in AXCESS Explorer. Window titles may also appear at the top of new windows that appear on-screen.
AXCESS Setup Window	Whenever you launch AXCESS software, the AXCESS Setup window appears on your screen. This window displays the drop-down menu bar, toolbar, AXCESS Wizard and AXCESS Explorer.
AXCESS Wizard	Use AXCESS Wizard's 3 buttons (previous, next, and reset) to logically step through the process of completely configuring an AXIOM reader. Recommended for first-time/novice users.
AXCESS Explorer	Use AXCESS Explorer's navigation list when you need to modify specific setup parameters, save/retrieve settings, or access reader diagnostics.
Modal Window	Certain actions you perform in AXCESS may cause a modal window to display. A modal window requires you to act on its contents before you can continue, usually by choosing OK or Cancel.
Block	Every AXCESS window consists of one or more blocks containing information on specific setup parameter. All required fields in a block must be completed before you can move to the next block or setup window. The first or only block in a window assumes the name of the window. Otherwise, block names appear across the top of the block. A horizontal line marks the beginning of the block.
Region	A region is a collection of logically–related fields set apart from other fields by a rectangular box. Each block can optionally contain one or more regions. Regions help to organize the information within a block. A scrollable region is a region whose contents are not entirely visible in a window. A scrollable region contains a horizontal or vertical scroll bar so that you can scroll horizontally or vertically to view additional fields hidden in the region. In addition, if a field is partially hidden you can scroll the region to fully display the field by clicking on the partially hidden field.
Field	Each block contains fields you use to enter, view, update, or delete information. A field prompt describes each field by telling you what kind of information appears in the field or what kind of information you should enter in the field. Fields that allow you to enter data are white and display a beveled border. Fields that are display–only are white and do not have a beveled border. If a field is disabled, it is dimmed. The term field generally refers to a text field, an area in a window that either displays data or allows you to enter data.
Check box	You can indicate an on/off or yes/no state for a value by checking or unchecking its check box.
Option Group	An option group is a set of option buttons. You can choose only one option button in an option group at a time, and the option group takes on that button's value after you choose it.
Status Line	The status line, located along the bottom of the AXCESS window, displays helpful hints or status messages during reader setup and diagnostics. May also be referred to as the message line.
Drop-down Menu	These menus (File, Configuration, Tools, and Help) are across the top left corner of the AXCESS window, just below the window title.
Drop-down List	A drop-down list, or poplist, lets you choose a single value from a short list. To choose a value, click the drop-down list down-arrow to display the list choices, then drag your mouse through the list to the desired value. Release your mouse button to choose the highlighted value and display it in the drop-down list field.
Toolbar	The Toolbar is a collection of iconic buttons that each perform a specific action when you choose it. Each button replicates a commonly–used function also found in the drop-down menus and AXCESS Explorer. Use your mouse to move the arrow cursor over the toolbar to display the functional names of the buttons.
Button	You choose a button to initiate a predefined action. A button is usually labeled with text to describe its action or it can be an icon whose image illustrates its action. Depending on the context of a field or window, a button can be enabled or disabled.

Navigating AXCESS

Once you proceed to the next screen and begin reader setup, the Main window is not accessible again until you exit and restart AXCESS.

Click the **Next** button to continue to the **Modify** window.

The **Modify** window introduces you to **AXCESS Wizard** and **AXCESS Explorer**. AXCESS Explorer, the frame on the left side of every window, allows easy navigation through the setup windows. This frame is a dynamic interface: Depending on the selection of certain options, and the configuration of your reader, access to specific windows becomes available.
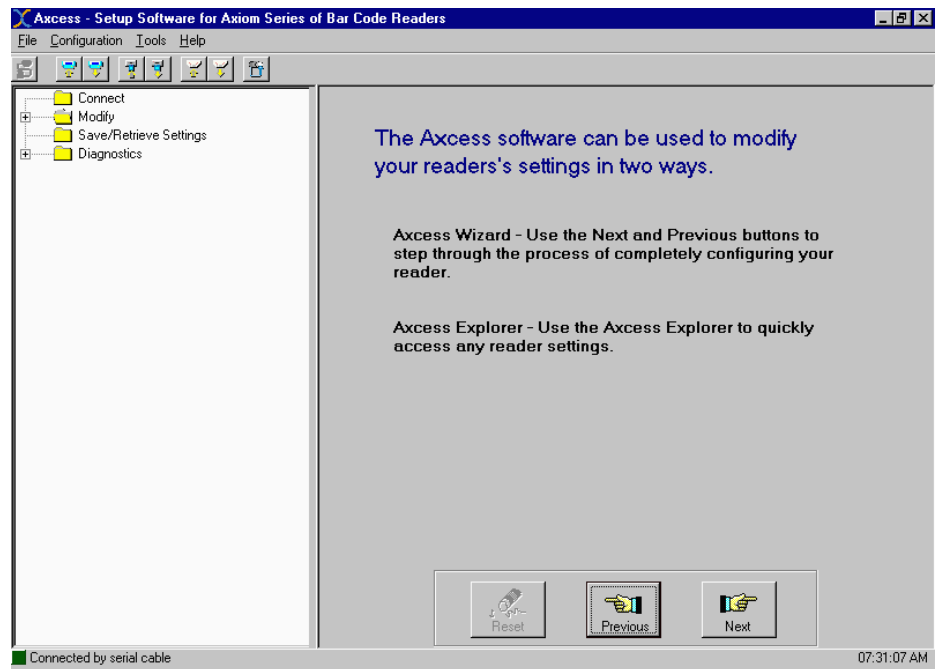
AXCESS Modify Window

You can navigate through the AXCESS software using any of three methods:

- Menu   Bar
- AXCESS   Explorer
- AXCESS   Wizard

Menu Bar

The main menu bar includes the following pull–down menus:

- File
- Configuration
- Tools
- Help

You use these menus to navigate quickly to specific AXCESS functions, to save, edit or retrieve data, or to perform various actions.

AXCESS Explorer

The functions that you can select are displayed in a navigation list on the left–hand side of the AXCESS Explorer frame. The function list is organized much like the hierarchy of a file system, where you can expand items that begin with a plus sign (+) to further sub–levels until you find a function of interest.

Sub–levels appear indented below the items from which they are expanded. Items that are expanded are preceded by a minus sign (–). You can expand no further when an item displays neither a plus or minus sign.

The AXCESS Explorer list appears with no items expanded. Click the folders to display the active window for the setup function and/or expand the folders to view any additional setup features.
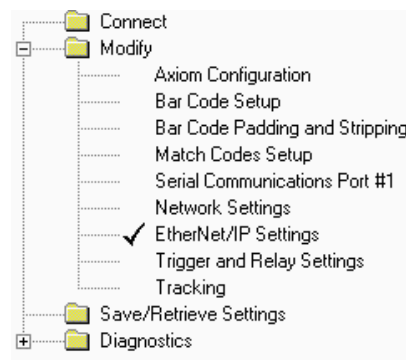
AXCESS Wizard Buttons

The reset, previous, and next buttons are part of the AXCESS Wizard. The wizard allows you to proceed easily through a predefined sequence of screens in the reader setup. Each screen must be completed before you can proceed to the next screen.

Button	Function
Reset	Quickly reverts all the values on any actively displayed screen to the configured default values.
Previous	Steps to the previously displayed screen. Use this button to step back through one or more screens.
Next	Steps to the next available AXCESS screen. Typically, you will need to complete the current screen before going to the next screen.

Getting Help

AXCESS provides complete online help. Whenever you need assistance, simply choose an item from the Help Index to pinpoint the information you want.

To display help for a current window:

1. Choose   **Help Index** from the Help drop-down menu or press the **F1** key. A help window appears, providing you with information and an index of topics associated with the current application window.

2. Click on a topic of interest to display more detailed information.

3. You can use the menus or buttons in the help window to navigate to other topics of interest, or from the **File** menu in the help window, you can choose **Exit** to quit from Help.

NOTE: Pressing **F1** will bring up Help for the current AXCESS window.

Connecting to an AXIOM

You must connect to a reader in order to modify, send, or retrieve any parameters. Upon startup, your AXIOM remains disconnected until you activate the command to connect.

There are two ways to make a connection to an AXIOM:

- AXCESS Setup Programming Cable (standard) or
- Through a connection with your Network (typically Ethernet)

To connect to an AXIOM via the setup cable:

1. Connect the programming cable to the setup connector located on the front of the wiring base. (All AXIOM readers use the same type of wiring base and programming cable.)

2. Connect the other end of the programming cable to your computer. Be sure to note which COM port you are connected to on your computer.

3. Click the AXCESS Wizard's **Next** button. (You can also use AXCESS Explorer's Connect function, the Connect button on the button menu or **Connect to AXIOM** from the **Configuration** drop-down menu.)

4. The next screen is **Connection Mode**, which is used to establish a connection with the reader. The type of connection, setup cable or network, determines which options will be displayed.

5. In the Connection Mode options group, click the **Setup Cable** option button. (AXCESS is preset to default to the Setup Cable mode.) Be sure to select the correct COM port from the **RS232 Connection** drop-down list.
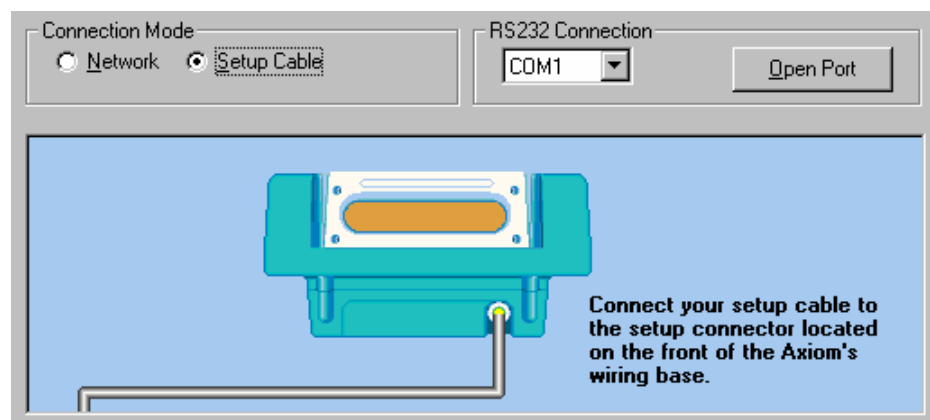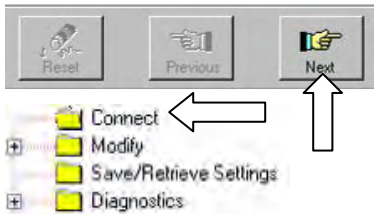
To open a communication port:

1. Click   the **Open Port** button.

2. Once the reader connection is complete, the message "**Connected by serial cable"** appears in the status line.

3. The   **Connection** window displays the **Reader's Information**. The type of AXIOM (1L, 2L, 4L) or AXIOM-X (2L, 4L) is identified in the Reader model line.
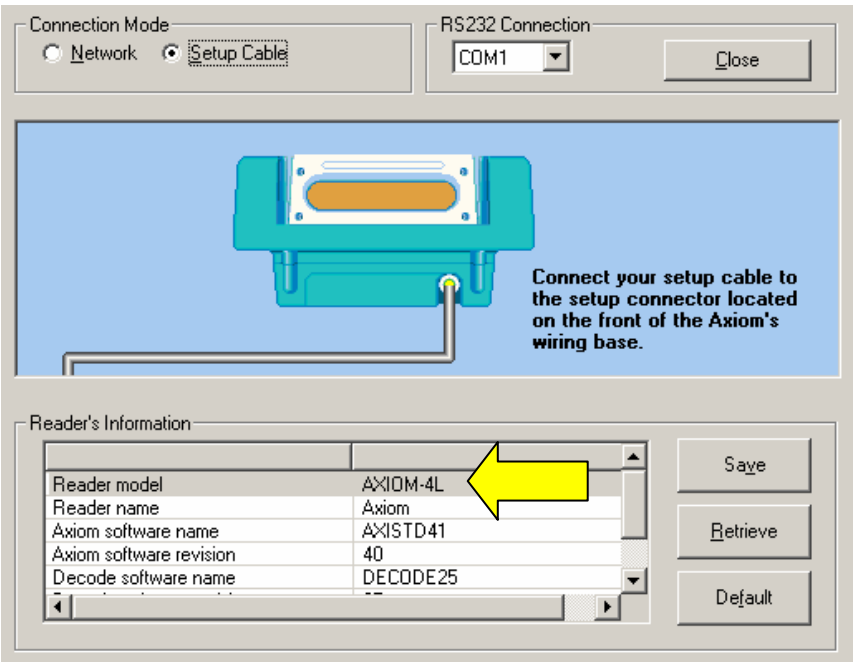
Connection – Open Port

4. If a connection is not made, *"No reply received from AXIOM"* message is displayed.

5. Check the cable connection between the reader and computer to assure proper connection, and then click **Open Port**.

Reader's Information Buttons

Button	Definition
Save	Saves the reader information to scan head.
Retrieve	Retrieves the reader information from scan head.
Default	Returns the reader configuration to the default settings.

NOTE: Selecting Default will return your reader to the default factory settings. Since your AXIOM may have been pre-configured for your application at the factory, it is recommended that you ALWAYS save your reader parameters to disk before using the default function.

To connect to an AXIOM via network:

1. Confirm the AXIOM is properly connected to your Ethernet network. *(See Chapter 3.)*

2. Assign a valid IP address to the AXIOM.

3. In   the **Connection Mode** options group, click **Network**.

4. Select the IP address of your AXIOM from the **Reader's IP Address** list. (If this is your first time, you may need to add the AXIOM's IP address to the **Reader's IP Address** list.)

5. To verify the AXIOM can be accessed on the network, click **Ping**. The status will be returned in the **Reader's Status** column on the **Connection** window.

6. To connect to the AXIOM over the network, click **Connect**.

NOTE: If you have enabled the use of a password for all network access, you will be prompted for a password after this step.

AXCESS Connection Window with Network Selected

Button	Definition
Add IP	Opens the **Add/Edit IP Address** popup window.
Remove	Enables removal of the selected Reader's IP Address.
Connect	Allows you to connect to the selected reader.
Ping	Checks network communications with the selected reader.

To add an AXIOM to the Reader's IP Address list

1. Click   the **Add IP** button. The **Add/Edit IP Address** popup window appears.
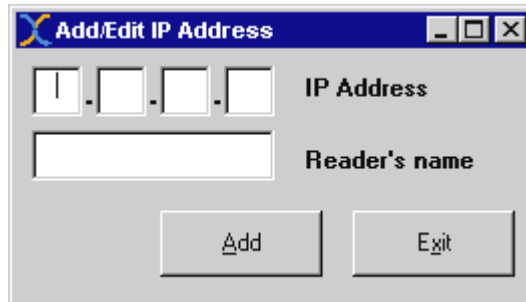
2.   Enter the IP address and reader name in the fields.

3. Click   **Add**. The IP address and reader name will appear in the **TCP/IP connection** fields of the Connection Mode screen.

4.   Repeat steps 2 and 3 in the **Add/Edit IP Address** popup window to enter as many AXIOM readers as necessary for your application.

5. Click   **Exit** to return to the **Connection Mode** screen.

Modify

After establishing a connection with your AXIOM reader, use the **Modify** menu to set all operational parameters to fit your application.

NOTE: AXCESS functionality varies based on the type of AXIOM reader you are setting up. Functions that do not apply to your reader will either not appear on the active screen or will appear grey (rather than black) indicating the function is not applicable.

The parameters are divided into the following categories:

- AXIOM   Configuration
- Bar Code Setup
- Bar Code Padding and Stripping
- Match Codes Setup
- Serial Communications Port #1
- Network   Settings
- Trigger and Relay Settings
- Tracking

The following **Modify** menu items only appear if another function is enabled:

- Bar Code Groups   (Multiple Codes enabled)
- FAST Monitor Configuration   (Collect FAST Monitor Statistics selected)
- User Defined Mod Checks   (Advanced Setup selected)
- Message Definition – Port #1   (User Defined Message selected)
- Message Definition – Net #1   (User Defined Message selected)
- Message Definition – Net #2   (User Defined Message selected)
- EtherNet/IP   (EtherNet IP selected as Message Format of Net Host Port1)
- DRX   (Advanced   Setup selected)

NOTE: Select **Advanced Setup** from the **Configuration** drop-down menu (Configuration > Setup > Advanced).

AXIOM Configuration

Use the **Modify > AXIOM Configuration** window to define the reader name and identify the related software names, revisions, and configuration options.
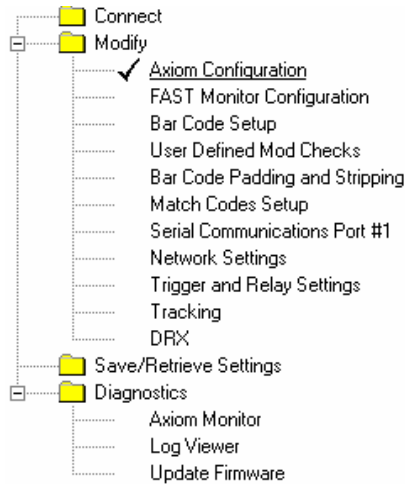
Reader Information

The Reader Information region of the AXIOM Configuration screen identifies the reader name and current software revisions being used by the AXIOM scan head.

Modify > AXIOM Configuration > Reader Information

Field	Definition
Reader Name	User-defined reader name (up to 15 characters). Useful when it is necessary to identify multiple AXIOM readers within the same building or application.
Reader Model	Identifies the type of reader to which AXCESS is connected (e.g., AXIOM 1L, 2L, 4L or AXIOM-X-2L, AXIOM-X-4L).
AXIOM Software Name / Revision	Name of AXIOM software and revision number. Cannot be modified.
Decode Software Name / Revision	Name of decoder software and revision number. Cannot be modified.

Configuration Options

Use the Configuration Options to setup the laser configuration and scan rate if it becomes necessary to change the factory settings to optimize reader performance for your application.

Modify > AXIOM Configuration > Configuration Options

Field	Definition
Laser Configuration	Allows you to specify whether or not laser toggling is enabled. When not enabled, you can select whether the "near" or "far" lasers are used. The **Laser Configuration** option buttons are enabled only if in **Advanced** setup mode.
Scan Rate	Allows you to change the scan rate. Changing scan rate and then saving parameters causes the AXIOM to reboot. AXIOM 700 – 1400 scans/second AXIOM-X 700 – 1120 scans/second
Enable Trigger or Tach Controlled Laser *(checkbox)*	Enabling this function results in the following: **Non-Tracking:** Lasers turn off whenever "trigger" is not active. **Tracking:** Lasers turn off whenever the belt speed is zero or a package has not been detected for two minutes.
Collect FAST Monitor Statistics *(checkbox)*	Enabling this function results in the following: **FAST Monitor Configuration** selection becomes available in the menu tree under Modify. *(See Appendix D.)*

CAUTION: Changing the scan rate and/or laser configuration can adversely affect reader performance. Do not change the scan rate or laser configuration unless instructed to do so by Accu-Sort Technical Support.

Control Panel Options

The AXIOM's control panel is very useful during setup. When the **Enable AXIOM Control Panel Buttons** checkbox is selected, you will be able to use the AXIOM reader's control panel. *(See Chapter 6.)*

Once setup is complete, disable the control panel buttons to reduce the potential for accidentally changing parameters at the scanning area. Clear the checkbox to assure the buttons cannot be erroneously activated.

Modify > AXIOM Configuration > Control Panel Options

Selection	Definition
Use ! Button For Test Mode	Activate the test mode by pressing the "!" button.
Use ! Button to Learn Match Code	Unit operates in Test Mode, but the last code read is also stored in the match code table.

Network Access Options

Control AXIOM network access through these options:

- Password for FTP Only

- Password for All Net Access

Modify > AXIOM Configuration > Network Access Options

Selection	Definition
Password for FTP Only	When selected, FTP access to an AXIOM reader is enabled when the correct password is entered. Use FTP to update and extract the AXIOM firmware and parameter settings. The username for FTP access is always "axiom".
Password for All Net Access	In addition to FTP connections, a password is also required for network connections from AXCESS and Telnet connections. Host communications are not affected.
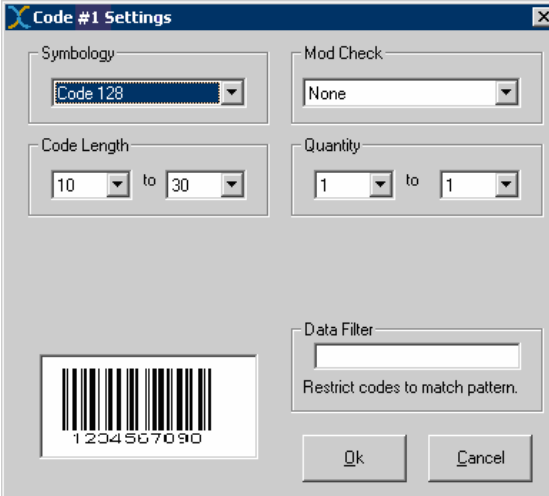
NOTE: If a password is not entered in the field, or an incorrect password is entered, the selected network access option is disabled.

Bar Code Setup

Use **Modify > Bar Code Setup** to define what symbologies the AXIOM should be reading for your application. Additionally, mod-check verification within a bar code can be specified.

AXCESS provides up to four windows for setting bar code parameters:

- Bar Code Setup
- Bar Code Groups
- Bar Code Padding and Stripping
- Match Code Setup

The **Active Bar Code List** identifies all bar code types (maximum 10) and their associated parameters (e.g.: Code #, Code Type, Characters, Mod Check, Quantity) that the AXIOM reader has been setup to search for and decode.

The **code quantity** is specified by a minimum and maximum number of codes. These parameters control what is reported as a "no-read" or a "multiple code." For example, if a Code128 is specified with a minimum quantity of 1 and a maximum quantity of 2, the reader can read one or two Code128 codes during a trigger cycle without reporting a problem. However, if no codes were read, one no-read message would be sent. If three codes were read, a "multiple codes" condition would be reported.

NOTE: The minimum quantity can be set to zero. This allows you to disable reporting of no-reads for a particular code type.

Button	Definition
Move Up	Move a symbology toward the top (beginning) of the list
Move Down	Move a symbology further back (toward the end) of the list
Edit	Enable changes to a symbology already on the active list
Add	Enables the addition of a new symbology to the active list
Remove	Enables the removal of a symbology to the active list

Moving a Bar Code

Highlight a symbology (Code#) listed in the bar code fields. To move the selected symbology toward the top (beginning) of the list, click **Move Up**. Click **Move Down** to move the selected symbology further back (toward the end) of the list.

Editing a Bar Code

Highlight the symbology (Code#) listed in the bar code fields that you want to edit. Click **Edit**. The highlighted symbology appears in a modal window. The available parameters are shown in the **Code Settings** window.

To change any of the settings (e.g. Symbology, Code Length, Mod Check, or Quantity) use the drop-down lists to select the required changes.

Click **Ok** to save the code settings. **Cancel** to return to the Bar Code Setup window without saving any changes or additions.

NOTE: The **Data Filter** allows a "match pattern" to be specified for a bar code definition. This restricts this code definition to only bar codes that match this pattern. Example: Setting "9*" as a data filter defines that only bar codes that start with a nine will be accepted. Only one '*' may be entered in the **Data Filter** field.

Adding a Bar Code

Click **Add**. A modal window is displayed. Review the drop-down list settings (e.g., Symbology, Code Length, Mod Check, or Quantity). Be sure to select the required parameters for the symbology you are adding to your active list.

Select the symbology you want to add using the drop-down list. Be sure to select the correct minimum and maximum code length. Select the necessary Mod Check from the drop-down list. (See also *User-Defined Mod Checks.)*

Removing a Bar Code

Highlight the **Code#** in the **Bar code Setup** window that you want to remove. Click **Remove**. The code will disappear from the list.

Bar Code Groups

When more than one bar code type is defined in Bar Code Setup, the **Bar Code Groups** selection becomes available. This enables you to define the valid "groups" of bar codes that are to be transmitted together.

For example, in the **Modify > Bar Code Groups** window shown below, the reader is configured to transmit EITHER a code 128 bar code (Group 1) OR both an Interleaved 2 of 5 code and a Code 39 code (Group 2).

Defining a Bar Code Group

NOTE: By default, all codes are placed into the same group.

To add a code into a group, double-click the empty field in the corresponding group number and code number column. The symbology name would appear from the field.

For example: To add Interleaved 2 of 5 to Group 3 in our window shown above, you would double-click the Group 3/Code 2 field. The symbology name would appear in the blank field.

To remove a code from a group, double-click the symbology name in that group. The symbology name would disappear from the field.

For example: To remove a code from the default group (group 1), double-click the symbology name. The symbology name would disappear from the field.

User Defined Mod Checks

This window becomes available when you specify a user defined mod check for a symbology while in **Modify > Bar Code Setup**.

Connect
Modify
 Axiom Configuration
 Bar Code Setup
 Bar Code Groups
✓ User Defined Mod Checks
 Bar Code Padding and Stripping
 Match Codes Setup
 Serial Communications Port #1
 Network Settings
 Trigger and Relay Settings
 Tracking
Save/Retrieve Settings
Diagnostics

User Defined 1
Factors: 31 Divisor: (1-255): 10 ☐ Remain ☐ Right ☐ Wrap ☐ Add

User Defined 2
Factors: [ ] Divisor: (1-255): 1 ☐ Remain ☐ Right ☐ Wrap ☐ Add

User Defined 3
Factors: [ ] Divisor: (1-255): 1 ☐ Remain ☐ Right ☐ Wrap ☐ Add

User Defined 4
Factors: [ ] Divisor: (1-255): 1 ☐ Remain ☐ Right ☐ Wrap ☐ Add

User Defined 5
Factors: [ ] Divisor: (1-255): 1 ☐ Remain ☐ Right ☐ Wrap ☐ Add

Field	Definition
Factors	Define weighting factors for determining mod check value. Example: Enter 31 for a 3-to-1 weight.
Divisor: (1-255)	Number that is divided into the mod check sum.
Remain	Defines whether check digit is a remainder of the divided amount or the number that must be added to the remainder to get the divisor.
Right	Defines where weight string begins (i.e., from right if selected).
Wrap	If the remainder of the check digit is calculated to be 0, accept 0 as check character (wrap not selected) or replace the 0 with a 1 (wrap selected).
Add	Select to add the most significant digit to the mod check.

Bar Code Padding and Stripping

For each code type (defined in Bar Code Setup), padding and/or stripping of the bar code data can be specified using the **Modify > Bar Code Padding and Stripping** screen. This padding and stripping is applied to the bar code before any message formatting.
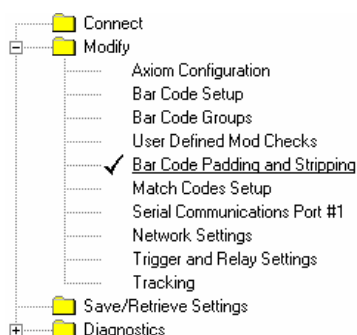
Character Stripping

Option Group	Definition
Transmit All	Transmits all data
Strip Selected Characters	Example: To strip the first and last character of a code (such as for Codabar without start and end) specify **F1,L1** for the character stripping. **NOTE:** Stripping is applied before padding.

Character Padding

Option Group	Definition
No Padding	No effect on bar code.
Add Padding	This will add a fixed string of characters to the beginning and/or end of the bar code. The character(s) to be added as padding must be entered in the field next to the Add Padding option button.
Padding Before bar code for fixed length	The specified character is repeated before the bar code to create a string of the length specified (30-50).
Padding After bar code for fixed length	The specified character is repeated after the bar code to create a string of the length specified (30-50).

Match Codes Setup

Use the **Modify > Match Codes Setup** window to define a specific code pattern within a symbology type that is to be considered a "match condition".

In addition to identifying and reading a symbology you defined (using the *Modify > Bar Code Setup* function), this feature enables you to configure an AXIOM to match specific characters within a bar code.
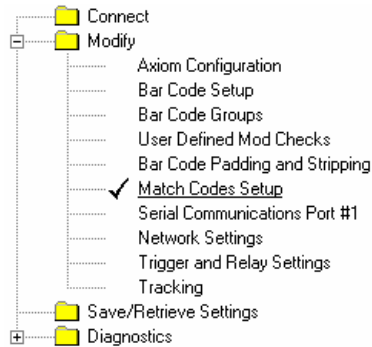
All bar codes are compared to the complete list of Match Codes. If a bar code matches ANY of the codes defined in **Match Code Setup** it is considered a MATCH. When a match code is read, you can also setup your AXIOM to:

- Fire a relay - e.g., Activate a diverter
- Send a user-defined message - e.g., Acknowledge match code

The following wildcards are available:

- "*" represents a string with arbitrary length
- "?" represents a single character

REMEMBER: If ANY match code pattern is set to "*" (i.e., the asterisk wildcard), ALL codes will match it.

Serial Communications Port#1

Use the **Modify > Serial Communications Port#1** window to set the serial port connection parameters (e.g., baud rate, data, bits, stop bits, parity, and flow control) and the message format to the "host" computer.

Set or modify the communications parameters for Serial Port #1 using the Mode drop list (to select RS232 or RS422). Click the appropriate option group buttons to define the baud rate, data bits, stop bits, parity, and flow control.

Connect
Modify
  Axiom Configuration
  Bar Code Setup
  Bar Code Groups
  User Defined Mod Checks
  Bar Code Padding and Stripping
  Match Codes Setup
✓ Serial Communications Port #1
  Network Settings
  Trigger and Relay Settings
  Tracking
Save/Retrieve Settings
Diagnostics

Serial port 1

Mode

RS -232

Data Bits
○ 7 Bits
◉ 8 Bits

Stop Bits
◉ 1 Bit
○ 2 Bits

Baud Rate(Bits/Sec)
○ 300   ◉ 9600
○ 600   ○ 19200
○ 1200   ○ 38400
○ 2400   ○ 57600
○ 4800   ○ 115200

Parity
◉ None
○ Even
○ Odd

Flow Control
◉ None
○ Xon/Xoff
○ RTS/CTS
○ ACK/NAK

Message Format

Standard Message

Standard message format is to precede the bar code with a <STX> character and follow it with a <CR><LF>.

Message Format

You have four format selections for messages the AXIOM reader sends to your host computer (or other device) connected to port#1.

Selection	Definition	
Custom Message	Enables custom messaging implemented via custom software	
Standard Message	Default reader message.	Header = <STX> Trailer = <CR><LF> Separator = "," (comma) No-read = "?"
User defined Message	Enables you to define specific message formats. The **Modify > Message Definitions – Port#1** window is available when you select this message format. *(See also Creating User Defined Messages.)*	
MUX (ADP) Message	Message format for communicating with an Accu-Sort MUX.	

When **ACK/NAK Flow Control** is selected, the **Retry Count** drop-down list and **Timeout (in ms)** options become available.

Modify > Serial Communications Port#1 (ACK/NAK enabled)

Retry Count for ACK/NAK flow control can be set for 1 to 10 retries.

TimeOut (ms) sets the ACK/NAK flow control timeout anywhere from 100ms to 30,000ms. Enter a number outside this range and an error message is displayed when you attempt to move on to the next step.

Network Settings

The **Modify > Network Settings** window allows you to specify network settings (including the IP address) for the reader. Currently, the reader can only be configured to use a Static IP address.

Net Host Port1 and **Net Host Port2** define two network connections for sending bar code messages. The **Connection Type** and **Message Format** for each port can be set independently. Message formatting is the same as for the serial port.

Network Settings

Field	Definition
IP Address	An IP address specifies a unique host ID for the reader on a particular TCP/IP network. Consult your network administrator for a valid IP address for the reader.
Net Mask	A net mask modifies a standard IP address into subnets. A default class C net mask should be valid in most cases (either 255.255.255.0 or 255.255.240.0). Consult your network administrator for the net mask value.
Gateway IP Address	A gateway allows the reader to reach other systems not on the local network and remote systems to reach the reader. If the reader requires external connectivity, consult your network administrator for a valid gateway address.
Net Host Port1 or Net Host Port2	**Connection Type** – The following connections types are available for each network port: ▪ TCP/IP Server: As a TCP/IP server, a Port # must be specified. In this case it is the TCP/IP client's responsibility to initiate an AXIOM connection. ▪ TCP/IP Client: As a TCP/IP client, aside from the Port #, the Remote IP Address of the TCP/IP server which is to receive the bar code messages must be specified. The **Reconnect Time** specifies the interval (in seconds) at which the AXIOM attempts to establish a connection. ▪ UDP Messaging: In some instances, it may be desirable to use a connectionless UDP message to send bar code data. In this case, only the Port # and Remote IP Address of the receiver need to be specified. ▪ EtherNet/IP (Net Host Port1 only): This enables use of the EtherNet/IP protocol on the AXIOM. **Message Format:** There are four message format options: Custom Message, Standard Message, User Defined Message and MUX (ADP) Message.
Controller/Client Configuration	**Number of Client Readers** - This number in a multi-reader network must be defined on the AXIOM Controller. Drop-down list selectable for up to five (5) AXIOM readers functioning as "Clients". Client readers must be set at zero (0). **Group Number** – All AXIOM readers in a Controller/Client group (both the Controller and ALL Clients) must be set to the same controller group number. The default of zero (0) disables a reader from listening for messages to become a client.
Ethernet Link	Drop-down List with 2 selections: 10 Mbps/Full Duplex, 10 Mbps/Half Duplex

Message Format

Selection	Definition
Custom Message	Enables custom messaging implemented via custom software
Standard Message	Default reader message (header <STX> trailer <CR> <LF>).
User defined Message	Enables you to define specific message formats. The **Modify > Message Definitions – Net#1** window is available when you select this message format. *(See also Creating User Defined Messages.)*
MUX (ADP) Message	Message format for communicating with an Accu-Sort MUX.

Advanced Network Settings

The advanced network parameters are only available when *Advanced Setup* is selected from *Configuration* drop-down menu. Under normal circumstances, these should never need to change.

Controller Multicast IP Address			Setup Port #	Telnet Port #
239	255	0 . Group Number	2001	23

Selection	Definition
Controller Multicast IP address	During Controller/Client operations, the controller uses TCP/IP multicasting to communicate with the clients. The group number represents the low byte of the Multicast IP Address that is used.
Setup Port #	TCP/IP port number used for setup. Changing this can cause problems with AXCESS, which always uses port 2001.
Telnet Port #	TCP/IP port for terminal interface.

EtherNet/IP Settings

EtherNet/IP allows the AXIOM to communicate bar code and I/O data to other EtherNet/IP (EIP) enabled devices on your network.

The **Modify > EtherNet/IP Settings** are only available if EtherNet/IP has been enabled from the **Network Settings** window. Once enabled, EtherNet/IP Explicit and I/O messaging are enabled. The EtherNet/IP Objects supported by the AXIOM are described in *Appendix C*.
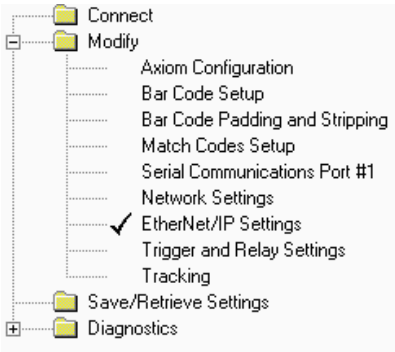
```
Connect
Modify
        Axiom Configuration
        Bar Code Setup
        Bar Code Padding and Stripping
        Match Codes Setup
        Serial Communications Port #1
        Network Settings
    ✓   EtherNet/IP Settings
        Trigger and Relay Settings
        Tracking
Save/Retrieve Settings
Diagnostics
```

Bar Code Data

ASCII Message ▼   ☐ Byte Swap ASCII Data

☐ Enable ControlLogix OnDemand Messaging

Axiom Inputs

☐ Enable Trigger Input

Control of Axiom Relays

☐ Output #1
☐ Output #2
☐ Output #3
☐ Output #4

Axiom Outputs

Duration (msec)

Output 1	Trigger Output ▼	500
Output 2	Good Read Output ▼	500
Output 3	No Read Output ▼	500
Output 4	Multiple Output ▼	500
Output 5	Match Output ▼	500
Output 6	Nomatch Output ▼	500
Output 7	Error Light ▼	0
Output 8	Life Light ▼	0

EtherNet/IP Settings

Selection	Definition
Bar Code Data	Select **ASCII Message** to transmit an ASCII bar code message (as defined by the Message Type). The only difference is that the Header and Trailer are omitted from the bar code messages transmitted using EtherNet/IP. When ASCII messages are in use, the Byte Swap ASCII Data selection will swap the high and low byte of data within each 16 bit word. This is useful for processing data on some Programmable Controllers. Select **Binary Message** to convert bar code data to a "numeric value" and transferred as a 32 bit word. The user can specify the byte ordering of this word. If any non-numeric (not ASCII '0' to '9' or leading or trailing space) characters are contained in the bar code, the numeric value is zero. **On-Demand Messaging** is a special option for communicating with ControlLogix Controllers. When enabled, you must provide the Controller IP Address, the Slot number of the processor in the Controller and a Tag Name. To use On-Demand messaging, a tag of the same name is then defined on the ControlLogix Controller and every time a bar code is read, the Bar Code object is transferred to the ControlLogix Tag.
AXIOM Inputs	When Enable Trigger Inputs is selected, the AXIOM Trigger settings are ignored and the AXIOM is triggered solely by manipulating the Trigger Bit in the Output Word (contained within the AXIOM Assembly and Output Objects).
AXIOM Outputs	The **AXIOM Outputs** function the same as AXIOM relay outputs, but they manipulate bits within the AXIOM Input Word (contained in the AXIOM Assembly and Input Objects). When defining these outputs, remember to ensure that the duration of these outputs is two or three times longer than the I/O message interval.
Control of AXIOM Relays	The AXIOM can relinquish control of the internal AXIOM relays to another EtherNet/IP device. When this has been done, the AXIOM relays are only controlled by the appropriate bits within the Output Word (contained within the AXIOM Assembly and Output Objects).

Message Definitions (User-defined Messages)

Whenever you specify a *user-defined message* format for either *serial port #1* or *network* settings, **Message Definitions** become available within the Modify menu. For the serial port, use the **Message Definitions – Port #1** window (shown below). For network communications, use the **Message Definitions – Net#1** screen. The following provides details on defining the message framing and contents for the serial port and network communications.
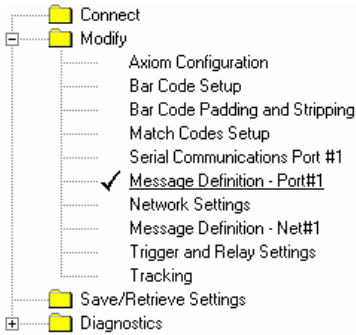
Modify > Message Definitions - Port#1 (User defined Message enabled)

NOTE: Use the visual keyboard in the **Tools** drop-down menu to easily create your user-defined messages.

Message Framing

Selection	Definition
Header	Character string specified for the header. Sent at beginning of every message.
Trailer	Character string specified for the trailer. Use to terminate every message.
Seq #	When enabled, a sequence number consisting of the specified number of digits is inserted just after the header.
Check	When enabled, a two-character hexadecimal check character is inserted just prior to the trailer.
Include Multi-Bar code in single message	(Checkbox) This parameter effects how the reader handles multiple bar code transmissions. If enabled, the bar codes are sent in one message (between one header and trailer) and each bar code is separated by the specified "separator." If disabled, all bar codes are always sent as a complete message (with a header and trailer).
Separator	String used to separate multiple bar codes (see above).
Power Up Message	String that is always sent on reader initialization. Note that for a Network connection, this string is always sent when the socket connection is made.

Message Content

The message drop-down lists define the message options for each bar code. The message content can be defined for transmissions from the AXIOM's serial port #1 as well as any network connection (via Net#1). These messages are based on various conditions. For each condition, there are options for what message can be sent. These options include:

Send Bar Code – Bar code (with padding and/or stripping) is sent.

Repeated Character – Send a message consisting of the specified character repeated for the minimum number of characters for the bar code (example is "???????" no-read message).

User Specified Message – Send a message defined string for this condition.

User Defined Message Content

Selection	Definition
Category #1: These first three conditions are mutually exclusive, so only one of these three messages can be sent for any bar code.	
Read	If "No Message" is selected, nothing is sent for a valid read; otherwise either the bar code or a user-specified message is sent.
No Read	If "No Message" is selected, nothing is sent for a no-read; otherwise either the specified "repeated character" or the user specified message is sent.
Multiple Bar Code	If "No Message" is selected, a multiple bar code condition will be reported as a "Read" of the first bar code reported. Otherwise, the specified "repeated character" or the user-specified message is sent.
Category #2: The next three conditions are IN ADDITION to the conditions specified above. If a condition in both categories is met, these messages will be appended. If you desire to only generate a message based on these conditions, all messages in Category #1 should be disabled.	
Match	If the bar code matches any of the match codes, this message is sent. Options include sending the bar code or a user specified message.
No Match	If the bar code does not match any of the match codes (or was a no-read), this message is sent. Options include sending a "repeated character" or a user specified message.
No Match Read	If a valid bar code was read, but it does not match any of the match code, this message is sent. Options include sending the bar code or a user specified message.
Append QQ (code quality) to message (checkbox)	When selected a two digit "code quality" indication (number from 00 to 99) is appended to the bar code message. The code quality value is separated from the message with the specified separator.
Heart Beat Message	When enabled, if no other message is sent for the specified period of time, the specified heart beat message string is sent. (A time-out of zero disables this option.)
Heart Beat Time Out (0-30,000 ms)	0 = Disable Heart Beat message 1-30,000 = Delay before sending Heart Beat message

Trigger and Relay Settings

Use the **Modify > Trigger and Relay Settings** window to set the type of trigger. It also provides configurations for the optional input/output relay modules.

Example: IO Configuration when Height Tracking Photoeyes are used.

Trigger Source

The trigger source options are:
- Hardware Trigger
- Hardware Start/End Trigger
- Software Trigger
- Continuous Trigger

Since the trigger parameters vary based on trigger type selected, the trigger parameter options are defined within the context of the specific trigger source.

Trigger Source Options

Selection	Definition
Hardware Trigger	
Active-High vs. Active-Low	This defines whether trigger is active when the input signal is high or low.
Debounce Duration (ms)	Defines the minimum time required for detection of a change in the hardware trigger status.
Transmit Delay (ms) *(only for Transmit after End Trigger)*	This defines how long after the end of trigger this code will be sent. If Transmit Delay is set to zero, the code will be transmitted once all scan data has been processed. Otherwise, the reader will not transmit the code until the transmit delay period is over.
Transmit Type	Defines when the bar code(s) should be transmitted. **Transmit after End Trigger** - No codes will be transmitted until after the end of the trigger signal. **Transmit after Code Read** - Codes will be transmitted as soon as they are decoded.
Trigger Timeout (ms) *(only for Transmit after Code Read)*	This defines a period of time after which trigger will be automatically terminated. If set to zero, automatic termination of trigger is not performed. *(This appears in place of Transmit Delay.)*
Hardware Start/End Trigger	
Active-High vs. Active-Low	This defines whether trigger is active when the input signal is high or low. In this case this needs to be specified for BOTH the hardware trigger input (which is used for start trigger) and for IO#1 which is used for the end trigger input. **NOTE:** Typically these parameters are set to OPPOSITE values as the end trigger signal (IO#1) indicates the state at which trigger should be stopped.
Transmit Delay	This defines how long after the end of trigger this code will be sent. If Transmit Delay is set to zero, the code will be transmitted once all scan data has been processed. Otherwise, the reader will not transmit the code until the transmit delay period is over.
Software Trigger	
Port Selection	Defines the source of the software trigger message. It can be any "host port" either serial or network based (i.e., Host 1,2 or Net 1,2). *Although shown, Host-2 is not available.*
Start Character / End Character	These define the ASCII characters that, when received, will start and end trigger of the reader.
Transmit Delay (ms)	This defines how long after the end of trigger this code will be sent. If Transmit Delay is set to zero, the code will be transmitted once all scan data has been processed. Otherwise, the reader will not transmit the code until the transmit delay period is over.
Continuous Trigger	
Continuous	Reader is always in trigger and transmits any bar codes that are seen.
Timed	Whenever a code is transmitted, trigger is removed for the period of time specified in Trigger Off-Time.
Once	Same as continuous, but the same bar code will not be sent a second time until the Bar Code Time Out value has expired.

I/O Options

Outputs are the most common uses for the I/O options (e.g., use to activate diverters, beacon lights, alarms, etc. when specific conditions occur). The only input options are to indicate an end trigger or custom signals.

Input	Definition
Custom Input	User-defined signal sent to AXIOM (requires custom software)
End Trigger	Only available at I/O#1 if the Trigger Source is set to Hardware Start/End Trigger. Active when trigger signal ends (i.e., photoeye no longer blocked).
Learn Match Code	When this input is active, the AXIOM is placed into Test Mode in order to "learn" a match code. When the line is deactivated, Test Mode is exited. When this option is enabled, the last code read is stored in the first entry of the Match Table.
Height Tracking Photoeye	Used in applications requiring Height Tracking Photoeyes. Up to three photoeyes may be used to divide the AXIOM's depth of field into up to four zones. The **Distance from scanner** (in inches) must also be set. *(See Chapter 3. See Mounting the Height Tracking Photoeyes.)* **CAUTION:** If you get this message when saving parameters, they should be corrected before saving them. **CAUTION:** If you get this message when retrieving parameters, you should correct and save them before use.
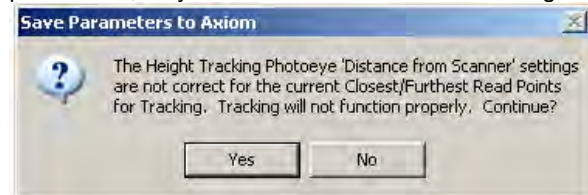
Output	Definition
Custom Output	Used for applications involving custom software to select a customized output option.
Life Light	Always on while the reader is operating.
Trigger Output	Echoes the status of the trigger signal.
Error Light	Active in the event of an error condition (see later section on errors currently detected).
Good Read Output	Active if all expected codes are read.
No-Read Output	Active if not all expected codes are read.
Match Output	Active if any code matches the match code criteria.
No Match Output	Active if no codes match the match code criteria (includes no-reads).
Good Read and No-Match Output	Active if a code was read but did not match the match code criteria.
Multiple Output	Active is too many codes were read.
Multiple or NoRead Output	Active if too many codes were read or a no-read occurred.

Tracking

Use the **Modify > Tracking** window to define the parameters associated with monitoring package travel on the conveyance system. The tracking parameters are only available if tracking is enabled; otherwise they are not shown in this window.

Click the **Tracking Enabled** checkbox. When tracking is enabled, a checkmark appears in the checkbox and the tracking parameter settings are visible in the window.

The tracking options for the tachometer are:
- Hardware/External   Tach
- Cons   tant/Internal Tach
- Computed   Tach

NOTE: Details on tracking applications are provided in *Chapter 6.*

Tachometer Type Settings

Drop-down List	Definition
Hardware/External Tach	Used for external hardware tachometer. User must set the number of pulses per inch generated by the tachometer.
Constant/Internal Tach	User can specify the tach rate to be used (from 25-600 ft/min).
Computed Tach	There are two options available: Start-End and Start-Start. In both cases, the user specifies the Length (from 1-200 inches) between either a start and end trigger (Start-End) or between one start trigger and the next (Start-Start). From this information the reader will compute the belt speed and generate an internal tach signal.
Pulses per inch *(slider)*	Use to set the number of tach pulses per inch of conveyor travel (from 1-16 PPI).

Transmit Point Settings

Selection	Definition
Transmit Edge	Specifies which edge of the package (leading or trailing) is used to determine the transmit point.
Transmit Point (in.)	The point at which bar code data is transmitted. Defines the number of inches after the specified edge of the package passes the trigger before data transmission occurs.

AXIOM Mounting Settings

Selection	Definition
Closest Read Point (in.)	Specify, in inches, the nearest distance from the reader where the reader is expected to read a bar code.
Farthest Read Point (in.)	Defines the furthest distance from the reader where the reader is expected to read a bar code.
Trigger Reference Point	Specifies the distance from the trigger signal to the center point of the scan line.
AXIOM Rotation Direction (deg.) *(slider)*	Specifies any rotation of the scan line with respect to the motion of the belt. Use the slider to set the rotation direction from -180 to 180 degrees. A scan line that is perpendicular to the belt has a rotation angle of 0. Two readers mounted in an X-pattern have rotation angles of 45 and 135 or -45 and -135 degrees respectively.

Tracking Configuration Settings

Selection	Definition
Extend Front (in.)	Used to increase the apparent size of the package by increasing the leading edge (front) of the package.
Extend Back (in.)	Used to increase the apparent size of the package by increasing the trailing edge (back) of the package.
Tolerance	Specifies the tolerance (in inches) for associating a label with a box.

Tracking Setup Procedures

Specify Tachometer Source

AXIOM tracking requires a tachometer input that reflects the belt speed. This tachometer input can originate from one of three sources:

- Hardware tachometer input
- Constant tachometer input (generated internal to AXIOM)
- Computed tachometer input (for first size or evenly spaced packages, the software will compute the belt speed from the package length or spacing)

In all instances, the tachometer configuration can be verified by monitoring "belt speed" on the AXIOM Monitor. The belt speed is displayed in ft/min.

Specify Transmit Point

All tracking systems, require the transmit point for the bar code to be specified. This is a point, located a fixed number of inches from the trigger source (such as a photoeye), at which the bar code for a package will be transmitted. When assigning the transmit point, make sure the package will have completely passed through the lasers before reaching the transmit point and leave some margin for "processing time" once the bar code has passed through the laser.
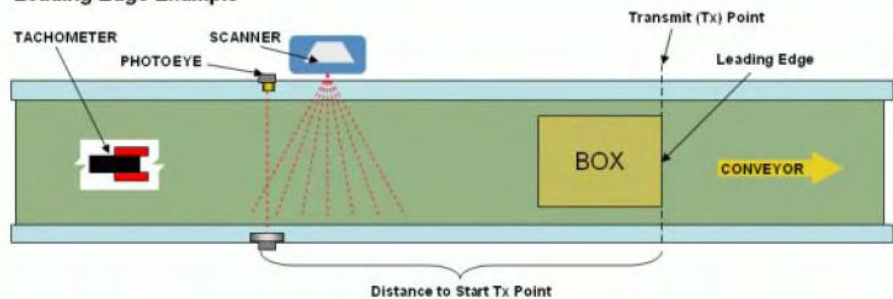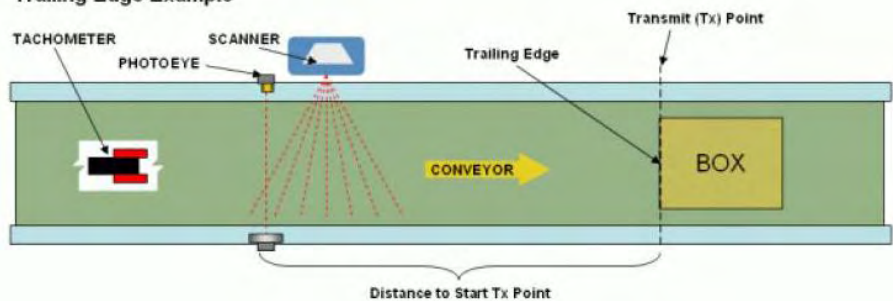
Specify AXIOM Mounting Information

For proper performance, the following information about the reader mounting is required.

- The nearest and furthest distance (from the front window of the AXIOM) at which a bar code is to be read.
- The distance from the trigger source (i.e., Photoeye) to the center point of the AXIOM scan line (Trigger Reference Point).
- Orientation of the reader with respect to the motion of the belt. This is a rotation value from 0 to 360 degrees.
- When an AXIOM reader's scan line (or AXIOM-X reader's "X" pattern) is perpendicular to conveyor travel, it has a rotation angle of zero degrees.
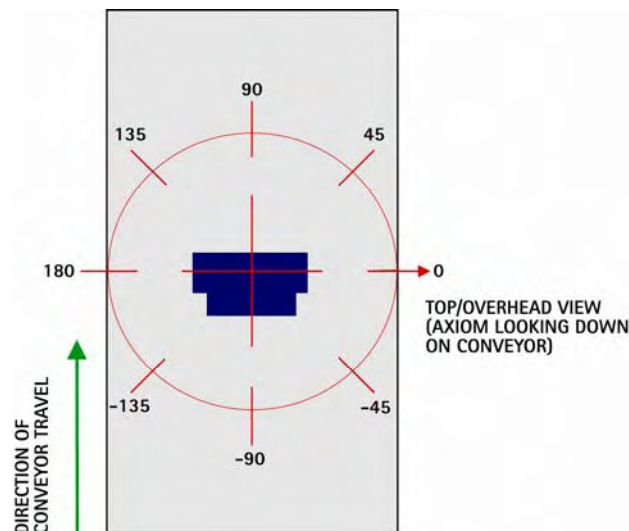
AXIOM mounted at zero degrees
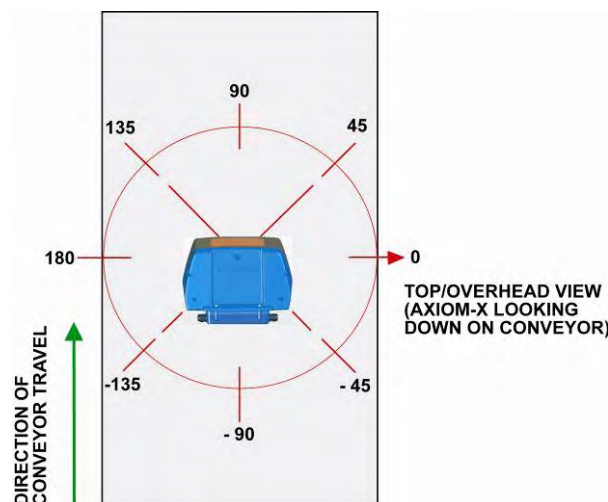
AXIOM-X (Omnidirectional) mounted at zero degrees
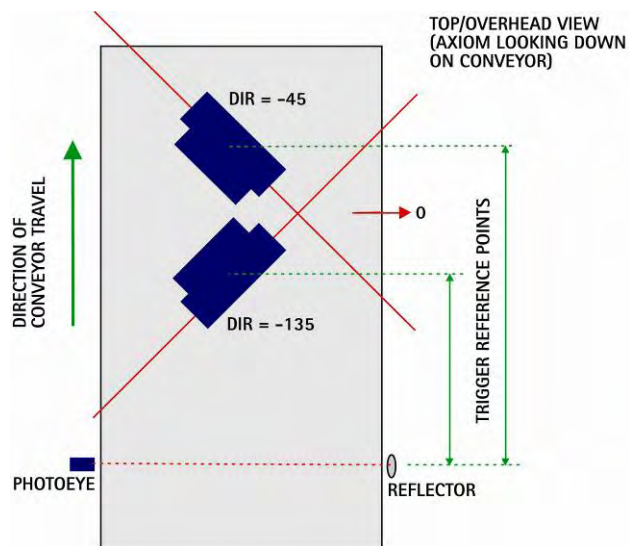
AXIOMs (2) in X-pattern configuration

When two AXIOM readers are mounted to create an X-pattern, they have rotation angles of 45 and 135 degrees or -45 and -135 degrees respectively.

NOTE: This only applies to the use of two AXIOM line scanners; it does not apply to AXIOM-X omnidirectional scanners.

Advanced Tracking Setup Procedure

To assure tracking accuracy, the **Tracking > Trigger Reference Point, Closest Read Point** and **Farthest Read Point** parameters must be properly set to match the application.

NOTE: This procedure assumes that the basic setup procedure has already been performed. *(See Chapter 6, Tracking Operation.)*

IMPORTANT: If Height Tracking Photoeyes are used, be sure to disable them before performing the advanced tracking setup procedure. (See **Modify > Trigger and Relay Settings**. Select the *Not in use* option.)

1. In AXCESS, go to the **Modify > Tracking** screen.
2. Set both the **Closest Read Point** and **Farthest Read Point** (in inches) to the distance from scanner to bar code.
3. Measure the distance (in inches) from the center of the bar code to the front edge of the package. When the **Trigger Reference Point** is set correctly, tracking will report this number.

NOTE: Make sure that the package position intersects the scan lines so that the bar code will be read as close to the center of the "X" as possible.

4. Select the **AXCESS Monitor** screen.
5. Run the package through the scanning area.
6. Observe the reported tracking position in the **Messages** window. For example: The display **"Box/Zone/Code:42/1/3"** is reporting a bar code position of 3 inches from the front of the package.
7. Adjust the **Trigger Reference Point** until the bar code position reported in the **Messages** window is correct.
8. Reset the **Closest Read Point** and **Farthest Read Point** parameters as follows:
   a. Set **Closest Read Point** to the distance between the scanner and the closest possible bar code that will be read
   b. Set **Farthest Read Point** to the distance between the scanner and the furthest possible bar code that will be read
   c. Once these two read points are set to the actual distance, *it is normal* for the reported location on the packages to vary slightly.

IMPORTANT: If Height Tracking Photoeyes are used, be sure to enable them after completing this procedure. (See **Modify > Trigger and Relay Settings**. Select the *Used as input* option.)

DRX

CAUTION: Modifying the DRX features within AXCESS may adversely affect the operation of your AXIOM reader. Changes to the DRX parameters should not be made unless recommended by an authorized Accu-Sort customer support technician.

The **Modify > DRX** settings are only available if **Configuration > Setup > Advanced** is selected from the drop-down menu.

NOTE: The **Modify > DRX** parameters are to be modified only under the guidance of Accu-Sort.

Selection	Definition
Data Filtering	The data filtering parameters specify the minimum and maximum pulse width (in counts) for the bar code data. This important data filter setting assures optimal reader performance. The **Sampling Frequency** default of 100 Mhz assures better decoder resolution for poorly printed bar codes. **Scan Filtering (Skip Scans)** is disabled for AXIOM-X.
DRX Settings	The DRX settings typically will not need to be modified. They are very similar to the settings on other Accu-Sort readers.
Transmit QQ	The **Minimum QQ** is the smallest allowable QQ value for a code to be transmitted. The **Maximum QQ** forces the transmission of a code after the maximum QQ value is reached.

Save/Retrieve Settings

The final step in configuration setup is to Save/Retrieve Settings. Use this window to save all the settings to the scan head. You should also backup your settings to the wiring base and/or disk.

This window's buttons correspond to those in the Toolbar: Both sets of buttons have the same functionality. However, if there is no established connection to a reader, the Toolbar buttons are disabled (grayed), whereas the buttons in this window would display a message indicating there is no connection when selected.
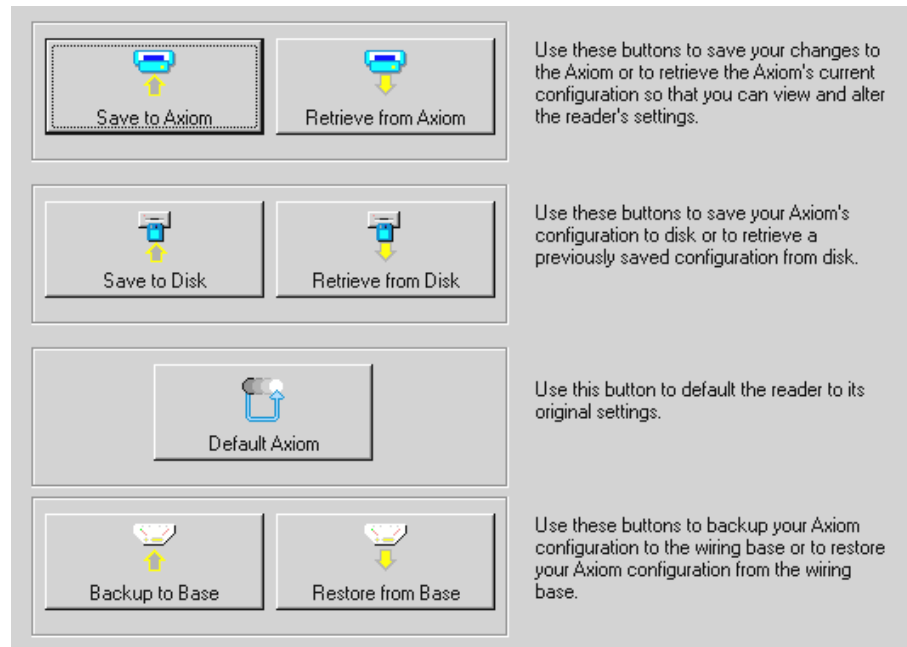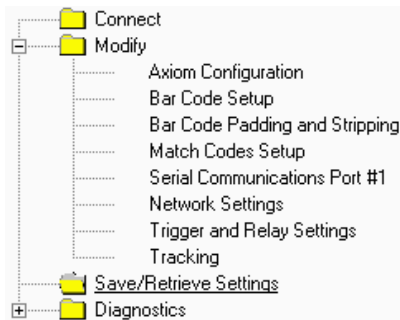
Buttons	Definition
Save to AXIOM	Use to save parameters from AXCESS to the scan head. Parameters saved on the AXIOM scan head's parameters storage module are the set of parameters that will be used during normal operations.
Retrieve from AXIOM	Retrieves the current parameters from the AXIOM scan head's parameters storage module to the AXCESS setup software.
Save to Disk	Use to save a copy of the parameters from AXCESS to disk.
Retrieve from Disk	Retrieves a set of parameters from disk.
Default AXIOM	Use to return the reader's parameters to the hardcoded "default" values built-in to the reader software.
Backup to Base	Use to save a backup copy of the scan head parameters to the wiring base.
Restore from Base	Retrieves the backup parameters stored in the wiring base. This is especially useful when replacing a scan head module. Use restore from base to load the correct parameters to the replacement head.

Save Parameters to Disk

To specify a file name and location to store the current settings, select the **Save Parameters to Disk** option of the File Drop-down menu. (This function is also found on the **Toolbar** of AXCESS.) To save setup parameters to disk:

1. Selecting   the **Save Parameters to Disk** function from the **File drop-down menu** or press <**Alt**> <**F**> and <**Alt**> <**V**>. This opens the **Save parameters to disk** window.
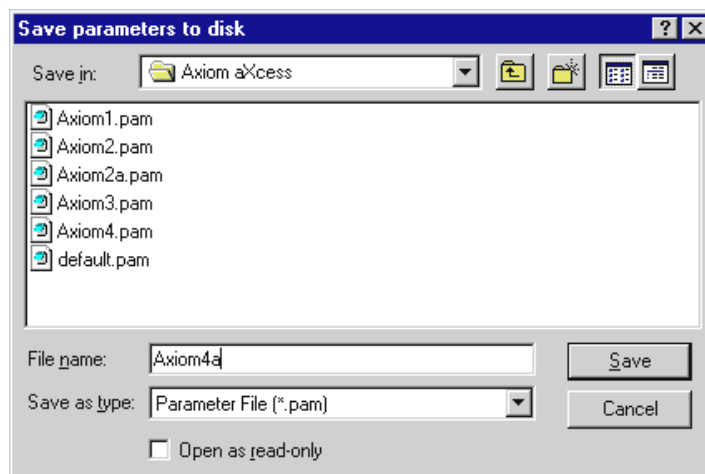
2. Locate the folder where the parameters are stored. (The **Save parameters** window should automatically default to the AXIOM AXCESS folder.)

3. Enter a name for the file in the **File name** field. The **.pam** extension is added to the name when you save the file to disk. Be sure to use a unique file name that will aid your memory in case you need to use the file later.

4. Click **Save** or press the <**Alt**><**S**> keys. When this operation is successfully completed, the following message appears in the AXCESS status line: *Parameters saved to disk. (If you get a warning message regarding Height Tracking Photoeye parameters, reference Modify > Tracking.)*

If you have not already done so, be sure to update the wiring base with the file you have saved, using the **Backup AXIOM Parameters to Base** button.

It is recommended that the previous settings and any changes be stored in separate files, in case it becomes necessary to return the reader to a previous configuration. The default file extension for these files, as well as the default folder and directory, is ****.pam**.

NOTE: Parameters can be retrieved from disk only after they have been saved to disk. It is recommended that any changes be stored to a disk file in case you need to return a reader to a previous configuration. It is also a good practice to store any ****.pam** files in the Parameters folder of the AXCESS directory so that they can easily be located.

Retrieve Parameters from Disk

Selecting the **<u>R</u>etrieve Parameters from Disk** function enables you to restore reader settings from a disk file that contains a copy of previously stored reader parameters. (This function is also found on the **Toolbar**.)

To retrieve setup parameters from disk:

1. Select   the **Retrieve Parameters from Disk** function from the **<u>F</u>ile drop-down menu** or press <**Alt**> <**F**> and <**Alt**> <**R**>. This opens the **Retrieve Parameters from Disk** window.
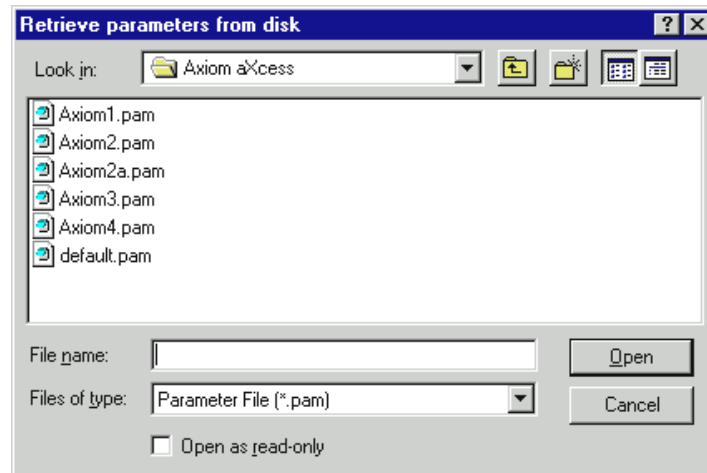
Retrieve Parameters from Disk

2. Locate the folder where the parameters are stored. (The **Retrieve Parameters** window should automatically default to the AXCESS folder.)

3. Click the appropriate ***.pam** file name.

4. Click   **Open** or press the <**Alt**> <**O**> key.

Once parameters are retrieved, AXCESS is automatically updated to match the retrieved settings. To update the reader with the file you have retrieved, use the **Save to AXIOM** button.

NOTE: If you get a warning message regarding Height Tracking Photoeye parameters, *reference Modify > Tracking and Modify > Trigger and Relay Settings.*

Parameters can be retrieved from disk only after they have been saved to disk. It is recommended that any changes be stored to a disk file (as well as the wiring base), in case you need to return a reader to a previous configuration. *(See **Save to Disk** for details.)* The parameters are stored in files with a ***.pam** extension.

NOTE: It is good practice to store any *.pam files in the AXIOM AXCESS folder of the AXCESS directory so that they can be easily located.

Backup AXIOM Parameters to Base

NOTE: The active, or current, parameters used by an AXIOM are stored in the scan head's parameter storage module. It is recommended that you backup a copy of the parameters to the wiring base's parameter storage module. By doing so, the current parameters will be available from the wiring base if the need should arise to replace the scan head.

Restore AXIOM Parameters from Base

NOTE: This feature is useful if you ever need to replace a scan head or retrieve a set of parameters from the wiring base after modifying the scan head's parameters only to find that the previous parameters performed better. If you used the **Backup AXIOM Parameters to Base** earlier, you will be able to recover those parameters from the base using the **Restore AXIOM Parameters from Base** command.

Exiting AXCESS

When you complete your work, you can choose to save or discard any unsaved parameter change(s) before exiting AXCESS.

To exit AXCESS:

1. Choose   **Exit** from the **File** menu.

2.   Whether or not you made any changes, AXCESS asks you to confirm your exit. The **Exit Setup** window is displayed:
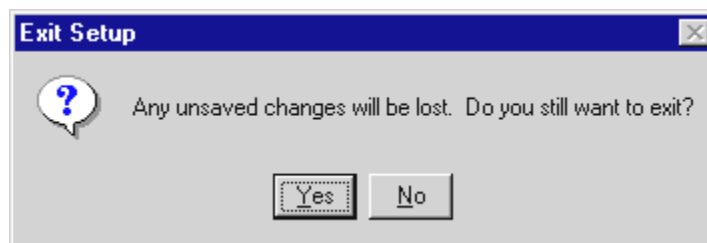
3. Choose   **Yes** to exit AXCESS and return to your desktop without saving changes.

4. Choose   **No** to save changes before exiting. This returns you to the active AXCESS window.

5.   Use one of the save parameter functions (i.e., **Save to AXIOM** or **Save to Disk**), then exit AXCESS.

Drop-down Menus

There are several menus available across the top of the **AXCESS Setup Software** windows. Many of these functions are also available from the Toolbar and the AXCESS Explorer's Save/Retrieve folder.

To access any of these menus, simply click the menu name to display the drop-down list. You can also use the keyboard shortcuts underlined in the drop-down menus. For example: To open the File drop-down list, enter **<Alt><F>**.

File

The File menu offers the following options:

File Menu Descriptions

Selection	Definition
Retrieve Parameters from Disk	Retrieves a file of parameters stored on your computer.
Save Parameters to Disk	Saves a file of parameters to your computer's hard disk.
Exit	Use this option to exit AXCESS. Whether or not there are changes to save, AXCESS asks you to confirm your exit. The message **"Any unsaved changes will be lost. Do you still want to exit?"** is displayed. Click **Yes** to leave without saving changes. Click **No** to remain in AXCESS. You will still be able to save changes before exiting AXCESS if you click **No**.
	USEFUL TIP: Before you exit AXCESS, do at least one of the following: 1. Save any necessary changes to scan head 2. Save a backup file of changes to wiring base 3. Save a copy of the parameters to disk

Configuration

The Configuration menu offers the following options:
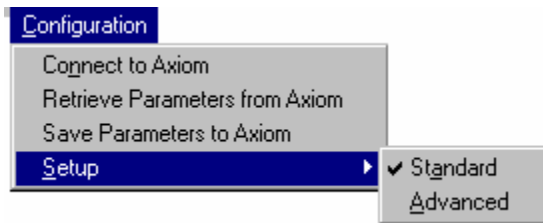
Configuration Menu Descriptions

Selection	Definition
Connect to AXIOM	Use to connect to a reader. If a programming cable is already connected between the computer and AXIOM, AXCESS will automatically connect to the reader.
Retrieve Parameters from AXIOM	Retrieves the current parameters stored in the scan head's parameter storage module.
Save Parameters to AXIOM	Saves a set of parameters to the scan head.
Setup	Standard – Enables the standard setup features.
	Advanced – Enables various advanced setup features available in AXCESS.

Advanced Setup

The advanced setup functions do not appear in AXCESS Explorer unless **Setup > Advanced** is selected from the **Configuration** drop-down menu. When selected, a checkmark appears next to Advanced in the menu.

The following table identifies the parameters available when using the **Advanced Setup** function.

Advanced Setup Functions

Modify > AXIOM Configuration > Configuration Options > Laser Configuration
Modify > User Defined Mod Checks
Modify > Network Settings – Controller Multicast IP Address
Modify > Network Settings – Setup Port # and Telnet Port #
Modify > DRX

Tools

The Tools menu offers the following functions:
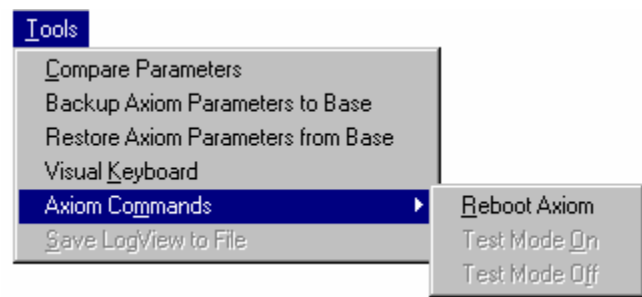
Tools Menu Descriptions

Selection	Definition
Compare Parameters	Compares two sets of operational parameters. *(See Comparing Parameters.)*
Backup AXIOM Parameters to Base	Sends parameters the AXIOM scan head is using to the wiring base to which it is connected.
Restore AXIOM Parameters from Base	Send the parameters stored in the wiring base to the AXIOM scan head to which it is connected.
Visual Keyboard	Use the visual keyboard to save keystrokes while creating messages that use non-printable ASCII characters (e.g.: STX, CR, LF).
AXIOM Commands	Reboot AXIOM – Use to reboot/restart the AXIOM reader.
	Test Mode On – Enables the reader's test mode.
	Test Mode Off – Disables the reader's test mode.
Save LogView to File	Use to save the on-screen LogView information (from **Diagnostics > Log Viewer**) to a file on your computer. *(See Chapter 8.)*

Compare Parameters

The Compare Parameters function enables you to compare two different parameter sets in order to:

- find and return the reader to a previous set of parameters saved on disk
- determine which parameter set offers optimal system performance, or to
- make changes to improve system performance.

The **Parameters compare** window is displayed when this tool is selected.
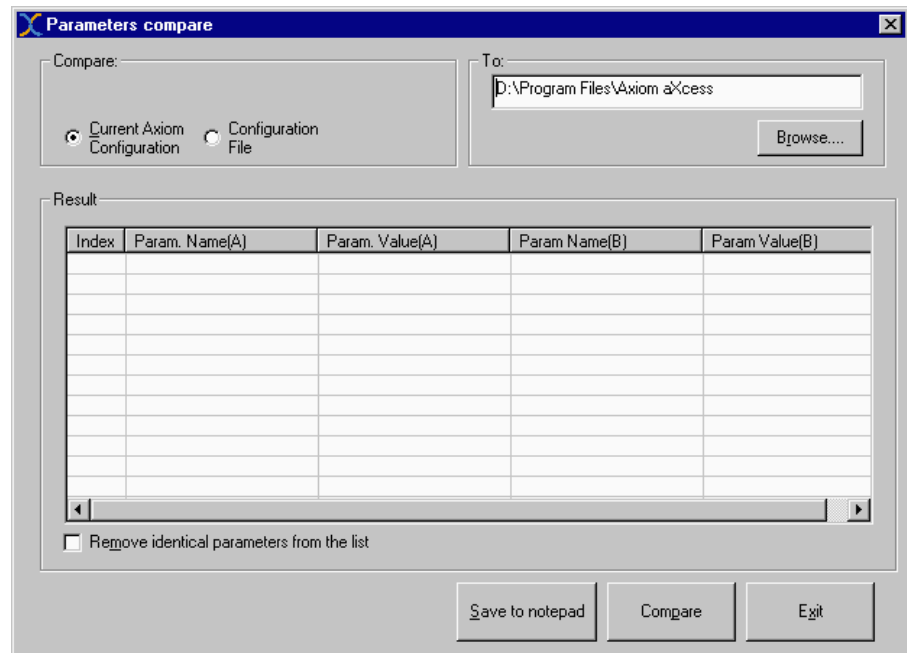
Compare Parameters (before parameter selection)

To compare two sets of parameters:

1. Select the option button in the **Compare** options group for either a **Configuration File** (from disk) or the **Current AXIOM Configuration**.
2. If looking for a **Configuration File**, use the **Browse** button locate the ***.pam** files saved on your computer. If you're comparing current settings, go to step 3.
3. In   the **To** field, use the **Browse** button to find the configuration file with which you wish to make a comparison. Highlight the desired parameter file.
4. Click   **Compare**. The Compare parameters will be displayed under Param.Name(A) and the To parameters under Param.Name(B). (In the example on the following page, the **default.pam** file is being compared to the **NewSetup.pam** file.
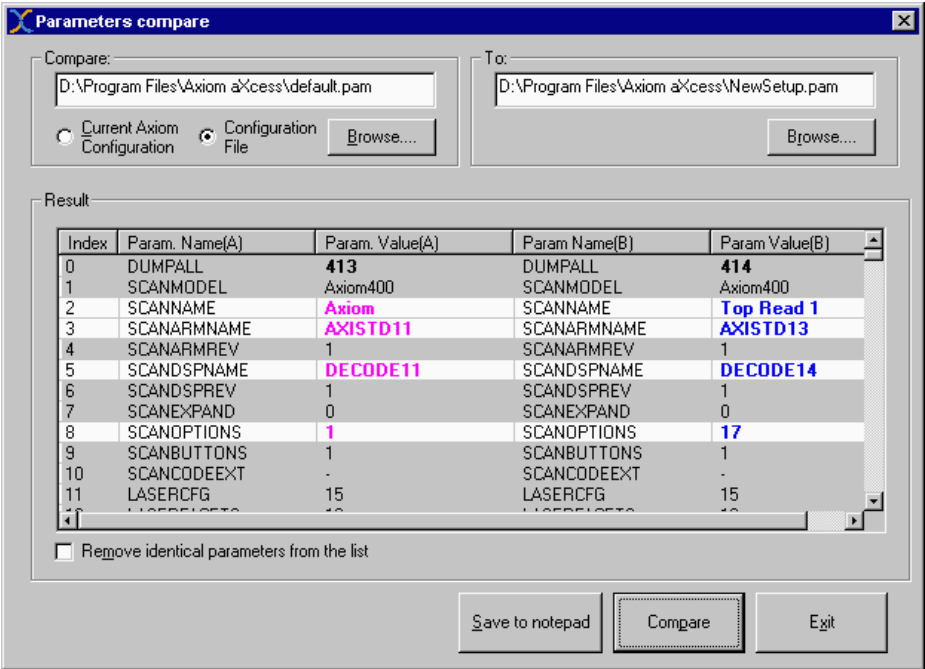
Compared Parameters (entire list of parameters)

NOTE: To compare only the parameters that are different between the two sets, put a checkmark in the **Remove identical parameters from list** checkbox. Click **Compare**. Only the parameters that are different will be compared.
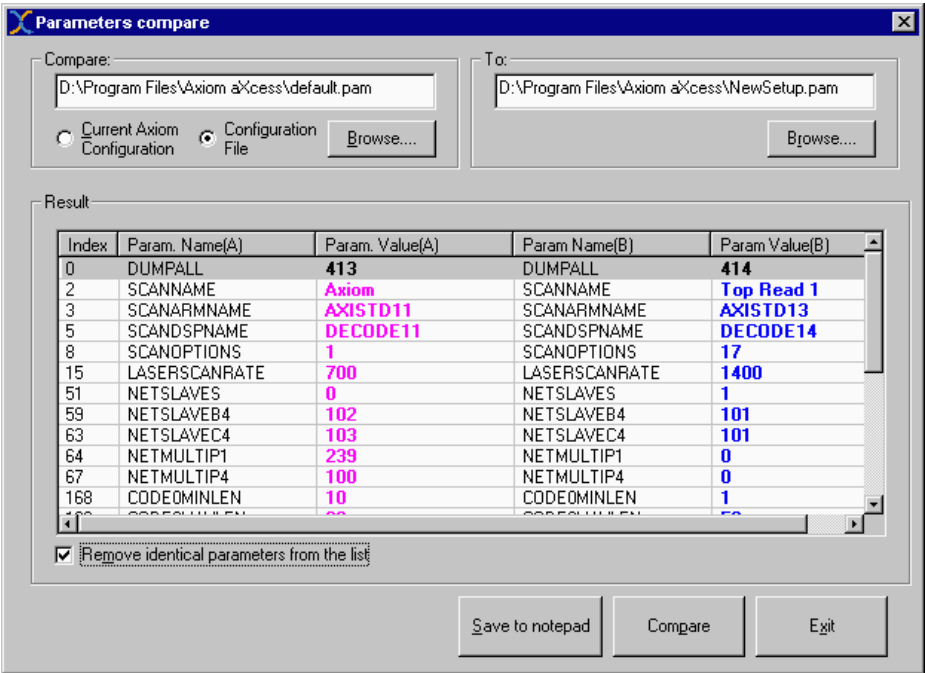
Compared Parameters (identical parameters removed)

Use the **Save to notepad** button if you wish to save a comparison as a text file for future reference.

```
Compare_default-to-new.txt - Notepad
File  Edit  Search  Help
NETSLAVES        0            NETSLAVES        1
MSG0FORMAT       1            MSG0FORMAT       0
MSG0CFGNOREAD    1            MSG0CFGNOREAD    0
MSG2FORMAT       1            MSG2FORMAT       2
CODE0MAXLEN      30           CODE0MAXLEN      50
CODE0MASK                     CODE0MASK        AS
CODE0PADCFG      0            CODE0PADCFG      2
CODE0PADLEN      0            CODE0PADLEN      50
CODE1TYPE        0            CODE1TYPE        1
CODE1MINLEN      15           CODE1MINLEN      10
CODE1MAXLEN      15           CODE1MAXLEN      20
CODE1GROUP       1            CODE1GROUP       2
CODE2TYPE        0            CODE2TYPE        3
CODE2MINLEN      15           CODE2MINLEN      10
CODE2GROUP       1            CODE2GROUP       2
CODE3TYPE        0            CODE3TYPE        5
TRIGCFG          0            TRIGCFG          3
TRIGTIMEOUT      0            TRIGTIMEOUT      50
TRACKCFG         0            TRACKCFG         1
TRACKTACHTYPE    0            TRACKTACHTYPE    1
TRACKXMITEDGE    1            TRACKXMITEDGE    0
```

Compared Parameters Saved to Notepad

Use the **Exit** button to leave the Compare Parameters functional tool.

Visual Keyboard

Select the **Visual Keyboard** tool to display the **ASCII Chart** pop-up window. This tool enables you to save keystrokes while creating messages using non-printable ASCII characters (e.g.: STX, CR, LF). Rather than entering the "\" followed by the hexidecimal value of the character (e.g.: \02 for a STX character), just use visual keyboard to create your message then copy and paste it into the appropriate text box.
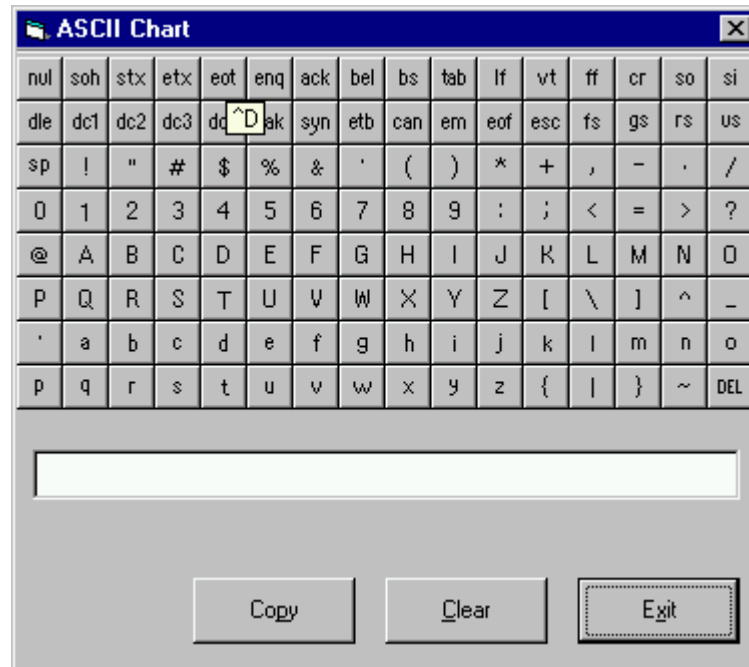
To create a message with the Visual Keyboard tool:

1. Go   to **Tools > Visual Keyboard**.
2. The   **ASCII Chart** pop-up window appears.
3.   Click on the keys you want to use for your message.
      (Example: Clicking the **STX, CR, LF** buttons of the visual keyboard
      causes **\02\0D\0A** to appear in the text field.)
4.   Click on the **Copy** then **Exit** buttons, after creating your message to
      leave the visual keyboard.
5. In   the **Message Definition** window, click in the text field where you want
      to place your message.
6.   Right-click and paste (Ctrl+V).

AXIOM Commands

Reboot AXIOM

1. Select the Reboot AXIOM command from the AXIOM Commands menu.
2. Establish a connection before attempting to reboot.
3. When this command is selected, you are asked: ***"Are you sure you want to reboot the AXIOM?"***
4. Click **YES**. If the AXIOM is connected with your computer, it will be rebooted.
5. Upon completion of reboot, the message: ***"You will now need to reconnect to the AXIOM"*** is displayed after a successful reboot.
6. If there is no connection with an AXIOM, the error messages***: "Not connected to AXIOM"*** and ***"AXIOM failed to echo REBOOT command"*** are displayed.

Test Mode On

Enables the test mode.
For details on how to use the test mode, reference the start-up and operations checklist procedures in *Chapter 6.*

Test Mode Off

Disables the test mode.

Save LogView to File

Enables you to store a copy of the LogView to a file on your computer.
*(See Chapter 8 for details on the **Diagnostics > Log Viewer**.)*

Help

Help Menu Descriptions

Selection	Definition
About	Displays the About AXIOM AXCESS screen, identifying what version of AXCESS software is being used. Click **OK** to return to the active AXCESS window. Click the **System Info** button for details on the AXIOM system.
Help Index	Accesses the index functions of online help.
Compatibility	Defines the software and hardware compatibility of the version of AXCESS you are currently using.

Toolbar

The toolbar buttons (from left to right) and the actions they perform are outlined in the table provided below.

AXCESS Toolbar Button Descriptions

	Button Function	Definition
	Connect	Use to connect your computer with the AXIOM so you can use the AXCESS setup software. (The button, as shown in the above example, indicates there is no connection to a reader.) Be sure the setup programming cable is connected to both the computer and AXIOM or the No Connection message is displayed.
	Save Parameters to AXIOM	Use to send any changes you made using AXCESS to the AXIOM scan head's parameter storage module. This is the set of parameters the AXIOM uses during operations.
	Retrieve Parameters from AXIOM	Use to retrieve the reader's current parameters to AXCESS.
	Save Parameters to Disk	Use to save a copy of the parameters from AXCESS to disk.
	Retrieve Parameters from Disk	Retrieves a set of parameters from disk.
	Backup AXIOM Parameters to Base	Use to save the scan head parameters to the wiring base. This enables you to keep a parameters backup in the wiring base in case you need to: 1) return the scan head to those parameters, or 2) configure a replacement scan head with identical parameters.
	Restore AXIOM Parameters from Base	Retrieves the current parameters stored in the wiring base. Use this function to restore the parameters in the wiring base to the existing scan head or a replacement scan head.
	Default AXIOM Parameters	Use to return the reader's parameters to the hardcoded "default" values built-in to the reader software.

For additional information, reference Save / Retrieve Settings in this chapter.

6 Operations

This chapter provides details on how the AXIOM / AXIOM-X bar code scanning solutions function during normal operation. It also outlines how you can verify optimal performance through several methods:

- Become more familiar with your application

- Step-by-step   start-up operations checklist

- Status Indicator LEDs

- Diagnostics to confirm normal operations (using AXCESS)

After configuring your reader with the **AXCESS for AXIOM Setup Software,** use the operations checklist to verify normal operations. *(See Chapter 5.)*

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.

NOTE: 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. *(See Chapter 5.)*

Default Parameters

The reader 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

AXCESS Setup Software for AXIOM, functioning under the familiar Windows® operating system on your computer, 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 reader's operations, allowing you to program it to fit your application seamlessly.

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 reader is configured to fit your application.

To setup your AXIOM / AXIOM-X bar code reader:

1. Install AXCESS on the computer you will use to setup your reader.

2. Connect the programming setup cable to the reader's setup port.

3. Connect the programming setup cable to your computer.

4. Apply power to the reader.

5. Set configuration parameters using AXCESS for bar code symbologies, trigger, tracking, and communications (serial, Ethernet, and I/O). *(See Chapter 5.)*

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. You can also 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 **default parameters** listed. *See **Modify > AXIOM Configuration** and **Modify > Bar Code Setup**.*

To quickly check AXIOM operation:

1. Apply power to the reader.

2. Position a test bar code symbol approximately 20 inches [508 mm] from the reader. Skew the bar code symbol slightly.

3. Press the Test/Diagnostics button on the control panel to initiate test.

4. The laser(s) should be scanning continuously during normal operations. (Observe the laser safety warnings in Chapter 2. If it becomes necessary to shutoff the laser(s), follow procedure outlined in Chapter 7.)

5. Observe the bar graph LEDs on the AXIOM-X control panel. The bar graph LEDs illuminate when the reader is scanning and decoding the bar code symbol. *(See page 120.)*

6. Using the programming setup cable, connect your PC to the setup connector on the wiring base. You may also connect via a network.

7. Run the AXCESS setup software and establish a connection with the reader.

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. *(See Chapter 8, Diagnostics.)*

10. Close the connection to the reader.

11. Disconnect setup cable.

Operations Checklist

- Check trigger photoeye LED for proper operation.

- Test parameters to assure optimal operation.

- Observe the reader's Status Indicator LEDs during power-up. *(What to watch for is outlined later in this chapter.)*

- Using AXCESS Explorer, select **Diagnostics > AXIOM Monitor**. *(See Chapter 5.)*

- Pass test label in scanning beam.

- Adjust mounting as needed for optimal performance.

- Modify parameters as needed for optimal performance.

- Save parameters to scan head.

- Backup parameters from scan head to wiring base.

- Backup parameters to disk (optional, but recommended).

Control Panel Status Indicators

There are several control panel status indicators on the AXIOM / AXIOM-X.
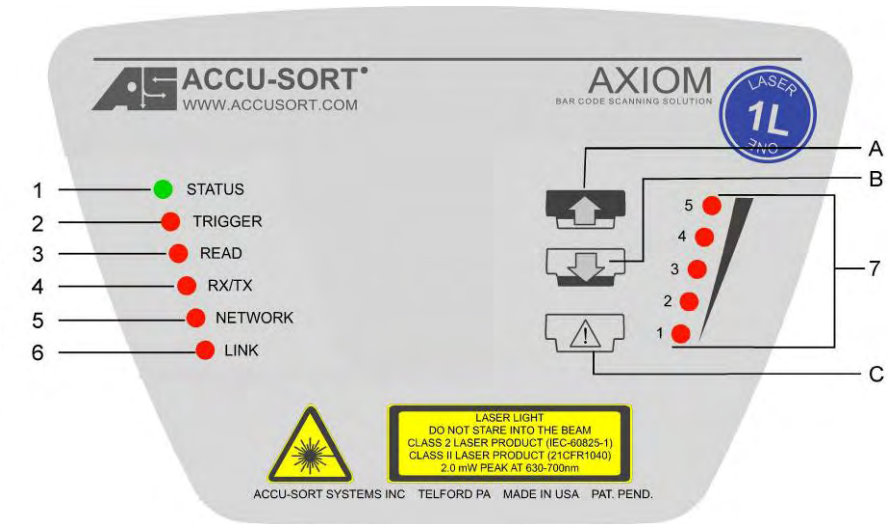
AXIOM Control Panel (on scan head)
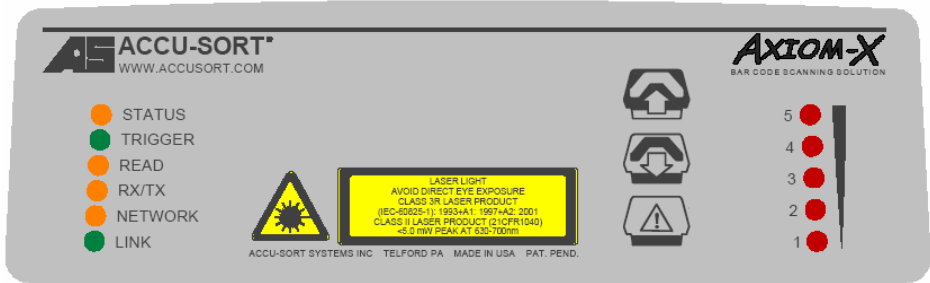
AXIOM-X Control Panel (on scan head)

The LEDs provide the following indications during normal operations.

Using LED Indicators to Check Normal Operations

LED	Description
STATUS	**GREEN** to indicate the overall "health" of the reader. (If **RED**, see *Chapter 8, Troubleshooting*.)
TRIGGER	Indicates the trigger input. The LED is activated upon trigger input regardless of trigger source (incl. software trigger).
READ	Flashes red or green based upon the software criteria.
RX/TX	LED for serial port 1. **GREEN** = Transmitting data **RED** = Receiving data
NETWORK	Flashes red or green to indicate connection status. ▪ Fo r a **Single TCP/IP** connection, it indicates that a "host" connection has been made to the reader. ▪ Fo r **EtherNet/IP** connection, it indicates "network" connection status. This LED is software controlled. ▪ Fo r a **Controller/Client** multi-reader connection, it indicates that all inter-reader communications (connections between readers) are correctly functioning.
LINK	This LED is LINK indicator for Ethernet. Flashes **GREEN** when connected to a network.
Bar Graph (LED 1 - 5)	▪ Scan quality indicator. ▪ Flashes when parameters copied to/from wiring base. ▪ LEDs stay on when Test/Diagnostic button C is pressed during the laser shutoff procedure. *(See Chapter 7, Maintenance.)*

NETWORK LED during Normal Operations

Mode	Description
Single TCP/IP	Solid **GREEN** – AXIOM-X 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-X 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 configuration you are using. Ethernet/IP is the highest priority, Single TCP/IP mode operation is the lowest.

Using Control Panel Buttons to Check Normal Operations

Ref	Button	Description
A	**Restore to AXIOM**	Restores parameters from Wiring Base to Scan Head ▪ Button must be pressed twice to initiate action. ▪ *See page 123 for procedure.*
B	**Backup to Base**	Downloads parameters from Scan Head to Wiring Base ▪ Button must be pressed twice to initiate action. ▪ *See page 123 for procedure.*
C	**Test /Diagnostic (Laser Shutoff)**	▪ Enables the AXIOM-X test mode. (Test mode can also be selected remotely using AXCESS *Tools > AXIOM Commands > Test Mode*.) ▪ Use to perform laser shutoff. *(See page 132.)*

REMEMBER: The reader's control panel buttons can be enabled or disabled through the use of the AXCESS setup software.
(See Modify > AXIOM Configuration, Enable AXIOM Control Panel Buttons.)

Backup / Restore Procedures

To backup parameters from scan head to wiring base:

1. Press   the **backup** button for about 1 second.

2. Release button. The bar graph LEDs continuously flash to indicate the button has been pressed long enough. If the LEDs flash only once, the button was not pressed long enough.

3. Press button a second time while LEDs are flashing. Hold for about 1 second.

4. Release button. The bar graph LEDs strobe from 5 to 1 indicating parameters are being backed up from scan head to wiring base.

5. When the LEDs stop strobing, the backup is complete.

To restore parameters from wiring base to scan head:

1. Press   the **restore** button for about 1 second.

2. Release button. The bar graph LEDs continuously flash to indicate the button has been pressed long enough. If the LEDs flash only once, the button was not pressed long enough.

3. Press button a second time while LEDs are flashing. Hold for about 1 second.

4. Release button. The bar graph LEDs strobe from 1 to 5 indicating parameters are being uploaded from wiring base to scan head.

5. When the LEDs stop strobing, the upload is complete.
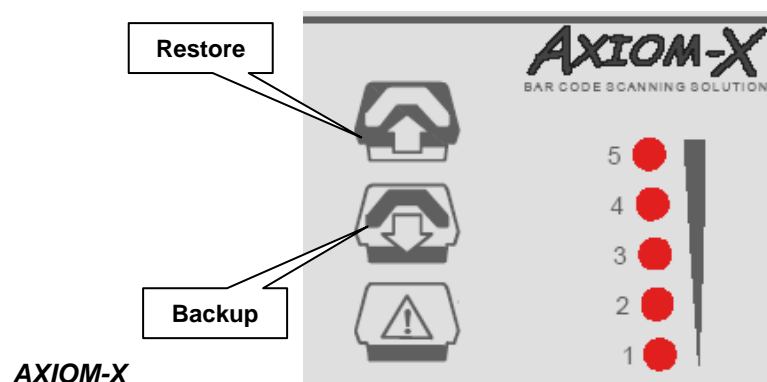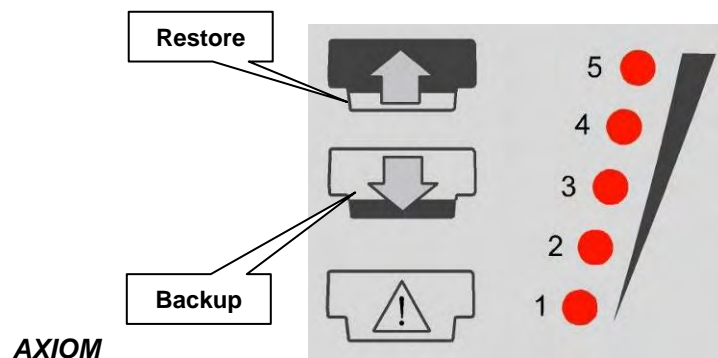
AXIOM

AXIOM-X

Checking Operations with AXCESS

The **AXCESS Diagnostics > AXIOM Monitor** enables you to evaluate the operational performance of your reader by providing vital statistics via status indicators, real-time read quality monitoring, and box information. Outgoing and incoming messages are also monitored.
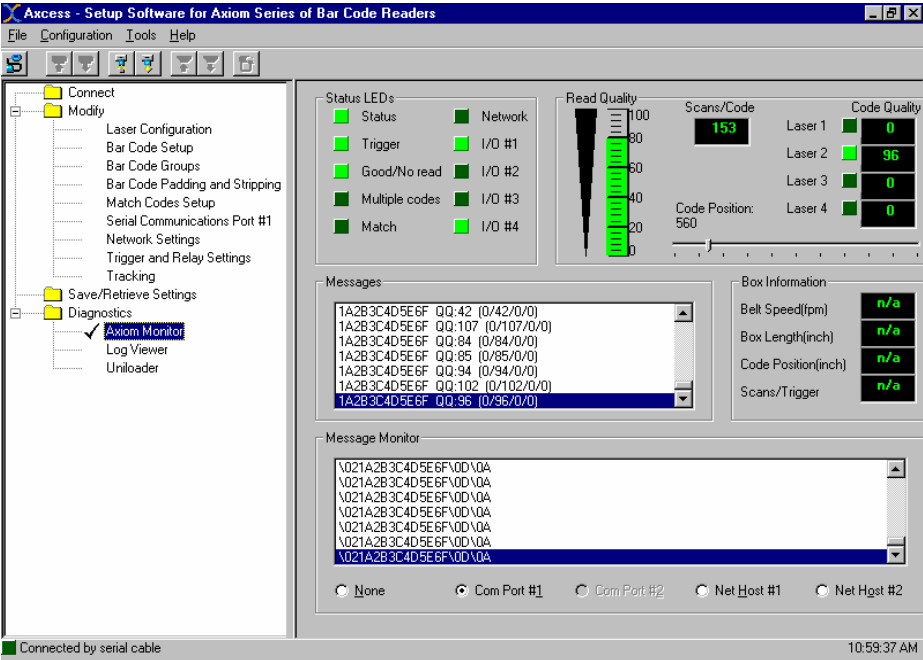
Checking Multi-Reader Network with AXCESS

From the AXIOM Controller, check **Diagnostics > Log Viewer > Read Rate**. This simple diagnostic allows you to check bar codes read, by laser, for each 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. *(See Chapter 5.)*

```
┌─ Axiom Log Viewer ──────────────────────────────────────────┐
│ ┌──────────────────────────────────────────────────────────┐ │
│ │ Log view                                                 │ │
│ │ DISPREADRATE=16                                          │ │
│ │ Total Boxes:            7545                             │ │
│ │ Good Boxes:             7545      100%                   │ │
│ │ Partial Boxes:             0        0%                   │ │
│ │ Bad Boxes:                 0        0%                   │ │
│ │                                                          │ │
│ │ Total Codes:            7553                             │ │
│ │ Controller                                               │ │
│ │ Laser#1                    0        0%                   │ │
│ │ Laser#2                 7553      100%                   │ │
│ │ Laser#3                    0        0%                   │ │
│ │ Laser#4                    0        0%                   │ │
│ │ Client (0.0.0.0)                                         │ │
│ │ Laser#1                    0        0%                   │ │
│ │ Laser#2                    0        0%                   │ │
│ │ Laser#3                    0        0%                   │ │
│ │ Laser#4                    0        0%                   │ │
│ │ ◄ |                                          |  ►        │ │
│ └──────────────────────────────────────────────────────────┘ │
│  [ Read Rate ]  [ System Counters ]  [ Message Log ]  [ Clear ] │
│ ┌─ Command ────────────────────────────────────────────────┐ │
│ │ [                                        ]   [ Send ]    │ │
│ └──────────────────────────────────────────────────────────┘ │
└──────────────────────────────────────────────────────────────┘
```

Standalone Operation

In a typical standalone setup, a single AXIOM / AXIOM-X scans bar codes on one side of packages as they move down a conveyor. A photoeye is used to trigger the reader to begin searching for valid bar codes. Bar code data is transmitted to a host device.
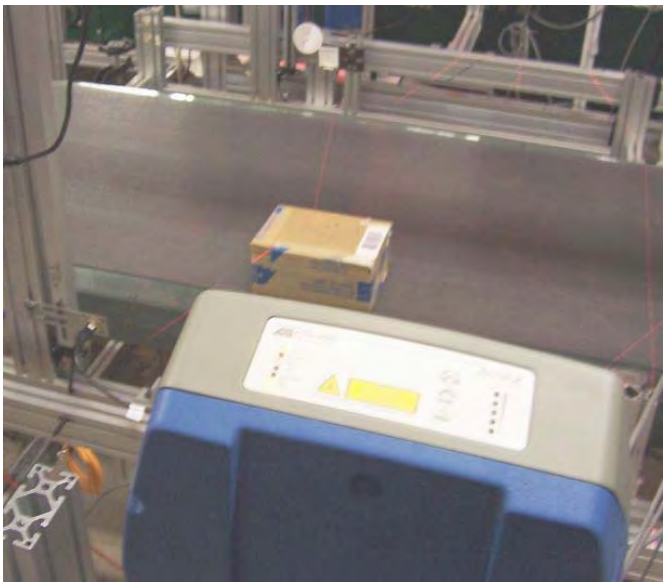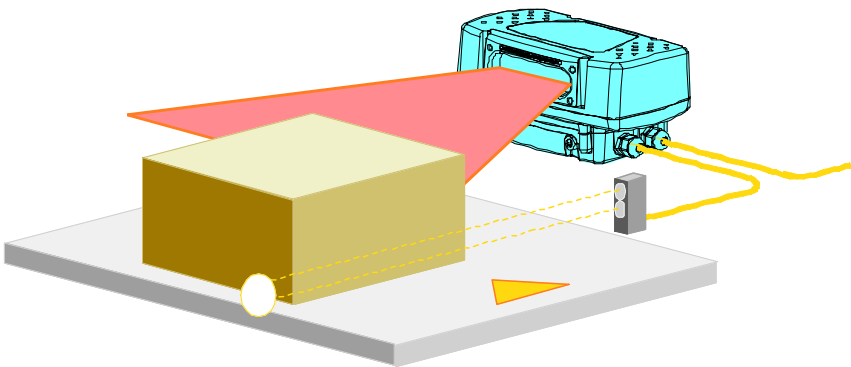
A simplified schematic diagram of the required items is shown below:
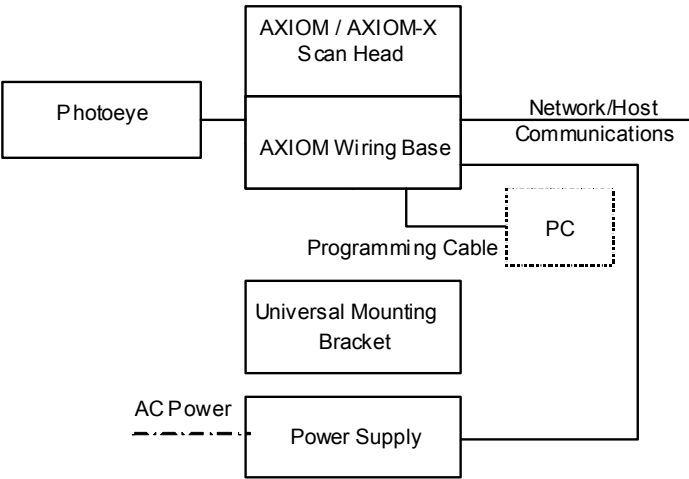
Tracking Operation

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 reader 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:
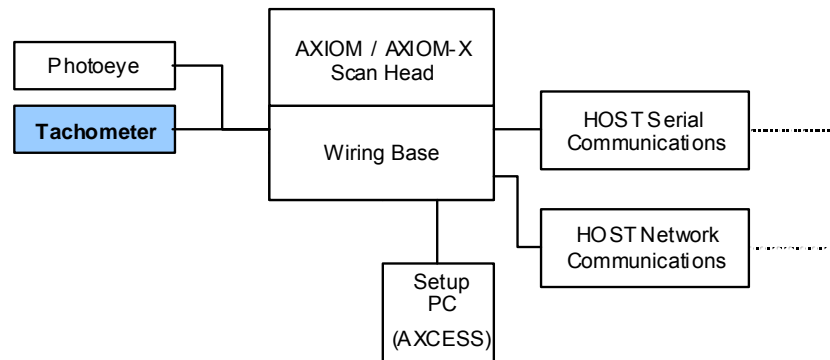
Setup Functions for AXIOM / AXIOM-X Tracking Operation

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

Basic Tracking Setup Procedure

To assure tracking accuracy, the distance from the Trigger Photoeye to the "X" scanning pattern must be measured and entered in AXCESS.

1. To properly track-in the reader, drop a plumb bob from the center of the AS logo on the scan head.
2. Measure the distance (in inches) from the plumb bob to Trigger Photoeye.
3. Use AXCESS to establish a connection with the reader.
4. Enter the value (in inches) into the **Modify > Tracking > AXIOM Mounting > Trigger Reference Point** field.

IMPORTANT: After completing the basic tracking setup, see the advanced tracking procedure provided in the **Modify > Tracking** section. The **Tracking > Trigger Reference Point, Closest Read Point** and **Furthest Read Point** parameters must be properly set. *(See Chapter 5.)*

Dual X-Scanning Operation

In dual X-scanning applications, two AXIOM-X omnidirectional readers mounted side-by-side are used to create a dual "X" scanning patterns across the entire width of a conveyor.
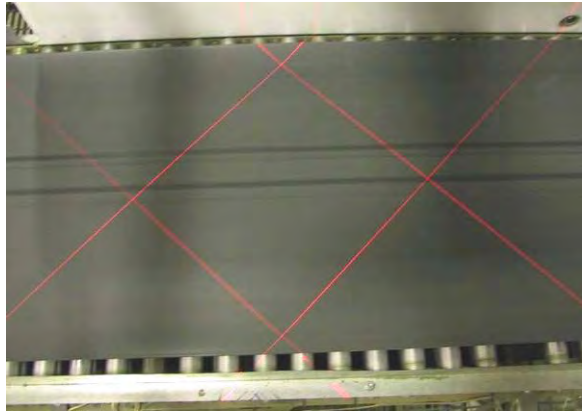
Dual X-pattern can be created by two AXIOM-X (or four AXIOM)

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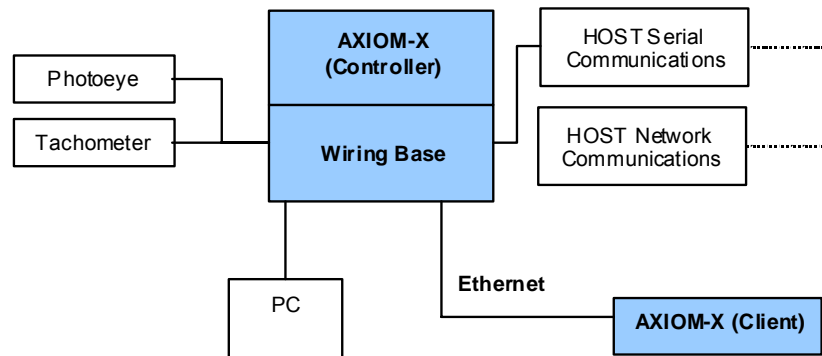
Setup Functions for Controller

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

Setup Functions for Clients

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

See Chapter 5 for details on setting up a multi-reader network.

Multiple-Reader Network Operation

In multiple-reader applications, from two to six readers can be networked together. A single reader is configured as a *Controller* for a multiple-reader network. The Controller gathers data from other readers (up to five, configured as *clients*) over an Ethernet network. The 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:
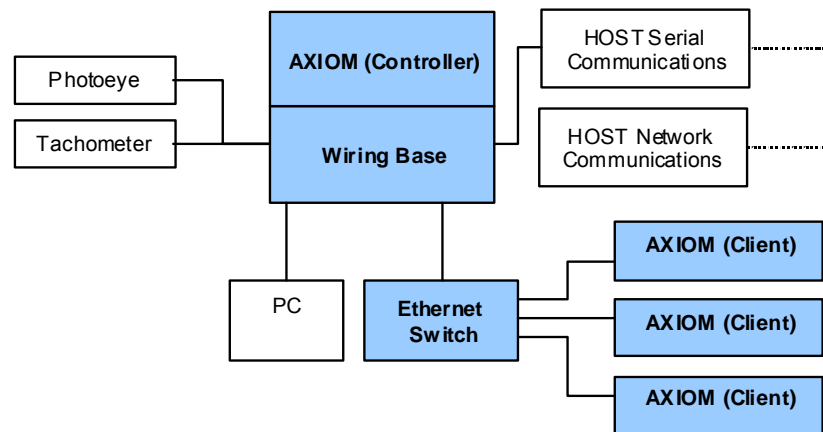
Setup Functions for Controller

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

Setup Functions for Clients

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

See Chapter 5 for details on setting up a multi-reader network.

Scanning Array / Tunnel Operations

When two multi-reader AXIOM networks are coupled to function in the same scanning area, the entire application is called a scanning array or tunnel.

NOTE: Due to the complexity of these applications, tunnel arrays are typically custom-engineered to your specifications.
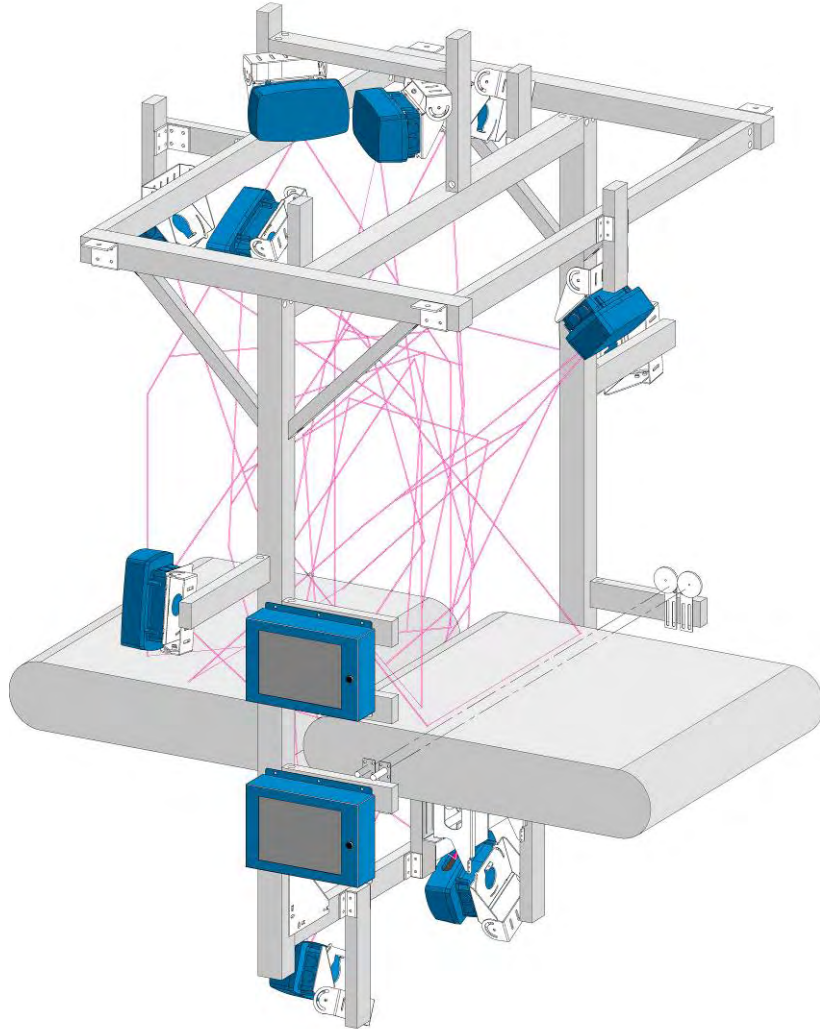
Setup Functions for Controller

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

Setup Functions for Clients

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

See Chapter 5 for details.

7 Maintenance

This chapter provides instructions for maintaining optimum performance and life for your AXIOM / AXIOM-X. It provides specific information on:

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

Tools and Materials Required

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

Laser Shutoff Procedure

In order to perform certain maintenance and service tasks, the reader's lasers must be shut off in order to comply with all laser safety requirements.

To shutoff the lasers:

1. Press   the **Test/Diagnostics** button for five (5) seconds.

2. The bar graph LEDs will light red for the five (5) second duration and then go out.

3. The lasers will then shut off.

4. After maintenance or service is complete, repeat the process to turn the lasers back on.
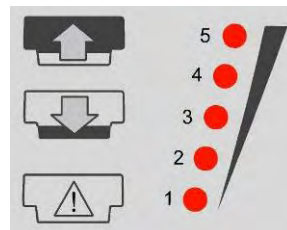
Test/Diagnostics button used for Laser Shutoff

AXIOM Button and LEDs involved with Laser Shutoff

Test/Diagnostics button used for Laser Shutoff

Bar Graph LEDs
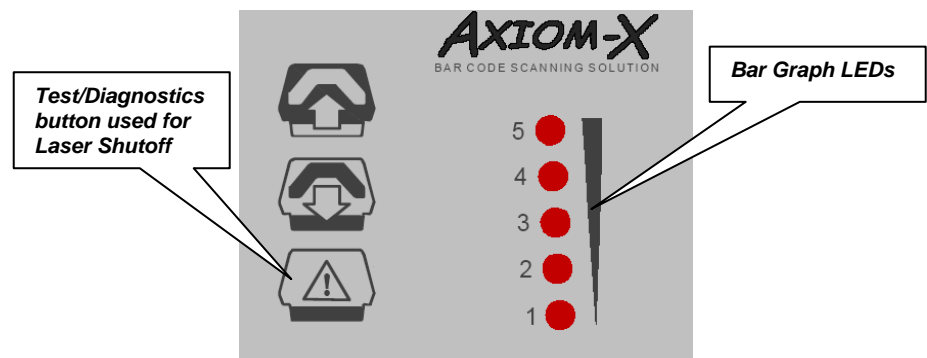
AXIOM-X Button and LEDs involved with Laser Shutoff

Maintenance Tasks

Perform the maintenance tasks on an "as needed" basis to assure proper operation of the AXIOM / AXIOM-X. 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 reader before performing this maintenance task. Do not stare into the reader'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 reader that is unsafe for plastics, such as benzene, acetone, or similar products. Before performing this maintenance task, be sure to shutdown the reader.

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

1. Turn off the reader's lasers.
   (See Laser Shutdown, page 132.)

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.
   (See Cleaning the Exit Window.)

Cleaning the Exit Window

WARNING: Shut down the reader before performing this maintenance task. Do not stare into the 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 reader 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 reader's lasers. *(See Laser Shutoff.)*

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. Turn the reader's lasers back on.

9. Verify reader operation. Follow the Operations Checklist procedure in Chapter 5.

AXIOM
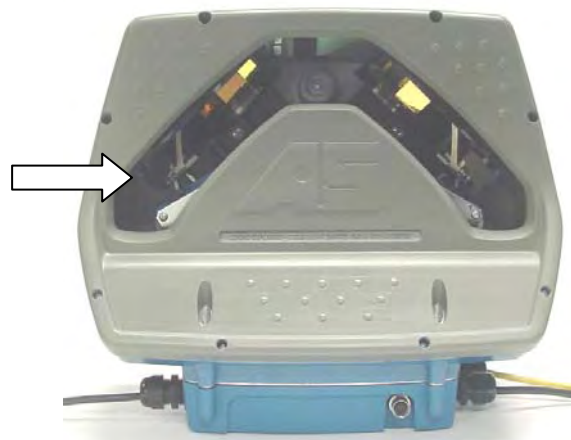
AXIOM-X

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 reader's lasers.
   (See Laser Shutoff.)

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.

Verify Trigger Photoeye Operation

1. Block the photoeye 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 reader is green when photoeye 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 reader is not green when the photoeye is blocked, check the cabling between the photoeye and reader wiring base for damage.

NOTE: The Height Tracking Photoeyes should also be maintained using these procedures.

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 reader's lasers.
   (See Laser Shutoff.)

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.

Verify Tachometer Operation

There are two ways to verify tachometer operations.

Use AXCESS Setup Software

1. Connect reader to a computer.

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.

Tighten Mounting Hardware

1. Check all reader mounting hardware. DO NOT 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).

3. Tighten as necessary. Do not over-tighten.

Checking Wiring Base Connections

All wiring connections to the reader are made through the wiring base. Specific wiring instructions are located on the insulation flap inside the wiring base. *(See Chapter 4.)*

1. Check all wiring connections to the wiring base terminal blocks.

2. Tighten as necessary. Do not over-tighten.

3. Check all cabling/conduit for signs of wear/damage.

4. Repair/replace any damaged cable connections as necessary.

Verify Reader Operation

1. Follow the Operations Checklist procedure defined in Chapter 5.

2. If the reader 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.

Notes:

8 Troubleshooting

This chapter provides instructions for diagnosing, troubleshooting and correcting AXIOM / AXIOM-X performance issues. It provides specific information on:

- Test   Mode

- Indicators

- Diagnostics

- Troubleshooting   (Problem/Cause/Solution)

Test Mode

In test mode, the reader displays the read rate on the AXIOM-X 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 / AXIOM-X provides several status indicators that you can use to troubleshooting performance during operations. They are found at two locations:

- Control Panel
- AXCESS Diagnostics > AXIOM Monitor screen

Control Panel Status Indicators

There are several control panel status indicators on the scan heads.
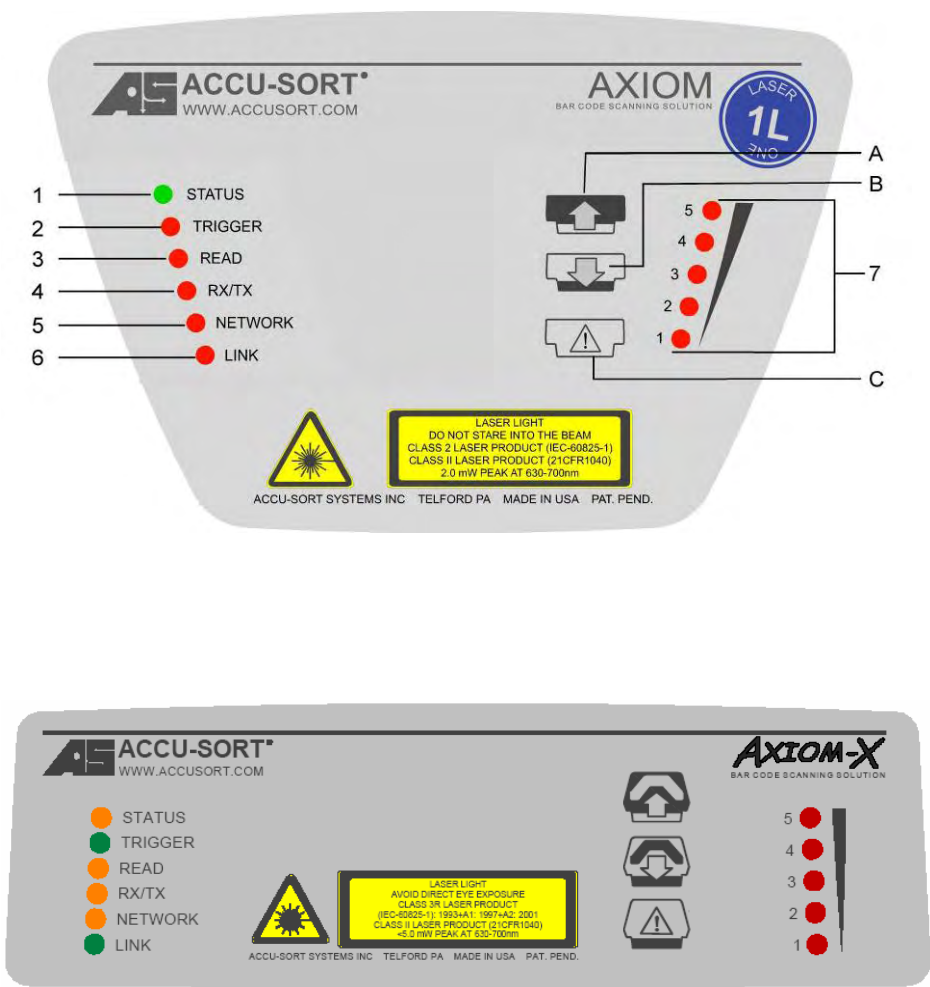
Control Panel LED Fault Detect Descriptions

LED	Description
STATUS	**RED** indicates a problem regarding the overall "health" of the reader.
TRIGGER	Indicates the trigger input. The LED is controlled through software no matter the trigger source (including software trigger).
READ	**RED** identifies a No Read condition. Check bar code print quality, trigger configuration, and bar code parameters.
RX/TX	If bar codes are being read, but the LED is NOT illuminated, data is not being transmitted on serial port 1.
NETWORK	*(See Network LED – Fault Detection.)*
LINK	If the LED is not flashing, there is no network connection.
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% **NOTES:** Also flashes during parameter upload/backup.
(Laser Shutoff)	LEDs stay on when Test/Diagnostic button C is pressed during the laser shutoff procedure. *(See page 132.)*

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: See *Network LED during Normal Operations in Chapter 6*.	

Control Panel Buttons – Uses during Troubleshooting

Ref.	Button	Description
A	**Restore to AXIOM**	Use to restore a 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. *See procedure on page 123.*
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. *See procedure on page 123.*
C	**Test /Diagnostic** **(Laser Shutoff)**	Enables the AXIOM test mode. (Test mode can also be selected remotely using *AXCESS Tools > AXIOM Commands > Test Mode On*.) Use to perform laser shutoff. *(See page 132.)*

NOTE: Keep in mind that the buttons on the reader's control panel can be enabled/disabled through the use of the AXCESS setup software. *(For details, see Modify > AXIOM Configuration in Chapter 5.)*

Wiring Base Status Indicators
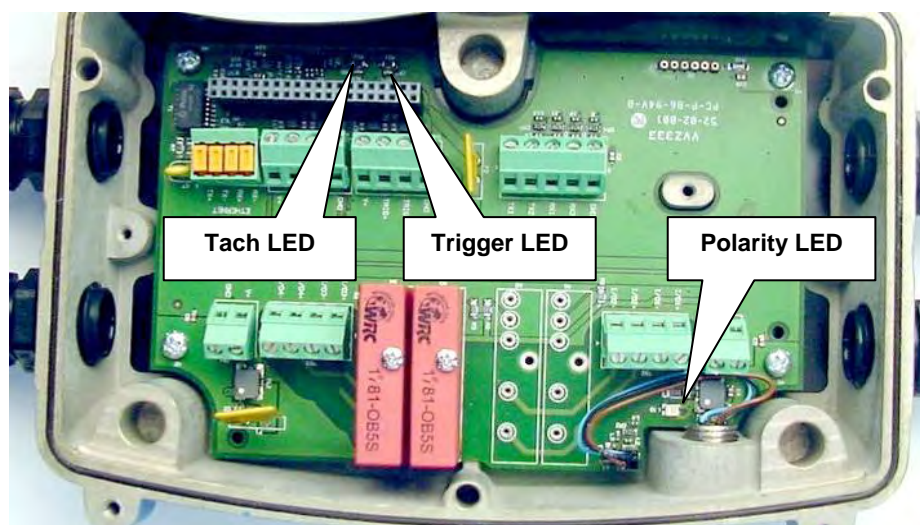
Wiring Base Status LED Descriptions

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 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, page 136.)*
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 Trigger Photoeye Operation, page 135.)*

Diagnostics

The **AXCESS for AXIOM software** includes comprehensive diagnostic capabilities that monitor reader operation, triggering, conveyor speed, package and label dimensions, bar code readability, scan rates and message output.

The **Diagnostics > AXIOM Monitor** window is the primary tool used to monitor the reader's operation and bar code readability in real-time.

The **Diagnostics > Log Viewer** lets you review the performance logs saved by the AXIOM. The log view field remains empty until you select one of the three buttons (Read Rate, System Counters, or Message Log).

Update Firmware is used to reload the reader firmware.

AXIOM Monitor

Status indicators and vital statistics appear on a single screen, enabling you to effectively and efficiently detect and troubleshoot any problems that may occur in high-speed laser bar code scanning.
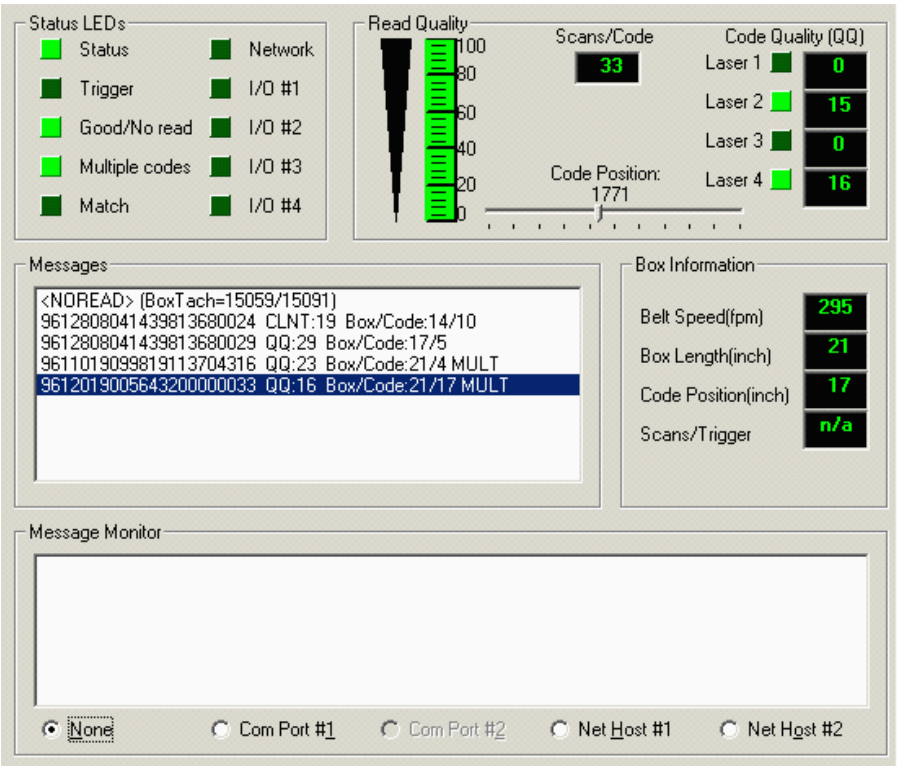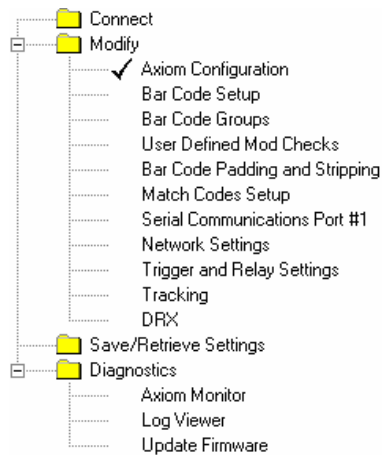
Status LEDs

These AXIOM Monitor status indicators reflect the AXIOM control panel LEDs functionality as well as additional LEDs such as the Match and I/O LEDs.

Status LED Definitions

LED Conditions	Definition of Conditions
Status	
Green	Indicates the overall "health" of the reader.
Red	Fault condition: Troubleshooting is required.
Trigger	
Green	Indicates the trigger input. The LED is activated upon trigger input regardless of trigger source (including software trigger).
Good/No read	
Green	Indicates a good (valid) bar code has been decoded.
Red	Indicates a no-read (or incomplete decode).
Multiple codes	
Red	Indicates more codes than desired were read.
Match	
Green	Indicates a code matches the Match Code criteria.
Network *(See table below.)*	
Flashes green or red to indicate connection status. Example: A red Network LED upon power up could indicate the MAC address was not set at the factory).	
▪ Fo r a **Single TCP/IP** connection, it indicates that a "host" connection has been made to the reader.	
▪ Fo r **EtherNet/IP** connection, it indicates "network" connection status. This LED is software controlled.	
▪ Fo r **Controller/Client** multi-reader connections, it indicates all inter-reader communications (i.e., connections between readers) are correctly functioning.	
I/O #1 through **I/O #4**	
Green	Indicates the status of the programmable I/O lines.

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. Flashes red – All client(s) with the same group number have NOT been found **Client** Solid green – Connected to controller with same group number. Off – Not connected to controller with 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.	

146 T   roubleshooting

Read Quality

The Read Quality indicators provide information regarding the bar code that was read.

Read Quality	Definition
Graph 0-100	The large percentage bar maps to the values displayed on the reader bargraph. It is a measure of "how well" the bar code was read.
Scans/Code	Indicates how many passes of the laser (scan lines) contributed to the reading of the code.
Code Position *(slider)*	Indicates the bar code's position in the AXIOM's scan line (from zero to 4095).
Code Quality (QQ) Laser 1 through 4	Indicates the QQ (code quality) value for each laser that read the bar code.

Box Information

The availability of diagnostic information within these fields depends on whether tracking is enabled or not. The first three are only available in tracking and the last one only in triggered, non-tracking modes.
These items are only updated when a trigger occurs. To monitor belt speed more accurately, it can also be viewed as part of the System Counters in the log viewer.

Box Information	Definition
Belt Speed (FPM)	Belt/conveyance speed in feet per minute
Box Length (inch)	Box/package length in inches
Code Position (inch)	Bar code position on the box in inches
Scans/Trigger	Number of scans per trigger cycle

Messages

Diagnostic messages from the reader are displayed here. This is primarily information on each bar code read. By **right clicking** on this area, options for clearing, starting, stopping and logging this information are made available.

Message Monitor

The message monitor can be used to monitor the messages being sent from any of the reader host ports (either serial or network). As with messages, options for clearing, starting, stopping and logging this information are made available by **right clicking**.

Message Monitor	Definition
(Display Field)	Displays the message transmitted
None	Select the port to be monitored.
Com Port #1	The AXIOM will not attempt to send messages out
Com Port #2	Net Host ports unless a connection is already
Net Host #1	established.
Net Host #2	Note: Nothing is displayed on Net Host #1 if EtherNet/IP communications are being used.

Log Viewer

The **Diagnostics > Log Viewer** lets you review the performance logs saved by the AXIOM. The log view field remains empty until you select one of the three most common logs (Read Rate, System Counters, or Message Log) via the buttons or enter a log request in the Command field.

> **NOTE:** Use the **Tools > Save LogView to File** menu selection to save the on-screen log view information to a file on your PC. This is useful if you need to archive or review the log information at a later time.

Log Viewer Commands

There are several commands that you can use to display AXIOM parameters and diagnostic information. Commands can be sent from the Command field on the log viewer. Commands may also be sent from a terminal interface, such as a TELNET connection to the AXIOM.

Display Commands	Description
DISP COUNTERS	Display the **System Counter** log view.
DISP ENET	Display the Ethernet interface status including MAC address.
DISP LASERS	Display ALL Lasers log view.
DISP LASERx	Display one Laser log view, where X is 1 – 4.
DISP MSGLOG	Display the **Message** log view.
DISP READRATE	Display the **Read Rate** log view.
Other Commands	**Description**
CLEAR ALL	Clears all information from the Message Monitor.

> **NOTE:** All commands can be issued from the Command field. However, when entering a command in the field, spaces are NOT permitted. As a result, the display commands need to be entered without a space (i.e., DISPCOUNTERS, DISPMSGLOG, etc.)

> **NOTE:** Right-click on log view provides two options: **Save LogView to File** (also available from Tools) and **Copy to Clipboard**.

Read Rate Log View

For a summary of the AXIOM's overall performance, click the **Read Rate** button. You can also enter **DISPREADRATE** in the command field and click **Send**.

```
┌ Axiom Log Viewer ─────────────────────────────────────────┐
│  ┌──────────────────────────────────────────────────────┐ │
│  │ Log view                                             │ │
│  │ DISPREADRATE=16                                      │ │
│  │ Total Boxes:          7545                           │ │
│  │ Good Boxes:           7545      100%                 │ │
│  │ Partial Boxes:           0        0%                 │ │
│  │ Bad Boxes:               0        0%                 │ │
│  │                                                      │ │
│  │ Total Codes:          7553                           │ │
│  │ Controller                                           │ │
│  │ Laser#1                  0        0%                 │ │
│  │ Laser#2               7553      100%                 │ │
│  │ Laser#3                  0        0%                 │ │
│  │ Laser#4                  0        0%                 │ │
│  │ Client (0.0.0.0)                                     │ │
│  │ Laser#1                  0        0%                 │ │
│  │ Laser#2                  0        0%                 │ │
│  │ Laser#3                  0        0%                 │ │
│  │ Laser#4                  0        0%                 │ │
│  │ ◄                                                  ► │ │
│  └──────────────────────────────────────────────────────┘ │
│                                                            │
│  [ Read Rate ]  [ System Counters ]  [ Message Log ]  [ Clear ] │
│                                                            │
│ ┌ Command ──────────────────────────────────────────────┐ │
│ │ [                                          ]  [ Send ] │ │
│ └────────────────────────────────────────────────────────┘ │
└────────────────────────────────────────────────────────────┘
```

The Read Rate Log Viewer provides information on the overall read rate.

Overall Read Rate Counters

Read Rate	Description
Total Boxes	Total number of triggers.
Good Boxes	A good box is a box with all required codes. This counter is the number of good boxes along with the percentage of the total boxes that were good.
Partial Boxes	A partial box is a box were some, but not all required codes were read. This obviously only applies when the AXIOM is configured to read multiple codes each trigger.
Bad Boxes	A bad box is a box where no codes were read.

The Read Rate Log Viewer also provides performance information on each laser. In order to provide diagnostics on the performance of each laser, the percentages reference here are the percentage of the **total codes** read by the particular laser, NOT the percentage of the **total packages** read by that laser.

Read Rate Counters per Laser

Read Rate	Description
Total Codes	Total number of bar codes read.
Laser#x	Total number of bar codes read by the particular laser.

For an AXIOM configured as a Controller in a multi-reader network, this command also provides counters for the number of bar codes read, by laser, for each AXIOM client. The clients are identified by their *reader name* as assigned in the *Modify > AXIOM Configuration* window of AXCESS. *(See Chapter 5.)*

REMEMBER: Not every AXIOM is configured with four lasers.

System Counters Log View

You can display a number of values and counters that indicate whether the AXIOM is configured and operating properly by clicking the System Counters button. You can also enter **DISPCOUNTERS** in the command field and click **Send**.

```
┌─Axiom Log Viewer──────────────────────────────────────────┐
│  ┌──────────────────────────────────────────────────────┐ │
│  │ Log view                                             │ │
│  │ DISPCOUNTS=17                                         │ │
│  │ Scan Rate:          701                              │ │
│  │                                                      │ │
│  │ Triggers:         31654   Good Reads:       31662    │ │
│  │ No Reads:             0   Mult Codes:           2    │ │
│  │ Match Codes:          0   Bad ModChk:           0    │ │
│  │                                                      │ │
│  │ Xfer Ovrflw:        926   Xfer BadLen          0    │ │
│  │ QData@TX:             0   Qdata@Trig:           0    │ │
│  │ ForcedTx:             0                              │ │
│  │                                                      │ │
│  │ DSP Codes:        33212   Scan Ints:        54902    │ │
│  │ Queue Size:         593   Num Cluster:         10    │ │
│  │ Bad Scan:             0   Pipe Error:           0    │ │
│  │ Full Scans:           0   Mem Full:         27115    │ │
│  │ ScanTooLong:        157   Max Clusters:         0    │ │
│  │                                                      │ │
│  │ ARM Restarts:         0   DSP Restarts:         0    │ │
│  └──────────────────────────────────────────────────────┘ │
│                                                           │
│  [ Read Rate ]  [ System Counters ]  [ Message Log ]  [ Clear ] │
│                                                           │
│  ┌─Command──────────────────────────────────────────────┐ │
│  │ [                                        ]   [ Send ] │ │
│  └──────────────────────────────────────────────────────┘ │
└───────────────────────────────────────────────────────────┘
```

Scan Rate and Belt Speed System Counters

	Description
Scan Rate	This is the total number of scans/second that the AXIOM is reading. Note the this number does NOT take into account "laser toggling" if it is enabled. If "laser toggling" is enabled, the effective scan rate for any laser is half of this value.
Belt Speed	(tracking) Speed of the belt (in ft/min) as measured by the tachometer.

Bar Code Counters	Description
Triggers	Total number of packages based on the trigger signal. In self-trigger mode, this will match the number of good reads.
Good Reads	Total number of bar codes read and transmitted. If the AXIOM is set up to read multiple bar codes each trigger, this counter is incremented for each bar code read.
No Reads	Total number of bar codes that were not read.
Mult Codes	Total number of instances where more bar codes of a specific type were read than expected. This counter will also increment, regardless of whether the AXIOM is configured to report "multiple codes" as an error.
Match Codes	Total number of bar codes that matched any of the Match Code criteria.
Bad ModChk	Total number of bar codes that were rejected due to an invalid Mod Check.

Error Counters	Description
Xfter Ovrflw	Transfer Overflow. This counts the number of codes that were lost due to an overflow in the transfer buffer between the Decode/DSP processor and the AXIOM/ARM processor.
Xfer BadLen	Transfer Bad Length. Number of codes in the transfer buffer than contained an invalid length, indicating some sort of memory corruption.
QData@TX	Queue Data at Transmit (non-tracking). This counter indicates that the AXIOM had not completed processing all of the scan data at the user specified transmit time. This will only happen if the "transmit time" parameter is set to a value other than zero. This does not necessarily indicate an error, but does indicate that either the transmit time is too short or the AXIOM is seeing a lot of data which may be the result of too much background noise.
QData@Trig	Queue Data at Trigger (non-tracking). This counter indicates that the AXIOM had not completed processing all of the scan data prior to the start of the next trigger. This typically can only happen when the "transmit time" parameter is set to zero; although it can also happen in conjunction with a Force Transmit. As with the Queue Data at Transmit counter, this does not necessarily indicate an error, but it likely indicates that the AXIOM is seeing a lot of data which may be the result of too much background noise.
ForcedTx	Forced Transmit (non-tracking). A forced transmit indicates that the start of trigger occurred before the specified transmit delay time had expired.
Lost Codes	Lost Codes (tracking). If a bar code cannot be placed onto any package while in tracking, the code is "lost" and this counter is incremented. Lost codes are also reported in the AXIOM Monitor message window. Lost code occurances typically indicate tracking parameters need to be adjusted.
Missed Tx	Missed Transmit (tracking). If a bar code is decoded after the message for that package has been transmitted, the Missed Transmit counter is incremented.

Decode/DSP Counters	Description
DSP Codes	Count of the number of barcodes decoded, per laser, by the DSP.
Scan Ints	Number of scan interupts detected by the DSP.
Queue Size	Current size of the scan data queue within the DSP. This value changes dynamically.
Num Cluster	Current number of DRX clusters in use by the DSP. This value changes dynamically.
Bad Scan	Count of the number of scans in which the data contained formatting errors.
Pipe Error	Count of internal errors on the transfer of scan data from the scan data buffer.
Full Scans	Number of times a scan could not be added to the scan data buffer because the maximum number of scans was exceeded.
Mem Full	Number of times a scan could not be added to the scan data buffer because the memory was full.
ScanTooLong	Number of times a scan was skipped because it contained too many transitions.
Max Clusters	Number of times, the maximum number of DRX clusters was exceeded.

ARM / DSP Restarts Counters	Description
ARM Restarts	Number of times the ARM processor has restarted. This typically means the hardware watchdog timer expired causing the ARM processor to restart.
DSP Restarts	Number of times the DSP processor has been restarted. Typically, this happens if the ARM suspects the DSP has "locked up" for any reason.

Message Log View

The **Message Log** contains various text messages that have been logged by the AXIOM software. You can view these messages by clicking the Message Log button. You can also enter **DISPMSGLOG** in the command field and click **Send**.

```
Axiom Log Viewer
 ┌─ Log view ──────────────────────────────────────────┐
 │ DISPMSGLOG=7                                         │
 │ 0-00:00:00.304: FPGA Loaded Successfully.            │
 │ 0-00:00:00.597: DSP Loaded and Started.             │
 │ 0-00:00:00.664: Network Initialized Successfully.    │
 │ 0-00:00:01.857: TX Port 1 Started                   │
 │ 0-00:00:01.864: TX Port 0 Started                   │
 │ 0-00:00:01.870: Axiom Software Started.             │
 │ 0-00:00:06.870: SysMon: Not enough clients detected. │
 └─────────────────────────────────────────────────────┘

 [ Read Rate ]  [ System Counters ]  [ Message Log ]  [ Clear ]

 Command
 [                                              ]  [ Send ]
```
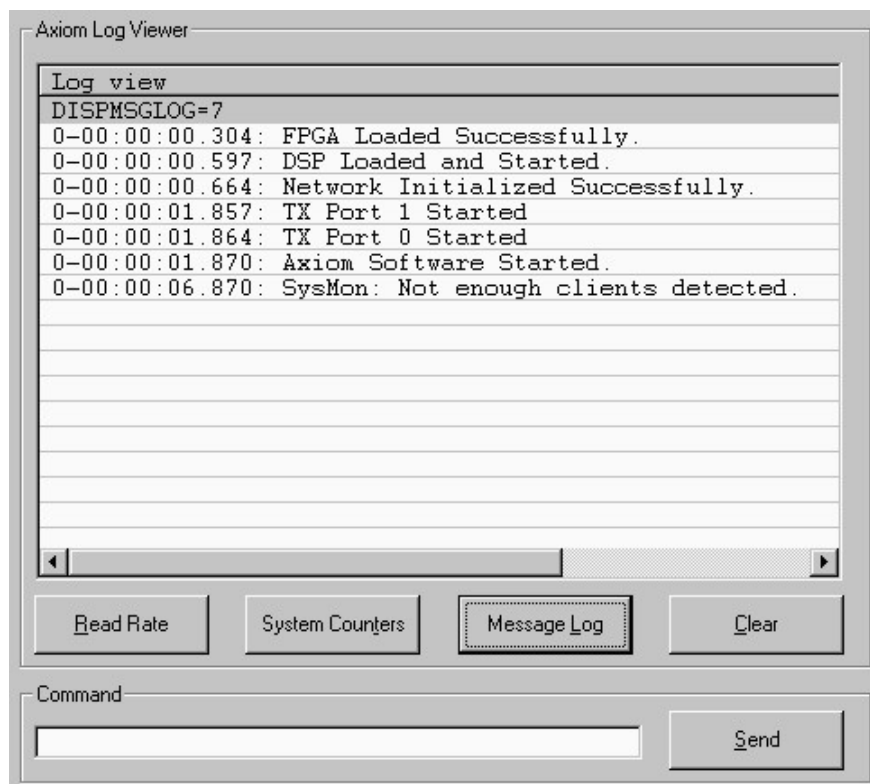
The messages contained in this log typically reflect significant events.

Display Lasers Log View

The Display Lasers command provides a summary of the scan data being detected by each laser. You can also enter **DISPLASERS** in the command field and click **Send**.
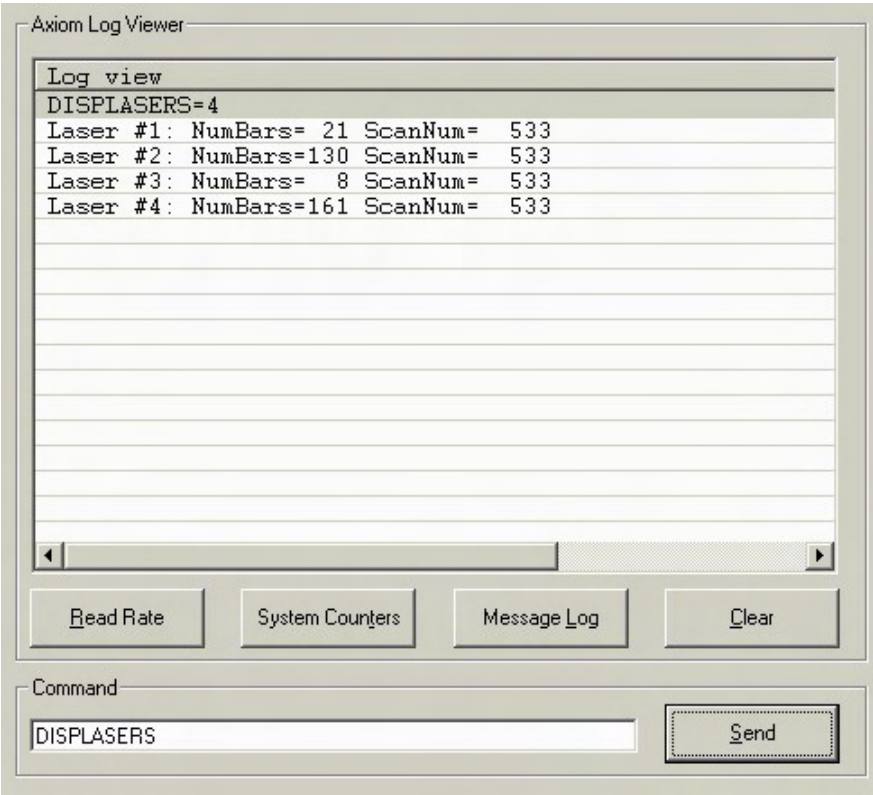
Details of each laser can be seen with the **DISP LASERx** command (where x is the laser number). For each transition, the raw position and bar width is shown first. After that (with brackets), the computed bar and space values are displayed. A zero is used if the bar or space exceeds the minimum or maximum bar/space width threshold for that laser.

```
┌─Axiom Log Viewer──────────────────────────────────────────────────────────
│ ┌────────────────────────────────────────────────────────────────────────
│ │ Log view
│ │ DISPLASER3=13
│ │ Laser #3:   Scan#:  2331   Bars:   12  Tach:    0
│ │ Pos:  33293   Bar: 1023 [    0╱    0]
│ │ Pos:  35040   Bar:  121 [  121╱    0]
│ │ Pos:  35166   Bar:   91 [   91╱    0]
│ │ Pos:  35259   Bar:   52 [   52╱    0]
│ │ Pos:  35313   Bar:   25 [   25╱    0]
│ │ Pos:  35345   Bar:   13 [   13╱    0]
│ │ Pos:  35365   Bar:   20 [   20╱    0]
│ │ Pos:  35389   Bar:   16 [   16╱    0]
│ │ Pos:  35409   Bar:   31 [   31╱    0]
│ │ Pos:  35445   Bar:   12 [   12╱    0]
│ │ Pos:  35460   Bar:   14 [   14╱    0]
│ │ Pos:  47777   Bar:    0 [    0╱    0]
│ │
│ └────────────────────────────────────────────────────────────────────────
│   [◄]                                                               [►]
│
│   [ Read Rate ]   [ System Counters ]   [ Message Log ]   [ Clear ]
│
│ ┌─Command──────────────────────────────────────────────────────────────
│ │ DISPLASER3                                              [ Send ]
└─┴────────────────────────────────────────────────────────────────────────
```

Update Firmware

CAUTION: Used to reload AXIOM reader firmware. This function should only be performed under the guidance of Accu-Sort Technical Support.
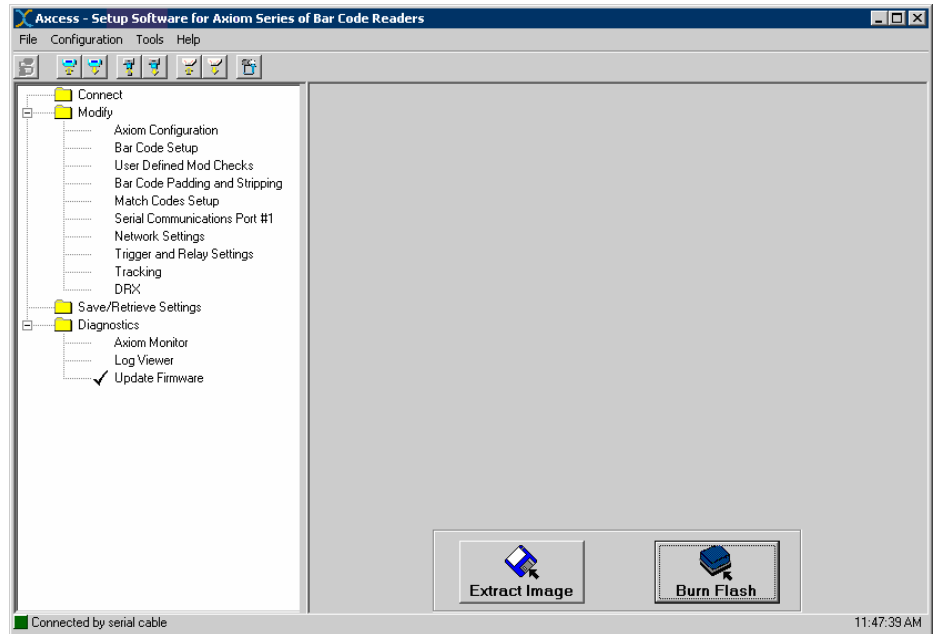
Extracting an Image:
1. Click   the **Extract Image** button.
2. The   **Save As** window enables you to save image (*.img) files.

Burning an Image to Flash:
1. Click   the **Burn Flash** button.
2. The   **Open** window enables you to open an image file (*.im*)
3.   Burn the image file to flash.
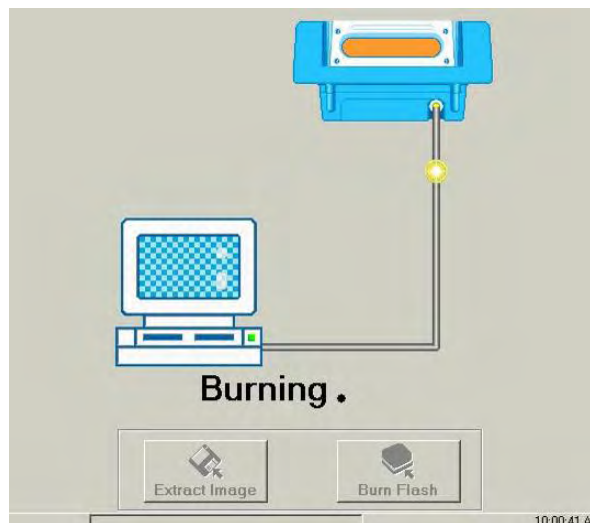
PCS Troubleshooting Tables

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.

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 Chapter 3.)*

Problem	There is no laser light exiting from the reader when power is activated.
Cause(s)	Have the laser(s) been shut off? *(See page 132.)* 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-X scan head from wiring base. 5. Verify Power LED in wiring base is GREEN. 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-X scan head to wiring base.

Problem	The AXIOM / AXIOM-X 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 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.

Problem	The reader 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 134. 3. Check reading distance with a known good quality sample bar code. 4. Enable TEST MODE. (Use either the AXIOM-X control panel button or AXCESS *Tools > AXIOM Commands > Test Mode On.*) 5. Hold code in the scan line. 6. Verify the AXIOM-X is reading the code. 7. Correct any tilt, pitch, or skew problems.

Problem	The reader 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 reader's laser is scanning the bar code. 2. Adjust the photoeye as necessary. *(See Verify Photoeye Operation, page 135.)* **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 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 the trigger input and trigger configuration. 4. View the Message Monitor to verify the reader is transmitting data from the SERIAL COM port. *(Reference AXCESS software, Diagnostics > AXIOM Monitor.)*

Problem	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, Tracking.)* 3. Correct as needed.

Problem	Cannot connect configuration PC running AXCESS to the reader'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.

9 Service

There are a limited number of field-replaceable units (FRUs) that are part of the AXIOM / AXIOM-X Bar Code Reader. In most cases, components should be replaced with a matching recommended spare part (RSP).

Service procedures are divided into two skill levels:

- Customer technicians (with some training from Accu-Sort)

- Accu-Sort Trained and Authorized Service Technicians only

All AXIOM / AXIOM-X accessories and options are considered customer technician field-replaceable units (FRUs).

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*.

External Devices

To replace any external devices, reference the installation procedures provided in Chapter 3 and Chapter 4.

Field Replaceable Units (FRUs)

Replacement procedures for internal field-replaceable units (FRUs) that may be performed by customer technicians are provided with the replacement part. The FRU Quick Reference Guides (QRGs) and "how to" videos are also available on our website www.datalogic.com *(Not available at time of publication.)*

CAUTION: Although someone with basic electromechanical / technical skills may perform the removal and replacement of the field replaceable units (FRUs), Accu-Sort training is recommended. Contact Customer Service at 1-800-BAR-CODE to schedule training that fits your needs.
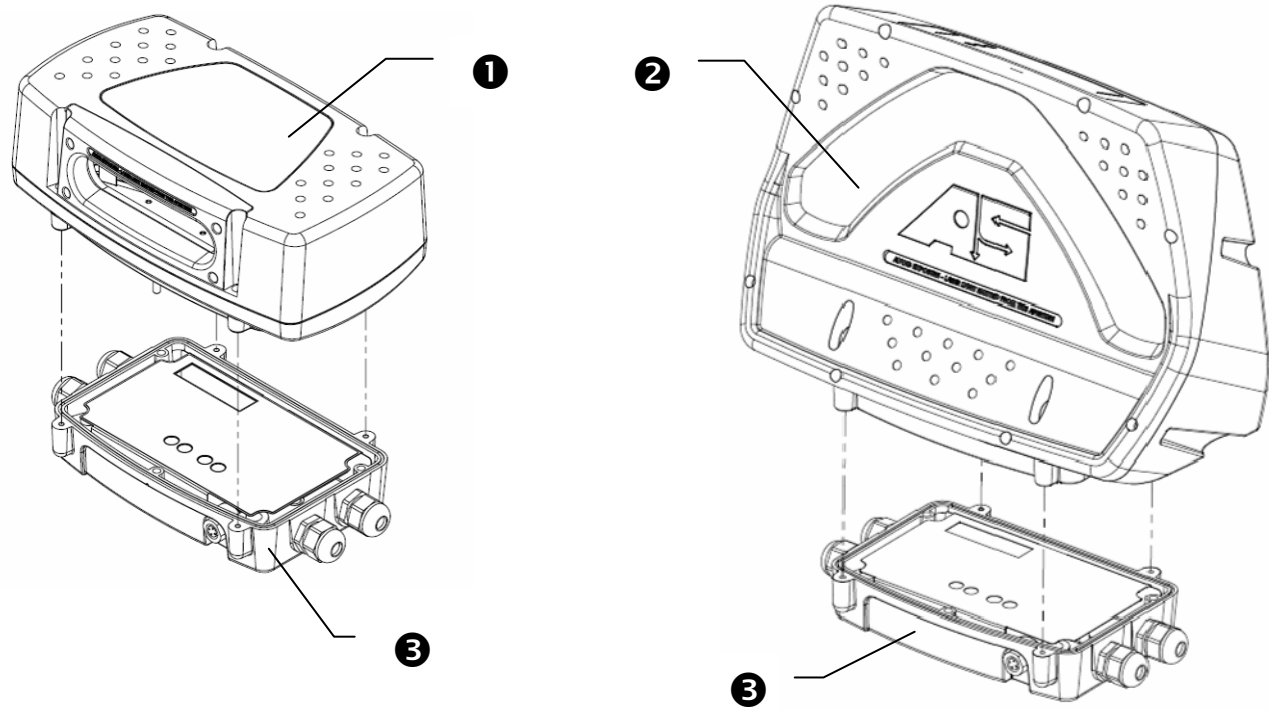
AXIOM / AXIOM-X Readers

	FRU Guide	Item	Spare Part #	Replacement Descriptions	# of Readers on site ▶	Spares Recommended		
						1-10	11-30	31-50
❶	N/A	**AXIOM Scan Head**	1000052807	1-Laser, Standard Density				
			1000052809	1-Laser, High Density				
			1000052802	2-Laser/1-Module, Standard Density				
			1000052803	2-Laser/1-Module, High Density				
			1000052804	Enhanced: 2-Laser/2-Module, Standard Density				
			1000052805	Enhanced: 2-Laser/2-Module, Standard Density				
			1000059582	Enhanced: 2-Laser//2-Module, Airport				
			1000052800	4-Laser, Standard Density				
			1000052801	4-Laser, High Density				
❷	N/A	**AXIOM-X Scan Head**	1000062887	2-Laser, Standard Density				
			1000063502	2-Laser, Medium Density				
			1000062888	2-Laser, High Density				
			1000062889	4-Laser, Standard Density				
			1000063503	4-Laser, Medium Density				
			1000062890	4-Laser, High Density				
❸	N/A	**Wiring Base**	0104636001	Universal Wiring Base for AXIOM / AXIOM-X				

NOTE: The illustrated FRU Guides and 'how to' videos were not available at the time of publication. When they are completed, they will be placed on the Accu-Sort website (www.datalogic.com). Go to: **Support > Downloads** for the latest information and setup software for AXIOM / AXIOM-X.

❹

❻

❺

❼

Accessories

	FRU Guide	Item	Spare Part #	Replacement Descriptions	# of Readers on site ▶	Spares Recommended		
						1-10	11-30	31-50
❹	N/A	**Power Supply**	0112591001	40 watt / 24V (IP40-rated, Domestic)				
			0112591002	40 watt / 24V (IP40-rated, International)				
			0105365001	40 watt / 24V (IP65-rated, Domestic)				
			0105365002	40 watt / 24V (IP65-rated, International)				
			0105914001	110 watt (IP65-rated, Domestic)				
			0105914002	110 watt (IP65-rated, International)				
❺	N/A	**Photoeye**	1000020569	Kit (flying leads, includes reflector, hardware)				
			1000063534	Height Tracking Eye Kit (1 photoeye, 1 input module)				
❻	N/A	**Tachometer**	1000019875	Programmable, 8-30VDC (with 20 ft. cable)				
❼	N/A	**I/O Modules**	1000056135	DC Input Module (White, 3.3-32VDC)				
			1000056136	DC Output Module (Red, 3-60VDC)				
			1000056137	AC Output Module (Black, 12-42VAC)				

NOTE: The illustrated FRU Guides and 'how to' videos were not available at the time of publication. When they are completed, they will be placed on the Accu-Sort website (www.datalogic.com). Go to: **Support > Downloads** for the latest information and setup software for AXIOM / AXIOM-X.

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 Installing a Scan Head, pages 36-40.)*

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.

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. *(See Restore Parameters from Wiring Base, page 107.)*

    -   Download a parameter set you have saved to disk directly through the reader's Configuration Port Connector using AXCESS and the setup cable.

Replacing a Wiring Base

1. Remove power from reader.

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 reader.

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.

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 reader.

2. Unplug power supply from source.

3. Remove the scan head from wiring base.

4. Disconnect power supply wiring from INPUT POWER terminal blocks.
    (See pages 25 and 51.)

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 reader.
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 reader.

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. Install the two ferrite clamps on the TACH cable.

8. Confirm tachometer operation (LED in wiring base).

9. Install the scan head to wiring base.

Notes:

A Specifications

AXIOM / AXIOM-X Technical Specifications

Characteristic	Description
Name	AXIOM Line Scanning Laser Bar Code Reader
	AXIOM-X Omnidirectional Laser Bar Code Reader
Dimensions AXIOM	L 6.23" [158.2 mm] x W 10.87" [276.1 mm] x H 5.19" [131.8 mm]
AXIOM-X	H 12.23" [311 mm] x W 13.92" [354 mm] x D 6.93" [176 mm]
Weight AXIOM	Scan Head: 7.9 lbs. [3.9 kg]
AXIOM-X	Scan Head: 14.5 lbs. [6.6 kg]
	Wiring Base: 1.8 lbs. [0.8 kg]
	Power Supply: *(specs on next page)*
	Mounting Bracket: 4.1 lbs. [1.9 kg] *including mounting hardware*
Temperature	Operating: +32° F to +122° F [0° to +50° C]
	Storage: -4° to +158° F [-20° to +70° C]
Relative Humidity	10-90% non-condensing
Enclosure AXIOM	Powdered-Coated Cast Aluminum, rated for IP 65
AXIOM-X	Powdered-Coated Cast Aluminum, rated for NEMA 13 / IP54
Power Requirements	Input: 12-30 VDC, Typ. 1.0A@24VDC (AXIOM-X 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)
	AXIOM: Class 3R
	AXIOM-X: Class 1 Laser Product (IEC-60825-1, 1993+A1: 1997+A2: 2001),
	Class II Laser Product (21CFR1040)
Depth of Field - AXIOM	15-72 inches [381-1829] max. *See read charts, Appendix B*
AXIOM-X	Out to 80 inches [2032] max. *See read charts, Appendix B*
Scan Rate AXIOM	700-1400 SPS
AXIOM-X	620–1120 SPS
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)
MTBF	> 71,949 hours @ 30° C
	> 65,500 hours @ 40° C
	> 48,700 hours @ 50° C
Options	9 AXIOM Scan Head Versions – (4) Standard, (4) High-density, (1) Airports
	X-scanning bracket (supports 2 AXIOM and power supply)
	AXIOM-X Scan Heads – Standard, Medium, High-Density (2 ea.)
	120 VAC or 240 VAC Power Supply
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, CE, FCC (Class A) *(See Certifications in this appendix.)*
	BUREAU OF INDIAN STANDARD (BIS), Self Declaration – Conforming to IS
	13252 (Part 1):2010, R-41011797
	Note: Accu-Sort reserves the right to change product specifications without notice.

Power Supplies for AXIOM / AXIOM-X

IP40- rated Power Supply for AXIOM / AXIOM-X (24V)

Characteristic	Description
Dimensions	L 4.65" [118 mm] x W 1.36" [34.5 mm] x H 2.05" [52 mm]
Weight	0.6 lbs. [0.275 kg]
Temperature	Operating: 0° to +70° C
	Storage: -40° to +85° C
Relative Humidity	5-95% non-condensing
Enclosure	ABS plastic, Rated for IP40
Power Requirements	Input: 90-264 VAC / 0.5A typical, 1.0A max. @ 120 VAC
	Output: Max. 250mA Load
Power Consumption	< 40 W
Connections	Male IEC (available with either domestic or international power cord)
Compliance	UL, cUL, CE, FCC (Class A) *(See Compliance table.)*

IP65- rated Power Supply for AXIOM / AXIOM-X (24V)

Characteristic	Description
Dimensions	L 6.73" [171 mm] x W 4.76" [121 mm] x H 2.16" [55 mm]
Weight	2.5 lbs. [1.1 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. 250mA Load
Power Consumption	< 40 W
Connections	Male IEC (available with either domestic or international power cord)
Compliance	UL, cUL, CE, FCC (Class A) *(See Compliance table.)*

Dual AXIOM Power Supply for use with an XMB to create X-pattern

Characteristic	Description
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
	Output: Max. 2.5A Load
Power Consumption	< 110 W
Connections	Male IEC (available with either domestic or international power cord)
Compliance	UL, cUL, CE, FCC (Class A) *(See Compliance table.)*

Note: Accu-Sort reserves the right to change product specifications without notice.

I/O Modules
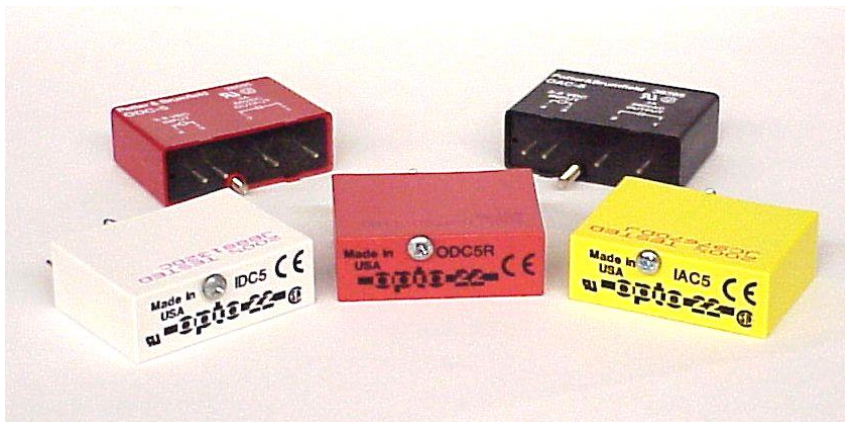
Output Modules

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 Module

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.	

Certifications

UL Listing (UL)	UL Listed
c(UL)	UL Listed to Canadian safety standards
	Standard to which conformity is declared:
	UL 60950-1: 1st Edition, 2006-07-07 (Information Technology Equipment – Safety – Part 1: General Requirements) CSA C22.2 No. 60950-1-03, 1st Edition, 2006-07 (Information Technology Equipment – Safety – Part 1: General Requirements)
FC (FCC)	Standards to which conformity is declared: 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 Emissions** EN 61000-6-4: 2001 CISPR 11:1999 Radiated Emissions – Class A CISPR 11:1999 Conducted Emissions – Class A **2 Immunity** EN 61000-6-2: 2001 Electromagnetic Compatibility - Generic Standards - Immunity for industrial environments EN 61000-4-2:1995, Electromagnetic compatibility (EMC), Electrostatic discharge immunity test EN 61000-4-3: 2001, (EMC), Part 4 - Section 3: Radiated, radio-frequency electromagnetic field test EN 61000-4-4:2004, (EMC), Electrical fast transient/burst immunity test EN 61000-4-5:1995, (EMC), Part 4 - Section 5 Surge immunity test EN 61000-4-6:2003, (EMC), Part 4 - Section 6 Immunity to conducted disturbances, induced by radio-frequencies IEC 61000-4-11: 2003, (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) ENV 50204: 1995, "(EMC), Radiated, Electromagnetic Field From Digital Radio Telephones-Immunity Test"
BUREAU OF INDIAN STANDARD (BIS)	Self Declaration – Conforming to IS 13252 (Part 1):2010, R-41011797

B Read Charts

Scan Rate Explained

The **AXIOM line scanners** can be configured with either one or two modules. The **AXIOM-X omnidirectional readers** are configured with 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.

AXIOM 1L: These configurations use a single laser in a single module. The AXIOM maximum scan rate is 1,400 SPS. The standard scan rate is 1,100 SPS. (See the read charts for 1000052807 and 1000052809.)

AXIOM 2L: 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. (See the read charts for 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.

AXIOM-X 2L: When one laser is installed in each module, that laser has exclusive use of the mirror wheel and receiving sensor. The AXIOM-X 2L maximum scan rate when one laser is installed per module is 1,120 SPS. The standard scan rate is 1,000 SPS.

AXIOM 2L Enhanced: 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. 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 scan rate is not additive. When you have two modules in the AXIOM each with one laser each laser is reading over a different zone and the scan rate in that zone is still 1,400 SPS or 1,100 SPS. (See the read charts for 1000052804 and 1000052805.)

AXIOM 4L: These units include two modules, each with two lasers per module. (See the read charts for 1000052800 and 1000052801.)

AXIOM-X 4L: These scan heads include two modules, each with two lasers per module. The 4L maximum scan rate when two lasers are installed per module is 560 SPS. The standard scan rate is 500 SPS.

IMPORTANT: All read charts are applicable to the standard SPS only.

The following labels only appear on the **AXIOM-X omnidirectional readers**:

STANDARD DENSITY Identifies a standard density scan head for reading bar codes with minimum bar/space widths of 15 mil+.

MEDIUM DENSITY Identifies a medium density scan head for reading bar codes with minimum bar/space widths of 13 mil+.

HIGH DENSITY Identifies a high density scan head for reading bar codes with minimum bar/space widths of 10 mil+.

AXIOM 1L Line Scanning Applications (Standard 1000052807 / High Density 1000052809)
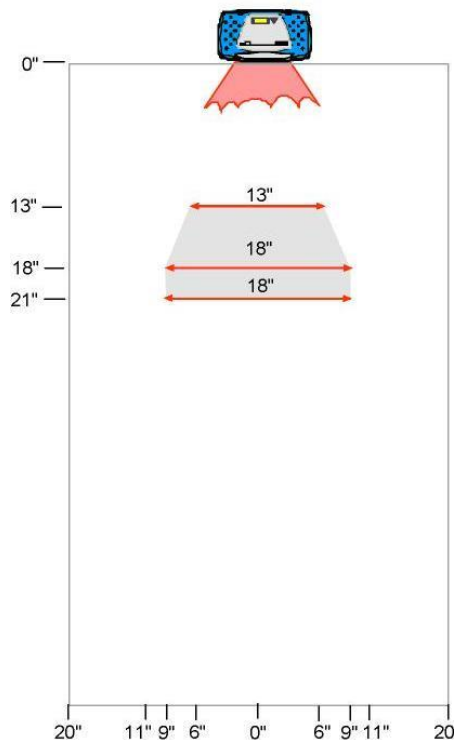
10-mil code   (1000052809)   **12-mil code   (1000052809)**

[Not available at time of publication.]
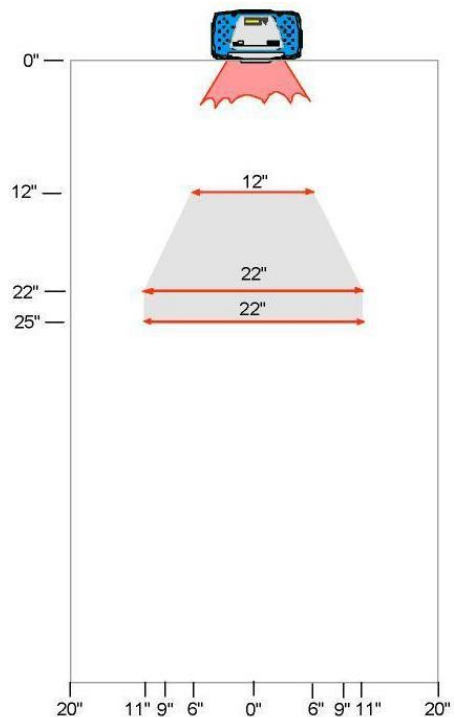
15-mil code   (1000052807)   **20-mil code   (1000052807)**
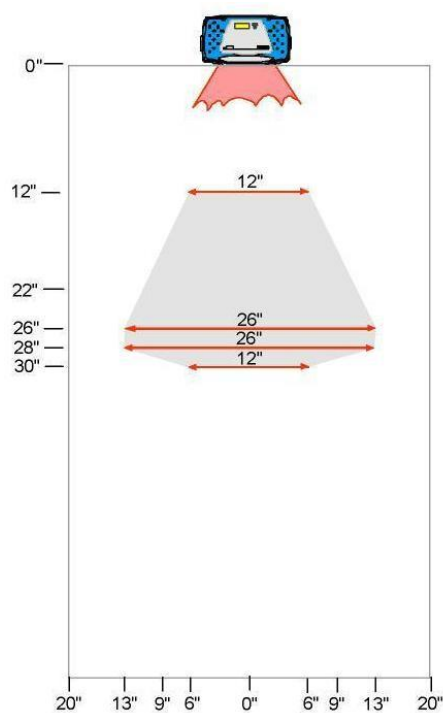
- **1,100 scans per second (standard) throughout DOF**
- **ANSI Contrast Grade 84% or greater**
- **ANSI "Grade A" Print Quality**

- **Pitch not greater than +/- 15 °**
- **Skew not greater than +/- 15 °**
- **Tilt not greater than +/- 45 °**

AXIOM 2L Line Scanning Applications (Standard 1000052802 / High Density 1000052803)
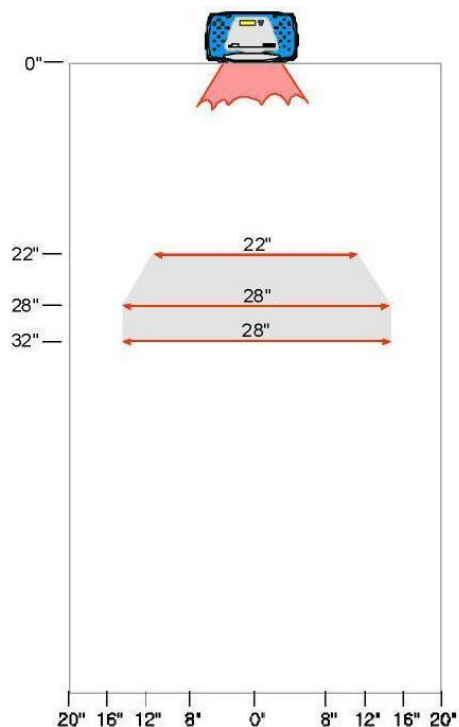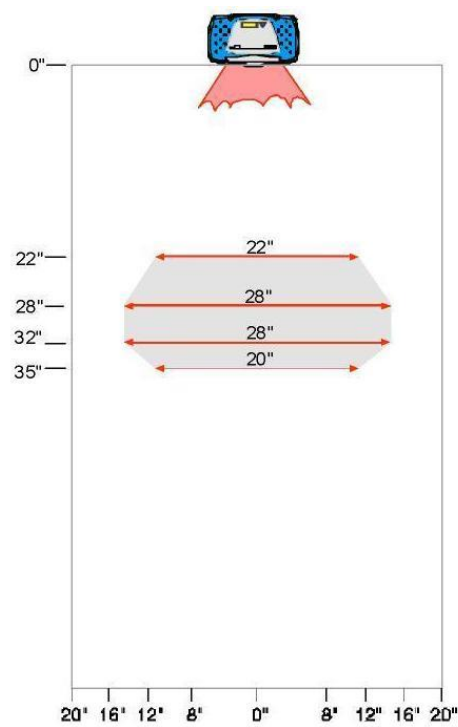
10-mil code   (1000052803)   **12-mil code   (1000052803)**

15-mil code   (1000052802)   **20-mil code   (1000052802)**
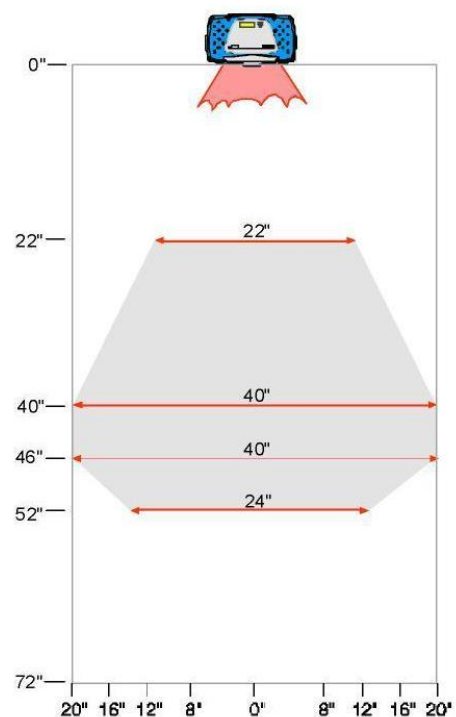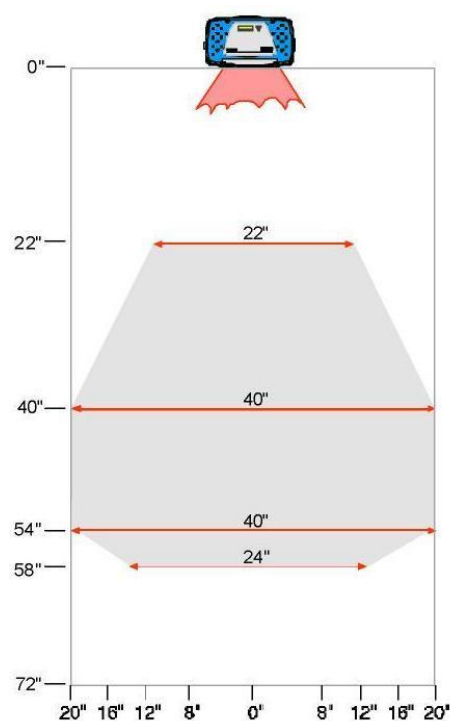
- 550 scans per second (standard) throughout DOF
- Using one receiving sensor
- Laser pairs alternate on/off every other scan
- ANSI Contrast Grade 84% or greater

- Pitch not greater than +/- 15 °
- Skew not greater than +/- 15 °
- Tilt not greater than +/- 45 °
- ANSI "Grade A" Print Quality

AXIOM 2L Enhanced Line Scanning Applications (Std. 1000052804 / High Density 1000052805)
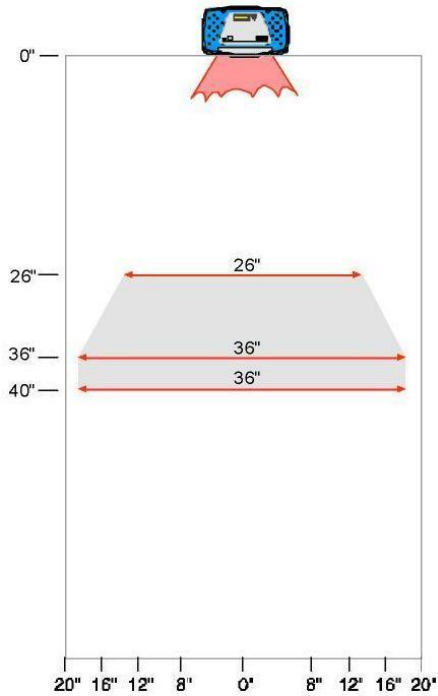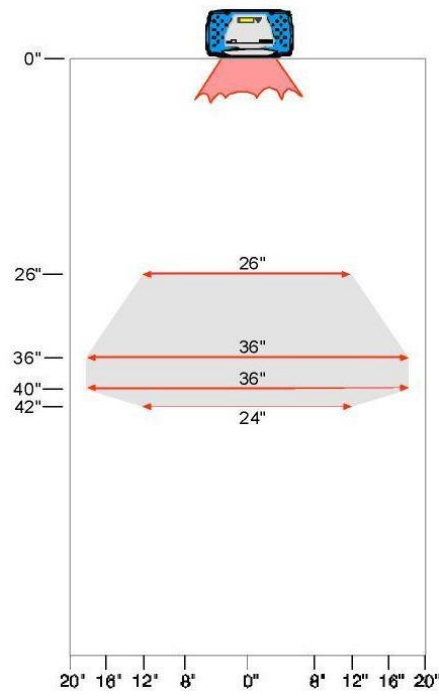
10-mil code   (1000052805)

12-mil code   (1000052805)

15-mil code   (1000052804)
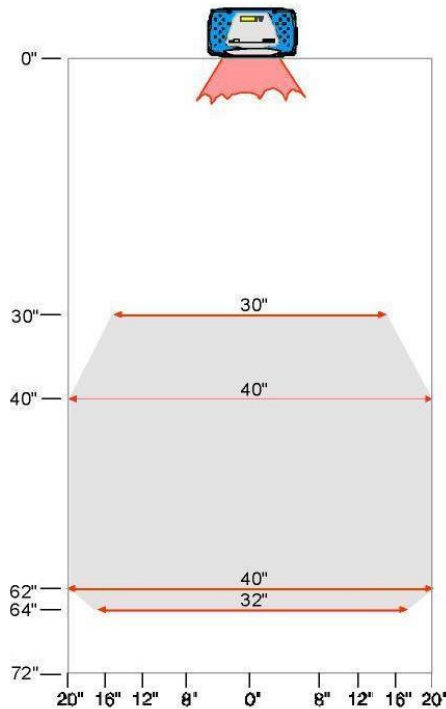
20-mil code   (1000052804)
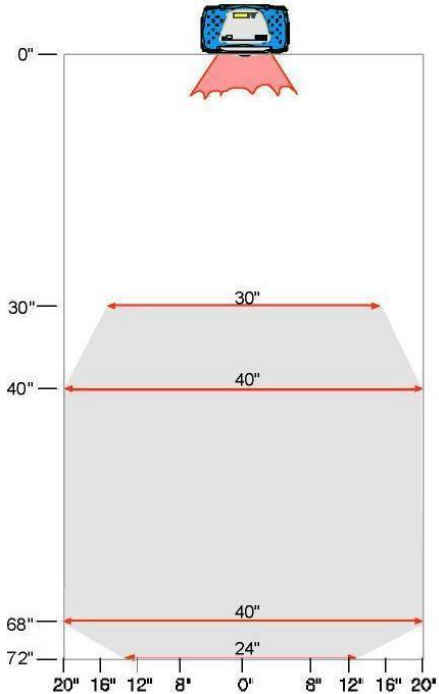
- **1,100 scans per second (standard) throughout DOF**
- **Using two receiving sensors, one per module**
- **Each laser always on**
- **ANSI Contrast Grade 84% or greater**

- **Pitch not greater than +/- 15 °**
- **Skew not greater than +/- 15 °**
- **Tilt not greater than +/- 45 °**
- **ANSI "Grade A" Print Quality**

AXIOM 2L Enhanced Line Scanning 45˚ Skew Apps. (Std. 1000052804 / High Density 1000052805)

10-mil code   (1000052805)   **12-mil code   (1000052805)**

[Not available at time of publication.]   *[Not available at time of publication.]*

15-mil code   (1000052804)   **20-mil code   (1000052804)**

[Not available at time of publication.]   *[Not available at time of publication.]*

- **1,100 scans per second (standard) throughout DOF**
- **Using two receiving sensors, one per module**
- **Each laser always on**
- **ANSI Contrast Grade 84% or greater**

- **Pitch not greater than +/- 15 °**
- **Skew = 45 °**
- **Tilt not greater than +/- 45 °**
- **ANSI "Grade A" Print Quality**

AXIOM 4L Line Scanning Applications (Standard 1000052800 / High Density 1000052801)

10-mil code   (1000052801)
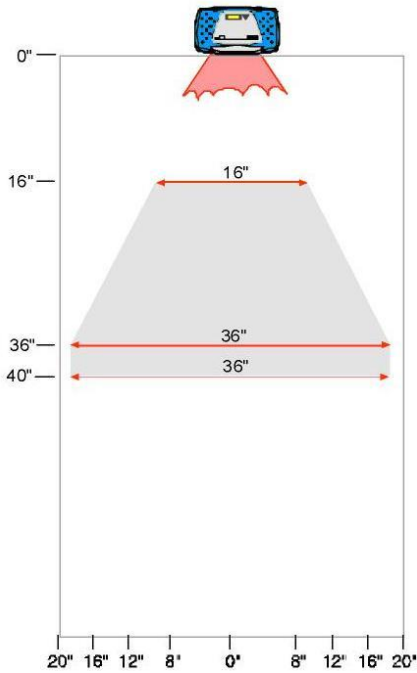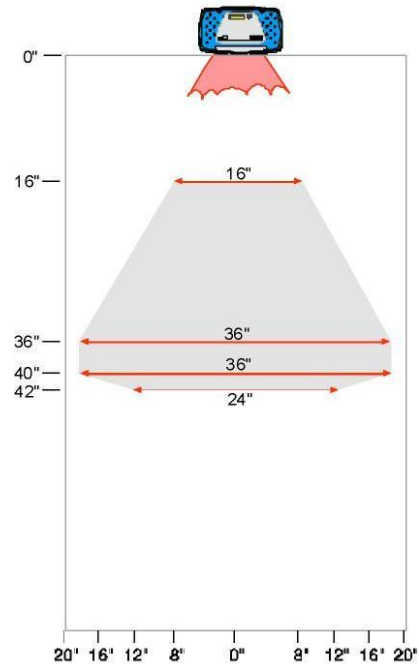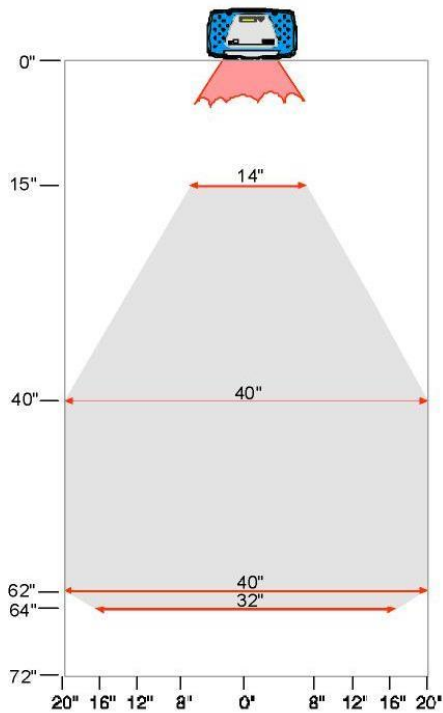
12-mil code   (1000052801)

15-mil code   (1000052800)

20-mil code   (1000052800)
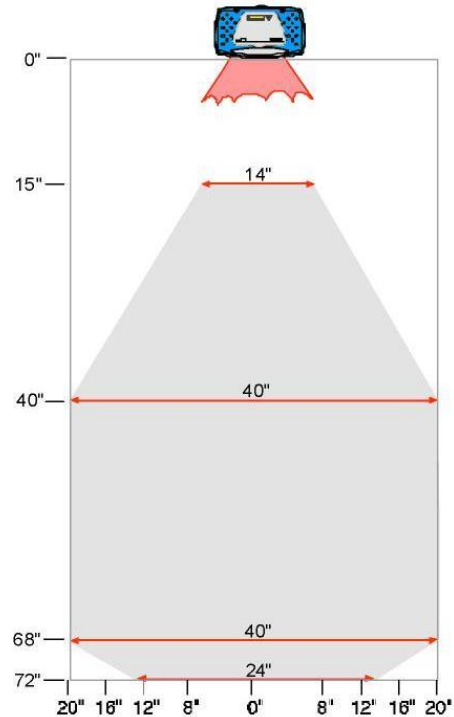
- **550 scans per second (standard) throughout DOF**
- **Using two receiving sensors, one per module**
- **Laser pairs alternate on/off every other scan**

- **Pitch not greater than +/- 15 °**
- **Skew not greater than +/- 15 °**
- **Tilt not greater than +/- 45 °**

- **ANSI Contrast Grade 84% or greater**   ▪ **ANSI "Grade A" Print Quality**

AXIOM 2L Omnidirectional X-Scanning Application
(2) 2L AXIOM and X-Pattern Mounting Bracket (XMB) (Std. 1000052802 / High Density 1000052803)

10-mil code   (1000052803)   **12-mil code   (1000052803)**

15-mil code   (1000052802)   **20-mil code   (1000052802)**

- **550 scans per second (standard) throughout DOF**   ▪ **Pitch not greater than +/- 15 °**
- **Using one receiving sensor**   ▪ **Skew not greater than +/- 15 °**
- **Laser pairs alternate on/off every other scan**   ▪ **ANSI "Grade A" Print Quality**

- **ANSI Contrast Grade 84% or greater**

AXIOM 2L Enhanced Omnidirectional X-Scanning Application
(2) 2L Enhanced AXIOM and X-Pattern Mounting Bracket (XMB) (Std. 1000052804 / High Density 1000052805)

10-mil code   (1000052805)   *See page 27.*   **12-mil code   (1000052805)**
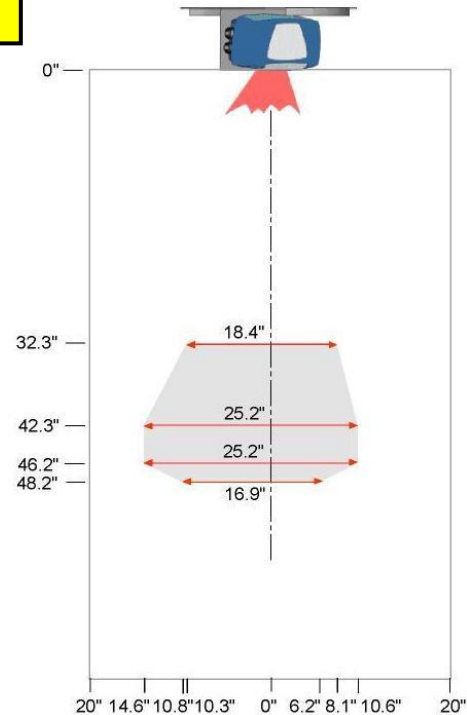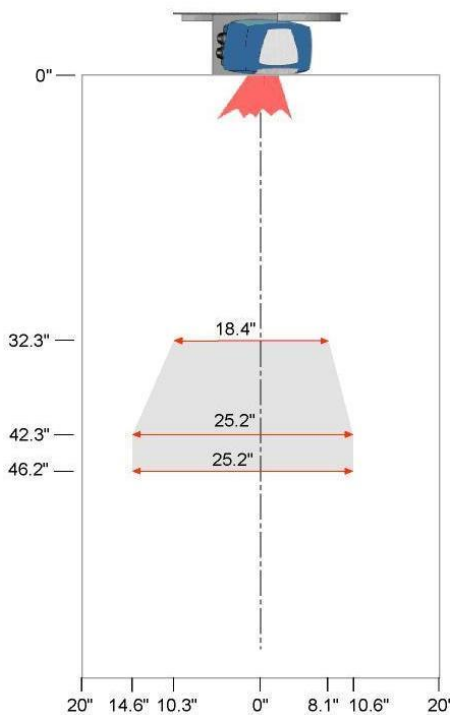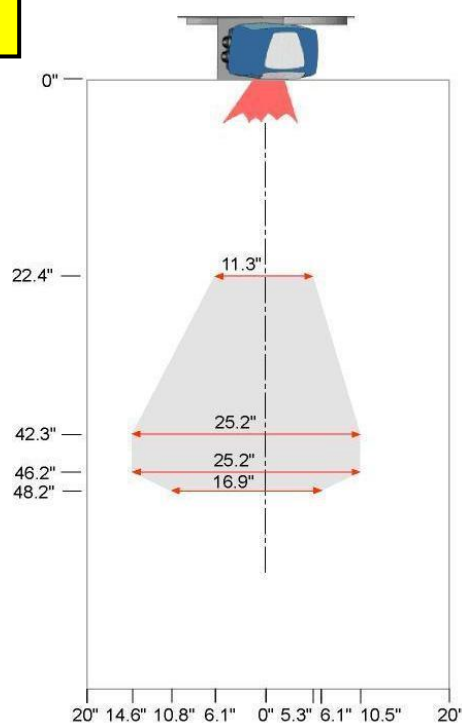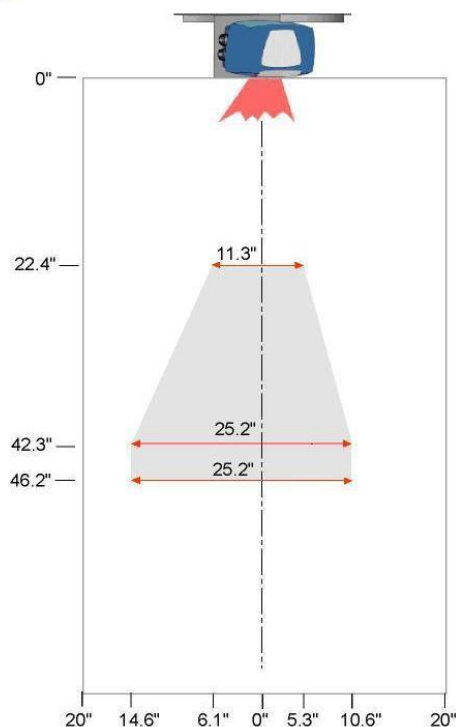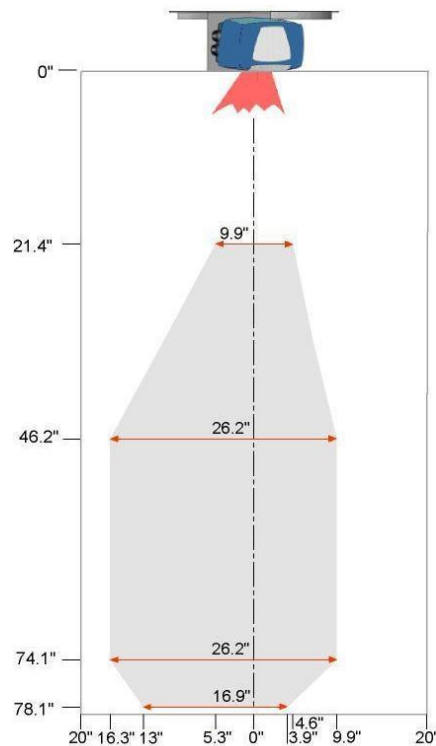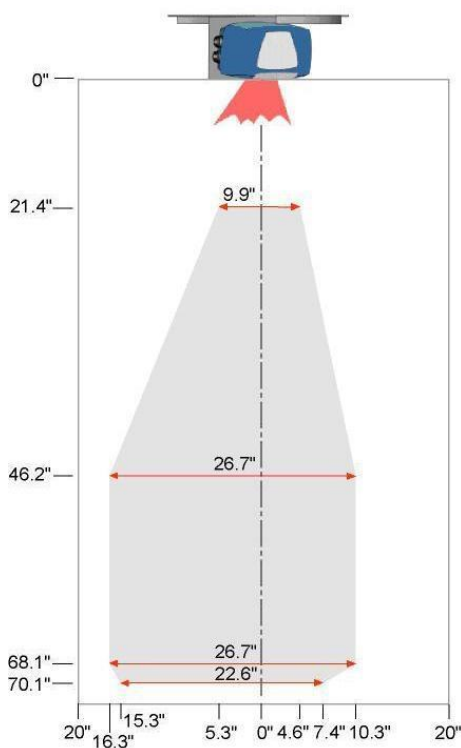
15-mil code   (1000052804)   **20-mil code   (1000052804)**

- **1,100 scans per second (standard) throughout DOF**
- **Using two receiving sensors**
- **Each laser always on**

- **Pitch not greater than +/- 15 °**
- **Skew not greater than +/- 15 °**
- **ANSI "Grade A" Print Quality**

- **ANSI Contrast Grade 84% or greater**

AXIOM 4L Omnidirectional X-Scanning Applications
Using (2) 4L AXIOM and X-Pattern Mounting Bracket (XMB): 1000052800 and 1000052801

10-mil code   (1000052801)   **12-mil code   (1000052801)**

15-mil code   (1000052800)   **20-mil code   (1000052800)**

- **550 scans per second (standard) throughout DOF**
- **Using two receiving sensors, one per module**
- **Laser pairs alternate on/off every other scan**

- **Pitch not greater than +/- 15 °**
- **Skew not greater than +/- 15 °**
- **ANSI "Grade A" Print Quality**

▪   **ANSI Contrast Grade 84% or greater**

AXIOM-X Omnidirectional Scanning Applications

(Standard Density 2L 1000062887 and 4L 1000062889)
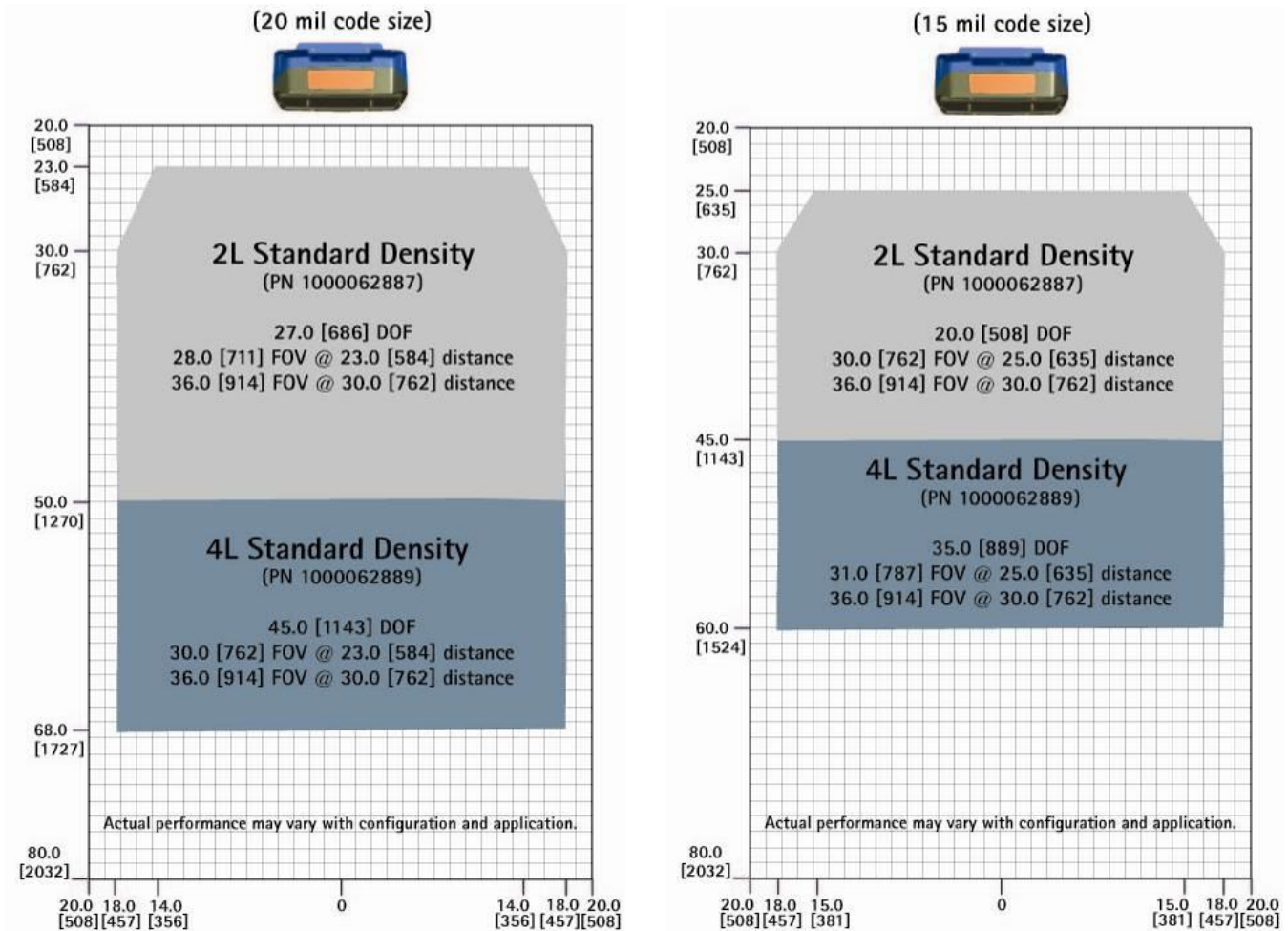
Pitch / skew not greater than + / - 15 °

ANSI Contrast Grade 84% or greater

ANSI "Grade A" Print Quality

AXIOM-X 2L = 1000 SPS (standard) throughout the DOF

AXIOM-X 4L = 500 SPS (standard) throughout the DOF

Height Tracking Photoeyes are required when package spacing is under 1/3 of the total DOF. *See Chapter 3.*

AXIOM-X Omnidirectional Scanning Applications

(Medium Density 2L 1000063502 and 4L 1000063503)

(High Density 2L 1000062888 and 4L 1000062890)
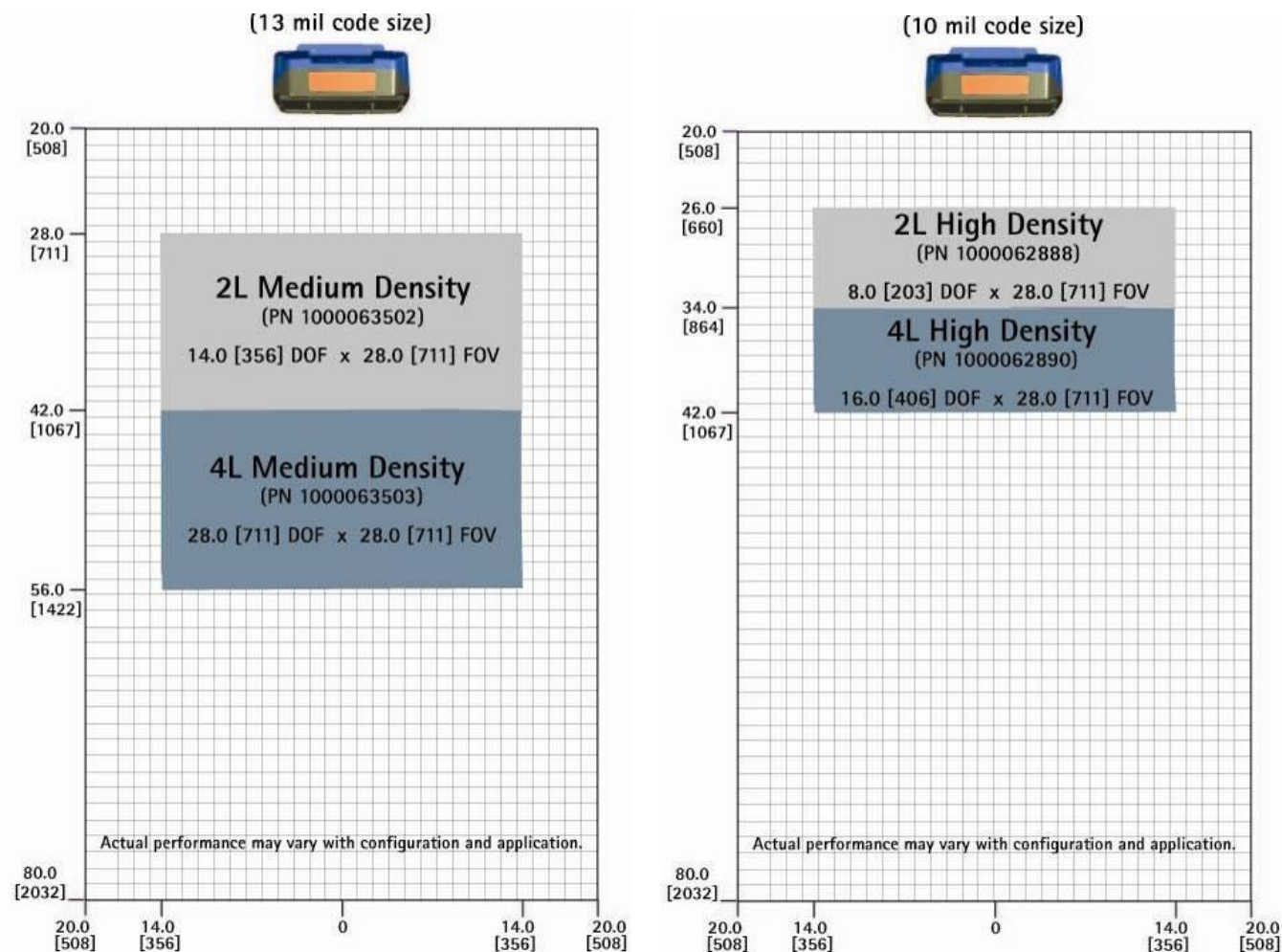
Pitch / skew not greater than + / - 15 °

ANSI Contrast Grade 84% or greater

ANSI "Grade A" Print Quality

AXIOM-X 2L = 1000 SPS (standard) throughout the DOF

AXIOM-X 4L = 500 SPS (standard) throughout the DOF

Height Tracking Photoeyes are required when package spacing is under 1/3 of the total DOF. *See Chapter 3.*

Notes:

C Networking Guide

Introduction

The AXIOM bar code reader includes a built-in Ethernet interface that can be used both for receiving bar code data from the AXIOM as well as monitoring and configuring the AXIOM.

AXIOM Ethernet Hardware Configuration

The AXIOM Ethernet hardware supports a 10/100mbps full or half-duplex Ethernet link. The wiring is described on the label within the AXIOM wiring base. (See *Chapter 4.*)

Industrial environments can be *very noisy* electrically. This can cause problems with 100mbps Ethernet links. AXIOM operations do not require a high data rate, so the AXIOM default is set at10mbps (full duplex). If your network requires the AXIOM operate at 100mbps, you can still select the higher data rate (or Auto-Detect). Ethernet link errors are more likely to be encountered at this data rate. Try to isolate the Ethernet cabling from electrical noise sources. Use the AXCESS Log Viewer's **DISP ENET** command to monitor for Ethernet errors.

The AXIOM hardware will detect the swapping of the Transmit and Receive lines and configure appropriately.   This allows a straight cable to be used to connect two AXIOMs.

AXIOM Network Software Configuration

Before an AXIOM will communicate on your Ethernet network, a few parameters must be set. Initially this must be done by using the AXCESS software and connecting to the AXIOM using the yellow setup programming cable. Once the AXIOM network parameters have been set, AXCESS can be used to connect to the AXIOM over the network.

Currently, the AXIOM software only supports static IP addresses. The defaults for the AXIOM network settings are listed below:

Parameter	Default Value
IP Address	192.0.0.100
Net Mask	255.255.255.0
Gateway	0.0.0.0

If you are adding your AXIOM to a larger network, you must obtain an IP addresses (as well as the other parameters) from your network administrator. If the AXIOMs are to operate on a closed network, you may assign your own IP addresses. This is typically by just incrementing the last number from the default (192.0.0.101, 192.0.0.102, etc.).

Controller/Client Communications

Up to six AXIOMs can be configured to operate together as a single unit. All communications between readers is accomplished over an Ethernet network.

In this configuration, one AXIOM must be set up as a Controller. The Controller initiates connections with the remaining readers, configuring them to operate as Clients. The trigger input (such as a photoeye) is only connected to the Controller. (See *drawings in Appendix E.*)

Setting up AXIOMs for a Multi-Reader Network

Wiring

If only two readers are to be communicating, and the EtherNet network is not needed for diagnostics or host communications, the readers can be connected directly with a CAT5 network cable. However, if connecting them directly with a single cable, the Ethernet Link must be configured for 10mbps-Full Duplex (which is the default). If more than two readers are to be networked or the network needs to be accessible for other reasons, an EtherNet switch is needed.

Only provide the trigger signal to the Controller. If a tachometer is in use, it is recommended that it be wired to all readers. However, an option is provided for the Controller to transmit speed messages to the Clients over the network.

Configuration

1. All readers should be operating on the network with unique IP addresses.
2. All AXIOMs that are to communicate together should be assigned the same **Group Number**. A Group Number of zero (which is the default) disables the Controller/Client capability.
3. The **Number of Client Readers** should be changed from zero on the Controller in order to identify this unit as the Controller. After being configured as a Controller, it will broadcast messages onto the network to discover the specified number of Clients.
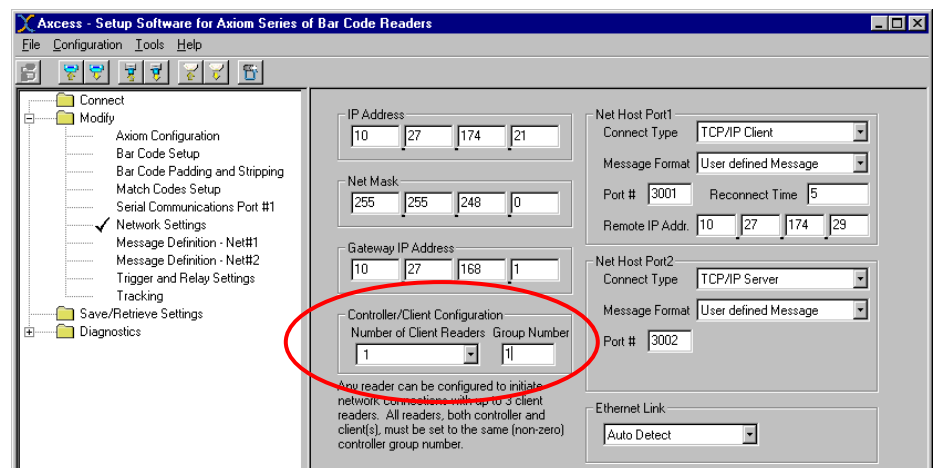
The only optional configuration parameter is that when using tracking, if the tachometer type for the Client(s) is set to Constant Tach; the Clients will rely

on a speed message sent from the Controller eliminating the need to provide a tachometer input to the clients.

The Controller always triggers the Client readers and it will properly configure the trigger settings on the clients when connecting. It is recommended that the trigger settings for Controller and Clients be set the same.

It is NOT necessarily to set the Transmit delay or Transmit point to a different value on the Clients, as is done using the "traditional master/slave" architecture of other Accu-Sort readers. In an AXIOM multi-reader network, bar codes are sent from the clients to the controller as soon as they are read.

Restrictions

- If a controller is configured with tracking enabled, all clients must also have tracking enabled.
- All units must have the same bar code types enabled, in the same order.
- Clients do not transmit data messages through their serial or network host ports.

Multi-Reader Network LED and Troubleshooting

NOTE: The following LED functions are overridden if EtherNet/IP communications are used. (See *Chapter 4.*)

The main AXIOM diagnosis tool is the Network LED. An AXIOM controller will FLASH the LED red once a second if it cannot locate the specified number of Clients. When all connects are made, the Network LED becomes a solid green.

For a client, the Network LED remains off until a Controller initiates a connection. Once a connection is made, the LED becomes a solid green.

Network Administrator Information

All communications from a Controller to the Clients is done using TCP/IP Multicasting. The default multicast IP address used is 239.255.0.x, where x is called the Controller Group Number (value from 0 to 255). If multiple Controller/Client Groups are on the same network, it is important that they be assigned unique group numbers so that each group is using a unique Multicast IP address.

It is important that the network be configured so that Multicast network traffic will be transmitted between these readers. The AXIOM multicast messages are configured with a Time-To-Live of 1, so they will not pass through a router. Additionally, an Ethernet Switch which supports IGMP snooping may be utilized to restrict the multi-cast traffic seen by the AXIOMs as well as any other items on the same network.

All communications from the Clients back to the Controller uses standard UDP messaging.

Network Host Communications

The AXIOM provides a number of options for transmitted bar code to another computer (typically referred to as the "host"). Additionally, two simultaneous host network connections are supported each with different message definition and formatting. These connections use ports 3001 and 3002 by default, but these values are modifiable.

TCP/IP Server

Operation as a TCP/IP server is the default configuration for the AXIOM. In this case, for an application to communicate with an AXIOM from a "host computer", the application should just initiate a simple TCP/IP socket connection. When a socket connection to the AXIOM is established, the green AXIOM network LED will be illuminated (unless client/controller mode is in use in which the LED indicates the status of the inter-AXIOM network connections).
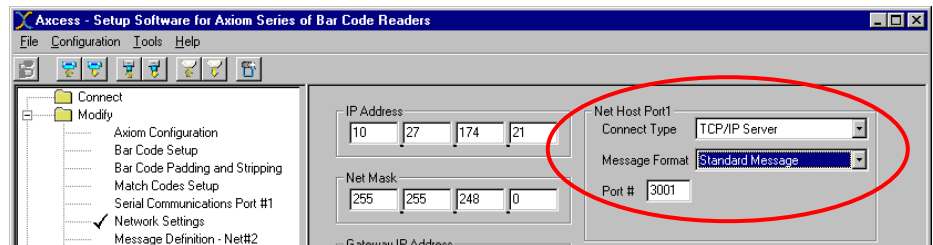
One issue should be considered when designing such an application: As with any socket connection, if one side or the other terminates the connection without properly closing it - the connection can be left open.

For example, if a host computer has initiated a connection to an AXIOM and the host computer "crashes" - the connection on the AXIOM will remain open until the AXIOM attempts to send the next message (normally the next bar code). At this point, the AXIOM will detect the connection from the host computer has been terminated and clear the connection allowing the host computer to reconnect.

However, it is possible that the AXIOM might be powered off while a host connection is active (or if the power is cycled on an intermediate piece of network equipment such as a hub or a switch). In this case, the AXIOM socket connection will be closed but the host computer may not be aware of this change. To handle this situation, it may be desirable to implement a means by which the host computer can test the state of the network connection.

One option is to periodically send a simple message (e.g., just a null character or just a single STX character) to the AXIOM verifying the link is still active.

Another option is for a heartbeat message to be enabled on the AXIOM. This both provides the host computer with a means for determining if the link has been lost (by lost of the heartbeat) and provides the AXIOM with quicker determination of lost of communications with the host computer. This is the recommended approach.

TCP/IP Client

It is also possible to configure the AXIOM to operate as a TCP/IP Client. In this case, you must also specify the IP address of the computer to which the AXIOM is to attempt to initiate a connection. If a connection cannot be established, the AXIOM will reattempt the connection after the specified number of seconds (default is 5 seconds).
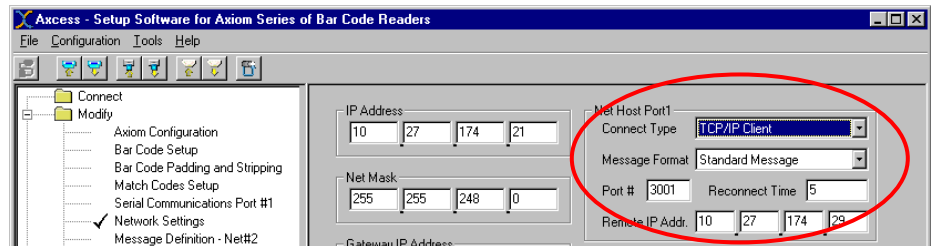
Similar issues exist regarding improper closing of connections as described in the TCP/IP Server section. As a result, it is also recommended that a heartbeat message be enabled for TCP/IP Client connections.

UDP Messaging

For UDP messaging, only the destination IP address and port need to be specified. Since this is a connectionless means of transfer, there are no issues with checking for loss of connection.
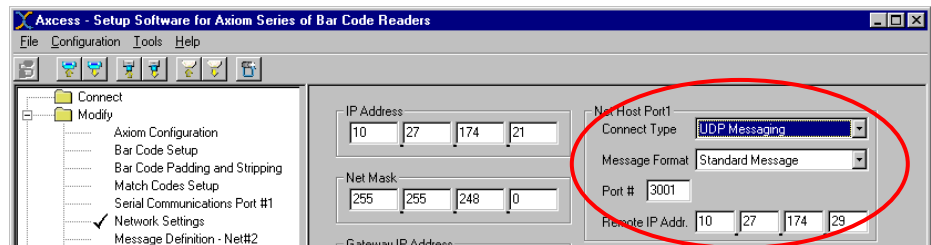
EtherNet/IP

The AXIOM supports the EtherNet/IP™ Industrial Networking protocol. EtherNet/IP™ simplifies the communication of bar code and input/output data with other EtherNet/IP enabled devices, such as a programmable controller.

EtherNet/IP is not enabled by default. To enable, select EtherNet/IP as the **Connect Type** for Net Host Port 1 on the Network Settings page of AXCESS. When EtherNet/IP is enabled, all of the other network capabilities of the AXIOM remain active. For example, an AXIOM controller can be configured for EtherNet/IP communications with a programmable controller while still communication with one or more AXIOM clients.
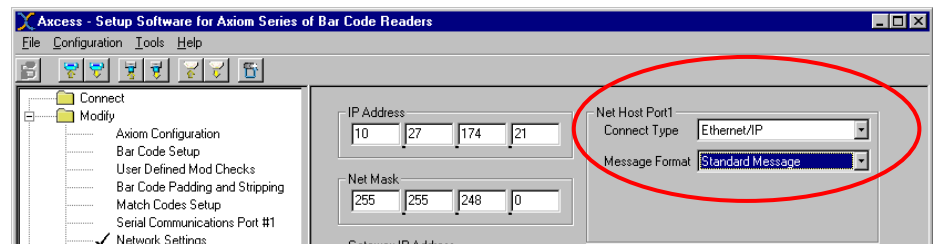
Once enabled, EtherNet/IP allows the AXIOM to communicate with other EtherNet/IP enabled devices. This can be done using:

- **Explicit Messaging**
- **I/O Messaging**
- **On-Demand Messaging**
  (a special AXIOM protocol for ControlLogix Controllers only)

All of the **EtherNet/IP Object definitions** are given later in this appendix. Refer to this appendix when setting up the interface to your device.

Use **I/O messaging** to monitor and set AXIOM I/O bits as well as to obtain bar code data from the AXIOM. The disadvantage is the I/O messages are always sent at scheduled intervals creating a lot of network traffic.

On-Demand Messaging only works with ControlLogix Controllers. This option uses standard EtherNet/IP messaging, but allows bar code data to be sent to the Controller only when a bar code is read. It can be used in conjunction with I/O messaging.

For monitoring purposes, an AXIOM EDS file is included with the AXCESS software download. To install this file with the Rockwell Software RSLinx software, use the EDS Hardware Installation Tool included with the RSLinx Tools. RSLinx provides a means to monitor the status of your AXIOM.
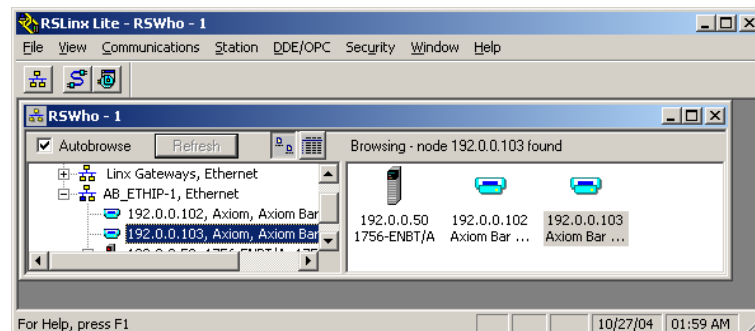
EtherNet/IP Options

When EtherNet/IP is enabled, new parameters become available within AXCESS that allow you to configure some additional options.
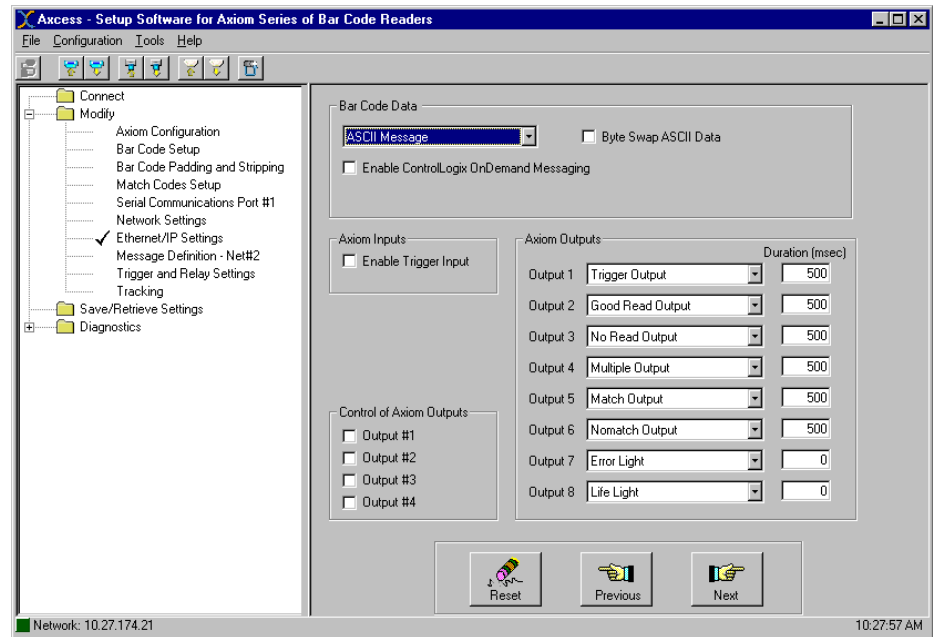
These parameters are described in more detail earlier in this manual, but a quick overview provides some context here. (See *Chapter 5.*)

The **Bar Code Data** parameters allow you to manipulate the format of the bar code data. Most notable if your bar codes only contain numeric digits, you can configure the AXIOM to convert the bar codes to a numeric value instead of transmitting them as ASCII text.

Additionally, you can enable the On-Demand Messaging Option for ControlLogix Processors. This is described in more detail later in this document.

If the EtherNet/IP **Trigger Input** is enabled, the AXIOM Trigger settings are ignored and the AXIOM is triggered solely by manipulating the Trigger Bit in the Output Word (contained in the AXIOM Assembly and Output Objects).

The **AXIOM Outputs** function the same as AXIOM relay outputs, but they manipulate bits within the AXIOM Input Word (contained in the AXIOM Assembly and Input Objects).

The AXIOM can relinquish control of the internal AXIOM relays to another EtherNet/IP device. When this has been done, these relays are controlled by bits within the Output Word.

I/O Messaging Example

The following example illustrates how an AXIOM can be configured to communicate with a ControlLogix processor using I/O messaging. Utilizing this information along with the AXIOM Object definitions, it should be possible to adapt these directions for other EtherNet/IP devices.

When EtherNet/IP is enabled on the AXIOM, EtherNet/IP I/O Messaging is automatically enabled. No further configuration is needed to setup I/O messaging.

Since the ControlLogix processor will treat the AXIOM as an I/O device, to setup an EtherNet/IP I/O message transfer between an AXIOM and a ControlLogix processor, you need to configure your AXIOM as a Generic Ethernet Module in the ControlLogix I/O tree.

To add a module:
1. Under the I/O Configuration Tree, right-click on the entry for your Ethernet module (e.g., 1756-ENET/A) and select New Module.
2. You will be presented with a list of options similar to what is shown below. From this list select ETHERNET-MODULE for the Generic Ethernet Module.
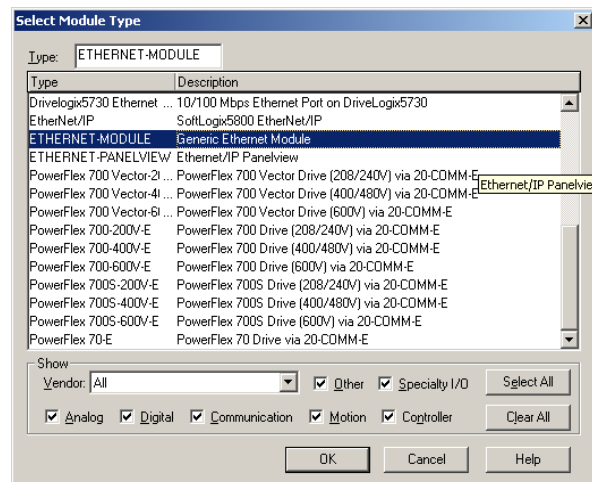
3. Specify the **Module Properties** for your AXIOM.
    a. The most important step is that you must first set the **Comm Format** to Data-INT. This must be done first since it cannot be changed later.
    b. After this you can specify the **Name**, **Description** and **IP Address** of the AXIOM.
4. The Connection Parameters must be specified as follows:

	Assembly Instance	Size
Input	100	68
Output	112	2
Configuration	128	0
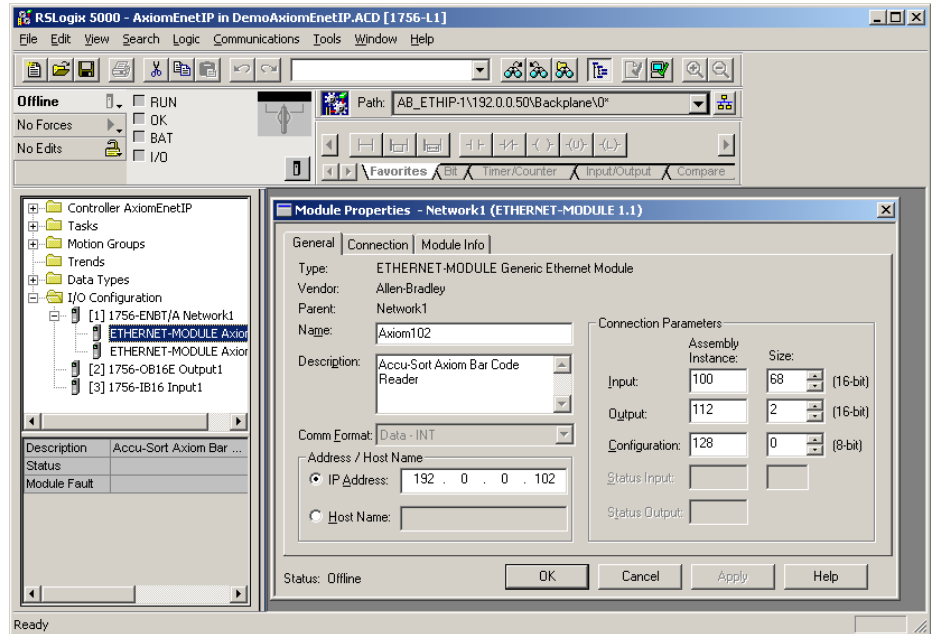
NOTE: You can only "schedule" I/O message transfers to the AXIOM at a fixed interval. The **Connection Tab** allows you to specify this interval. The AXIOM will handle intervals down to 10 milliseconds. However, intervals this small may affect the overall AXIOM performance.
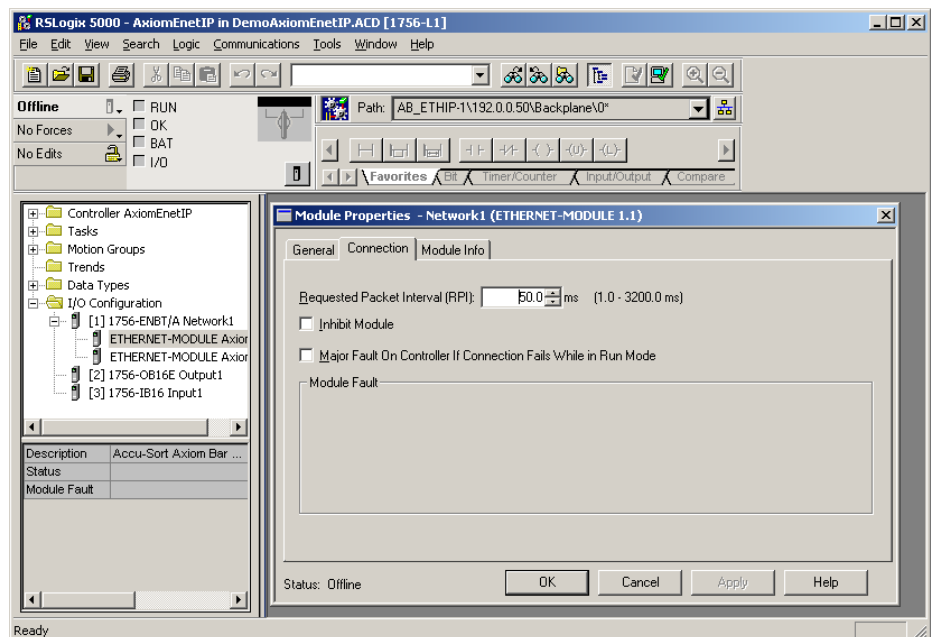
After this module definition for the AXIOM has been completed, tags will be created in the controller based on the name you specified for this AXIOM on the properties page for the module. These tags will consist of the name followed either by the letter 'C' (Configuration), the letter 'O' (Outputs) or the letter 'I' (Inputs). These tags are based on the AXIOM assembly objects.

AXIOM:C Configuration Data

This data is not used.

AXIOM:I Input Data

Tag Name	Value	Description
AXIOM:I.Data[0]	Discrete Input Word	See bit definitions.
AXIOM:I.Data[1]	Bar Code Sequence Number	This field is updated every time the bar code data is updated. However, the bar code data will only be updated when the "Last Bar Code Sequence Number" (see Output Data) is set equal to this value.
AXIOM:I.Data[2]	Bar Code Status	Not currently used.
AXIOM:I.Data[3]	Bar Code Size (words)	Number of words which contain the bar code data
AXIOM:I.Data[4-67]	Bar Code Data	
Discrete Input Word		
Bit		
0	AXIOM Programmable Output #1	
1	AXIOM Programmable Output #2	
2	AXIOM Programmable Output #3	
3	AXIOM Programmable Output #4	
4	AXIOM Programmable Output #5	
5	AXIOM Programmable Output #6	
6	AXIOM Programmable Output #7	
7	AXIOM Programmable Output #8	
8-15	Unused	

AXIOM:O Output Data

Tag Name	Value	Description
AXIOM:O.Data[0]	Discrete Output Word	See bit definitions.
AXIOM:O.Data[1]	Last Bar code Sequence Number Received	This field must be updated to match the Bar Code Sequence Number each time the bar code data has been processed.
Discrete Output Word		
Bit	Bit = 0	Bit = 1
0*	Trigger Off	Trigger On
1 – 7	Unused	Unused
8*	AXIOM Relay #1 Off	AXIOM Relay #1 On
9*	AXIOM Relay #2 Off	AXIOM Relay #2 On
10*	AXIOM Relay #3 Off	AXIOM Relay #3 On
11*	AXIOM Relay #4 Off	AXIOM Relay #4 On
12-15	Unused	Unused
* If enabled on AXIOM		

On-Demand Messaging (ControlLogix)

On-Demand messaging provides another option for transferring bar code data to your ControlLogix processor. With on-demand messaging, the data transfer occurs as soon as the bar code data is available, not as the result of constant messaging at a schedule interval.

Typically, On-Demand messaging is used in conjunction with I/O messaging. For applications requiring only the transfer of bar code data, using On-Demand Messaging allows the I/O packet interval to be increased (just to provide a heartbeat with the AXIOM) reducing overall network utilization.

On-Demand messaging can be enabled on the AXIOM from the EtherNet/IP window within AXCESS. When enabled, you need to specify the IP address and slot for the ControlLogix processor, along with the name of the Tag to contain the bar code data.
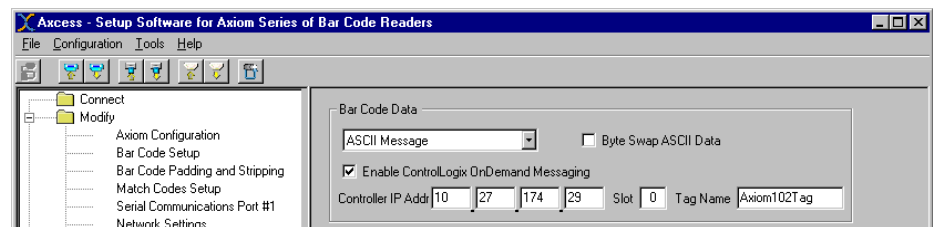
Once this is complete, you need to define a new Tag on the ControlLogix. The new tag should have a type of INT and a dimension of 67 words. The name must match the name specified on the AXIOM.
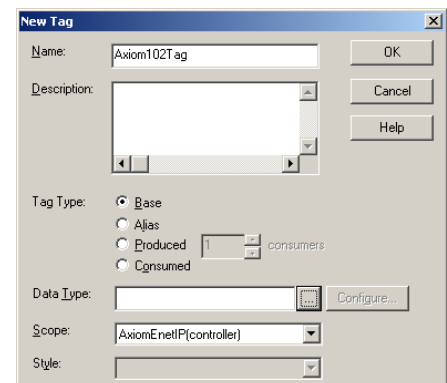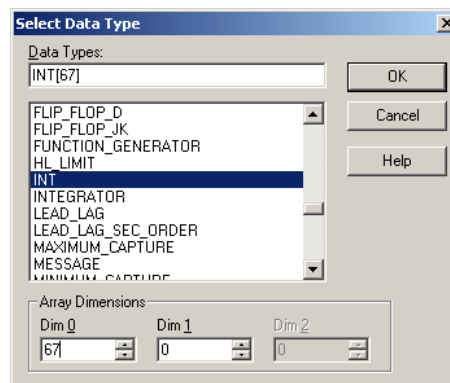
These tags will be updated every time a bar code is read. The following table defines the format of the data within this tag.

On-Demand Tag

Tag Name	Value	Description
AXIOMTag.Data[0]	Bar Code Sequence Number	This field is updated every time the bar code data is updated. However, the bar code data will only be updated when the "Last Bar Code Sequence Number" (see Output Data) is set equal to this value.
AXIOMTag.Data[1]	Bar Code Status	Not currently used.
AXIOMTag.Data[2]	Bar Code Size (words)	Number of words which contain the bar code data
AXIOMTag.Data[3-66]	Bar Code Data	

Remote Setup and Diagnostics

Monitoring an AXIOM with AXCESS

When multiple AXIOMs are placed on the same network, each one may be accessed over the network using the AXCESS software. This allows for remote monitoring and setup of the AXIOMs. Additionally, the AXCESS software can be run multiple times on a single PC, so multiple AXIOMs can be monitored simultaneously.

The AXIOM only supports one diagnostic network connection at a time, so if you leave AXCESS connected to an AXIOM on one PC, you will not be able to connect from another.

If a diagnostic network connection to an AXIOM is terminated "ungracefully" (PC crash, network cable, disconnect, etc..) the AXIOM does poll the status of the connection by periodically sending a single STX character and will time-out the connection.

Web Status Interface

The AXIOM supports a simple web interface that provides an overview of the AXIOM health and status.

FTP Interface

The AXIOM supports a very simple FTP interface that can be used to (1) update/extract the firmware image, (2) update/extract the parameter settings and (3) extract the current AXIOM message log.

The username for FTP access is always "axiom" and the password is specified within AXCESS.

When updating the firmware within an AXIOM using FTP, the new firmware file (named *.img) is transfer to the AXIOM using the PUT command. The file transfer takes approximately 15 or 20 seconds after which all of the LED's on the AXIOM bargraph will be illuminated. These will remain illuminated for 10 or 15 seconds while the contents of the file are verified. Next a "chaser light" sequence will start on the bargraph LED's while the contents of the AXIOM flash memory are updated. Once completed, the AXIOM will reboot. Extracting the AXIOM firmware is just done using an FTP GET command.

The parameter settings can also be extracted and sent using FTP. These parameters are in the same format as an AXIOM AXCESS .pam file.

Additionally, this file can be retrieved from the AXIOM using the GET command and transferred back to the AXIOM with a PUT command.

The files transferred back to the AXIOM can be a subset of the original file in that some parameters can be removed from the file. If a parameter is not contained in a file, that parameter will be untouched when a new file is transferred to the AXIOM. This allows the creation of files that just contain specific parameters (match code values for example) that can be transferred to a number of AXIOMs for quick reconfiguration.

Network Administrator Information

All setup and diagnostic communications by the AXCESS application are sent using TCP/IP socket connections to port 2001 on the AXIOM. This parameter can be changed (it is an advanced network setting within AXCESS), but no provision is provided for changing this on AXCESS. The capability to change this port number was provided primarily in case some sort of proxy access is required.

EtherNet/IP Object Models

Glossary

This is a description of the different data types that are used in the documentation of the object model. These are standard definitions of the Open DeviceNet Vendor Association (ODVA). For additional information, visit their web site: http://www.odva.org/.

Summary of Objects

The following standard objects are supported. More details than provided in this appendix can be found in the EtherNet/IP™ Specification available from the Open DeviceNet Vendors Association (ODVA).

- Identity Object (01_{HEX})
- Message Router Object (02_{HEX})
- Assembly Object (04_{HEX})
- Connection Manager Object (06_{HEX})
- TCP Object ($F5_{HEX}$)
- Ethernet Link Object ($F6_{HEX}$)

The following Vendor Specific Objects have been defined to support the AXIOM Bar Code Reader.

- Bar code Data Object (70_{HEX})
- Discrete Input Data Object (71_{HEX})
- Discrete Output Data Object (72_{HEX})

Definitions

The following table has a description of all of the data types used.

USINT	Unsigned Short Integer (8-bit)
UINT	Unsigned Integer (16-bit)
UDINT	Unsigned Double Integer (32-bit)
STRING	Character String (1 byte per character)
BYTE	Bit String (8-bits)
WORD	Bit String (16-bits)
DWORD	Bit String (32-bits)

Standard Objects

Identity Object (01$_{HEX}$ - 1 Instance)

Class Attributes					
Attribute ID	**Name**		**Data Type**	**Data Value**	**Access Rule**
1	Revision		UINT	1	Get
Instance Attributes					
Attribute ID	**Name**		**Data Type**	**Data Value**	**Access Rule**
1	Vendor Number		UINT	25$_{DEC}$	Get
2	Device Type 0x00 – Generic		UINT	00$_{HEX}$	Get
3	Product Code Number		UINT	01	Get
4	Product Major Revision Product Minor Revision		USINT USINT	03 01	Get
5	Status Word (see below for definition)		WORD	See Below	Get
6	Product Serial Number		UDINT	Unique 32 Bit Value	Get
7	Product Name Structure of: Product Name Size Product Name String		UINT USINT[0-32]	15 "Bar Code Reader"	Get
Status Word					
Bit	**Bit = 0**	**Bit = 1**			
0	No I/O Connection	I/O Connection Allocated			
1 – 15	Unused	Unused			

Common Services				
Service Code	**Implemented for**		**Service Name**	
	Class Level	**Instance Level**		
0E$_{HEX}$	Yes	Yes	Get_Attribute_Single	
05$_{HEX}$	No	Yes	Reset	

Reset Service Code				
Service Code	**Class**	**Instance**	**Attribute**	**Description**
05$_{HEX}$	1	1	0	Force software reset
05$_{HEX}$	1	1	1	Reload factory settings and reset

Message Router Object (02$_{HEX}$)
This object has no supported attributes.

Assembly Object (04_{HEX} – 4 Instances)

Class Attributes				
Attribute ID	**Name**	**Data Type**	**Data Value**	**Access Rule**
1	Revision	UINT	1	Get
2	Max Instance	UINT	81	Get

Instance 0x64 Attributes (Input Instance 1)				
Attribute ID	**Name**	**Data Type**	**Default Data Value**	**Access Rule**

3	Input Data
	Structure of:
	  Discrete Input Word (see below)
	  Bar code Sequence Number
	  Bar code Status (reserved)
	  Bar code Size Word
	  Bar code Data [UINT]
		
		UINT
		UINT
		UINT
		UINT
		UINT [ ] varies (up to 64)
			
			0
			0
			0
			0
			0
				Get

Discrete Input Word	
Bit	
0	AXIOM Programmable Output #1
1	AXIOM Programmable Output #2
2	AXIOM Programmable Output #3
3	AXIOM Programmable Output #4
4	AXIOM Programmable Output #5
5	AXIOM Programmable Output #6
6	AXIOM Programmable Output #7
7	AXIOM Programmable Output #8
8-15	Unused

Instance 0x70 Attributes (Output Instance 1)				
Attribute ID	**Name**	**Data Type**	**Default Data Value**	**Access Rule**

3	Output Data
	Structure of:
	  Discrete Output Word (see below)
	  Last Bar code Seq. Num Received
		
		UINT
		UINT
			
			0
			0
				Get / Set

Discrete Output Word		
Bit	**Bit = 0**	**Bit = 1**
0*	Trigger Off	Trigger On
1 – 7	Unused	Unused
8*	AXIOM Relay #1 Off	AXIOM Relay #1 On
9*	AXIOM Relay #2 Off	AXIOM Relay #2 On
10*	AXIOM Relay #3 Off	AXIOM Relay #3 On
11*	AXIOM Relay #4 Off	AXIOM Relay #4 On
12-15	Unused	Unused
* If enabled on AXIOM		

Instance 0x80 Attributes (Configuration Instance)
Most I/O clients include a Configuration path when opening an I/O connection to a server. There is no Configuration data needed.

Instance 0x81 Attributes (Heartbeat Instance – Input Only)
This instance allows clients to monitor input data without providing output data.

Common Services			
Service Code	**Implemented for**		**Service Name**
	Class Level	**Instance Level**	
0E_{HEX}	Yes	Yes	Get_Attribute_Single
10_{HEX}	No	Yes	Set_Attribute_Single

Connection Manager Object (06 HEX)

This object has no attributes.

TCP Object (F5HEX - 1 Instance)

Class Attributes				
Attribute ID	**Name**	**Data Type**	**Data Value**	**Access Rule**
1	Revision	UINT	1	Get
Instance Attributes				
Attribute ID	**Name**	**Data Type**	**Default Data Value**	**Access Rule**
1	Status	DWORD	1	Get
2	Configuration Capability	DWORD	0	Get
3	Configuration Control	DWORD	0	Get
4	Physical Link Object Structure of: Path Size Path	 UINT Array Of WORD	 2 0x20F6 0x2401	Get
5	Interface Configuration Structure of: IP Address Network Mask Gateway Address Name Server Name Server 2 Domain Name Size Domain Name	 UDINT UDINT UDINT UDINT UDINT UINT STRING	 0 0 0 0 0 0 0	Get
6	Host Name Structure of: Host Name Size Host Name	 UINT STRING	 0 0	Get
Common Services				
Service Code	**Implemented for**		**Service Name**	
	Class Level	**Instance Level**		
0EHEX	Yes	Yes	Get_Attribute_Single	

Ethernet Link Object (F6 HEX - 1 Instance)

Class Attributes				
Attribute ID	**Name**	**Data Type**	**Data Value**	**Access Rule**
1	Revision	UINT	1	Get
Instance Attributes				
Attribute ID	**Name**	**Data Type**	**Default Data Value**	**Access Rule**
1	Interface Speed	UDINT	100	Get
2	Interface Flags	DWORD	3	Get
3	Physical Address	USINT Array[6]	0	Get
Common Services				
Service Code	**Implemented for**		**Service Name**	
	Class Level	**Instance Level**		
0EHEX	Yes	Yes	Get_Attribute_Single	

Vendor Specific Objects

Bar Code Data Object (70 HEX - 1 Instance)

Class Attributes				
Attribute ID	**Name**	**Data Type**	**Default Data Value**	**Access Rule**
1	Revision	UINT	1	Get
Instance Attributes				
Attribute ID	**Name**	**Data Type**	**Default Data Value**	**Access Rule**
1	Bar Code Sequence Number	UINT	0	Get
2	Bar Code Status (reserved)	UINT	0	Get
3	Bar Code Data Size	UINT	0	Get
4	Bar Code Data	UINT[ ] varies (up to 64)	0	Get
5	Last Bar Code Seq. Num Received	UINT	0	Get / Set
Common Services				
Service Code	**Implemented for**		**Service Name**	
	Class Level	**Instance Level**		
0E HEX	Yes	Yes	Get Attribute Single	
10 HEX	No	Yes	Set Attribute Single	

Discrete Input Data Object (71 HEX - 1 Instance)

Class Attributes				
Attribute ID	**Name**	**Data Type**	**Default Data Value**	**Access Rule**
1	Revision	UINT	1	Get
Instance Attributes				
Attribute ID	**Name**	**Data Type**	**Default Data Value**	**Access Rule**
3	Discrete Input Word	UINT	0	Get
Discrete Input Word				
Bit				
0	AXIOM Programmable Output #1			
1	AXIOM Programmable Output #2			
2	AXIOM Programmable Output #3			
3	AXIOM Programmable Output #4			
4	AXIOM Programmable Output #5			
5	AXIOM Programmable Output #6			
6	AXIOM Programmable Output #7			
7	AXIOM Programmable Output #8			
8-15	Unused			
Common Services				
Service Code	**Implemented for**		**Service Name**	
	Class Level	**Instance Level**		
0E HEX	Yes	Yes	Get Attribute Single	

Discrete Output Data Object (72 HEX – 1 Instance)

Class Attributes				
Attribute ID	**Name**	**Data Type**	**Data Value**	**Access Rule**
1	Revision	UINT	1	Get
Instance Attributes				
Attribute ID	**Name**	**Data Type**	**Default Data Value**	**Access Rule**
3	Discrete Output Data	UINT	0	Get / Set
Discrete Output Word				
Bit	Bit = 0	Bit = 1		
0*	Trigger Off	Trigger On		
1 – 7	Unused	Unused		
8*	AXIOM Relay #1 Off	AXIOM Relay #1 On		
9*	AXIOM Relay #2 Off	AXIOM Relay #2 On		
10*	AXIOM Relay #3 Off	AXIOM Relay #3 On		
11*	AXIOM Relay #4 Off	AXIOM Relay #4 On		
12-15	Unused	Unused		
* If enabled on AXIOM				
Common Services				
Service Code	**Implemented for**		**Service Name**	
	Class Level	**Instance Level**		
0E HEX	Yes	Yes	Get_Attribute_Single	
10 HEX	No	Yes	Set_Attribute_Single	

Notes:

D FAST Monitor Configuration

FAST Monitor and AXIOM

This version of AXCESS provides setup compatibility with Accu-Sort System's **FAST Monitor™.**

FAST Monitor is a browser-based application, running on a FAST Monitor Server, that gives facility managers and maintenance personnel the ability to monitor multiple Accu-Sort products within their facility or across multiple facilities from anywhere an internet connection is available. FAST Monitor provides real time and historical performance data in an easy to use browser interface as well as automatic status and error condition reporting of all Accu-Sort products and systems to which it is connected.

Use the **FAST Monitor Configuration** screen in AXCESS to setup an AXIOM reader for FAST Monitor message format compatibility.

How to Configure an AXIOM for FAST Monitor compatibility:

1. **Modify > Configuration Options**

   a. Select Collect FAST Monitor Statistics (checkbox)

   b. Set Reader Name

   (See page 206.)

2. **Modify > Network Settings**

   a. Set the Controller/Client Configuration for each AXIOM
      for either Controller (or standalone) or Client

   (See page 207.)

3. **Modify > FAST Monitor Configuration**

   a. Set Tunnel Information
      Tunnel Name (Standalone or Controllers, ignored for Clients)
      Unit Position (for all readers)

   b. Set the Net Host Port 2 information
      (Standalone or Controller only)

   (See page 208.)

1. Modify > Configuration Options for using FAST Monitor

To enable the FAST Monitor message format, go to the **AXIOM Configuration** and select the **Collect FAST Monitor Statistics** checkbox. Even though the Ethernet messaging portion for FAST Monitor setup is only applicable for an AXIOM controller or stand-alone unit, client units must still have this option selected in order to set unit position, which is only accessible from the **FAST Monitor Configuration** menu screen.

The **Reader Name** (set in the AXIOM Configuration menu) is used in all FAST Monitor messaging. Enter a unique alphanumeric name of up to 15 characters in the Reader Name field for all AXIOMs in the tunnel (controller and all clients). FAST Monitor uses this name to identify the AXIOM in a tunnel.

When the **Collect FAST Monitor Statistics** checkbox is selected, the **FAST Monitor Configuration** menu selection appears in the menu tree.
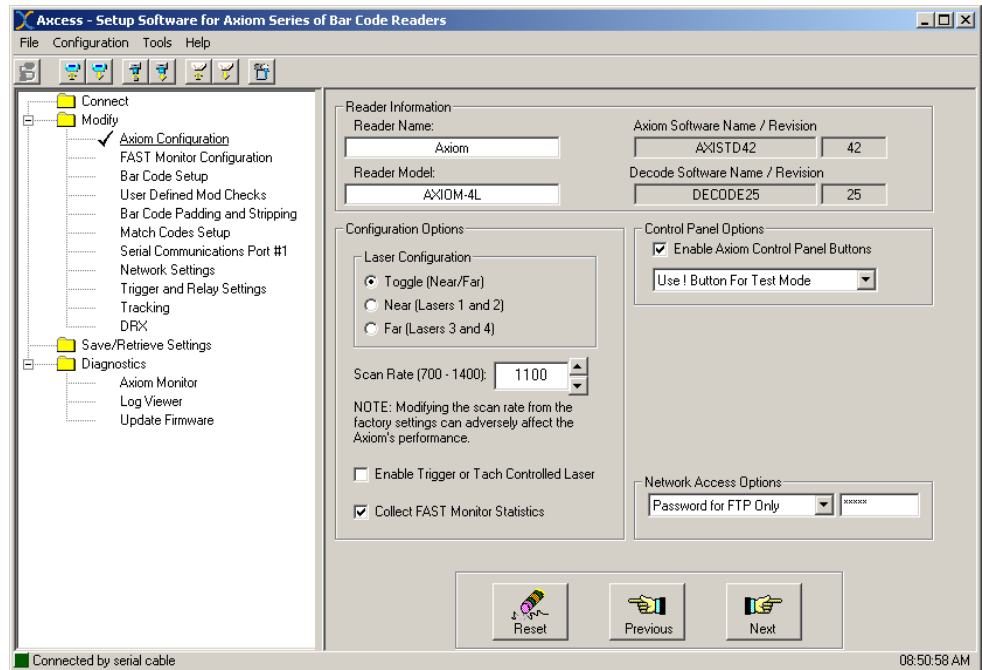
2. Modify > Network Settings for using FAST Monitor

Go to **Modify > Network Settings**.
Set up the AXIOM as a stand-alone unit, a controller, or a client.
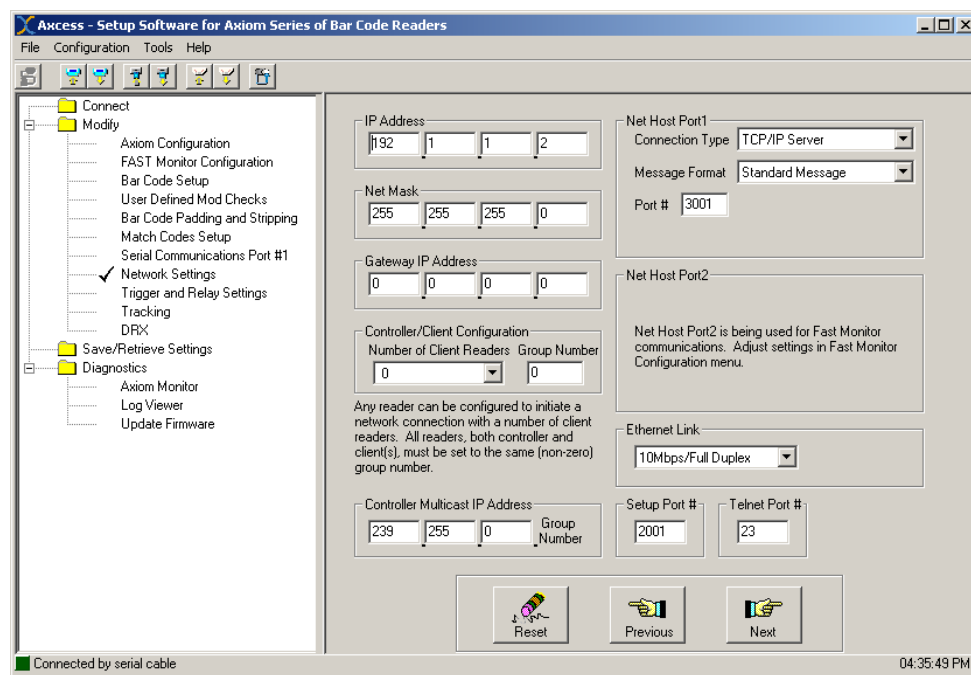
Controller/Client Configuration Settings	Standalone	Controller	Client
Number of Client Readers	= 0	> 0	= 0
Group Number	= 0	> 0	> 0

Example:			
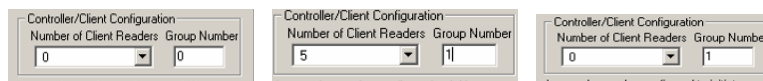
Since the **Collect FAST Monitor Statistics** option was checked, the **Net Host Port2** panel is masked out. Parameters for Net Host Port2 (used for FAST Monitor communications) are set on the **FAST Monitor Configuration** screen.

NOTE: Group number must be the same for all AXIOM units in the tunnel.

3.   Modify > Configuration Options for using FAST Monitor

Enter the **FAST Monitor Configuration** menu selection.
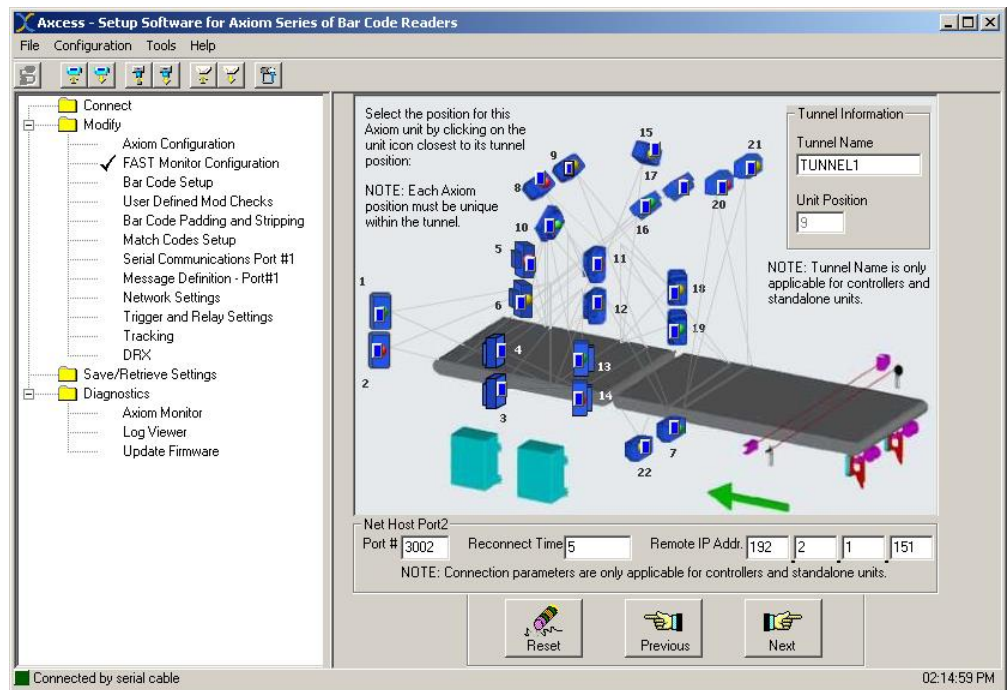
For controller or standalone units, set the following parameters:

Set a **Tunnel Name** of up to 15 alphanumeric characters.
This name is used in all FAST Monitor messages (bracketed by
<MsgSource> name </MsgSource>).

Set **Unit Position** by clicking on the appropriate AXIOM unit in the tunnel
picture and setting a number. The numeric display is for informational
purposes only. Each unit in the tunnel must have a unique position, which is
used in all FAST Monitor messaging.

The following **Net Host Port2** settings are programmable:

- Port Number
- Reconnect Time
- Remote IP Address (of FAST Monitor server)

NOTE: AXCESS forces FAST Monitor to use Net Host Port2. If Ethernet
host communications are required, you must use Net Host Port1.

For client units, set the Unit Position as described above.

E Installation Drawings

Mechanical Drawings

- AXIOM Line Scanner Mechanical Specification (104664)
- AXIOM Installation Drawing (105534)
- Dual AXIOM X-Pattern Mounting Bracket (XMB) Installation (106227)
- AXIOM-X Omnidirectional Scanner Mechanical Specification (108828)
- AXIOM-X Installation Drawing (109259)
- Photoeye Mounting (for Accu-Sort Structures) (41222)
- Photoeye Mounting (24130)
- Height Tracking Photoeye Mounting Adapter (112697)
- Universal Mounting Plate – AXIOM and IP65 Power Supplies (112465)

Interconnect Drawings

The interconnect drawings provided in this appendix are useful when wiring your AXIOM / AXIOM-X 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)
- Height Tracking Photoeyes – AXIOM-X only (109364)

Notes:

NOTES:
1) SCANNER WEIGHT: 10LBS [.66KG]
1) DIMENSIONS SHOWN IN BRACKETS [ ] ARE IN MILLIMETERS

10.87 [276.22]

6.23 [158.14]

5.190 [131.83]

3.86 [98.02]
SCAN LINE

AVOID EXPOSURE - LASER LIGHT EMITTED FROM THIS APERTURE

3X MOUNTING HOLES
SEE TABLE 1

6.102 [155]

3.543 [90]

TABLE 1

SCANNER ASSY NO	WIRING BASE ASSY NO	MOUNTING HOLE
0-105261-001	0-104477-001	10-32 UNF-2B .5[13]DP
0-105261-002	0-104477-002	M5 X .8-6H .5[13]DP

REFERENCE DRAWINGS
105307 UNIVERSAL MOUNTING BRACKET
105534 INSTALLATION DRAWING

PART NO. - -

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES
ALL ANGLES ARE 90 °
ALL C-SINKS ARE 82 ° ∨
ALL BEND RELIEFS TO SUIT
TOLERANCES:
LINEAR- .X±.100   ANGULAR- X±1.0°
    .XX±.020   .X±.10°
    .XXX±.005   .XX±.01°
    .XXXX±.0005
FT.,IN ±1"
FRACTIONS ±1/4
REMOVE SHARP EDGES AND BURRS

DRAWN	JJB	DATE	10.18.02
CHKD	TJB	DATE	03.24.03
ENGR	TJB	DATE	10.18.02
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

MECHANICAL SPECIFICATION DRAWING
AXIOM400

| SIZE | CAGE CODE | DWG. NO. | |
| C | 53830 | | 104664 |

SCALE NONE CAD SYS. SOLIDWORKS SHEET 1 OF 1

NOTES:
1) WHEN UNOBSTRUCTED AND WITHOUT POWER SUPPLY.
   WITH POWER SUPPLY DOWNWARD TRAVEL IS LIMITED TO 105°.
   OTHER OBSTRUCTIONS MAY LIMIT TRAVEL.
2) WHEN MOUNTED ON ACCU-SORT STRUCTURAL EXTRUSION.
   RE-POSITIONING OF MOUNTING BOLTS MAY BE REQUIRED.

YAW
±22.5°

ROLL
360°
SEE NOTE 2

PITCH
50° UP MAX
130° DOWN MAX
SEE NOTE 1

YAW AXIS

10.87
8.75
4.99
7.77

SCAN PLANE

3.86
5.83

8.71
1.97

.328 X 1.83 SLOT
5X

1.50 1.50 1.50 1.50

POWER SUPPLY NOT SHOWN FOR CLARITY

PITCH AXIS

2.94
3.49

6.36
7.86
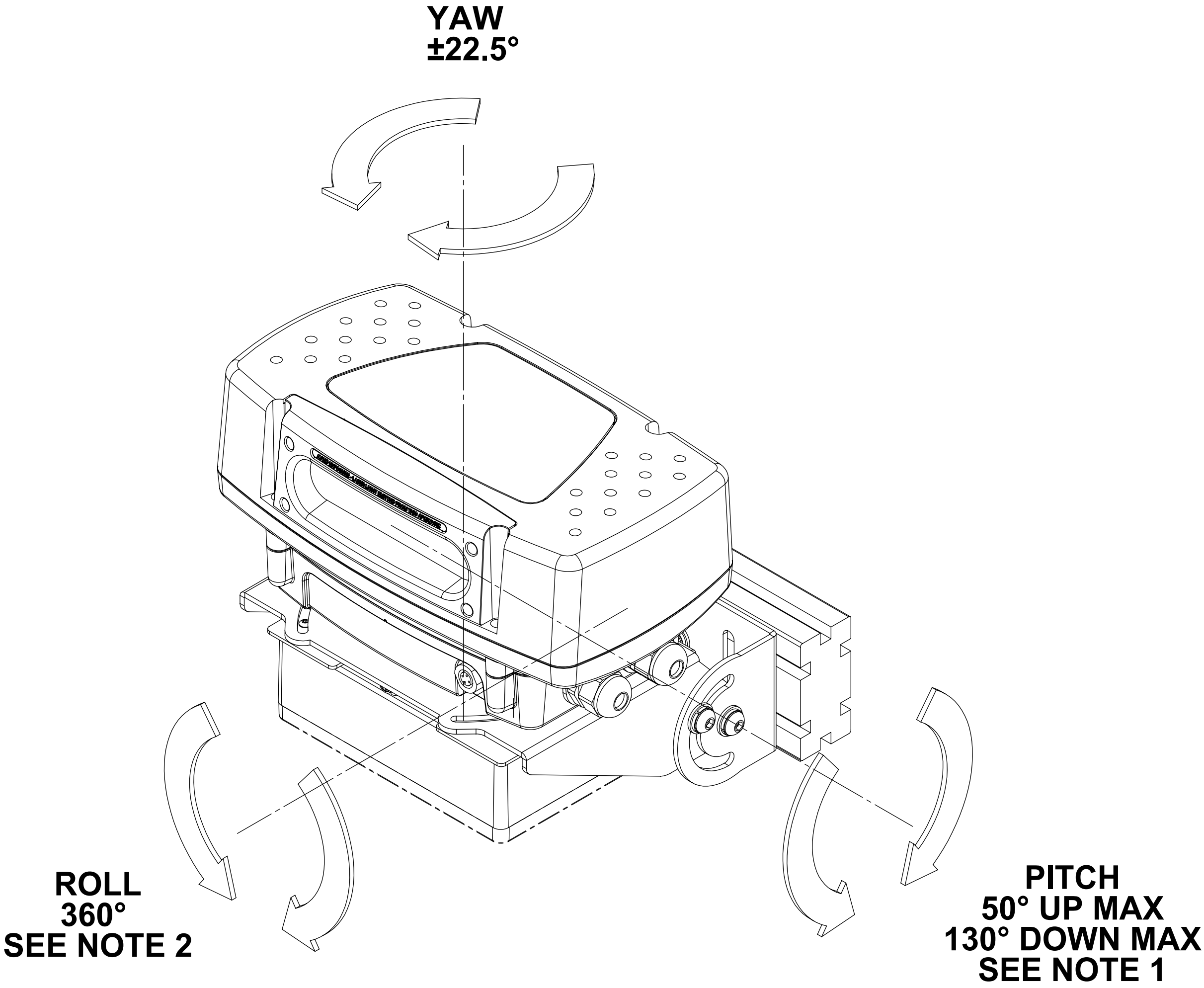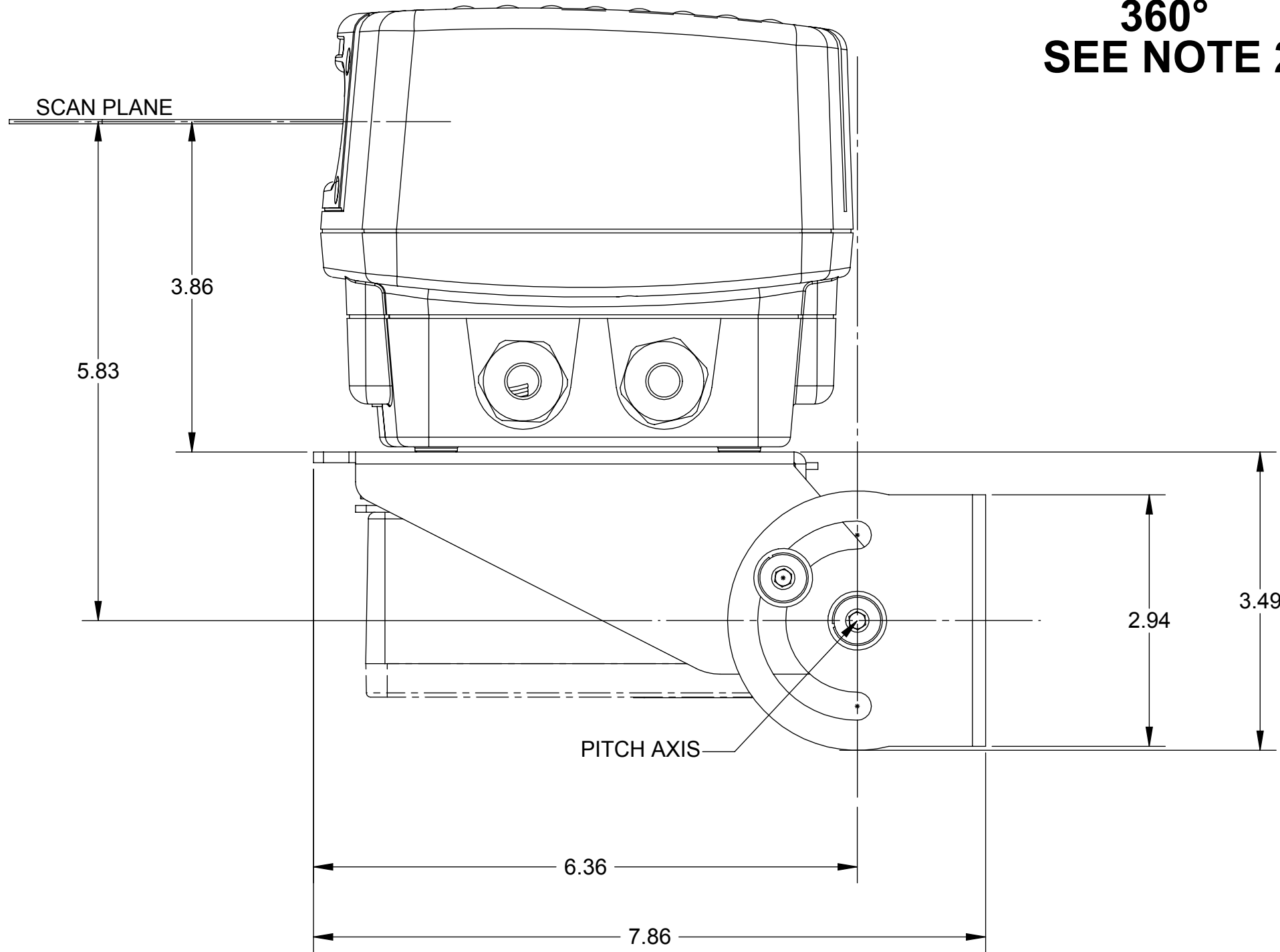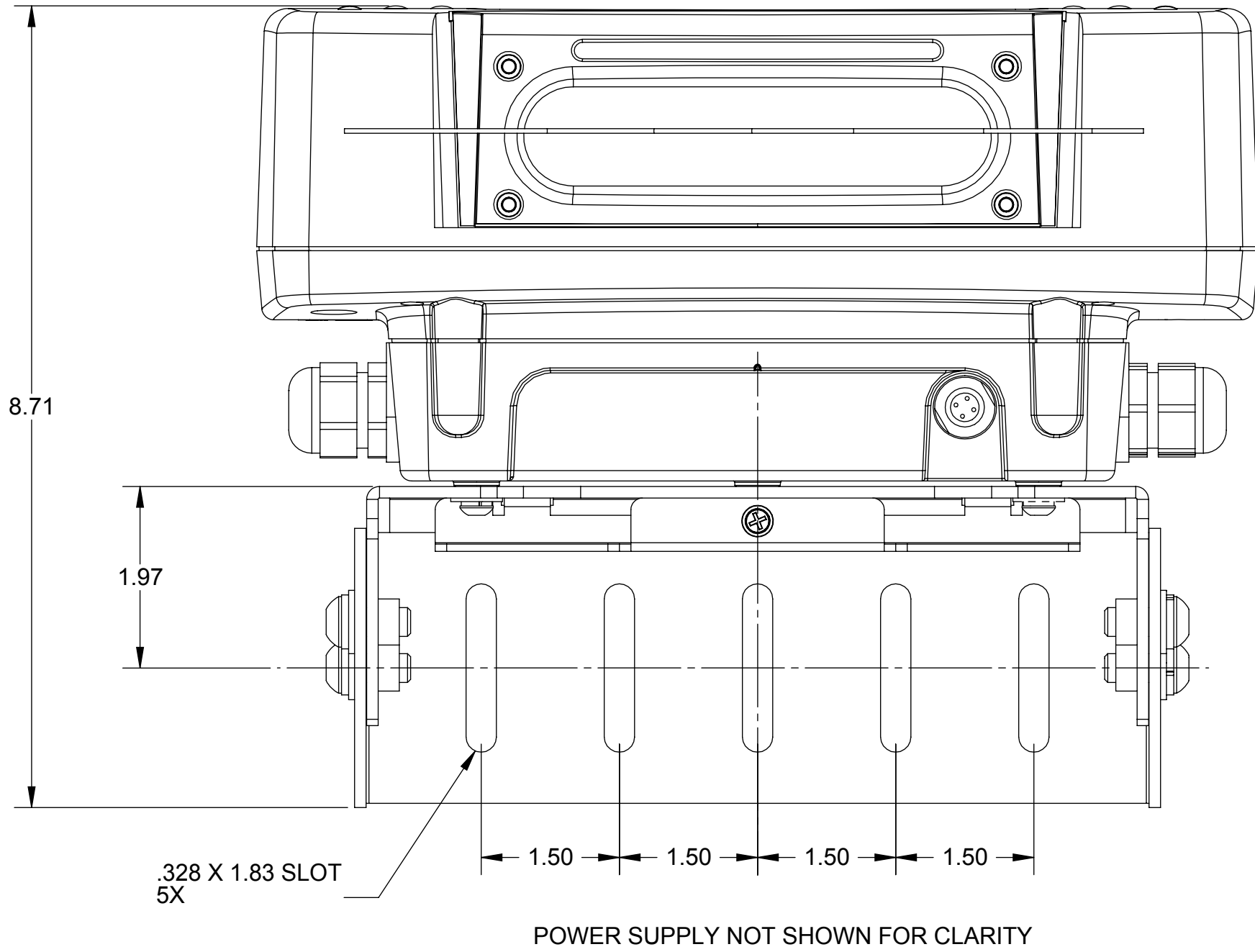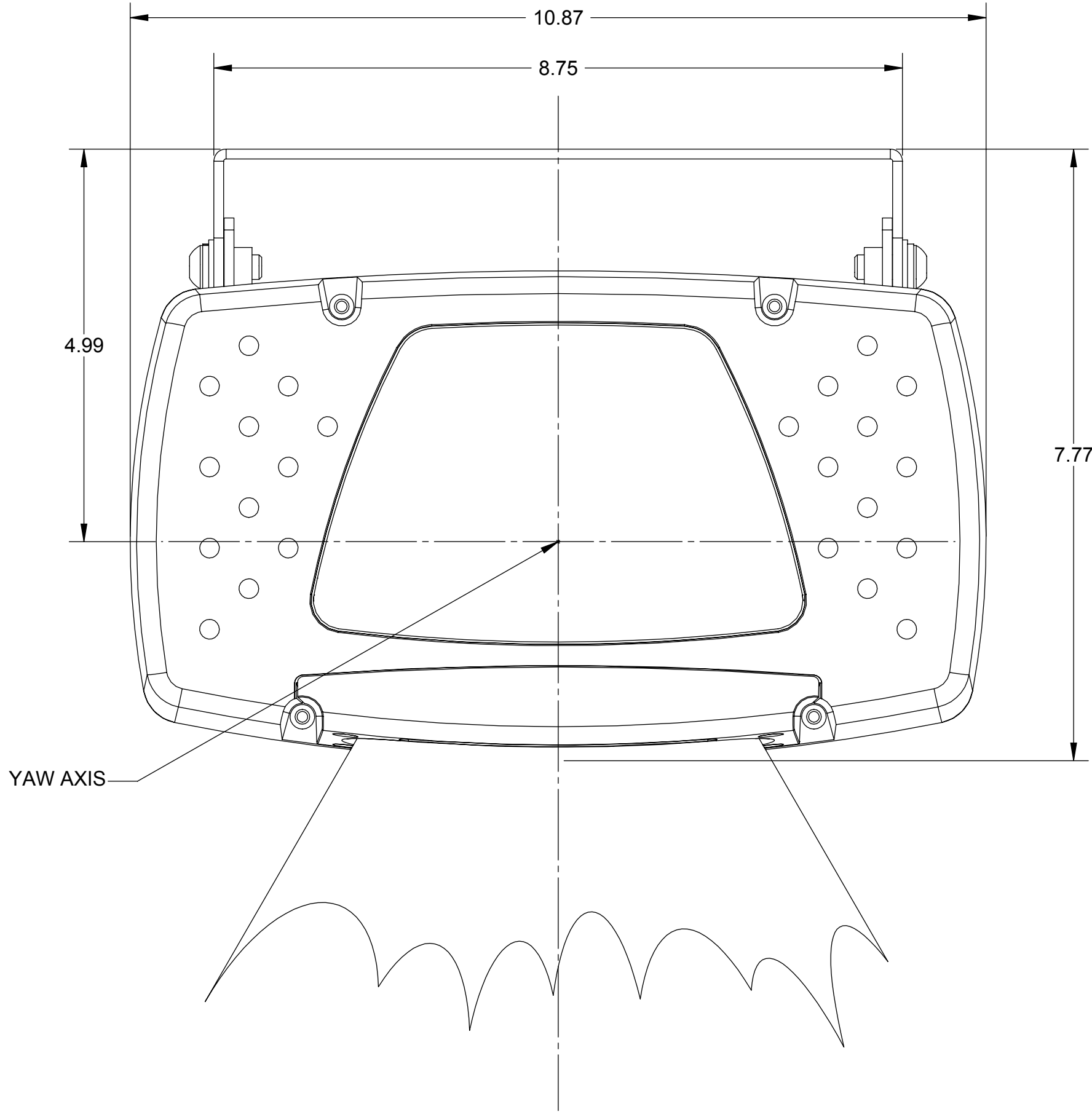
REFERENCE DRAWINGS:
104664 MECHANICAL SPECIFICATION DRAWING - AXIOM400 SCANNER

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]	ANGLULAR
	.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	TJB	DATE	05.06.03
CHKD	TWJ	DATE	05.12.03
ENGR	TJB	DATE	05.06.03
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

INSTALLATION DRAWING - AXIOM 400

SIZE D	CAGE CODE 53830	DWG NO.	105534
SCALE	NONE	CAD SYS. SOLIDWORKS	SHEET 1 OF 3

SCANNER HEAD ASSEMBLY - AXIOM400
0104638001

WIRING BASE ASSEMBLY - AXIOM400
0104636001/002

MOUNTING HARDWARE INCLUDED
WITH UNIVERSAL MOUNTING BRACKET

UNIVERSAL MOUNTING BRACKET (UMB)
0105307001/002

BRACKET, POWER
SUPPLY MOUNTING
(INCLUDED WITH UMB
0105307002)

MOUNTING HARDWARE INCLUDED
WITH WIRING BASE ASSEMBLY

POWER SUPPLY
0105365001/002

IP 65 POWER SUPPLY OPTION

PART NO.   0105534001

REVISION
02

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	XXX	DATE	XX.XX.XX
CHKD	XXX	DATE	XX.XX.XX
ENGR	XXX	DATE	XX.XX.XX
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

INSTALLATION DRAWING - AXIOM 400

SIZE D	CAGE CODE 53830	DWG NO.	105534
SCALE NONE	CAD SYS. SOLIDWORKS	SHEET 2 OF 3	

SCANNER HEAD ASSEMBLY - AXIOM400
0104638001

WIRING BASE ASSEMBLY - AXIOM400
0104636001/002

MOUNTING HARDWARE INCLUDED
WITH UNIVERSAL MOUNTING BRACKET

UNIVERSAL MOUNTING BRACKET (UMB)
0105307001/002

MOUNTING HARDWARE INCLUDED
WITH WIRING BASE ASSEMBLY

BRACKET, POWER
SUPPLY MOUNTING
(INCLUDED WITH UMB
0105307002)

POWER SUPPLY
0112591001/002

IP 40 POWER SUPPLY OPTION

PART NO. 0105534001

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±0.10°
	.XXXX±.0005	[.XXX±0.013]	.XXX±0.01°

FRACTIONS ±1/4
FT.,IN   ±1"

REMOVE SHARP EDGES AND BURRS

DRAWN	AS	DATE	05/18/09
CHKD	XXX	DATE	XX.XX.XX
ENGR	XXX	DATE	XX.XX.XX
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

INSTALLATION DRAWING - AXIOM 400

SIZE D	CAGE CODE 53830	DWG NO.	105534
SCALE NONE	CAD SYS. SOLIDWORKS	SHEET 3 OF 3	

NOTES:
1) "X" SCAN PATTERN WIDTH (ACROSS CONVEYOR) IS NOMINALLY 70% OF STANDARD AXIOM400 COVERAGE. REFER TO STANDARD AXIOM400 READ CHART.
2) "X" SCAN PATTERN LENGTH (IN DIRECTION OF CONVEYOR TRAVEL) IS 146% OF PATTERN WIDTH. SEE NOTE 1.

| 157 |
| 6.19 |

READ DISTANCE
REFERENCE PLANE

| 27 | 2X |
| 1.06 | |

| 354 | | 38.1 |
| 14 | | 1.50 |

| 156.9 |
| 6.18 |

| 241.3 |
| 9.50 |

| 195 |
| 7.68 |

| 317.5 |
| 12.50 |

CONVEYOR
TRAVEL

| 708 | MAX
| 28 | COVERAGE
SEE NOTE 1

PATTERN
CENTERLINE

MOUNTING HOLES 4X
FOR 5/16 OR 8MM HARDWARE

| 17.5 |
| .69 |

| 650.9 |
| 25.63 |

| 685.8 |
| 27.00 |

| 918 | MAX
| 36 |
SEE NOTE 2

PART NO. - -

REVISION			
REV	ECO	BY	DATE
2	ECO 04-424	TJB/PAP	06.22.04

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]	ANGLULAR
	.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	TJB	DATE	11.19.03
CHKD	MB	DATE	12.02.03
ENGR	TJB	DATE	11.19.03
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

INSTALLATION DRAWING, X-PATTERN MOUNTING
ARRANGEMENT - AXIOM400

SIZE	CAGE CODE	DWG. NO.	
C	53830		106227
SCALE	NONE	CAD SYS.	SOLIDWORKS	SHEET	1 OF 2

POWER SUPPLY
0105914001/002

HARDWARE INCLUDED WITH
MOUNTING BRACKET KIT

MOUNTING HARDWARE INCLUDED
WITH AXIOM WIRING BASE ASSEMBLY

HARDWARE INCLUDED
WITH MOUNTING BRACKET KIT

X-PATTERN MOUNTING BRACKET KIT
0106226001

BRACKET MOUNTING HARDWARE INCLUDED
WITH MOUNTING BRACKET KIT

AXIOM400 LASER SCANNER
2X

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	TJB	DATE	11.19.03
CHKD	MB	DATE	12.02.03
ENGR	TJB	DATE	11.19.03
DEPT.	MECH ENG	
E-	N/A	
CUSTOMER	N/A	
CONTRACT #	N/A	

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

INSTALLATION DRAWING, X-PATTERN MOUNTING
ARRANGEMENT - AXIOM400

SIZE	CAGE CODE	DWG. NO.	
C	53830		106227

| SCALE | NONE | CAD SYS. | SOLIDWORKS | SHEET | 2 OF 2 |

	REVISION		
REV	ECO	BY	DATE
4	RELEASED	TJB	12.22.05

90°
BEAM PATTERN
SEE NOTE 2

354
13.92

176
6.93

311
12.23

155
6.10

READ DISTANCE REFERENCE POINT

23
.91

90
3.54

10-32 UNC-2B X .5
3X

READ DISTANCE REFERENCE POINT

PART NO.   - -
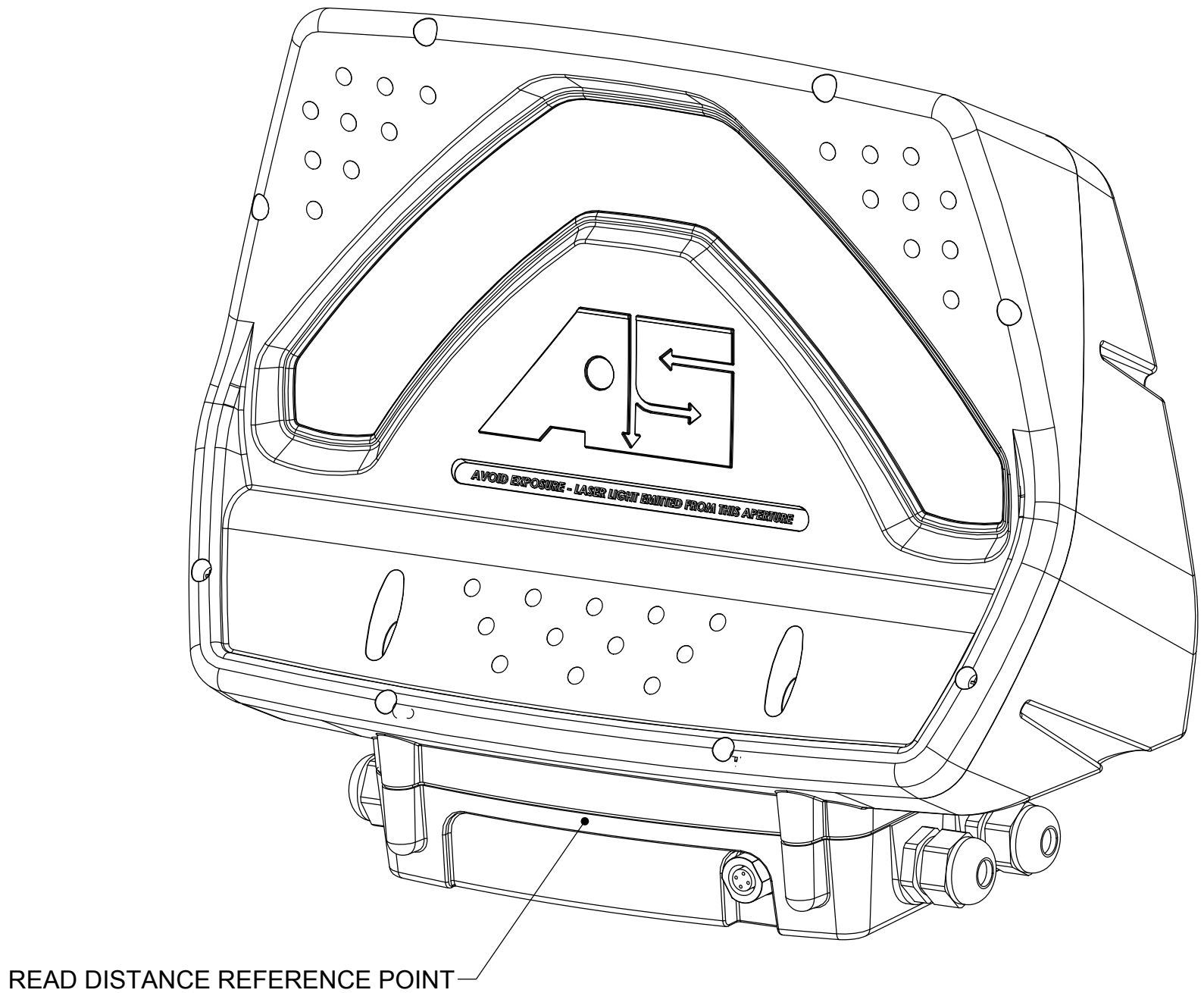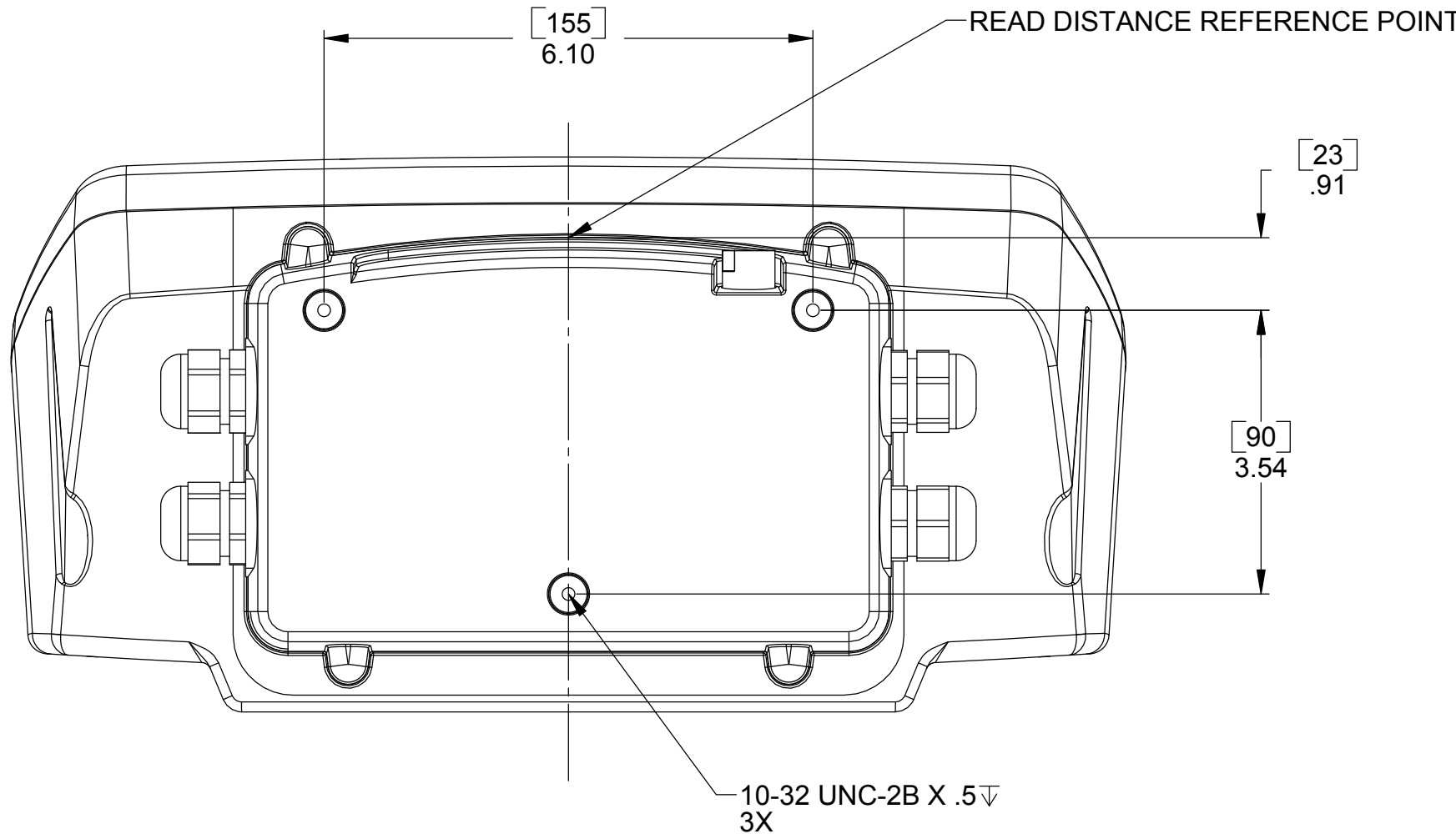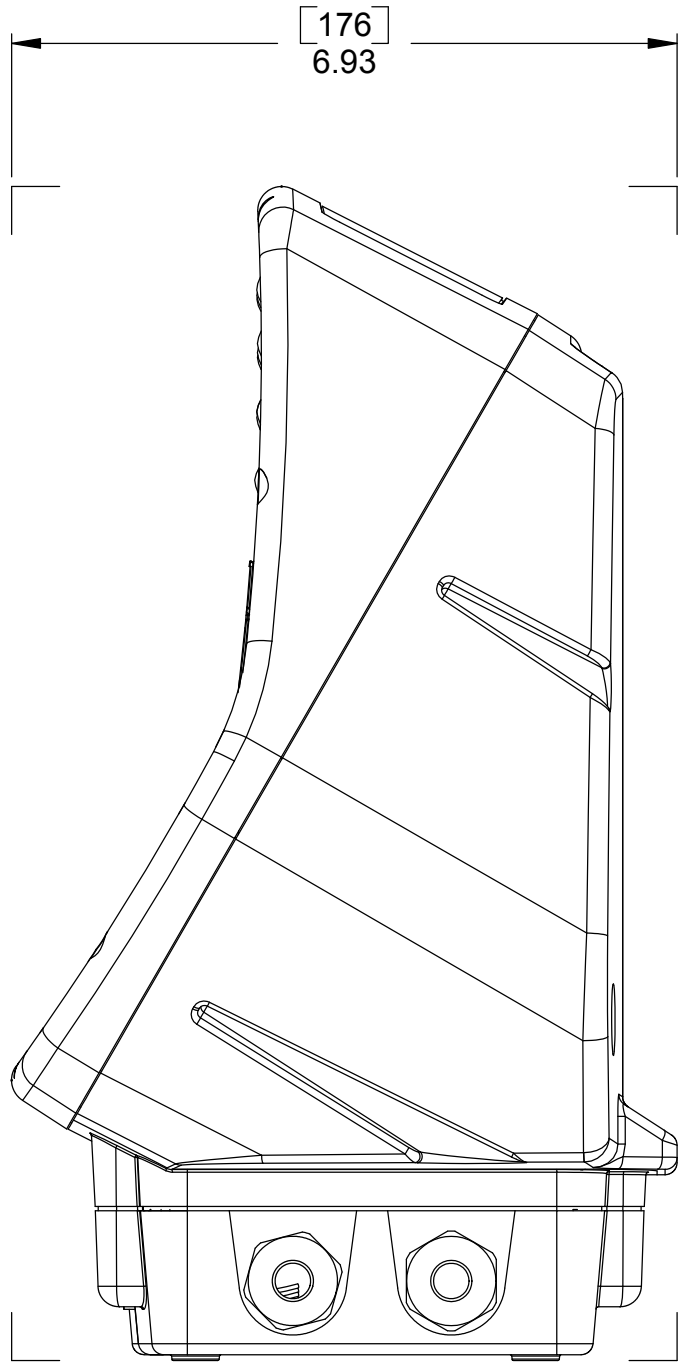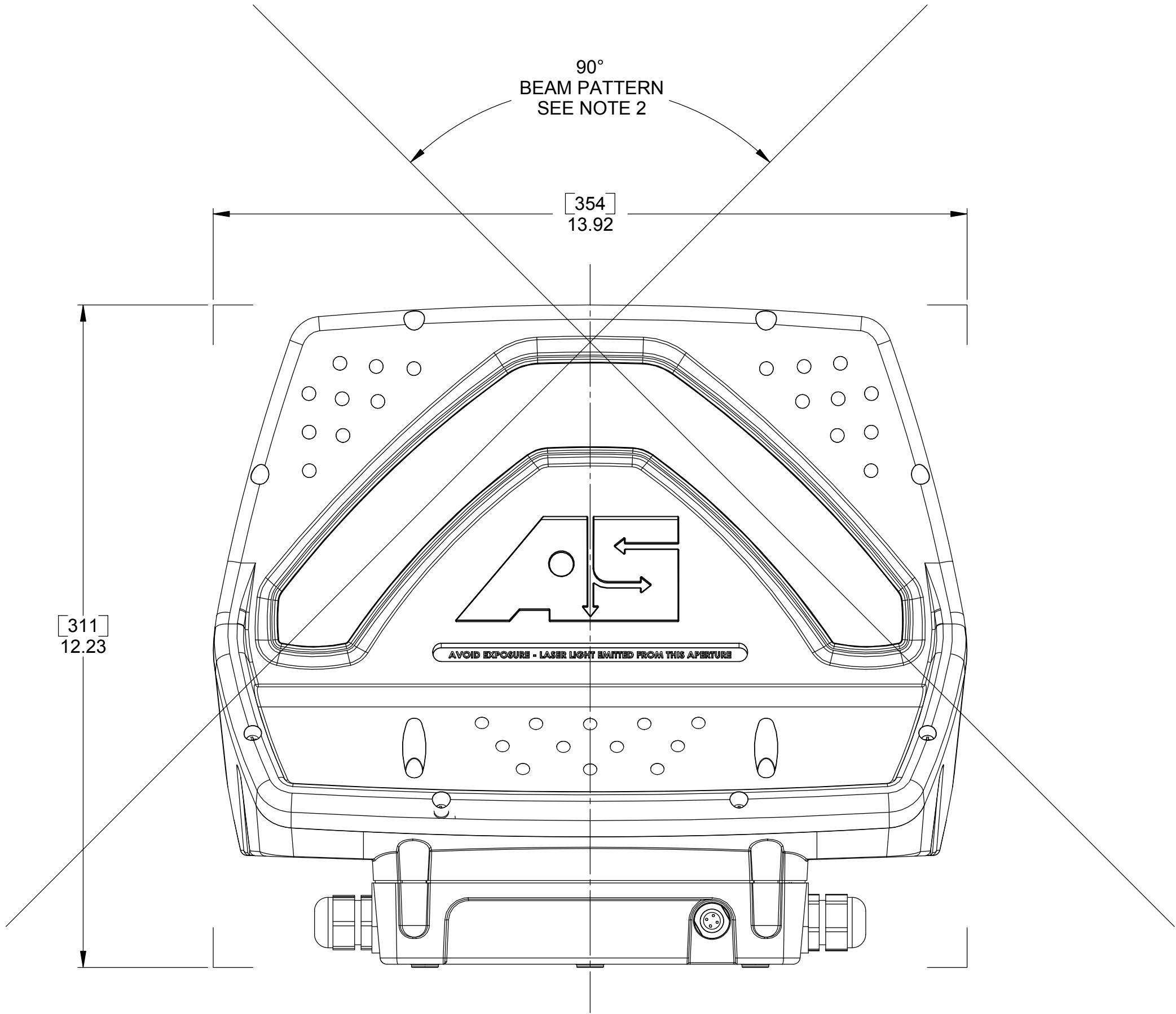
REFERENCE DRAWINGS
109042 ASSEMBLY, SCAN HEAD - AXIOM-X

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	TJB	DATE	10.20.05
CHKD	XXX	DATE	XX.XX.XX
ENGR	TJB	DATE	10.20.05
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

MECHANICAL SPECIFICATIONS

AXIOM-X

SIZE D	CAGE CODE 53830	DWG NO.	108828
SCALE NONE		CAD SYS. SOLIDWORKS	SHEET 1 OF 1

YAW
±22.5°

ROLL
360°
SEE NOTE 2

PITCH
50° UP MAX
130° DOWN MAX
SEE NOTE 1

YAW AXIS

READ DISTANCE
REF PLANE

9.85°

LINE OF INTERSECTION
OF SCAN PLANES

[353.58]
13.92

[222.25]
8.75

[126.75]
4.99

[211.36]
8.32

[185.79]
7.31

[291.08]
11.46

[399.16]
15.71

[50.04]
1.97

PITCH AXIS

[74.68]
2.94

[88.53]
3.49

[8.33] .328 X [46.48]1.83
5 SLOTS

[38.10]
1.50

[38.10]
1.50

[38.10]
1.50

[38.10]
1.50

POWER SUPPLY NOT SHOWN FOR CLARITY

[173.28]
6.82

[211.38]
8.32

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES [MILLIMETERS]
ALL ANGLES ARE 90°
ALL C-C/INK'S 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

		DATE	
DRAWN	TCS	01-OCT-2005	
CHKD	CDG	14-FEB-2006	
ENGR	TJB	01-OCT-2005	
DEPT	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

INSTALLATION DRAWING

AXIOM-X

SIZE	CAGE CODE	DWG NO
D	53830	109259

SCALE NONE   CAD SYS. SOLIDWORKS   SHEET 1 OF 4

SCANNER HEAD ASSEMBLY - AXIOM-X
0109042XXX

WIRING BASE ASSEMBLY - AXIOM400
0104636001/002

MOUNTING HARDWARE INCLUDED
WITH UNIVERSAL MOUNTING BRACKET

UNIVERSAL MOUNTING BRACKET (UMB)
0105307001/002

MOUNTING HARDWARE INCLUDED
WITH WIRING BASE ASSEMBLY

BRACKET, POWER
SUPPLY MOUNTING
(INCLUDED WITH UMB)
0105307002)

POWER SUPPLY
0105365001/002

PART NO. 0109259000

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

	INCH	[METRIC]	ANGULAR
.X±	.1000	[X±2.500]	X±1.00°
.XX±	.0200	[.XX±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	01-OCT-2005
CHKD	CDG	DATE	14-FEB-2006
ENGR	TJB	DATE	01-OCT-2005
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

INSTALLATION DRAWING
AXIOM-X

SIZE	CAGE CODE	DWG NO.	
D	53830		109259
SCALE	NONE	CAD SYS. SOLIDWORKS	SHEET 2 OF 4

DIRECTION OF FLOW TO RIGHT

DIRECTION OF FLOW TO RIGHT

DIRECTION OF FLOW TO RIGHT.

AXIOM-X TOP READ:
Typical safe mounting method:
Mount scan head on wiring base and tighten 4 screws
to hold scan head onto wiring base.
Adjust mounting bracket angle downwards to match application setup.

AXIOM-X SIDE READ, LEFT AND RIGHT SIDES SHOWN:
Typical safe mounting method:
Mount scan head on wiring base and tighten 4 screws
to hold scan head onto wiring base.
Adjust mounting bracket angle to match application setup.

DIRECTION OF FLOW TO RIGHT

AXIOM-X TOP READ: (NO OVERHEAD SPACE)
Typical safe mounting method:
Mount scan head onto wiring base using upper body to
stabilize unit. Tighten 4 screws to hold scan head onto wiring base.
Adjust mounting bracket angle to match application setup.

PART NO. 0109259000

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	[.XX±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	01-OCT-2005
CHKD	CDG	DATE	14-FEB-2006
ENGR.	TJB	DATE	01-OCT-2005
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

INSTALLATION DRAWING
AXIOM-X

SIZE	CAGE CODE	DWG NO	
D	53830		109259
SCALE	NONE	CAD SYS. SOLIDWORKS	SHEET 3 OF 4

Left view:

[0] / 0
IN RELATION TO FRONT MOST EDGE OF WIRING BASE.

[762] / 30 / NEAR

HEIGHT TRACKING PHOTOEYE #1 (FACING REFLECTOR)

[1016] / 40

ZONE 1

HEIGHT TRACKING PHOTOEYE #2 (FACING REFLECTOR)

[1270] / 50

ZONE 2

HEIGHT TRACKING PHOTOEYE #3 (FACING REFLECTOR)

[1524] / 60

ZONE 3

[1778] / 70.00 / FAR

ZONE 4

TRIGGER PHOTOEYE (FACING REFLECTOR)

[1802.75] / 71 / PHOTOEYE

[1904.35] / 75

[635] / 25

[609.60] / 24

MINIMUM BOX HEIGHT (SHOWN) = 5 INCHES
MAXIMUM BOX HEIGHT = 45 INCHES

[0] / 0
RELATIVE TO FLAT SECTION OF WIRING BASE WITH WIRING BASE MOUNTED AT 90 DEGREES TO BELT

DIRECTION OF FLOW TO RIGHT

Right view:

[0] / 0
FRONT MOST EDGE OF WIRING BASE

[762] / 30 / NEAR

PHOTOEYE REFLECTOR.

HEIGHT TRACKING PHOTOEYE #1 (FACING REFLECTOR)

[1016] / 40

ZONE 1

PHOTOEYE REFLECTOR.

HEIGHT TRACKING PHOTOEYE #2 (FACING REFLECTOR)

[1270] / 50

ZONE 2

PHOTOEYE REFLECTOR.

HEIGHT TRACKING PHOTOEYE #3 (FACING REFLECTOR)

[1524] / 60

ZONE 3

PHOTOEYE REFLECTOR.

ZONE 4

TRIGGER PHOTOEYE (FACING REFLECTOR)

[1778] / 70 / FAR

[1905] / 75.00

[914.40] / 36.00

CONVEYOR FLOW IS OUT OF PAGE.

Title block:

PART NO. 0109259000

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	[.XX±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

		DATE	
DRAWN	TCS	01-OCT-2005	
CHKD	CDG	14-FEB-2006	
ENGR	TJB	01-OCT-2005	
DEPT	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

INSTALLATION DRAWING
AXIOM-X

SIZE D	CAGE CODE 53830	DWG NO. 109259
SCALE NONE	CAD SYS. SOLIDWORKS	SHEET 4 OF 4

REVISION

REV	CHANGE	BY	DATE
03	ECO 08-741	AS	3/19/09
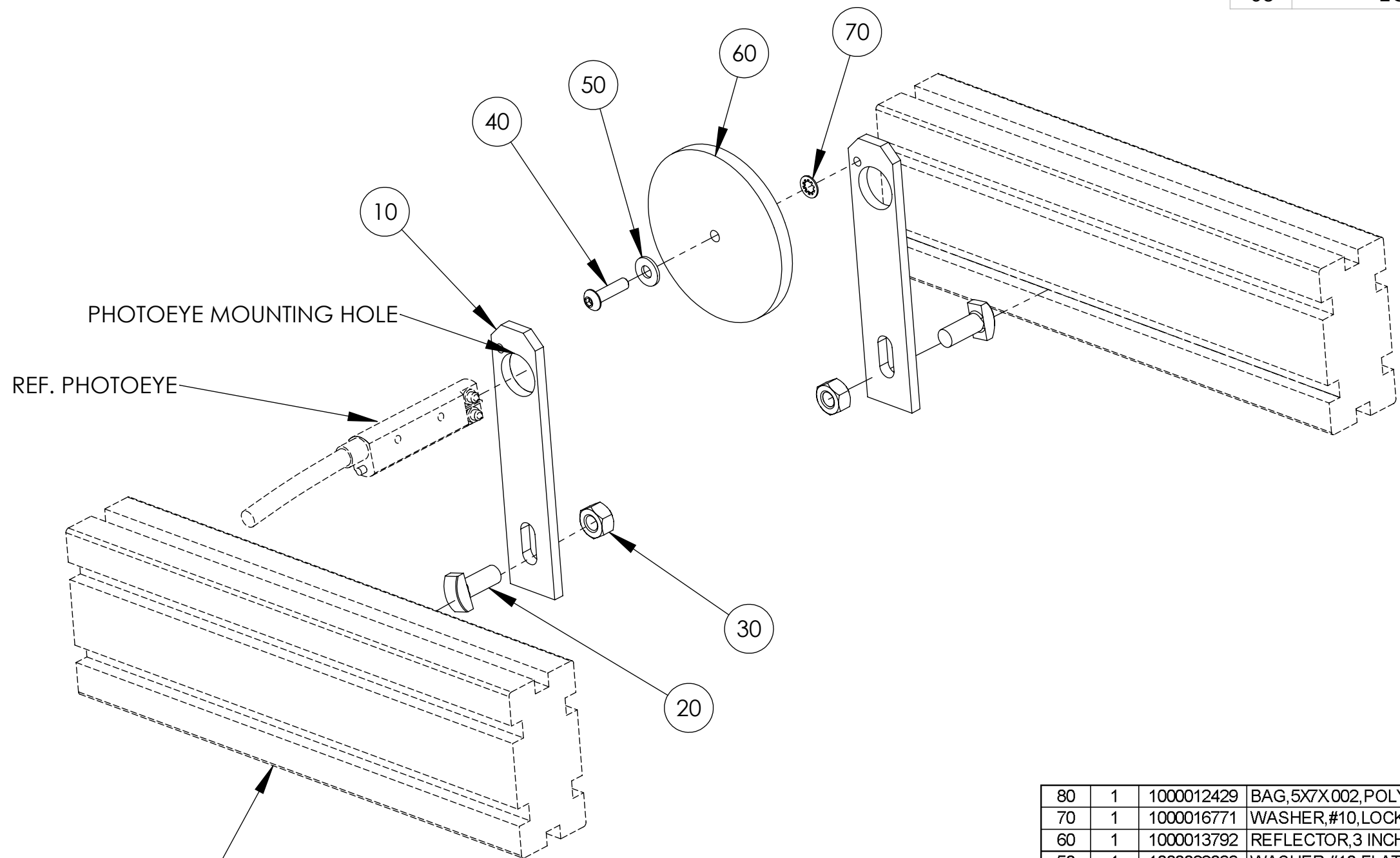
PHOTOEYE MOUNTING HOLE

REF. PHOTOEYE

REF. 1.5" X 3.0" EXTRUSION (2)

PART NO. 1000020589

ITEM	QTY.	PART NO.	DESCRIPTION
80	1	1000012429	BAG,5X7X.002,POLY **(NOT SHOWN)**
70	1	1000016771	WASHER,#10,LOCK,INTERNAL TOOTH,,
60	1	1000013792	REFLECTOR,3 INCH
50	1	1000022099	WASHER,#10,FLAT
40	1	1000005781	SCREW,10-32,3/4,HEX CAP,BUTTON HEAD,STEEL,BLACK OXIDE
30	2	1000065135	NUT,HEX,3/8,5/16-18,NYLON LOCKING INSERT,STEEL,ZINC,FLANGED
20	2	1000009193	SCREW,5/16-18,3/4,T-STUD,STEEL,BLACK OXIDE
10	2	1000008700	PLATE,STRAIGHT,PHOTOEYE/REFLECTOR

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	AS	DATE	01/16/09
CHKD	XXX	DATE	XX.XX.XX
ENGR	AS	DATE	XX.XX.XX

DEPT. MECH ENG

E- N/A

CUSTOMER N/A

CONTRACT # N/A

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

KIT, MOUNTING, REFLECTOR
PHOTOEYE

SIZE	CAGE CODE	DWG. NO.	
B	53830		41222

SCALE NONE CAD SYS. SOLIDWORKS SHEET 1 OF 1

NO.	CHANGES	BY	DATE
1	ECN #1958, UPDATED B.O.M.	RB	12.7.95
2	ECN #2294	JB	07.17.96
3	ECN #4091	AC	05.21.99

REFLECTOR
MTG SURFACE

PHOTOEYE MTG
BRKT SURFACE
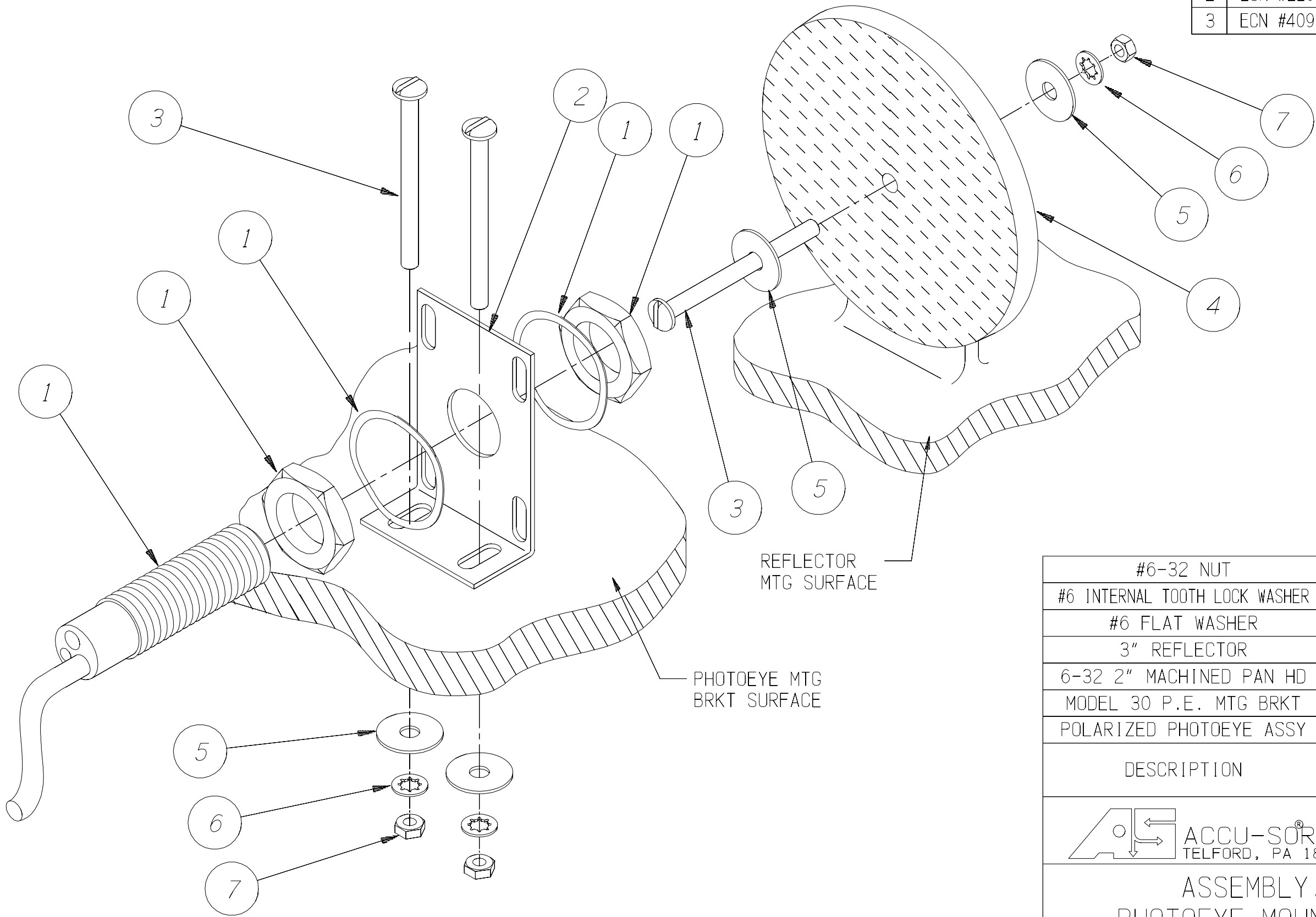
DESCRIPTION	PART NO	ITEM NO
#6-32 NUT	N#6-32	7
#6 INTERNAL TOOTH LOCK WASHER	L#6	6
#6 FLAT WASHER	W#6	5
3" REFLECTOR	C110MH	4
6-32 2" MACHINED PAN HD	6-32X2MPHZP	3
MODEL 30 P.E. MTG BRKT	A-33055	2
POLARIZED PHOTOEYE ASSY		1
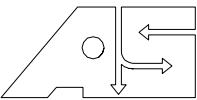
ACCU-SORT SYSTEMS, inc.
TELFORD, PA 18969 USA

ASSEMBLY, POLARIZED
PHOTOEYE MOUNTING DIAGRAM

CHK'D	DRAWN BY	CL	DRAWING NO.	
APP'D	DATE	8-5-93	B-24130	

NOTES:

1. EXTRUSION MEMBER LENGTH TOLERANCE: ± .06
   ALL PIECES OF SAME LENGTH DIMENSION ± .03
2. ACTUAL LOCATION OF HEIGHT PHOTOEYES IS APPLICATION-DEPENDENT.
   REFER TO ENGINEERING SPECIFICATIONS FOR ACTUAL SPACING.
3. THE 36" TALL HEIGHT PHOTOEYE MOUNTING ADAPTER (0112697003)
   WITH THREE HEIGHT EYES IS SHOWN HERE.
4. REMEMBER: THE TALLER PACKAGES ENTERING THE SYSTEM MUST BLOCK
   A HEIGHT PHOTOEYE BEFORE BLOCKING THE TRIGGER PHOTOEYE.

CONVEYOR TRAVEL

HEIGHT EYE REFLECTORS
(ZONE EYE REFLECTORS)

HEIGHT EYES
(ZONE EYES)

TRIGGER PHOTOEYE
REFLECTOR

CONVEYOR TRAVEL

TRIGGER PHOTOEYE
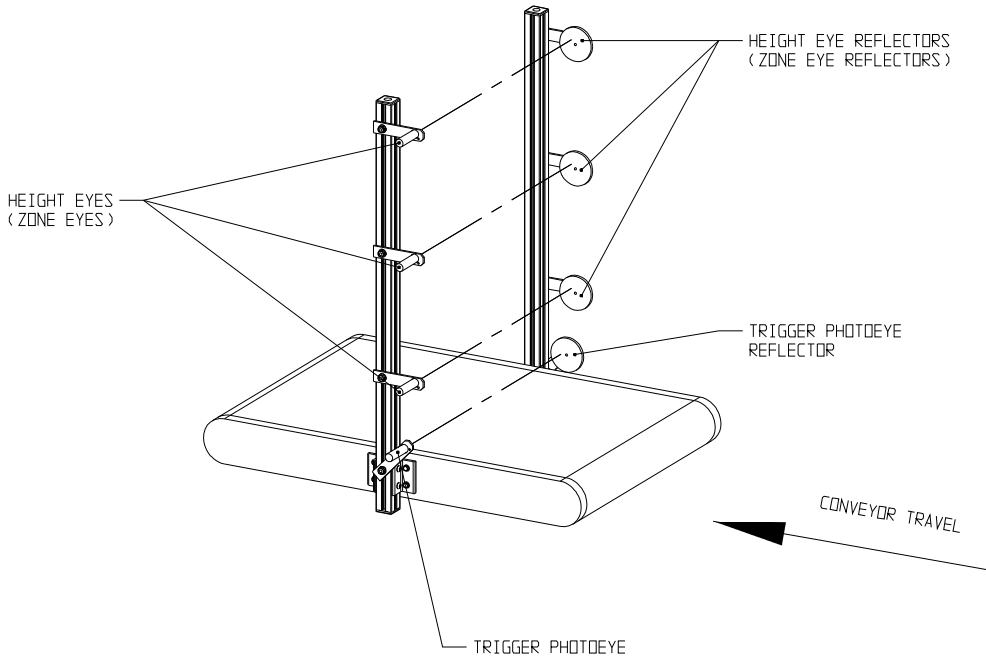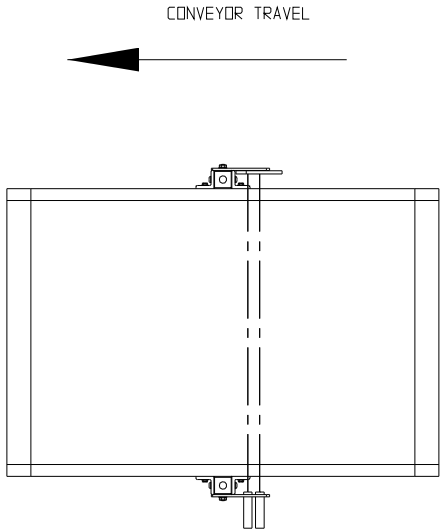
REF. FASTENING DETAIL 'D'
DWG. NO. D-39263

REF. FASTENING DETAIL 'F'
DWG. NO. D-39263

1 MIN
SEE NOTE 4

SEE NOTE 2

SEE NOTE 2

SEE NOTE 2

CONVEYOR TRAVEL

CONVEYOR TRAVEL

CONVEYOR TRAVEL
IS INTO DRAWING
NORMAL TO THIS VIEW

REVISIONS

REV	CHANGES	BY	DATE
1	ECO 09-257	KMS/NRS	06/23/09
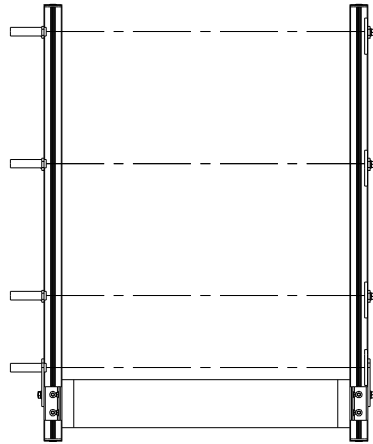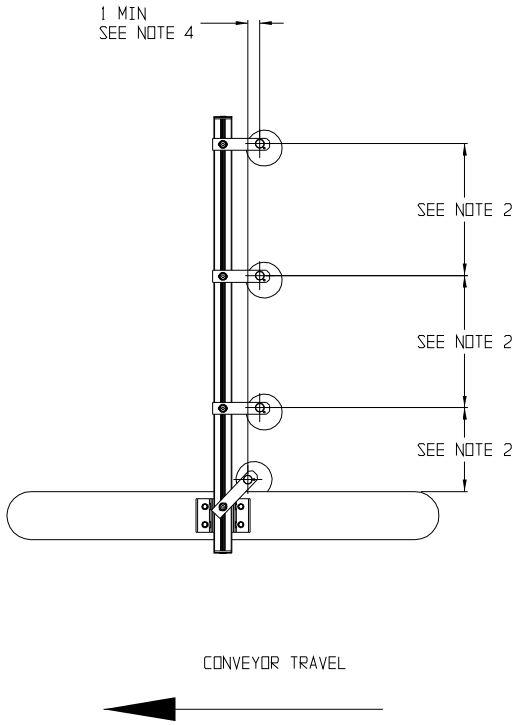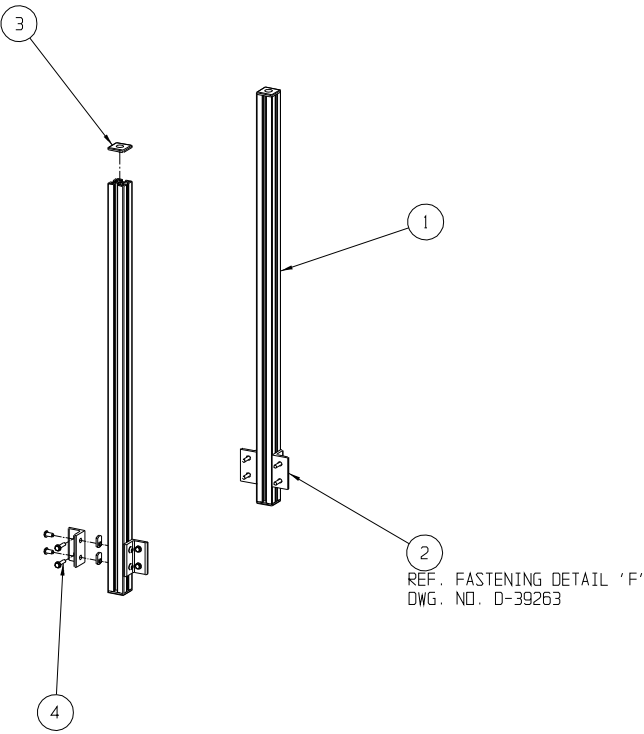
TABLE 1: HEIGHT EYE MOUNTING ADAPTER

PART NO.	DESCRIPTION	ITEM	QTY	SPECIFICATION
0112697001	12" TALL HEIGHT EYE MOUNTING ADAPTER	1	2	1515 XX XX - 12.00
0112697002	24" TALL HEIGHT EYE MOUNTING ADAPTER	1	2	1515 XX XX - 24.00
0112697003	36" TALL HEIGHT EYE MOUNTING ADAPTER	1	2	1515 XX XX - 36.00

	ITEM	QTY	DESCRIPTION	PART NO.	SPECIFICATION
NOT SHOWN	5	8	NUT, 5/16-18 HEX N5/16-18	1000018501	ACCU-SORT
	4	8	SCREW, SELF DRILLING 1/4-14X1-1/4 HEX	1000060236	ACCU-SORT
	3	1	KIT, 4PK 1515 END CAP MTHW11-04	1000018288 41606	ACCU-SORT
	2	1	KIT, 4PK 2 HOLE ANGLE BRACKET MTHW03-04	1000018273 41593	ACCU-SORT
	1	2	CUSTOM FRAME MEMBER 1515	1515 TABLE 1	ACCU-SORT

PART NO. SEE TABLE 1
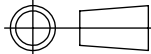
UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES
ALL ANGLES ARE 90.°
ALL C-SINKS ARE 82.°∨
ALL BEND RELIEFS TO SUIT
TOLERANCES:
LINEAR- .X±.100 ANGULAR- .X±1.0°
.XX±.020 .X±.10°
.XXX±.005 .XX±.01°
.XXXX±.0005
FT.,IN ±1°
FRACTIONS ±1/4

REMOVE SHARP EDGES AND BURRS

		DATE	
DRAWN	KMS	06/23/09	
CHKD	JAD	06/23/09	
ENGR	NRS	06/23/09	
DEPT.	APP ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

HEIGHT EYE MOUNTING ADAPTER
AXIOM/AXIOM-X

SIZE D	CAGE CODE 53830	DWG NO. 112697
SCALE NONE	CAD SYS. CADKEY	SHEET 1 OF 1

CONFIGURATION #4

CONFIGURATION #3

CONFIGURATION #2

CONFIGURATION #1

ALL SHOWN EXPLODED

TABLE 1

ASSEMBLY NO.	CONFIGURATION NO.	ITEM 3 QTY	ITEM 4 QTY	ITEM 5 QTY
0112465001	1	3	0	0
0112465002	2	0	2	0
0112465003	3	0	4	0
0112465004	4	0	0	2

ALL SHOWN ASSEMBLED

CONFIGURATION #4

DUAL AXIOM
POWER SUPPLY

CONFIGURATION #3

TWO SINGLE AXIOM
POWER SUPPLIES

CONFIGURATION #2

SINGLE AXIOM
POWER SUPPLY

CONFIGURATION #1

AXIOM SCANNER

PART NO. SEE TABLE 1

ITEM	QTY	DESCRIPTION	PART NO.	SPECIFICATION
5	X	SCREW,10-32X1/2, SELF-TAPPING,TYPE F	1000005748	ACCU-SORT
4	X	SCREW,6-32X7/16,THREAD ROLLING	1000066613	ACCU-SORT
3	X	SCREW,10-32X1/2 WITH LOCKWASHER	1000011439	ACCU-SORT
2	2	T-STUD, FLANGED NUT, PRE-ASSEMBLED	0110361001 110361	ACCU-SORT
1	1	MTG PLATE, AXIOM & POWER SUPLIES	0112188001 112188	ACCU-SORT

SEE TABLE 1 (items 5, 4, 3)

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES
ALL ANGLES ARE 90.°
ALL C-SINKS ARE 82.°∨
ALL BEND RELIEFS TO SUIT
TOLERANCES:
LINEAR- .X±.100 ANGULAR- X±1.0°
.XX±.020   .X±.10°
.XXX±.005   .XX±.01°
.XXXX±.0005
FT..IN   t1°
FRACTIONS ±1/4

REMOVE SHARP EDGES AND BURRS

DRAWN	KMS	DATE	12/10/08
CHKD	XXX	DATE	12/10/08
ENGR	MR	DATE	12/10/08
DEPT.	APP ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

ASSEMBLY PARTS GUIDE,
UNIVERSAL MOUNTING PLATE, AXIOM & POWER SUPPLIES

SIZE D	CAGE CODE 53830	DWG NO.	112465
SCALE NONE		CAD SYS. CADKEY	SHEET 1 OF 1

REVISION

REV	ECO	BY	DATE
03	09-214	AS	05/14/09

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

AXIOM "X" BRACKET
110 WATT POWER SUPPLY

GREEN

RED
BLACK

AXIOM CONTROLLER

AXIOM CLIENT

POWER
V+
GND

RED OR WHITE
BLK

POWER
V+
GND

SERIAL COM
GND
RX2
RX1
TX2
TX1

HOST RS232 PORT GND
HOST RS232 PORT RECEIVE
HOST RS232 PORT TRANSMIT

RELAYS 1 & 2
I/O1+
I/O1-
I/O2+
I/O2-

GREEN

SERIAL COM
GND
RX2
RX1
TX2
TX1

RELAYS 1 & 2
I/01+
I/01-
I/02+
I/02-

PHOTO EYE
BLK
WHT
RED

TRIGGER
GND
TRIG-
TRIG+
V+

TRIGGER
GND
TRIG-
TRIG+
V+

TACHOMETER
NOTE: TACH MUST BE
SET FOR NPN OPEN
COLLECTOR

BLK
WHT
RED

TACH
GND
TACH-
TACH+
V+

TACH
GND
TACH-
TACH+
V+

RELAYS 3 & 4
I/O3+
I/O3-
I/O4+
I/O4-

RELAYS 3 & 4
I/03+
I/03-
I/04+
I/04-

ETHERNET
RX-
RX+
TX-
TX+

POWER
V+
GND

ETHERNET
RX-
RX+
TX-
TX+

POWER
V+
GND

PART NO.   0107480000

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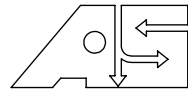
ACCU-SORT® SYSTEMS, inc.
TELFORD, PA 18969 USA

INTERCONNECT DRAWING,
CONTROLLER/CLIENT W/TACH,AXIOM

| SIZE | CAGE CODE | DWG. NO. | |
| B | 53830 | | 107480 |

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

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.

	4		3		2		1

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
05	09-214	AS	05/14/09
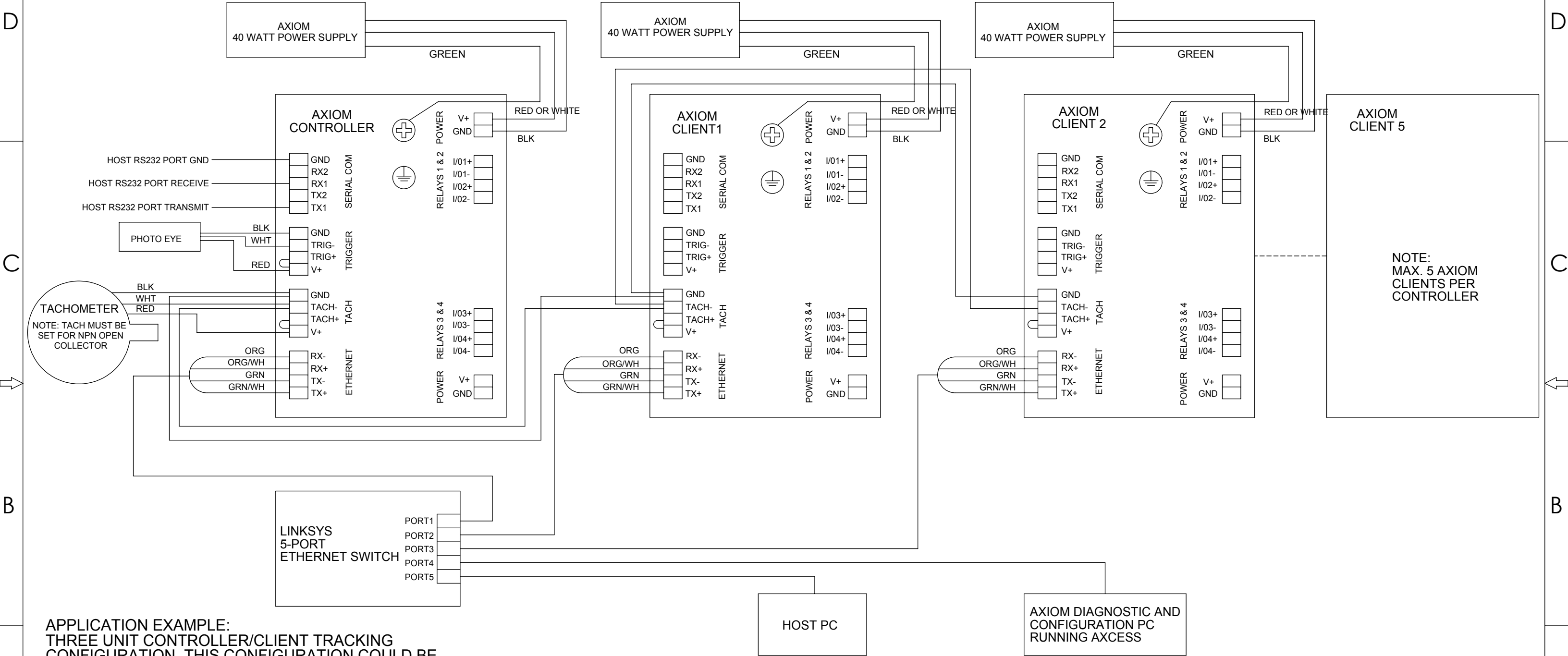
APPLICATION EXAMPLE:
THREE UNIT CONTROLLER/CLIENT TRACKING
CONFIGURATION. THIS CONFIGURATION COULD BE
A X PATTERN TOP READ WITH A SINGLE FRONT READ
AXIOM. SERIAL PORT FROM CONTROLLER AXIOM
WILL TRANSMIT DATA FROM READ STATION TO
A SORTATION CONTROLLER. HOST PC ATTACHED TO
ETHERNET SWITCH COULD BE USED 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

SIZE	CAGE CODE	DWG. NO.	
B	53830		107481

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

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

AXIOM
40 WATT POWER SUPPLY

GREEN

AXIOM

RED OR WHITE
BLK

Power V+
       GND

HOST RS232 PORT GND — GND
HOST RS232 PORT RECEIVE — RX2
HOST RS232 PORT TRANSMIT — RX1
TX2
TX1

SERIAL COM

Relays 1 & 2 I/01+
              I/01-
              I/02+
              I/02-

WHT

PHOTO EYE — BLK / WHT — GND
                       TRIG-
START TRIGGER PHOTO EYE — RED — TRIG+
                                V+

TRIGGER

DC INPUT MODULE

I/O 1
I/O 2
I/O 3
I/O 4

GND
TACH-
TACH+
V+

TACH

RX-
RX+
TX-
TX+

ETHERNET

POWER RELAYS 3 & 4 I/03+
                     I/03-
                     I/04+
                     I/04-

V+   RED
GND

BLK

PHOTO EYE

END TRIGGER PHOTO EYE

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

SIZE	CAGE CODE	DWG. NO.	
B	53830		107482
SCALE	NONE	CAD SYS. SOLIDWORKS	SHEET 1 OF 1

APPLICATION EXAMPLE:
WIRING SHOWN IS OF BOTH NON TRACKING 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.

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.
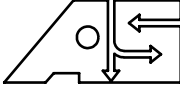4. CURRENT DRAW OF EACH LAMP IS 250mA.

CUSTOMER SUPPLIED 24 VDC

PE GROUND

GREEN/YELLOW

AXIOM

POWER: V+ / GND — RED / BLK

HOST RS232 PORT GND — GND
HOST RS232 PORT RECEIVE — RX1
HOST RS232 PORT TRANSMIT — TX1
SERIAL COM: GND, RX2, RX1, TX2, TX1

PHOTO EYE — BLK / WHT / RED
START TRIGGER PHOTOEYE

TRIGGER: GND, TRIG-, TRIG+, V+

RELAYS 1 & 2: I/O1+, I/O1-, I/O2+, I/O2-

DC OUTPUT MODULE — I/O 1
DC OUTPUT MODULE — I/O 2
DC OUTPUT MODULE — I/O 3
I/O 4

TACH: GND, TACH-, TACH+, V+

RELAYS 3 & 4: I/O3+, I/O3-, I/O4+, I/O4-

ETHERNET: RX-, RX+, TX-, TX+

POWER: V+ / GND

RED STACKLIGHT

GREEN STACKLIGHT

YELLOW STACKLIGHT

STACKLIGHT STANDARD BASE

c 1 2 3 4 5 6

PART NO. 0107483000

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

THIS DOCUMENT IS PROVIDED FOR A SPECIFIC PURPOSE AND THE DISCLOSED INFORMATION REMAINS OUR PROPERTY. IT MAY NOT BE DISCLOSED, COPIED, OR REPRODUCED, EXCEPT FOR THE SPECIFIC PURPOSE, WITHOUT ACCU-SORT'S PRIOR APPROVAL. THIS NOTICE MUST APPEAR ON ANY COPY OR REPRODUCTION OF THIS DOCUMENT.
© 2004 ACCU-SORT SYSTEMS, INC.

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.

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

| SIZE | CAGE CODE | DWG. NO. | |
| B | 53830 | | 107483 |

SCALE NONE   CAD SYS. SOLIDWORKS   SHEET 1 OF 1

REVISION

REV	ECO	BY	DATE
04	09-214	AS	05/20/09

4	3	2	1

NOTES:
1. WHEN PRINTED IN COLOR, THIS DOCUMENT WILL SHOW WHITE WIRES AS GREEN IN COLOR.

AXIOM 40 WATT POWER SUPPLY

GREEN

AXIOM-X

POWER
V+
GND

RED OR WHITE
BLK

RELAYS 1 &2
I/01+
I/01-
I/02+
I/02-

SERIAL COM
GND
RX2
RX1
TX2
TX1

HOST RS232 PORT GND
HOST RS232 PORT RECEIVE
HOST RS232 PORT TRANSMIT

I/O 1 DC INPUT MODULE
I/O 2 DC INPUT MODULE
I/O 3 DC INPUT MODULE
I/O 4

TRIGGER
GND
TRIG-
TRIG+
V+

PHOTOEYE
BLK
WHT
RED

TRIGGER PHOTOEYE

TACH
GND
TACH-
TACH+
V+

ETHERNET
RX-
RX+
TX-
TX+

RELAYS 3 & 4
I/03+
I/03-
I/04+
I/04-

POWER
V+
GND
RED
BLK

WHT
RED
BLK
PHOTOEYE
HEIGHT TRACKING PHOTOEYE # 1

WHT
RED
BLK
PHOTOEYE
HEIGHT TRACKING PHOTOEYE # 2

WHT
RED
BLK
PHOTOEYE
HEIGHT TRACKING PHOTOEYE # 3

APPLICATION EXAMPLE:
WIRING SHOWN IS TRACKING WITH SINGLE TRIGGER PHOTOEYE AND THREE HEIGHT TRACKING PHOTOEYES USED FOR TRACKING PURPOSES. SERIAL PORT FROM AXIOM-X WILL TRANSMIT DATA TO THE SORTATION CONTROLLER. AXIOM-X SCANNERS ARE CONFIGURED BY ATTACHING SERIALLY TO THE SETUP PORT ON THE WIRING BASE.

PART NO.   0109364000

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	CDG	DATE	16-FEB-2006
CHKD	LSM	DATE	16-FEB-2006
ENGR	JJY	DATE	16-FEB-2006
DEPT.	MECH ENG		
E-	N/A		
CUSTOMER	N/A		
CONTRACT #	N/A		

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

INTERCONNECT DRAWING,
HEIGHT TRACKING,PHOTOEYES,AXIOM-X

SIZE B	CAGE CODE 53830	DWG. NO.	109364
SCALE NONE	CAD SYS. SOLIDWORKS	SHEET	1 OF 1