Model 22 Series II

Bar Code Scanner Operations & Maintenance

Product Manual

ACCU-SORT® SYSTEMS

Lasers • Cameras • RFID • Systems

Model 22 Series II

Bar Code Scanner

OPERATIONS AND MAINTENANCE MANUAL

INTRODUCTION

This is the Operations and Maintenance Manual for the Model 22 Series II. It provides details on everything you need to know to unpack, set up, operate, and maintain your system.

> This note box is used throughout this manual to indicate supplementary information important to the current topic.

MANUAL REVISIONS

This Operations and Maintenance Manual is under revision control. Any addenda or other documents associated with this manual are under separate revision controls. A revision number is changed by 0.1 whenever technical information is changed or added to a document. Any revision between 0.1 and 0.9 is automatically considered preliminary. Any document with a revision greater than 0.9 has been officially released by the Accu-Sort Systems ECO process.

DISCLAIMER

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WARRANTY

Accu-Sort Systems, inc. warrants that its scanner and component parts will be free from defects in material and workmanship for a period of one year from the date of shipment (15 months for distributors to account for stocking of units). All new replacement units will also be warranted for the remainder of the original one-year time period. Unless otherwise stated, warranty for products not manufactured by ASI are limited to the manufacturer's warranty. Accu-Sort's sole obligation with respect to damage (whether direct, incidental or consequential, resulting from the use or performance of the unit) is to replace the defective units thereof.

Service requests due to misuse, abuse, neglect, changes in the original specifications, or service calls not related to the Accu-Sort equipment, will be charged at the then current service rate plus all travel related expenses.

- **If the unit fails within two weeks of shipping (Out Of Box Failure):**
  Standard units and custom units with only custom software are replaced within 48 hours with new units. Units with custom hardware will be replaced in 72 hours with new units. If the defective unit is not returned within 30 days, the customer will be contacted. If the defective unit is not returned after 45 days, the customer will be invoiced for that unit. Accu-Sort will issue a RA# (return authorization number) for each defective unit.

- **If the unit fails after two weeks of shipment, but before the end of the warranty period:**
  These procedures are the same as Out Of Box Failures, except Accu-Sort will send refurbished units instead of new units. These refurbished units will be warranted for 90 days from date of shipment or the balance of the original one-year warranty, whichever is greater.

- **If the unit fails after the original warranty period (Out Of Warranty Failures):**
  These procedures are the same as Out Of Box Failures, except Accu-Sort will send refurbished units instead of new units. These refurbished units will be warranted for 90 days from date of shipment. All out of warranty defective units will be replaced for a fixed price. Contact the Accu-Sort Customer Service Department for the current prices.

Additional details on the coverage, support, and services available for your bar code scanning and automated systems equipment is available from:

Accu-Sort Systems, inc.
511 School House Road, Telford, PA 18969

Phone: (215) 723-0981
1-800-BAR-CODE
FAX: Telford Main .... (215) 721-5551
Customer Service ...... (215) 799-1600
Sales .... (215) 996-8282
Acct/Mktg. .... (215) 996-8249
Integrated Systems .... (215) 996-8181
Federal Systems .... (215) 996-8787

E-Mail: info@accusort.com
Internet: www.accusort.com

CUSTOMER SERVICE

If you have any problems or questions that require Accu-Sort's help, direct your calls to the Customer Service Department.

⚠	Accu-Sort Customer Service: phone: (215) 723-0981 1-800-BAR-CODE (Ask for Customer Service) Fax: (215) 723-1515

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

- Product Serial Number
- Product Type
- Detailed description of the question or problem
- Customer contact name and phone number

Product Type	Serial Number

Model 22 Series II Serial Tag

Serial Number Breakdown:
WWXXXXXX (YY...)

WW - Two digit year of manufacture

XXXXXX - Six digit sequential build number

Suffix - Optional suffix (es) that reflect actual catalog options for the off-the shelf units

- Ex: M22A would have "A" as suffix
- At least 6 digits can be placed on the tag
- If "Z" is called out, this indicates a custom unit-requiring folder
- this could be used for special designations

⚠	The WWXXXXXX fields are bar coded with a Code 128 type bar code.

SAFETY RECOMMENDATIONS AND PRECAUTIONS

The Model 22 Series II is an electronic microprocessor-based line scanner. Please follow the safety precautions and warnings found throughout this manual in order to prevent personal injury or damage to the unit. Failure to follow these precautions may void your warranty.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide 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 manual 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.

The following note boxes are displayed throughout this manual to indicate safety concerns and/or warnings.

	This note box is used to provide precautions and/or guidelines, warning the user that personal injury or damage to the unit may occur during the task they are performing.

	This note box is used to alert the user they are about to perform an action involving a dangerous level of voltage, or to warn against an action that could cause electrical shock.

WHEN UNPACKING

- Do not drop the unit
- Do not touch the exit window glass

WHEN MOUNTING

- Do not drop the unit
- Do not touch the exit window glass

GENERAL PRECAUTIONS

Please follow these precautions:

- Avoid staring at the laser beam. Staring at the laser beam for prolonged periods could result in eye damage.
- Do not create any obstructions of airflow to the unit. Keep the area around the unit clean to provide for cooling.
- Any service should be performed so as not to violate compliance with the Code of Federal Regulations, Title 21, Part 1040, Section 10 (21 CFR 1040.10), as administered by the Center for Devices and Radiological Health, a service of the Food and Drug Administration under the Department of Health and Human Services. Do not attempt to defeat any safety provisions.
- Learn where the disconnect switches or circuit breakers are for your area. (Ensure that others using the equipment know this also.)
- Use shielded interface cables with this product. To maintain FCC compliance, the cable shield must make a 360° connection to the shielded mating connector.
- 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 connections to your Model 22 Series II. If a cable is damaged in any way, replace it.
- Routinely examine all wiring and plugs for any signs of exposed wire or deteriorating insulation.
- Check mounting hardware periodically for tightness and stability.
- Do not use sheet rock or wood as a mounting surface for the Model 22 Series II. Use steel or aluminum as a mounting structure.

| ⚠ | Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure. |

| ⚠ | Use of optical instruments with this product will increase eye hazard. Do not look into the laser beam with instruments such as telescopes, binoculars, or cameras. |

GROUNDING THE MODEL 22 SERIES II

The system must be grounded electrically at all times. Please follow these precautions:

- Ensure your AC power outlet has a properly grounded receptacle.
- Make sure you have the appropriate power cord for your country before turning on the unit.
- Do not turn on the system until all components are properly cabled and grounded with three-conductor AC power cords. Do not use a two-prong adapter.
- Do not cut or remove the round grounding prong from the plug under any circumstances.
- Do not use an extension cord to defeat the ground.

ELECTROSTATIC DISCHARGE

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 components 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 component is damaged to the point where it is permanently damaged.

Five 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 the sensitivity of devices to be handled in the ESD protective area;
- Establish a suitable static control program that both limits static generation to less than the damage threshold of the most sensitive device in the environment, and provides a safe, defined path for the dissipation of static charges;
- Prevent contamination of the protective area by unnecessary non-static controlled materials; and
- Audit the ESD protective area regularly to ensure that static control is maintained. Document the findings for future reference.

LABEL LOCATIONS

The following labels identify areas of the Model 22 Series II that require special precautions or handling, or provide general information.

Model 22 Series II Labels and Locations

⚠ **NOTE:** Laser power rating increased from <3.8 mW to **<5.0 mW peak**.

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CHECKING THE PACKING SLIP

Enclosed in plastic on the outside of your box is a packing slip. The packing slip lists the parts of your order.

As soon as you open the box, check the equipment against the packing slip to ensure you received everything you ordered. If any equipment is missing or has been damaged during shipment, contact Accu-Sort immediately at 1-800-BAR-CODE (refer to Customer Service).
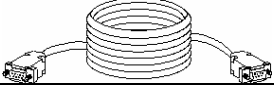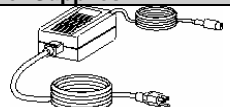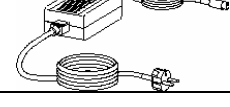
> The Model 22 Series II packaging was specifically designed to protect the unit during shipment. **Do not throw it away**. Save all the packaging materials for possible future use.
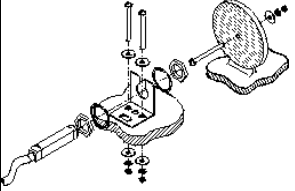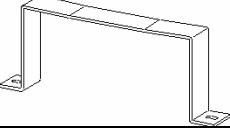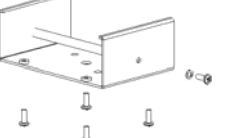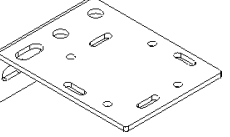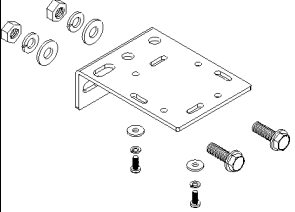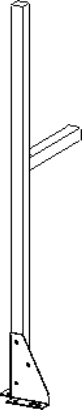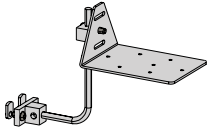
Depending upon your needs, you may have one or more of the pieces of equipment shown in the following table:
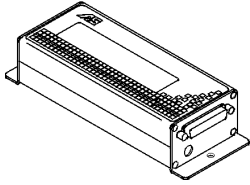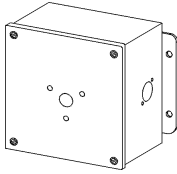
Drawings are not to scale		
Part	**Part Number**	**Description**
Model 22 Series II		**OTS Model 22 Scanner with Internal Logic**
	1000024639	Standard Optics, Linear Decoding
	1000024640	Standard Optics, DRX Decoding
	1000024641	Standard Optics Raster 1" @ 10"
	1000024642	High Density Optics, Linear Decoding
	1000024643	High Density Optics, DRX Decoding
	1000024644	High Density Optics, Raster 1" @ 10"
	1000024645	High Speed Motor Linear Decoding
	1000024646	High Speed Motor DRX Decoding
	1000024647	High Speed Motor Raster 1" @ 10"
	1000024648	Long Range Optics Linear Decoding
	1000024649	Long Range Optics DRX Decoding
	1000024650	Long Range Optics Raster 1" @ 10"
	1000024651	Standard Optics Dynamic Raster
	1000024652	High Density Optics Dynamic Raster
	1000024653	High Speed Motor Dynamic Raster
	1000024654	Long Range Optics Dynamic Raster

Model 22 Options		
Optical Setup		
	1000024888	Standard Optics
	1000024889	High Density Optics
	1000007007	High Speed Motor
	1000007008	Long Range Optics
	1000025622	Vibrating Vane
Right Angle Exit		
	1000050674	Right angle end caps
End Caps		
	1000050677	Low profile end caps
	1000050675	Standard end caps
Mirror Wheel		
	1000014049	8-sided straight
	1000001675	15-sided straight
	1000001652	8-sided Raster 1" @ 10"
	1000001672	12-sided Raster 1" @ 10"
Software		
	1000022766	Linear Decoding
	1000022767	DRX Decoding
	1000023065	Custom Software, application-specific

Supply Voltage		
	1000007014	110V Power Supply 20W
	1000007015	220V Power Supply 20W
Cable Configuration		
	1000017652	Daisy Chain Cable
	1000001199	3030 Programming cable
	1000015450	External Serial to DeviceNet Converter Kit
	1000015843	External Serial to Ethernet Converter Kit
Connector Kits		
For PC/Terminal	1000020542	25-pin Connector Kit with Strain Relief
For Serial Communications	1000020609	15-pin Connector Kit with Strain Relief
For Photoeye	1000020528	9-pin Connector Kit with Strain Relief

Model 22 Series II Accessories		
Interface Boxes /Expansion Modules		
	1000017362	Small Scanner Interface without relays
	1000017365	Small Scanner Interface with relays
	1000017376	Small Scanner Interface with solid state relays
	1000015791	EM-50 Scanner Expansion Module
Power Supplies		
	1000022163	110VAC Power Supply (for Small Scanner Interface)
	1000015618	220VAC Power Supply (for Small Scanner Interface)
	1000017369	120VAC 5VDC Programming Kit
	1000017371	220VAC 5VDC Programming Kit
	1000017370	110VAC 12VDC Programming Kit (for Optional Input Voltage)
	1000017372	220VAC 12VDC Programming Kit (for Optional Input Voltage)

Photoeyes		
	1000020527	Standard Photoeye Kit (9-Pin D-type Connector)
Mounting Equipment		
	1000017654	22II Mounting Bracket
	1000007016	Cradle Mounting Bracket
	1000003614	Bracket Mounting, Universal
	1000003627	Universal Mounting Shipkit NOTE: Includes Universal Mounting Bracket (PN 1000003614).
	1000003656	Ball and Socket Mount Kit NOTE: Cradle mounting bracket (PN 1000007016) also needed when using the Ball and Socket Mount Kit.
	1000018197	Mounting Structure Assembly
	1000018208	Mounting Kit

Other Accessories		
	1000016277	External Display
	1000016281	External Display w/ 10 Ft. Cable
	1000016280	110V External Power Supply for Display
	1000016283	220V External Power Supply for Display
	1000019935	Reader Status Indicator w/out Reset Switch - Green
	1000019936	Reader Status Indicator w/out Reset Switch - Red
	1000025097	Reader Status Indicator w/out Reset Switch - Amber
	1000022657	Reader Status Indicator w/out Reset Switch - Dual Red/Green
	1000019945	Reader Status Indicator w/ Reset Switch - Green
	1000019946	Reader Status Indicator w/ Reset Switch - Red
	1000025098	Reader Status Indicator w/out Reset Switch - Amber
	1000022661	Reader Status Indicator w/out Reset Switch – Dual Red/Green

Model 22 Documentation	
1000057582	Model 22 Series II Hardware User Documentation CD (ships with unit)
1000057581	Accu-Setup for Small Scanners Software CD (ships with unit)
1000025859	Model 22 Series II Hardware Manual (printed version)
1000017488	Accu-Setup for Small Scanners Software Manual (printed version)

Parts Table

Do not turn on the system until all components are properly cabled and grounded with three-conductor AC power cords. Do not use a two-prong adapter. Do not use an extension cord to defeat the ground.

GENERAL DESCRIPTION OF SYSTEM OPERATION

Accu-Sort presents the Model 22 Series II Bar Code Scanning System that provides medium range bar code scanning at an affordable price. If you are not familiar with Accu-Sort's small scanner family, it was developed with a solution in mind for your fixed scanning needs. Most bar code scanning and decoding applications need an external decoder logic unit and a remote scanning head. The Model 22 Series II has a built-in decoder logic.

Accu-Sort Systems developed the Model 22 Series II with the various needs of their customers in mind. Because of this, the Model 22 Series II is designed with many powerful features that make bar code scanning easier to implement and maintain.

The Model 22 Series II features include:

- RISC Processor
- Operator LED indicators
- Autodiscrimination of bar code symbologies
- Preset Scanning Distances for a wide variety of code densities
- Automatic Laser Control (ALC) to automatically adjust for deviations in bar code color, quality, and reflectance

Model 22 Series II optional features include:

- High Density scanning
- Long Range scanning
- Raster Option
- Accu-Sort's patented DRX technology
- High speed scanning (800 scans per second)
- Interface Box with relays
- Interface to Allen Bradley decoders

If your unit uses Accu-Sort's patented DRX technology, the following patent numbers apply:

Data Reconstruction & Decoding Technology by Accu-Sort Systems, inc.
US Patents 5,028,772; 5,124,538; and pending applications

The Series II version of the Model 22 combines die cast zinc-aluminum endcaps and extruded aluminum body to yield a strong enclosure. Rugged thread-on connectors ensure reliable power coupling.

Additionally you can use the decoder interface cable to make the Model 22 Series II completely compatible with the Allen Bradley DS DD decoders, replacing the Allen Bradley obsolete LD and L series scan heads.

Typical applications include:

- Tray Label Scanning
- Package Content Verification
- Product Identification Sortation
- Pharmaceutical Label Verification
- Automatic Tracking of Production Items
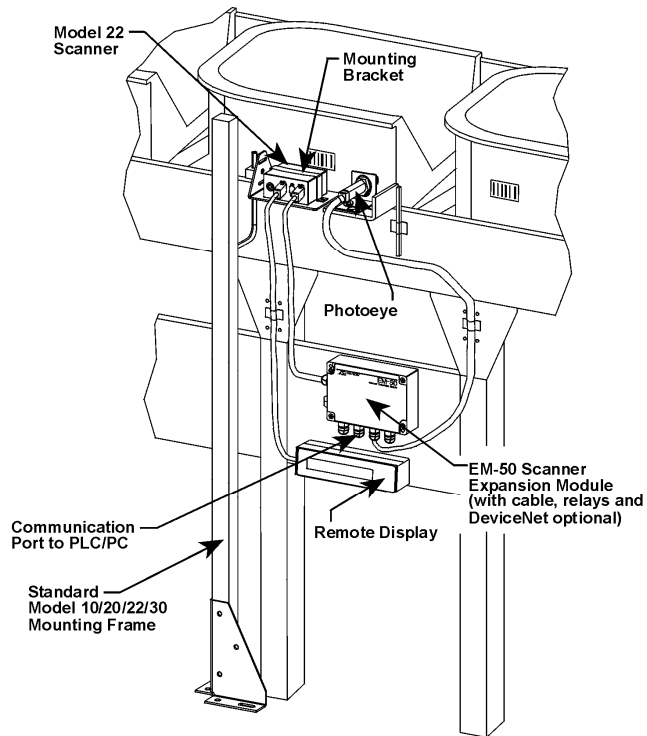
Typical Model 22 Installation

PRODUCT SPECIFICATIONS

Size	3.5" L (8.8 cm) x 4.2" W (10.7 cm) x 2.2" H (5.6 cm)
Weight	22 oz. (.62 kg)
Visual Diagnostics	One multifunction LED that indicates power, trigger, and good read/no read
Enclosure	NEMA 12 standard (gasketed, drip-proof and dust-tight)
Relative Humidity	10-90% non-condensing
Temperature Range	32° to 122 ° F (0–50°) C
Power Requirements	5 VDC @ 500 mA 12 VDC @ 500 mA
Laser Type	Visible Laser Diode
Radiant Power Output	<5.0 mW peak (630-700nm)
Scan Rate	500 scans per second (standard) 300 scans per second (high density) 400 scans per second (long range) 800 scans per second (high speed) 1200 scans per second (custom)
Scanning Range	1" (25.4mm) to 12" (304.8mm) General Purpose 36" (738 mm) Long Range
Bar Code Types	All standard 1D symbologies
Connectors	Host, Secondary, Trigger, Power Ports
Communications	RS232, RS422, RS485, multidrop, Current loop (with interface box option), DeviceNet, Ethernet, Profibus Baud Rate up to 38.4K
Approvals	E, UL1950, cUL, FCC, CLASS A, CDRH Class II

A drawing of the Model 22 Series II is shown below:
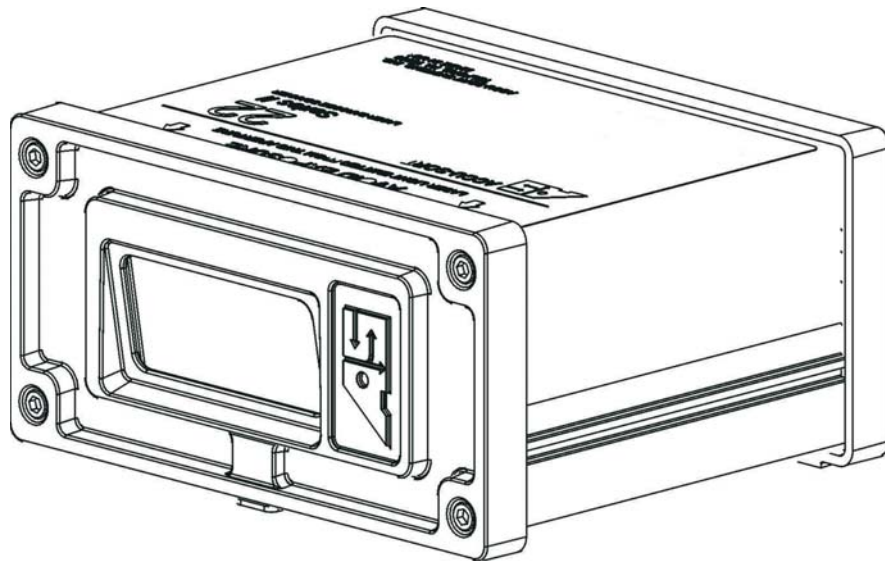
Model 22 Series II Scanner

Chapter Two　▼　*Contents*

MOUNTING YOUR MODEL 22 SERIES II

When you mount your Model 22 Series II, make sure there is enough space around the unit for the connections to the accessories needed for your application. There must also be enough room to allow the Model 22 Series II and its equipment to stay cool. The minimum space requirements for the Model 22 Series II are as follows:

- Overhead - Leave enough room for air flow
- Back - 2.25" for connections
- Sides - Leave enough room for air flow
- Front - Make sure there are no obstructions between the scanner and the bar code to be scanned during the read cycle

There are a few different ways to mount the Model 22 Series II as the remainder of this section shows. You can purchase mounting accessories from Accu-Sort to mount the Model 22 Series II.
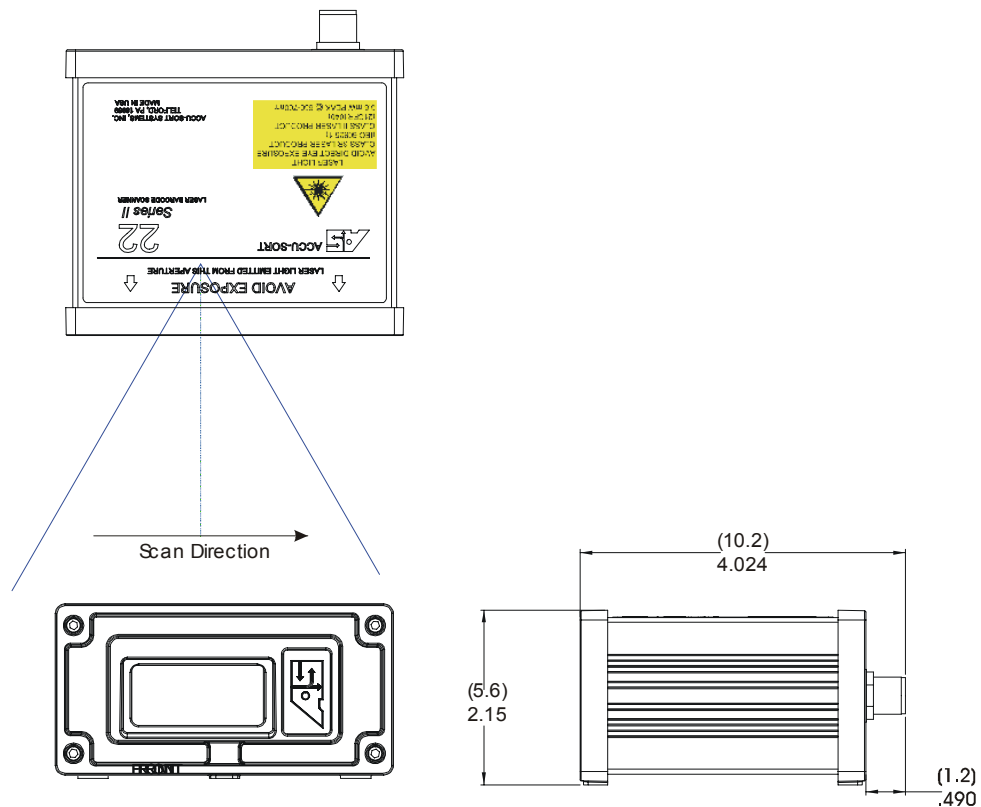
Model 22 Series II Dimensions With Reference to the Scan Line

MOUNTING BRACKET

The mounting bracket is designed to hold the Model 22 Series II in a position so the scan line is parallel to the mounting surface. The bracket fits around the Model 22 Series II, but is not directly secured to the Model 22 Series II. Flanges on the bracket provide slotted holes that are designed for #6 mounting screws on either side of the Model 22 Series II. Mounting screws need to be located 4.8 inches apart.

To mount the Model 22 Series II:

> You can use any type of fasteners with these mounting brackets, as long as they are compatible with the mounting surface.

1. Place the bracket around the Model 22 Series II so the backing of the bracket rests on top of the Model 22 Series II, as shown below.

2. Place the mounting bracket, with the Model 22 Series II clamped inside, against the mounting surface.

3. Insert and tighten the mounting screws in the slotted holes on the bracket. This ensures the Model 22 Series II is secured within the bracket against the mounting surface.

Mounting the Model 22 Series II Using the Picket Fence Mounting Bracket

CRADLE MOUNTING BRACKET

There is one cradle mounting bracket, one 2-1/8" #6-32 round spacer, two 3/8" #6-32 socket head cap screws, two #6 flat washers, and two #6 split lockwashers included with this assembly. The cradl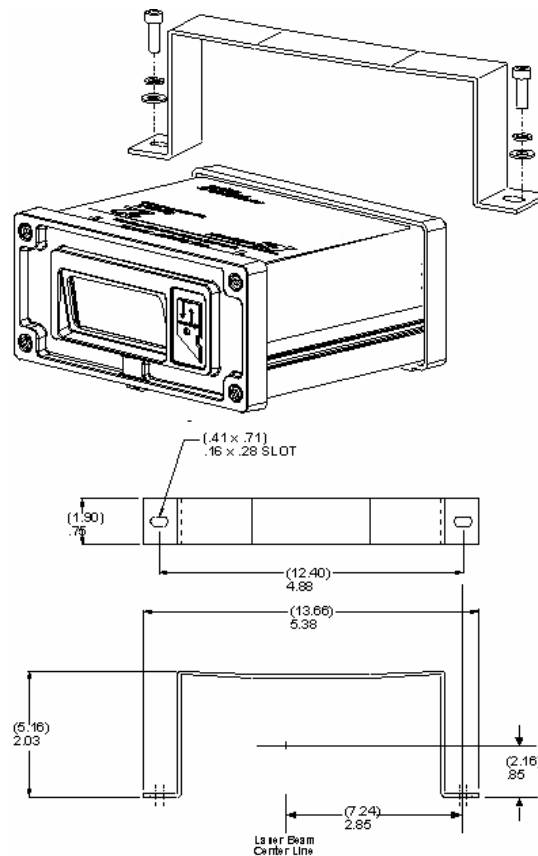e-mounting bracket is designed to hold the Model 22 Series II in a position so the scan line is parallel to the mounting surface. Four #6-32 pem nuts are provided on the bottom of the bracket.

To mount the Model 22 Series II:
The top edges on both sides of the cradle are bent at a 90-degree angle. This results in two flanges that fit into the bottom two slot levels on the sides of the Model 22 Series II. Mounting dimensions and beam location are provided in the drawing below.
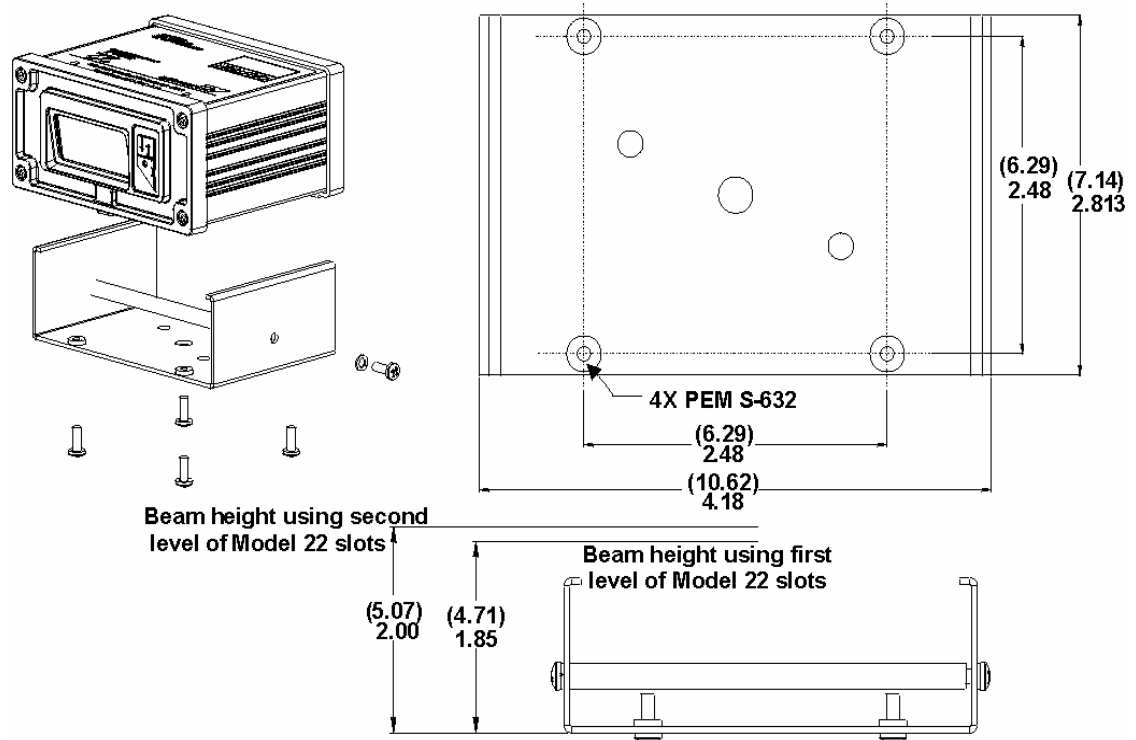
Mounting the Model 22 Series II Using the Cradle Bracket

BALL AND SOCKET MOUNTING KIT

A ball and socket mounting kit is also available. *(See pg. 1-4.)*
In order to use the ball and socket mounting kit with the Model 22 Series II, a mounting cradle (1000007016) is also needed.

USING MODEL 10/20/22/30 MOUNTING KIT TO MOUNT THE MODEL 22 SERIES II

This section shows how to mount your Model 22 Series II to a structure using the MT017 (1000018208) Mounting Kit. This mounting kit allows you to mount the unit in a picket fence position to any variety of structures.
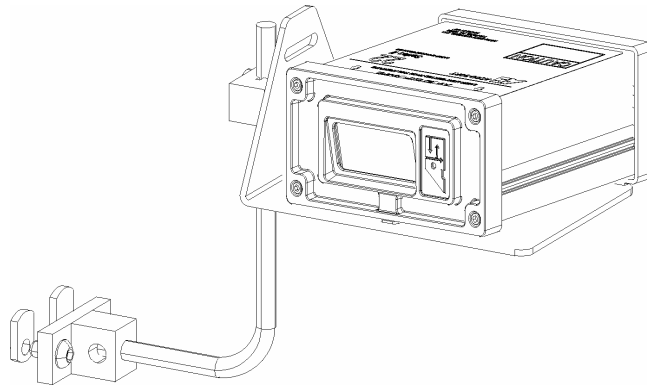
MT017 – Model 10/20/22/30 Mounting Kit

Use the drawing below to help you mount your Model 22. The table at the bottom of the page provides information pertaining to each item number in the drawing.
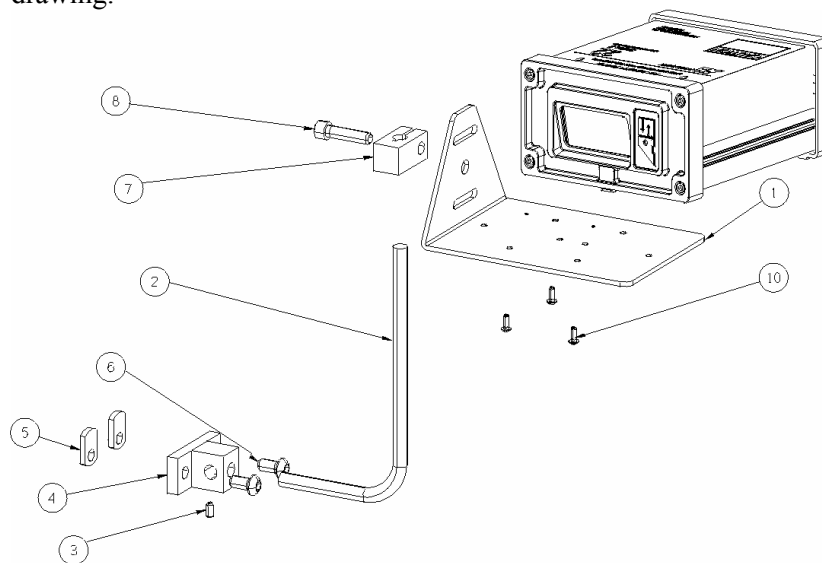
MT017 Mounting Diagram

Assembly, Model 22 Mounting 1000018208			
Item	**Quantity**	**Description**	**Part Number**
1	1	Mount, Model 10/20/22/30 Tilt	1000002333
2	1	Rod, Mounting	1000002330
3	1	10-32 3/8 Set, Cup Point	1000005795
4	1	Block, Mounting	1000002329
5	2	T-Nut, 5/16-18 Black	1000018505
6	2	5/16-18x5/8 Cap, Button Hd Black Hex	1000009218
7	1	Block, Pivot	1000002331
8	1	5/16-18x1-1/4 Cap, Socket Hd Black Hex	1000009209
10	A/R	6-32 1/4 Machined, Pan Hd	1000009693

MOUNTING THE PHOTOEYE

This section describes how to mount your photoeye to the photoeye mounting bracket. Photoeyes work by bouncing a light beam off a reflector and detecting when something breaks the path of light. In order for your photoeyes to work properly, you must make sure the following things are done:

- The photoeye must have a reflector mounted directly opposite it on the other side of the conveyor.
- 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.

Use the drawing below to help you mount your photoeye. The table at the bottom of the page provides information pertaining to each item number in the drawing.
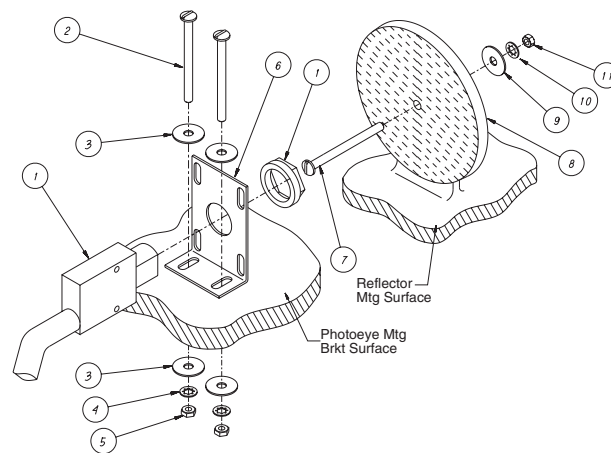

Photoeye Mounting Diagram

Use the following table to match item numbers with the photoeye mounting diagram above:

Photoeye Mounting Kit, 1000020584			
Item	**Quantity**	**Description**	**Part Number**
11	1	8#-32 Nut	1000018466
10	1	8# Internal Tooth Lock Washer	1000016778
9	1	#8 Flat Washer	1000022114
8	1	3"Reflector	1000013792
7	1	8-32 2" Machined Pan HD	1000010689
6	1	Model 30 P.E. Mtg. Bracket	1000011711
5	2	#6-32 Nut	1000018459
4	2	#6 Internal Tooth Lock Washer	1000016776
3	4	#6 Flat Washer	1000022111
2	2	6-32 2" Machined Pan HD	1000009740
1	1	Polarized Photoeye	1000013425

SETTING UP YOUR MODEL 22 SERIES II

The steps below represent one recommended scenario to set up your Model 22 Series II Scanning System:

1. Remove all materials from the box.

2. Check the materials against the packing list and make sure everything is there.

3. Make sure none of the parts are broken.

4. Make all the appropriate connections to your Model 22 Series II as explained in Chapter Three.

5. If you need to make any programming changes to your Model 22 Series II, connect your Model 22 Series II to a PC or CRT as described in Chapter Three of this manual, and refer to your Accu-Setup Small Module Programming Manual.

6. Mount your Model 22 Series II as described in Chapter Two.

7. Startup the scanner.
   IMPORTANT: Wait at least 30 seconds before attempting to enter the Set-up Mode.

8. Begin reading your bar codes.

If you have any problems or questions concerning setting up your Model 22 Series II, contact Accu-Sort immediately. Refer to the Customer Service Section of this manual.

Chapter Three ▼ Contents

INTRODUCTION

This chapter explains how to supply power to your Model 22 Series II, and how to connect your Model 22 Series II to a PC and TERMINAL. This chapter also explains how to connect a photoeye, tachometer, and interface box to your Model 22 Series II. You must make these connections before you can begin setting up or using your Model 22 Series II.

MAKING CONNECTIONS TO YOUR MODEL 22 SERIES II

There are four connectors on the rear of the Model 22 Series II. There are two serial communications ports, one power port, and one trigger port. The following are the port definitions on the Model 22 Series II connector panel:

- J1 (COM1) - 15-pin male 'D' connector (serial port)
- J2 (Trigger) - 9-pin female 'D' connector
- J3 (COM2) - 15-pin male 'D' connector (serial port)
- J4 (Power) - 5 pin EuroFast connector

Refer to the drawing to the right. It shows the Model 22 Series II connector panel and details the pins for each 'D' connector. Refer to the **Wiring Other Sources of Power** Section of this chapter for the pin definitions of the J4 power connector.
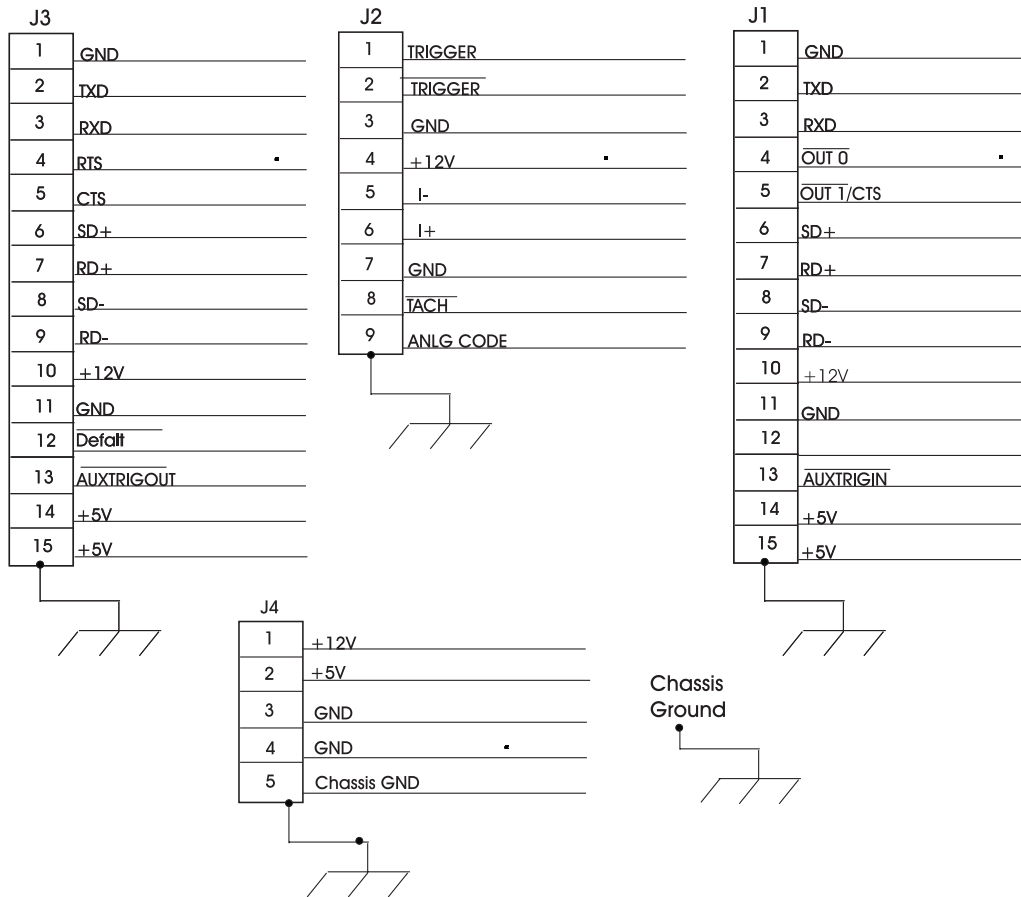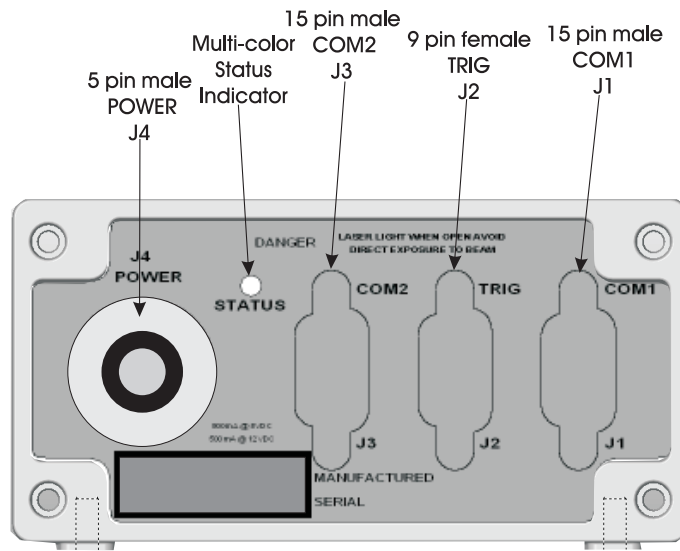
Model 22 Series II Rear Connector Panel with Pin Definitions

SUPPLYING POWER TO YOUR MODEL 22 SERIES II

You must supply power to the Model 22 Series II through the 5-pin "DIN" female connector at the rear of the unit labeled J4, or you wire power directly into J1 or J3. You can supply power using one of the following two methods: using one of the Accu-Sort local power supplies, or wiring power directly into the Model 22 Series II using one of your own methods.

The Model 22 Series II must meet the following three requirements regardless of the method that you use to supply power:

- +5VDC ±0.25V @ 500 mA must be supplied
- +12VDC ±0.6V @ 500 mA must be supplied
- Ground must be supplied
- Metal shell of all connectors must be grounded

USING ACCU-SORT'S LOCAL POWER SUPPLY FOR POWER

You can use the Accu-Sort 110V AC or the 220V AC local power supplies to supply power to the Model 22 Series II five pin "EuroFast" connector. These power supplies are shown below:
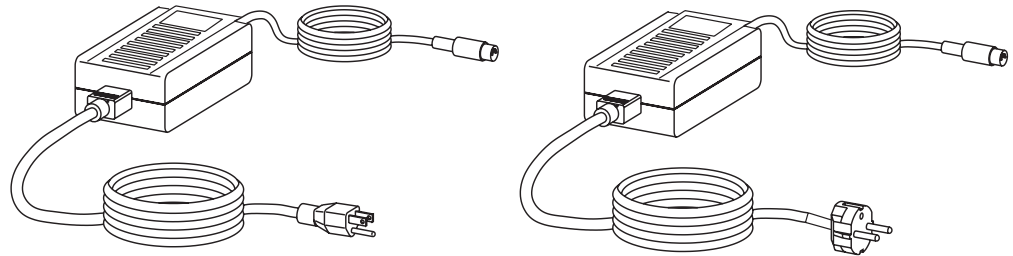
*Accu-Sort 110V AC power supply (left) and
220V AC power supply (right)*

If you use one of these power supplies, you need to plug the five pin male connector in the J4 connector at the rear of the Model 22 Series II. Then plug in the other end of the AC power cord to the appropriate grounded wall outlet. This power supply must be grounded electrically. Ensure your AC power outlet has a properly grounded receptacle. Also, make sure you have the appropriate power cord for your country before powering the unit.

WIRING OTHER SOURCES OF POWER DIRECTLY

To supply power to the Model 22 Series II five-pin connector, you can use many other sources than those previously mentioned. You must comply with the Model 22 Series II power requirements, mentioned in the beginning of this section, to ensure proper operation.

The drawings below show alternate ways of wiring power into the Model 22 Series II:

Model 22 (Power)

Model 22 (J1 or J3)   **Power Source**

Model 22 (J1 or J3)   **Power Source**
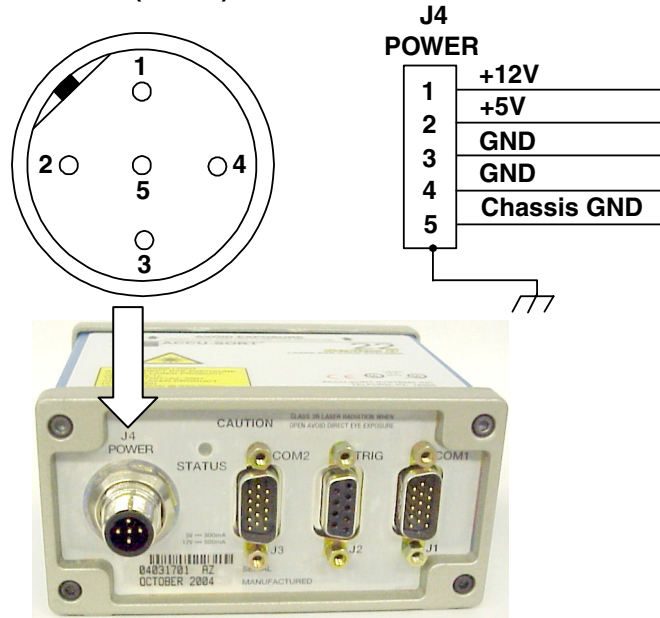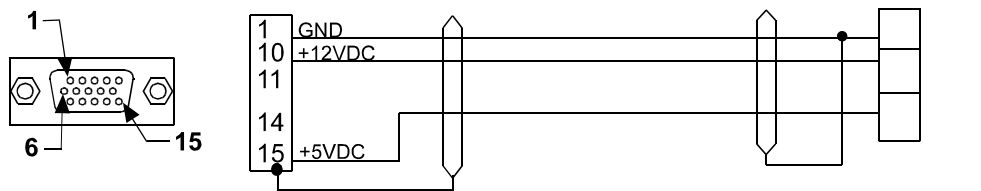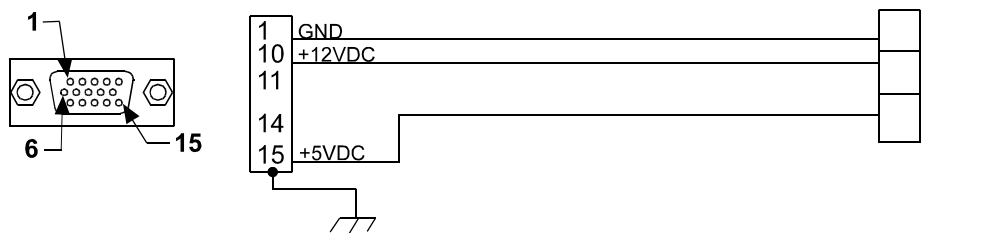
Alternative Wiring Methods for
Supplying Power to the Model 22 Series II

MAKING COMMUNICATION CONNECTIONS TO OTHER EXTERNAL DEVICES

The Model 22 Series II is versatile when you need to connect to other devices. The drawings below show all the pin connections for the Model 22 Series II when using serial communications on port J1 or J3. If you need to create your own cables to wire your Model 22 Series II to another device, use these drawings as a guide. It is very important that you make the proper pin connections. Use Accu-Sort mating connector (PN 1000012239) or equivalent 15-pin female connector.

Below is a list of terms used in these drawings:

GND	Ground	**RXD**	Receive Data (RS232)
TXD	Transmit Data(RS232)	**RTS**	Request To Send (RS232) – **J3 only**
CTS	Clear To Send (RS232) – **J3 only**	**RD+**	Receive Data (RS422)
RD	Received Data (RS422)	**SD+**	Non-inverting Line (RS485) Send Data (RS422)
SD	Inverting Line (RS485) Send Data (RS422)		

RS232 WITH NO HANDSHAKING

Use the following drawing as a guide when you want to connect your Model 22 Series II to a device that is using RS232 communication with no handshaking:

NOTE: All connectors are shown from the soldering side.

Recommended Cable Type: ALPHA # 5473C or equivalent
Maximum Cable Length: 50 feet
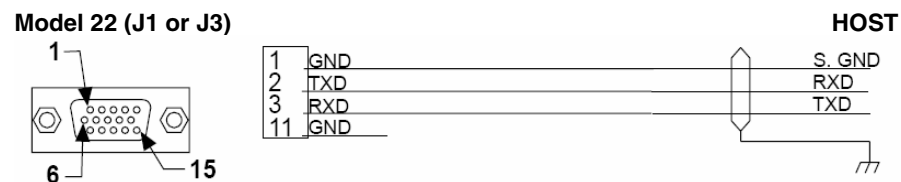
RS232 WITH RTS/CTS HANDSHAKING (J3 ONLY)

RS232 with RTS/CTS handshaking is available on the J3 port only. Use the following drawing as a guide when you want to connect your Model 22 Series II to a device that is using RS232 communication with RTS/CTS handshaking:

NOTE: All connectors are shown from the soldering side.

Recommended Cable Type: ALPHA # 5473C or equivalent
Maximum Cable Length: 50 feet
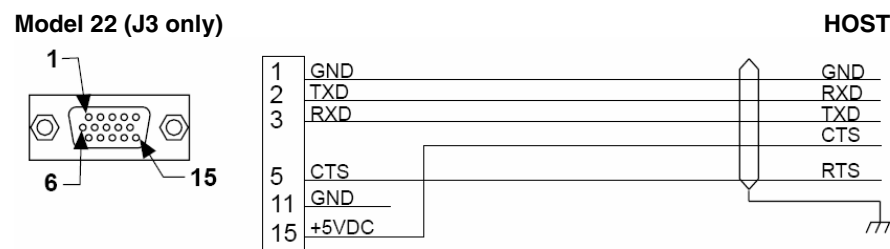
RS422 (POINT TO POINT)

Use the following drawing as a guide when you want to connect your Model 22 Series II to a device that is using RS422 serial communication:
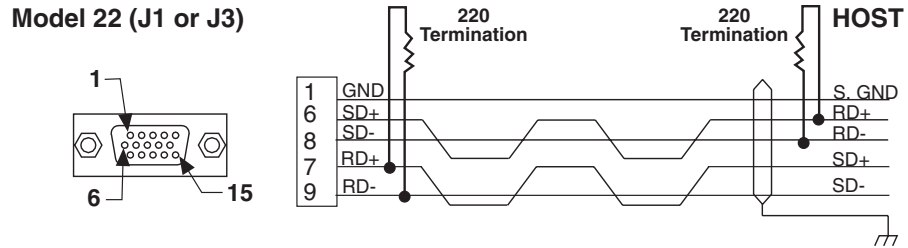
NOTE: All connectors are shown from the soldering side.

NOTE: Termination resistors may be placed inside the connector strain relief.
The termination resistor value is 220 OHM 1/4 watt.
With RS-422, the receive lines on both sides must be terminated.

CABLE TYPE: ALPHA #5473C (OR EQUIVALENT).

RS422 (FOUR WIRE MULTIDROP)

Use the following drawing as a guide when you want to connect your Model 22 Series II to a device that is using Four Wire Multidrop communications:

NOTE: All connectors are shown from the soldering side.
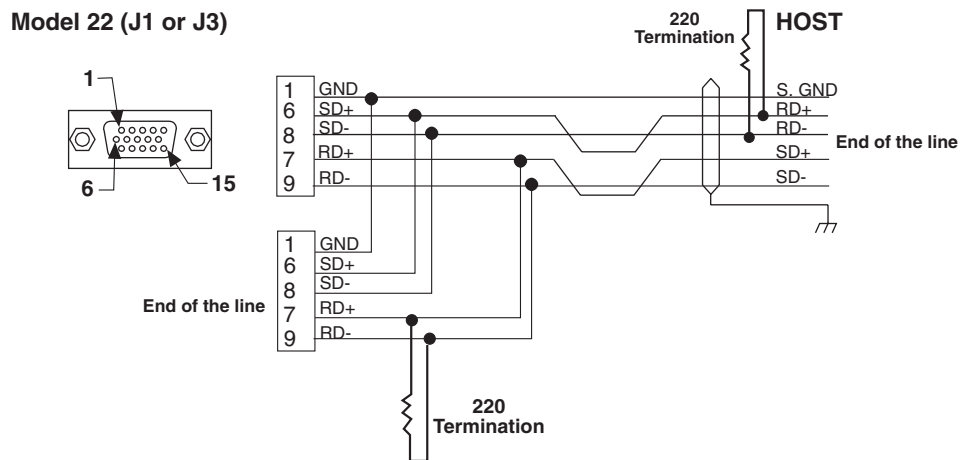
NOTE: Termination resistors may be placed inside the connector strain relief.
The termination resistor value is 220 OHM 1/4 watt.
With RS-422, the receive lines on both sides must be terminated.

CABLE TYPE: ALPHA #5473C (OR EQUIVALENT).

RS485 MULTIDROP (2 WIRE)

Use the following drawing as a guide when you want to connect your Model 22 Series II to a device that is using RS485 Multidrop serial Communication:

NOTE: All connectors are shown from the soldering side.
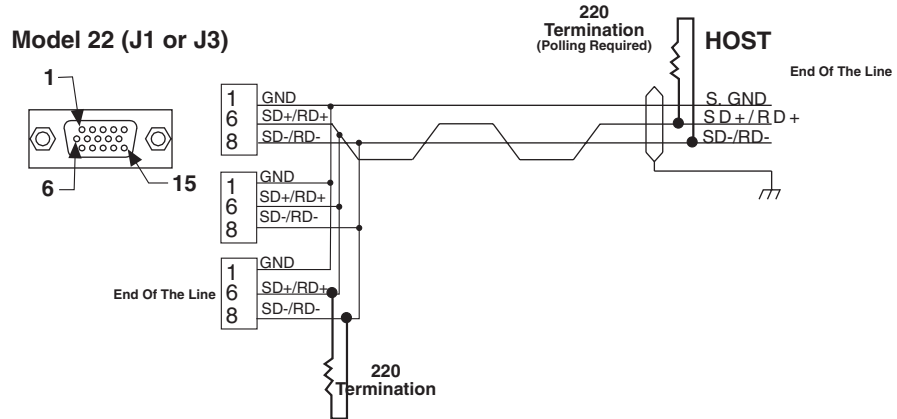
NOTE: RS485 allows for communication across the same lines
Termination resistors can be placed inside the connector strain relief.
The termination resistor value is 220 OHM 1/4 watt.
The transmit-receive lines on both sides must be terminated.

Cable type: Alpha #5473C (or equivalent)

CONNECTING YOUR MODEL 22 SERIES II TO A PC

Accu-Sort recommends that you purchase the programming kit for your Model 22 Series II. This kit provides you with the cables that you need to connect your Accu-Sort device to a PC. If you would like to purchase the programming kit, call the Accu-Sort Customer Service Department at (215) 723-0981 with the following information:

| **Part Name**	**Part Number**
Model 22 Series II Programming Kit	1000001199
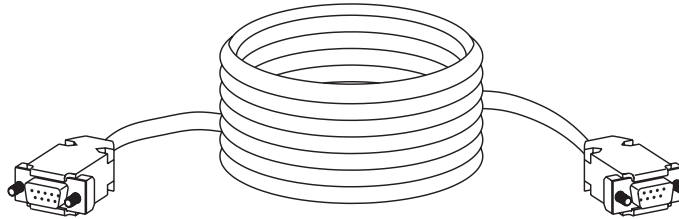
Model 22 Programming Kit

To connect your Model 22 Series II to most PCs using the programming kit:

1. Plug in the 15-pin connector on the programming kit cable labeled P1 to either 15-pin connector (J1 or J3) on the back of your Model 22 Series II.

2. Plug in the 9-pin connector end of your programming kit cable labeled PC to a 9-pin serial port on your PC.

3. Use a small standard slotted screwdriver to tighten the screws on the strain reliefs at both ends.

CONNECTING TO A PC WITHOUT THE PROGRAMMING KIT

If you choose not to purchase the Model 22 Series II Programming Kit, you need to make your own cables. The following pinout diagrams show typical RS232 communication cable pin connections from your PC to your Model 22 Series II with connector and cable specifications.

Item	Accu-Sort Part Numbers
15-pin connector	1000012239 (or equivalent)
9-pin connector	1000015249 (or equivalent)
Cable	1000009323 (or equivalent)
15-pin & 9-pin strain relief	1000016537 (or equivalent)

NOTE: All connectors are shown from the soldering side.
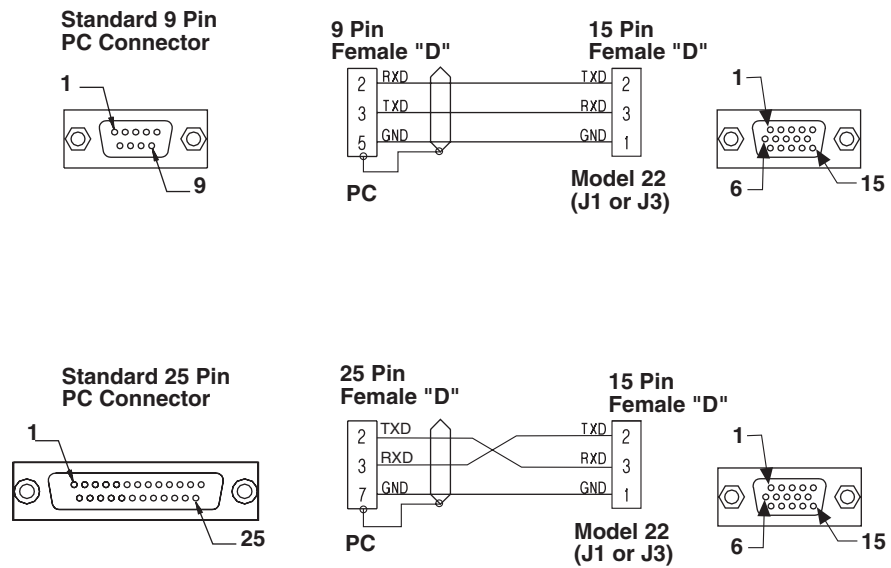
Model 22 Series II to PC Connections

CONNECTING YOUR MODEL 22 SERIES II TO A TERMINAL

If you are using a TERMINAL to program your Model 22 Series II, you need to make your own cables. The pin-out diagrams below show typical RS232 communication cable pin connections from your TERMINAL to your Model 22 Series II and connector and cable specifications. These pin connections are correct for most Terminals. Your TERMINAL may be different. Before you begin making your cable, check your TERMINAL documentation to make sure these pin connections are accurate.

Item	Accu-Sort Part Number
15-pin connector, female	1000012239 (or equivalent)
25 pin connector, male	1000015223 (or equivalent)
Cable	1000009323 or 1000017397 (or equivalent)
25-pin strain relief, metallic shell	1000016539 (or equivalent)
15-pin strain relief, metallic shell	1000016537 (or equivalent)

NOTE: All connectors are shown from the soldering side.
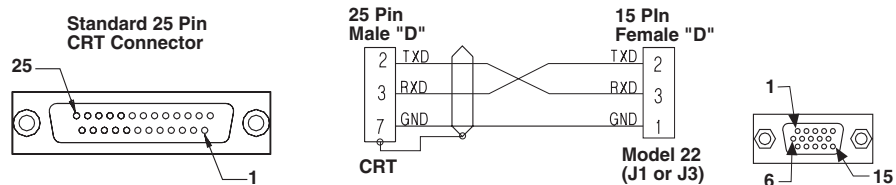
TERMINAL to Accu-Sort Device Connections

CONNECTING A TRIGGERING DEVICE TO YOUR MODEL 22 SERIES II

The trigger connector on the Model 22 Series II is a 9-pin "D" female, labeled TRIG (J2). Use this connector to connect hardware detection input; such as a photoeye to the Model 22 Series II. You can plug a standard photoeye directly in J2, or you can use the drawing below that shows the internal circuitry of the trigger input, to wire another triggering device:
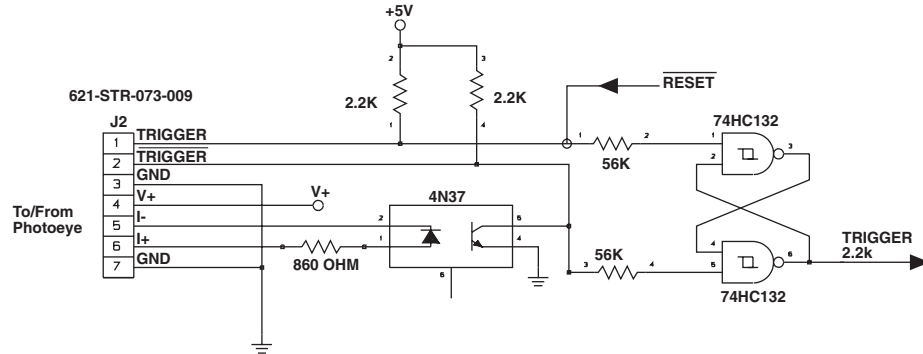
Internal Wiring for Model 22 Series II Trigger (J2) Connection

The following drawings represent some common triggering inputs the Model 22 Series II uses.
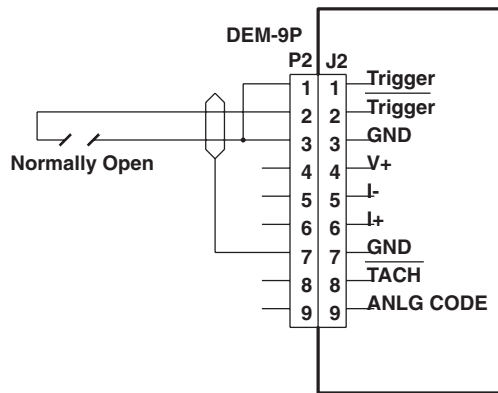
Dry Contacts: Minimum current rating = 1mA or less
Contact bounce = 5mS or less

Wiring Your Model 22 Series II to a (Form A) Triggering Input
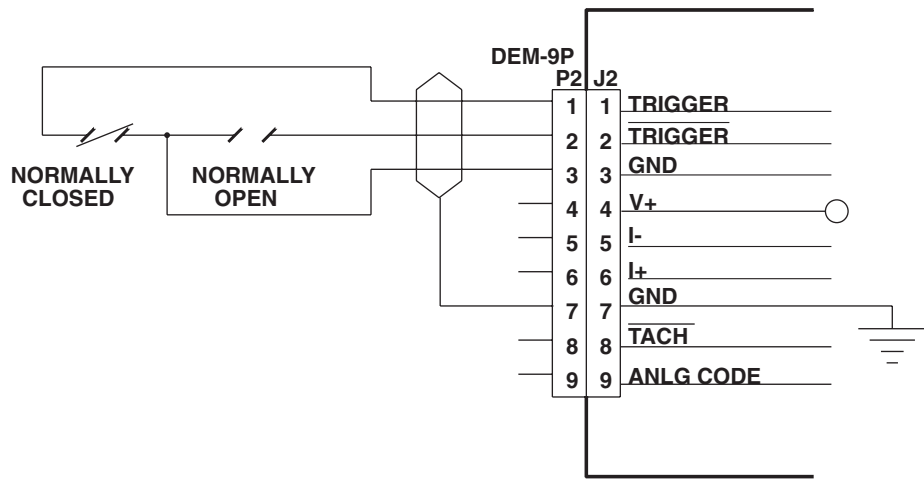
Wiring Your Model 22 Series II to a (Form C) Triggering Input
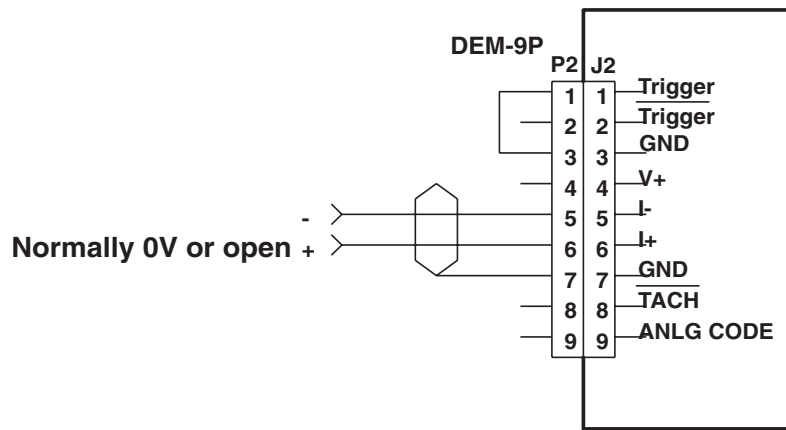
Wiring Your Model 22 Series II to a (5-24 Volt Optically Isolated) Triggering Input

22 scanner represents
approximately 2 TTL loads
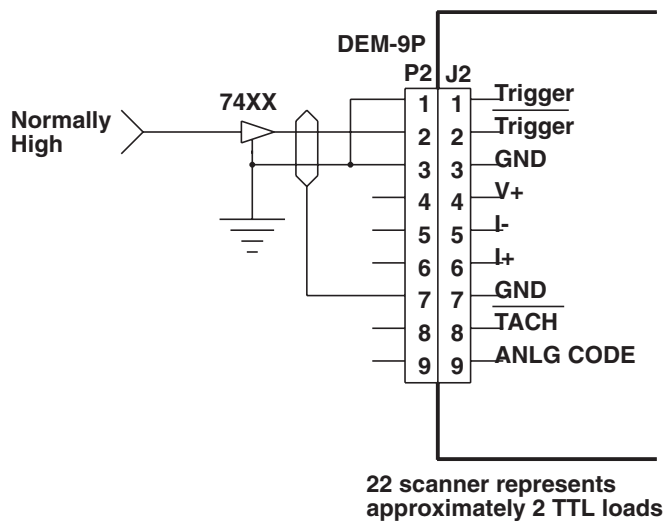
Wiring Your Model 22 Series II to a (TTL) Triggering Input

DEM-9P

P2	J2	
1	1	Trigger
2	2	Trigger
3	3	GND
4	4	V+
5	5	I-
6	6	I+
7	7	GND
8	8	TACH
9	9	ANLG CODE

Normally Off
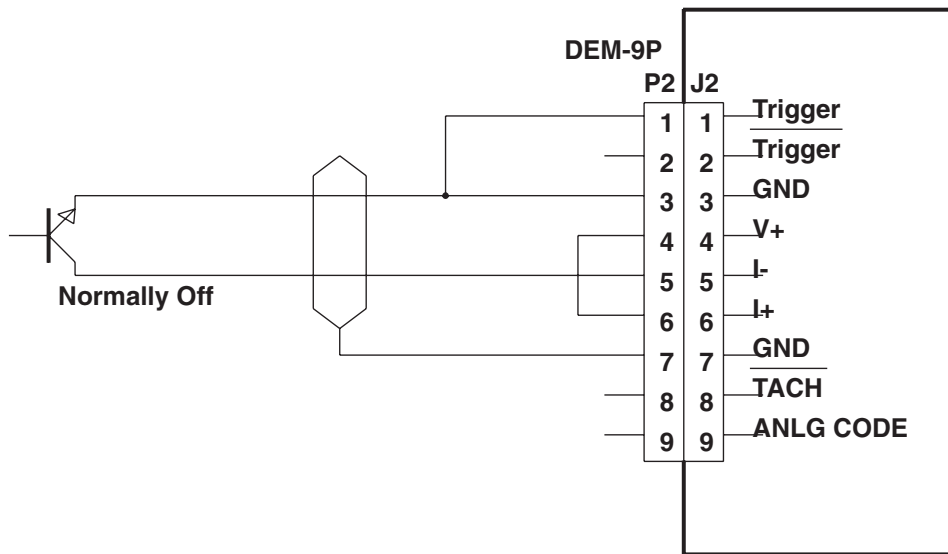
*Wiring Your Model 22 Series II to a NPN Transistor
Triggering Input*

DEM-9P

P2	J2	
1	1	Trigger
2	2	Trigger
3	3	GND
4	4	V+
5	5	I-
6	6	I+
7	7	GND
8	8	TACH
9	9	ANLG CODE

Normally Off
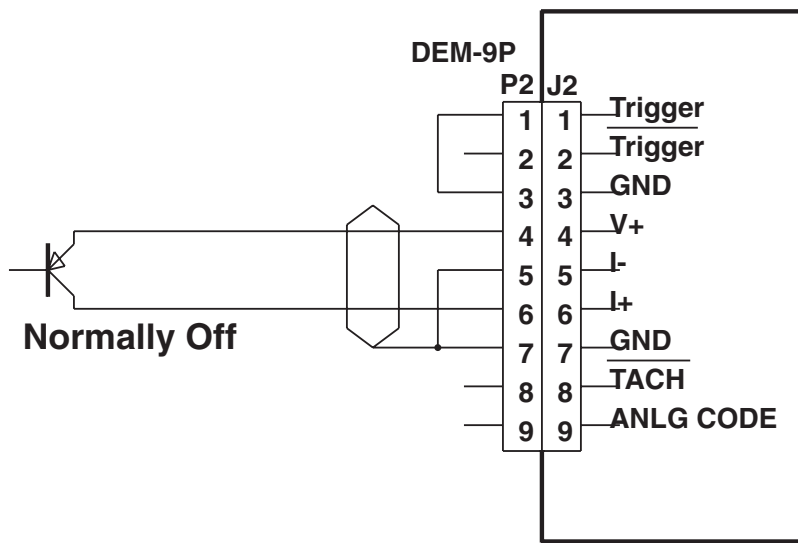
*Wiring Your Model 22 Series II to a PNP Transistor
Triggering Input*

CONNECTING YOUR MODEL 22 SERIES II TO THE INTERFACE BOX

Then you connect your Model 22 Series II to the Accu-Sort Small Scanner Interface Box, it is recommended that you use the interconnect cable provided with your interface box as shown below:
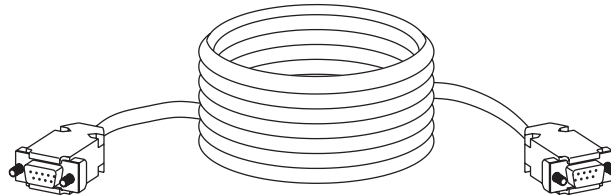
Model 22 Programming Kit

Interconnect Cable

This cable has two 15-pin "D" connectors. Connect the female end of the cable to the 15-pin "D" male connector on the rear of the Model 22 Series II, and tighten the screws with a small flat head screwdriver. Connect the other end of the cable to the 15-pin "D" female connector labeled SCANNER J1 on the interface box, and tighten the screws with a small flat head screwdriver.

> Every time a Small Scanner Interface Box is used with a Model 22, transformer W48D-J1000-5/1 is not to be used. Both the Model 22 and the interface box will be powered by the Model 22 power supply, using cable assemblies MDL22-17A or MDL22-17B.

IF THE INTERCONNECT CABLE IS NOT AVAILABLE

If you do not have the interconnect cable, you need to create one. The following drawing shows the pin connections for the 15-pin "D" male connector on the Model 22 Series II and the 15-pin "D" female connector on the interface box. The maximum length of this cable is 30 feet.

Note: Connectors are shown from the soldering side
The shield is electrically connected to both cable shells.

Interface Box End of Cable
(15 pin "D" male)

Model 22 End of Cable
J1 or J3
(15 pin female "D")
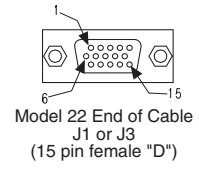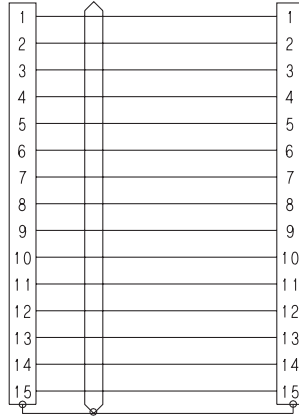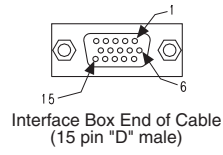
*Pin Connections for Connections Between
The Interface Box and the Model 22 Series II*

USING MODEL 22 SERIES II PARALLEL OUTPUTS

The Model 22 Series II has two parallel outputs; NVC/NO MATCH and GO/MATCH. These outputs are activated or deactivated from pin 4 and pin 5 respectively on the Model 22 Series II 15-pin connector. Both of these are controlled by software. (Refer to your Accu-Setup Small Scanner Module Programming Manual.)

You can use these outputs to have a beeper sound when you receive a no read or no match (when used as a verifier), or you could have a light turn on every time there is a go (good read) or match (when used as a verifier). There are many other uses for these outputs. When you connect these pins to the small scanner interface box, they control the relays in the box.

HOW THE OUTPUTS WORK

The names of the two outputs directly reflect their purpose. The NVC/NO MATCH output changes its electrical state dependent on receiving a no read or a no match (while in verifier mode). The GO/MATCH output changes its electrical state dependent on receiving a good bar code or a match (while in verifier mode). For example, if you set the NVC/NO MATCH timer for 150 milliseconds, every time the scanner sees a non-valid bar code the NVC/NO MATCH timer signals until that 150-millisecond time period is complete.

PARALLEL OUTPUT CONNECTIONS

The following diagrams show the proper connections that you need to ensure that the output function properly. If you use the interface cable to connect the Model 22 Series II to the Small Scanner Interface Box, you do not need to make any other connections.
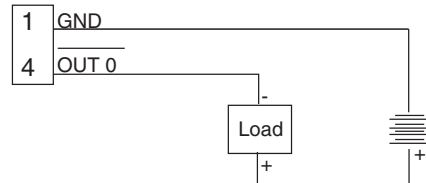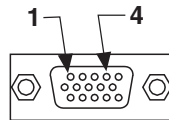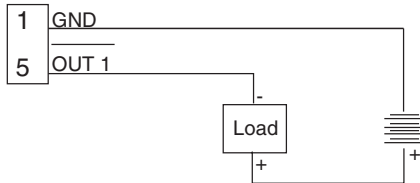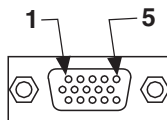
Output Connections

The table below defines some basic terminology. The drawing below shows the schematic of the output timer's circuitry:

Software	Model 20	Interface Box
NVC/No Match	OUT 0 =	Relay 1
Go/Match	OUT 1 =	Relay 2
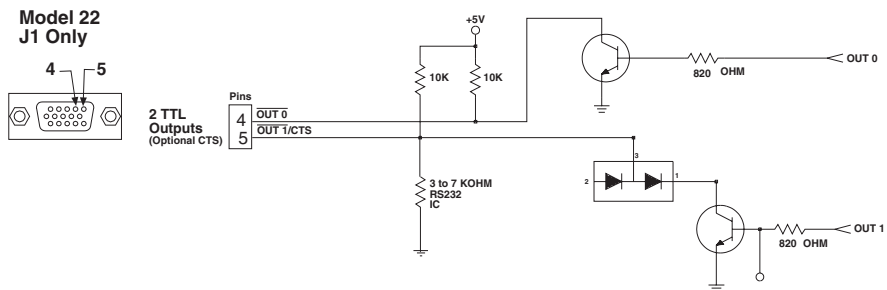
The Model 22 Series II Output Circuitry

| Chapter Four | ▼ | *Contents* |

INTRODUCTION

The Model 22 Series II hardware was specifically designed for the tough industrial environment. The unit does not need anything more than some basic cleaning and check-ups every month, depending on the harshness of your environment. This chapter provides you with a cleaning procedure and some troubleshooting techniques.

CLEANING PROCEDURE

The Model 22 Series II enclosure is tightly sealed to prevent dust or dirt from entering the unit. Nothing inside of the Model 22 Series II needs to be cleaned on a regular basis. If the Model 22 Series II needs repair, do not open the unit. The Model 22 Series II is to be shipped back for repair. Refer to the Customer Service Section of this manual.

To clean the Model 22 Series II:

1. Slightly dampen a lint-free cloth with a solution made of mild detergent and water.

2. Gently wipe the enclosure of the Model 22 Series II. Be careful to avoid the exit window.

3. Dry the enclosure of the Model 22 Series II with a dry lint-free cloth.

To clean the Model 22 Series II exit window:

1. Dampen a lint-free tissue with distilled water and wipe off any dust particles.

2. Dry the exit window with a dry lint-free tissue.

TROUBLESHOOTING YOUR MODEL 22 SERIES II

Use the following chart to help troubleshoot the Model 22 Series II. If your Model 22 Series II is damaged, please contact our Customer Service Department at 1-800-BAR-CODE. Please refer to the Customer Service Section in the front of this manual for more information about your equipment.

| Is there dust on the Model 22? | → | Use the steps on page 5-2 to clean the Model 22 Series II. |

| Are all connections tight? | → | Refer to Chapter 3 and tighten the connections. |

| Are any cables damaged? | → | Fix and replace the damaged cables. |

| Does the LED blink yellow when power is supplied to the Model 22? | → | Contact Accu-Sort for more information. |

The Model 22 is ready for operation.
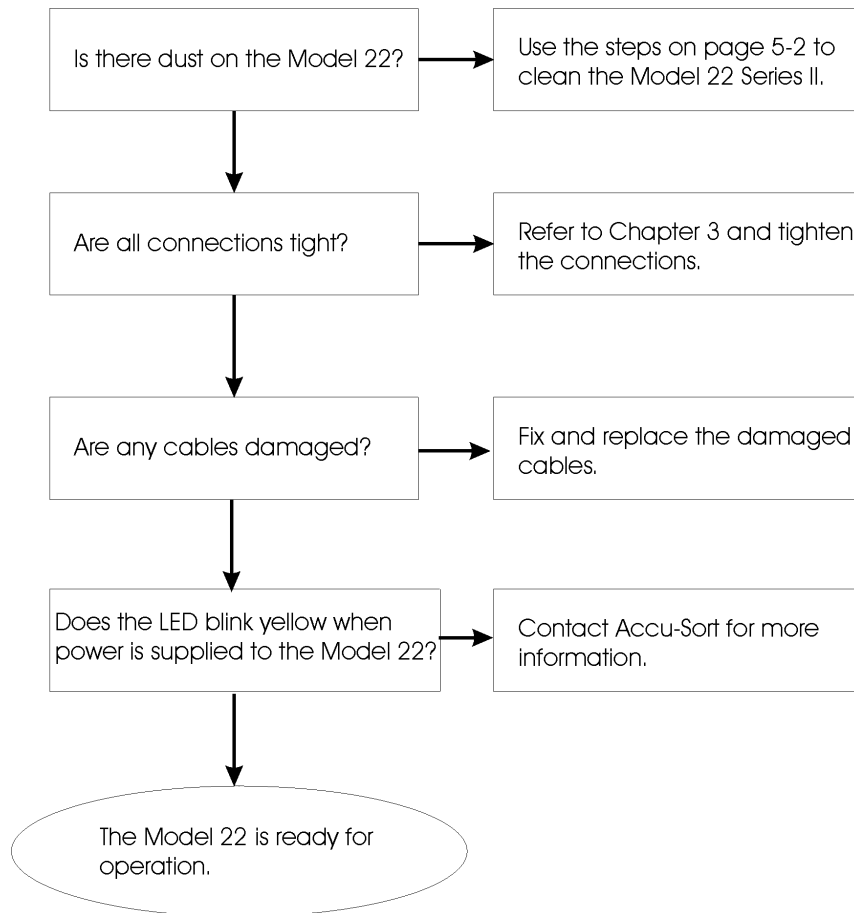
The Model 22 Series II status LED blinks for the first five seconds. If the unit is in continuous read mode, the LED turns solid amber, and the laser is activated.

PROBLEM/SOLUTION LIST

The following is a list of events that can occur with your scanning system. Below each event has a cause and solution.

Problem	Cause	Solution
The Status LED turns red for and extended period of time or it blinks	The Model 22 Series II detects a failure.	Call Accu-Sort Customer Service
There is no laser beam exiting from the scanner when power is supplied	No power is applied to the Model 22 Series II.	Check to ensure power is plugged in and power is applied to the interface connector.
The Model 22 Series II is not reading bar codes	Code type is not enabled or wrong code length	Enable code type or correct code length
Model 22 Series II has poor read rate	Model 22 Series II window is dirty, label is not within reading range, or label quality is poor.	Clean Model 22 Series II window, check reading range or label, or check code quality.
Model 22 Series II has poor read rate in hardware trigger	Photoeye not adjusted, or it is misaligned.	Adjust the photoeye
Model 22 Series II has poor read rate in serial trigger	Serial trigger is not timed properly with the arrival of the bar code.	Adjust the timing of your serial trigger so it turns on before the bar code and turns off after the bar code.
No communication to host	Host communication to scanner does not match	Connect the Model 22 Series II to a PC and use ACCU-SETUP SMALL SCANNER MODULE PROGRAMMING MANUAL to confirm communications parameters. Make sure baud rate is set no higher than 38.4K.

Appendix A ▼ *Contents*

APPENDIX A – ASCII COMMUNICATIONS

STANDARD RS485 MULTIDROP COMMUNICATIONS

RS485 communications is an Engineering Industries Association standard for the transmitters and receivers of a digital equipment interface. RS485 communication uses differential signal lines and allows for multiple transmitters on one signal pair (although only one transmitter may be enabled at any given time). This is a way of allowing one device to communicate with one or more other devices using the Master/Slave method.

The Host to polled device system works as follows:
The host device (usually a decoder logic or computer) originates poll messages. The poll message is a message from the host to a polled device requesting the polled device to respond with data (if data is available). The polled device is usually a bar code scanner. The polled device responds to the polls from the host. It is not allowed to transmit unless it has been "asked" (polled) by the host. Shown below is a simplified drawing of one way that RS485 communications works:

> This representation shows one host and six polled devices. You can ultimately have up to 32 polled devices for each serial port on the host (depending on the line length and required response time).

```
                    ┌──────────────┐
                    │ Polled Device │
                    └──────────────┘
┌──────────┐        ┌──────────────┐
│          │        │ Polled Device │
│          │        └──────────────┘
│   HOST   │        ┌──────────────┐
│          │        │ Polled Device │
│          │        └──────────────┘
└──────────┘        ┌──────────────┐
                    │ Polled Device │
                    └──────────────┘
                    ┌──────────────┐
                    │ Polled Device │
                    └──────────────┘
                    ┌──────────────┐
                    │ Polled Device │
                    └──────────────┘
```
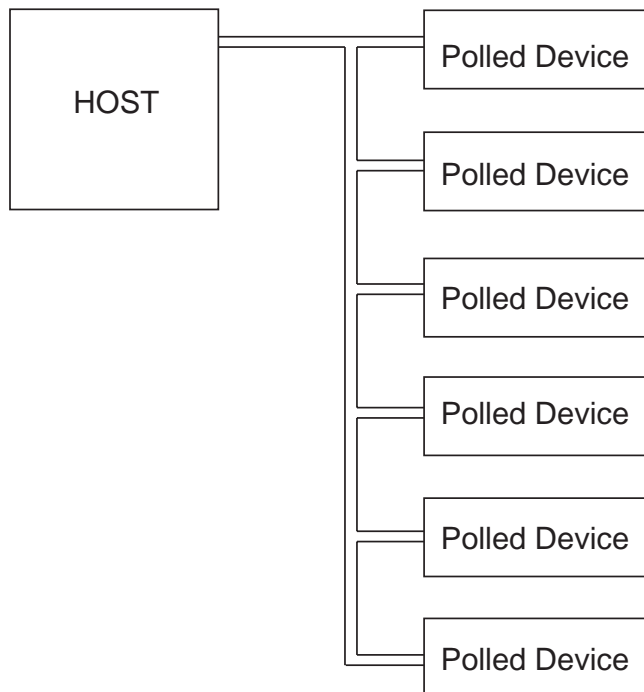
The remainder of this section defines the message formats and timing requirements for the protocol used on RS485 multidrop (2-wire) communications lines. The protocol is defined for both the "master" device and the "slave" devices. This protocol is defined for a one-master system only. The following definitions may help you understand this protocol a little better.

ASCII digit: This means the ASCII code for a single decimal digit. For example, 30h is the ASCII digit that encodes a zero.

HEX digit: This means the ASCII code for a single hexadecimal digit. Some examples are, 35h is the code for a five, 42h is the code for a "B" (which equals 11 base 10), the hexadecimal number "5A" would be encoded by the two HEX digits 35h and 41h.

Message Formats

The standard communications parameters are as follows:
Standard asynchronous data frame (least significant bit first)

> 7 data bits
> 1 even parity bit
> 2 stop bits

If the master can only support 8 bit data plus a parity bit, then the format is as follows:

> 8 data bits
> 1 odd parity bit
> 1 stop bit

(Odd parity is required to make sure that the guard character will be all ones with one for parity.)

You can use any baud rate that is supported by both the master and the slaves. System performance is usually best when using the highest baud rate possible.

IMPORTANT: Although Accu-Setup for Small Scanners allows for a maximum baud rate setting of 57.6K, the Model 22 Series II communications baud rate is limited to 38.4K. Setting the Model 22 Series II communications baud rate higher than 38.4K will result in communications failure.

The following is framing for all messages sent by any device on the multidrop line:

0FFH   STX   ID(2)   TYPE(2)   SEQ   DATA   LRC(2)   CR

(FFhex) = Guard Character

This character is "sacrificed" to the line noise that occurs when the unit transmitter is first turned on. The unit software may (optionally) wait one character time between transmitter enable and transmission of the STX (the next character). This eliminates transmitting the guard character. The receiver ignores this character.

STX (02hex) = Start of text character

This character indicates the start of a message. The receiver should clear any characters in its receive buffer whenever it receives this character.

ID (2 ASCII digits) = The unit ID

This field indicates the unit identification number of the unit to which the message is directed, if the message is coming from the master. This field indicates the unit identification number of the unit transmitting the message, if the message is from a slave.

A message with an ID of "00" from the master is a broadcast message. All slave units should act on the message (display data, reset, etc.), but no slave should respond to the message.

TYPE (2 ASCII digits) = The message type

This field describes the purpose of the message that is sent. There are five message types as shown below:

Message Types		
01	Poll	This message type is sent by the master unit to request data from a slave.
02	Data	This message type is sent by either a master to transfer data to a slave or by a slave to transfer data to the master after receiving a poll. The TYPE field will then be followed by a SEQ field and a data field.
03	ACK	This message type is sent by the unit that has just received a valid data message.
04	Wake up	This message type is sent by the master. The slave that receives it should acknowledge the message.
05	No data	This message type may be sent by a slave indicating that the slave has no data to send in response to a poll. This message is optional. If the slave has no data, it may ignore the poll.

SEQ (1 ASCII digit) = The sequence number

This field starts at zero at power up, and is incremented by one for each data message sent. When the sequence number reaches nine, it wraps around to one. This field is only present in a data message.

DATA = The content of the data field

This field contains data, if the message type indicates that data is included. This field may contain no characters (length of zero; poll, acknowledge and wake up messages do not have data fields.)

LRC (2 HEX digits) = The Linear Redundancy Check Sequence

The LRC is computed by exclusive-oring all the characters in the ID, TYPE, SEQ, and data fields, then converting the hex number into two HEX digits. This mathematical process allows the message to be checked for validity by the receiver.

CR (0Dh) = Carriage return

This character indicates the end of the message. When this character is received, the unit should check to see that the message started with a STX, and check that the LRC is correct before accepting it as a valid message.

Message Sequencing

The master unit initiates all data transfers by either sending data to a slave or requesting data from a slave. This protocol is strictly half duplex; only one device may be transmitting at any time. A slave device should not transmit unless it receives a valid message that requires a response--when it does receive such a message, it must respond quickly (See Timing). The master unit should respond in a timely manner, but is not under the same constraints as a slave. The following is the example of processing a Master/Slave interaction:

| Master	Slave's response	Master's response
1. Wake up	ACK	-none-
2. Poll	Data	ACK
3. Poll	No data	-none-
4. Poll	-none-	-none-
5. Data	ACK	-none-

<u>Timing</u>

If a slave unit is going to respond to a poll from the master, it must start its response within two character times of the end of the carriage return at the end of the poll.

> This makes the response time dependent upon the baud rate.

The slave must turn on its transmitter within two character times after receiving the CR of the master's poll. The slave must place the STX at the beginning of its response, into its serial port no later than three character times after receipt of the master's carriage return.

Once the slave begins transmitting, it must not allow a gap of more than one half a character time between characters. Most transmissions will take place under interrupt, so this should not be a problem; however, it means that serial port interrupts may not be disabled for an extended period of time during data transmission.
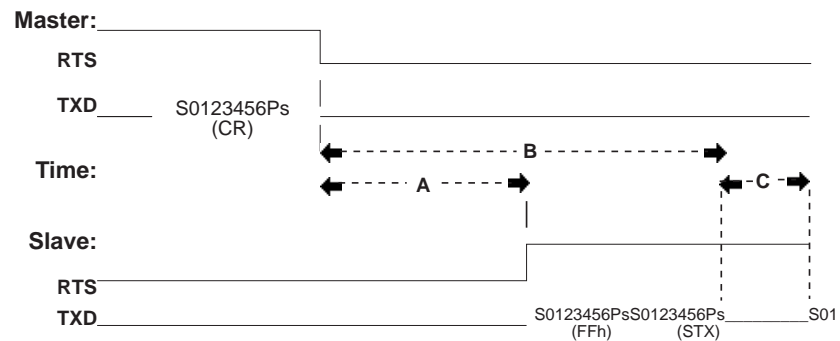
"S" is the start bit, "0123456" are the character bits, "P" is the parity bit and "s" is the stop bit.

Typically, the "RTS" line is used to control the transmitter. In this diagram, "RTS" is high when the transmitter is enabled and low when the transmitter is disabled ("tri-stated").

> The slave's "FF" may be replaced with a 1 character time (10/ baud rate) delay between transmitter turn-on and transmission of the STX.

Time Limits:

A   Maximum: 2 character times (20/baud rate)
          Minimum: 0
B   Maximum: 4 character times (40/baud rate)
          Minimum: 2 character times (due to guard
          Character + STX transmission time)
C   Maximum: 1/2 character time (5/baud rate)
          Minimum: 0

Both the master and the slave must disable their transmitter as soon as possible after transmitting the carriage return at the end of the message. The transmitter must remain enabled while the carriage return is being sent out, however. This means that the transmitting device must wait for a "transmitter empty" (as opposed to a "transmitter ready") indication from the serial port before disabling the transmitter.

This protocol has been designed for a "slow" master to communicate with a "fast" slave. The only time-critical item for the master is for the master to release control of the line immediately after spending a message to a slave. While the slave must respond within a very short time window, there are not such constraints on the master. The master may have any amount of time between messages or between characters within its message.

Error Recovery

Error: The slave does not understand a poll message.
Recovery: None. The master will time out, waiting for the slave's response, then will go on to the next unit.

Error: The slave does not understand a data message from the master.
Recovery: The master will retransmit the data message again after timing out while waiting for the acknowledgement.

Error: The master does not understand the slave's acknowledgement of a data message.
Recovery: The master will retransmit the data message after timing out while waiting for the acknowledgement. The slave will acknowledge the retransmitted message and discard it, since the message will have the same sequence number as the last message received.

Error: The master does not understand the slave's data message (response to a poll).
Recovery: The master will time out waiting for the slave's response, then continue on to the next poll. Since the slave did not receive an acknowledgement for the data message, it will retransmit the same message in response to the next poll.

Error: The slave does not understand the master's acknowledgement of the slave's data message.
Recovery: The slave will retransmit the same message in response to the next poll. The master will see that it is a duplicate message, acknowledge it, and discard it.

Error: The slave does not understand a broadcast message.
Recovery: None. The message will be lost.

<u>The general rules are as follows:</u>

1. **Each data message will be acknowledged by the recipient.** If a data message is not acknowledged, the transmitter should retransmit it again up to three retries. After the third retry, a communications error message should be displayed and the message discarded (in some systems the message may be recorded in a disk file or on a printer to prevent data loss).

2. **Each new message will have a new sequence number.** If a message is received that has the same message number as the last message received, the recipient should acknowledge the message and then discard it. The sequence number should only be checked for equality to the last sequence number received: there is no requirement that the sequence number must be the next number expected (although in some systems the master will keep track of "out of sequence" errors since they would indicate that messages had been lost).

The sequence number zero is a special case, since it indicates that the data message is the first data message sent since the device sending it has powered up. Messages with a sequence number of zero should always be processed as required, regardless of whether or not they are repeated "back to back".

3. **Any message that contains parity errors, LRC errors or an unrecognized message type should be discarded**. No acknowledgement should be sent. In some systems, the master will keep track of these transmission errors.

4. **Any message that contains a correct LRC, has no errors, is of a correct type, and requires an acknowledgement should be acknowledged even if its sequence number indicates that it is a duplicate message (the sequence number is the same as the last message).** If it is a duplicate message, it should be acknowledged then discarded. In some systems, the master will keep track of these duplicate message errors since they would indicate that an acknowledgement had been lost. A broadcast message (one sent to unit "00") must not be acknowledged.

Multidrop Protocol Examples

Message framing:
FFh,   02h,   idhigh,   idlow,   type,   seq no,   data...,   lrc0,   lrc1, 0Dh
(DEL,   STX,   ?,   ?,   ?,   ?,   ?,   ?,   ?,   CR)

	The Del character is used as a guard character to make sure that the transmission line is quiet for one character time before the STX is sent. The sequence number only appears on data messages. The LRC stands for "linear redundancy check" and appears on all messages.

Polling Sequence
1.   MUX polls slave at address 01 with the following format:

STX, unit id (2 char), 0, 1, lrc (2 char), CR

Example	STX	0	1	0	1	0	0	CR
HEX	02h	30h	31h	30h	31h	30h	30h	0Dh

2.   SLAVE answers the poll with the data in the following format:

STX, unit id, 0, 2, seq (1 char), ...data..., lrc, CR

Example	**HEX**
STX	02h
0	30h
1	31h
0	30h
2	32h
1	31h
A	41h
B	42h
C	43h
D	44h
E	45h
7	37h
3	33h
CR	0Dh

If no data is available:

STX, unit id, 0, 5, lrc, CR

Example	STX	0	1	0	5	0	4	CR
HEX	02h	30h	31h	35h	30h	34h	0	0Dh

	It is normally faster to allow the master to time out (which takes three characters times) than to use the "no data" response.

3.   MUX acknowledges data in the following format:
STX, unit id, 0, 3, lrc, CR

Example	STX	0	1	0	3	0	2	CR
HEX	02h	30h	31h	30h	33h	30h	32h	0Dh

4.   MUX polls the next unit . . .

Accu-Sort Master/Slave Protocol

Accu-Sort's master/slave protocol is a method of allowing two Accu-Sort scanners to scan during the same trigger cycle, and send their data through one unit to a host.

One unit is configured as a master unit. This unit communicates to the host through its primary serial port. It also receives data from the other unit through its secondary serial port.

The other unit is configured as a slave unit. It will send any data received for the current trigger cycle to the master unit. A message is transmitted for each trigger cycle.

DATA FORMAT

The secondary port of the master and the primary port of the slave are configured the same. They should both be set for RS-232 point-to-point. They communicate at 19200 baud, 7 data bits, even parity, and 2 stop bits. The slave transmits a message for each code enabled using a fixed format. The master is configured to receive this format. (See MESSAGE FORMAT)

TIMING

Non-Tracking:
In non-tracking mode, the slave unit's watch dog timer defaults to 400 ms. The slave unit has 400 ms from the end of the trigger cycle to begin transmission of its bar code data. It can begin transmission of its data anytime from the end of the trigger until the watch dog timer has expired. It is required to have completed all of its transmissions by the expiration of the master's watch dog timer.

The master's watch dog timer will default to 500 ms. The master will be required to wait until the expiration of its watch dog timer before it begins transmitting its data. This will allow the master to receive and process all of the slave unit's data before transmission.

Tracking:
In tracking mode, the master unit is configured to have 10 more tach pulses than the slave unit. This allows the master to receive and process all of the slave unit's data before transmission.

MESSAGE FORMAT

The transmission of bar code data from the slave unit to the master unit will use the following format:

STX TRIG_ID(1) TYPE (2) CODE(n) QQ(2) CR

STX = Start of text character (02h).

TRIG_ID(1) = Single ASCII character representing the ID number for the current trigger cycle. The first trigger cycle will start with an ID of zero (30h). Each consecutive trigger will increment the ID. The ID will increment up to nine (39h), wrap to one (31h), and begin incrementing again. All messages for a trigger cycle will have the same ID.

TYPE (2) = Two ASCII characters representing the code type of the data being transmitted.

VALUE	TYPE
00	No-read
01	Straight 2 of 5
02	Interleaved 2 of 5
03	Code 39 (STI option)
04	Code 39
05	Code 128
06	UPC-A (10 characters)
07	UPC-E (6 characters)
08	UPC-A (12 characters)
09	UPC-E (12 characters)
10	EAN-13
11	EAN-8
12	Codabar (start/stop not included)
13	Codabar (start/stop included)
14	AS-10
15	10 Bit Periodic Binary
16	Code 93
17	PharmaCode

CODE(n) = String of ASCII characters containing the bar code. This field is not required for a no-read message.

QQ(2) = Two ASCII characters representing the quality of code read (01-99). This field is not required for a no-read message.

CR = Carriage return (0Dh)

MESSAGE PROTOCOL

When each unit powers up, it will send a synchronization character (SYN or 16h) to the other unit. This character will indicate that both units will set their next trigger ID to 0.

The data messages will be sent down from the slave to the master for each trigger cycle. For each trigger cycle, the master will wait for messages from the slave before transmitting to the host. Each message received from the slave should have the same trigger ID that the master is using for that trigger cycle. If an incorrect ID is received, an error should be logged on the master unit and the data should be discarded. The master will place any valid messages into its compare buffer and process them as if they were read by that unit.

Protocols Used With RS232, Current Loop, and 422

RTS/CTS (Used with only RS232)

This protocol stands for "Request To Send" and "Clear To Send". This is a common type of "handshaking" that goes on between two units. When one device wants to transmit to another device, it will drive the RTS line indicating it has data to transmit. When the receiving device is ready to receive, it will drive the CTS line indicating it is ready. When you use RTS/CTS it requires the addition of two more wires on the communication cable. If they are not needed, it is advised not to use any other additional lines in the cable.

ACK/NAK

This is a software protocol. When a unit receives a message, it indicates whether it has received that message correctly. If all information is received, the unit will transmit an "ACK" (acknowledge). The ACK is a signal that more information may be transmitted. If the information is not received correctly, then it will transmit a "NAK" (non-acknowledge). The NAK is a signal requesting a message be retransmitted. Most software has a limit to the number of retransmits. Three NAKS is common.

XON/XOFF

This is a software protocol. XON stands for "transmit on" and XOFF stands for "transmit off." A unit receiving data may signal the unit transmitting that it should stop sending data by transmitting an XOFF (ctrl-S). An XON (ctrl-Q) signals the original unit to begin transmitting again.

APPENDIX B: ASCII CHART

HEXADECIMAL & DECIMAL CHARACTER ASCII TABLE											
DEC	HEX	ASCII		DEC	HEX	ASCII	DEC	HEX	ASCII	DEC	HEX	ASCII
000	00	^@	NUL	032	20	SPC	064	40	@	096	60	'
001	01	^A	SOH	033	21	!	065	41	A	097	61	a
002	02	^B	STX	034	22	"	066	42	B	098	62	b
003	03	^C	ETX	035	23	#	067	43	C	099	63	c
004	04	^D	EOT	036	24	$	068	44	D	100	64	d
005	05	^E	ENQ	037	25	%	069	45	E	101	65	e
006	06	^F	ACK	038	26	&	070	46	F	102	66	f
007	07	^G	BEL	039	27	'	071	47	G	103	67	g
008	08	^H	BS	040	28	(	072	48	H	104	68	h
009	09	^I	HT	041	29	)	073	49	I	105	69	I
010	0A	^J	LF	042	2A	*	074	4A	J	106	6A	j
011	0B	^K	VT	043	2B	+	075	4B	K	107	6B	k
012	0C	^L	FF	044	2C	,	076	4C	L	108	6C	l
013	0D	^M	CR	045	2D	-	077	4D	M	109	6D	m
014	0E	^N	SO	046	2E	.	078	4E	N	110	6E	n
015	0F	^O	SI	047	2F	/	079	4F	O	111	6F	o
016	10	^P	DLE	048	30	0	080	50	P	112	70	p
017	11	^Q	DC1 XON	049	31	1	081	51	Q	113	71	q
018	12	^R	DC2	050	32	2	082	52	R	114	72	r
019	13	^S	DC3 XOFF	051	33	3	083	53	S	115	73	s
020	14	^T	DC4	052	34	4	084	54	T	116	74	t
021	15	^U	NAK	053	35	5	085	55	U	117	75	u
022	16	^V	SYN	054	36	6	086	56	V	118	76	v
023	17	^W	ETB	055	37	7	087	57	W	119	77	w
024	18	^X	CAN	056	38	8	088	58	X	120	78	x
025	19	^Y	EM	057	39	9	089	59	Y	121	79	y
026	1A	^Z	SUB	058	3A	:	090	5A	Z	122	7A	z
027	1B	^[	ESC	059	3B	;	091	5B	[	123	7B	{
028	1C	^\	FS	060	3C	<	092	5C	\	124	7C		
029	1D	^]	GS	061	3D	=	093	5D	]	125	7D	}
030	1E	^^	RS	062	3E	>	094	5E	^	126	7E	~
031	1F	^-	US	063	3F	?	095	5F	_	127	7F	DEL

ASCII Chart

APPENDIX C: READ CHARTS

MODEL 22 SERIES II A – STANDARD OPTICS

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NARROW ELEMENT WIDTH	READING RANGE	DEPTH OF FIELD	MAXIMUM SCAN WINDOW
10.0 mil (.25mm)	6" - 12" (152-305mm)	6" (152mm)	10" (254mm)@10" (254mm)
15.0 mil (.38mm)	6" - 17" (152-432mm)	11" (279mm)	14" (356mm)@15" (381mm)
20.0 mil (.5mm)	6" - 20" (152-508mm)	14" (356mm)	14" (356mm)@15" (381mm)
30.0 mil (.76mm)	6" - 23" (152-584mm)	17" (432mm)	14" (356mm)@15" (381mm)

DISTANCE FROM SCANNER
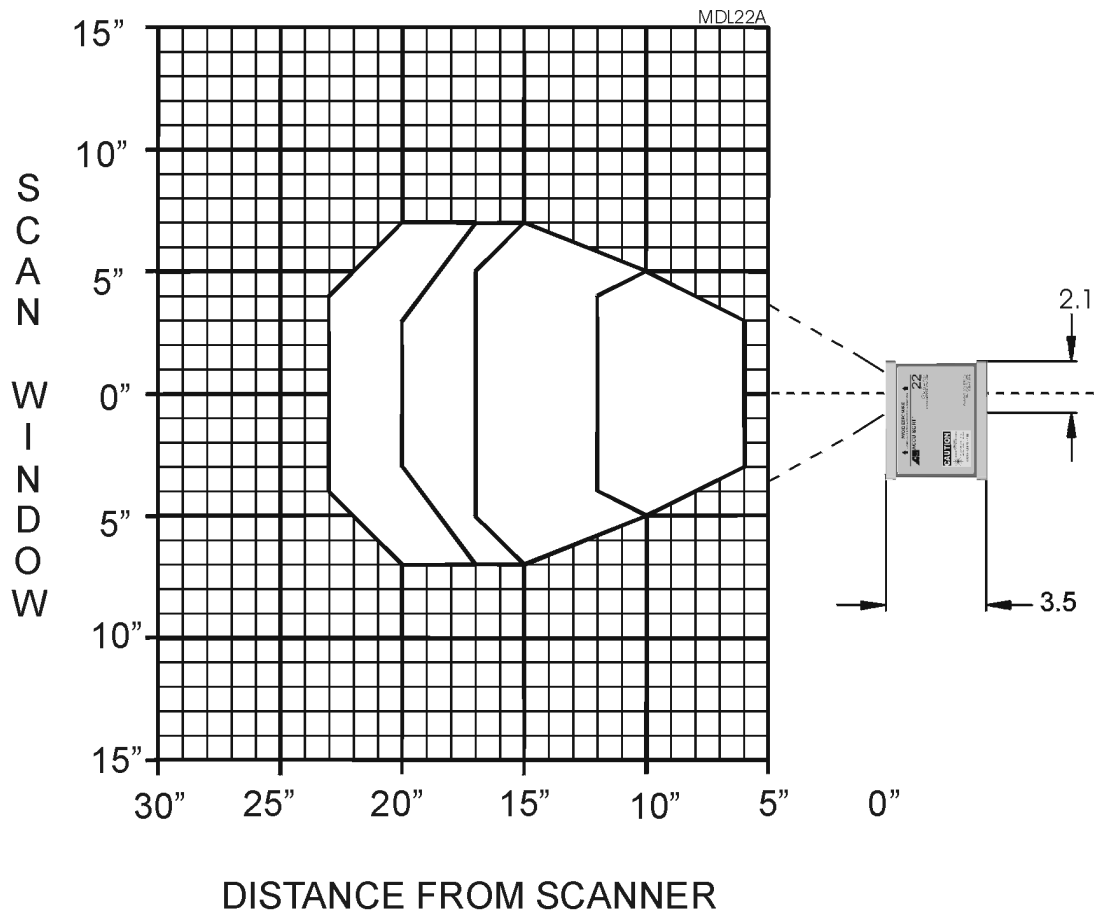
Scan Rate = 500 Scans/Sec
+/- 10 degrees pitch, +/- 10 degrees skew
D.O.F. + Window based on ≥ 96% Scanning Efficiency

MODEL 22 SERIES II B – HIGH DENSITY OPTICS

NARROW ELEMENT WIDTH	READING RANGE	DEPTH OF FIELD	MAXIMUM SCAN WINDOW
5.0 mil (.013mm)	5" - 7" (127-178mm)	2" (51mm)	5" (127mm)@7" (178mm)
7.50 mil (.019mm)	4.5" - 8" (114-203mm)	3.5" (89mm)	7" (178mm)@7" (178mm)
10.0 mil (.25mm)	4.5" - 9" (114-227mm)	4.5" (114mm)	8" (203mm)@8" (203mm)
15.0 mil (.38mm)	4.5" - 11.5" (114-292mm)	7" (178mm)	10" (254mm)@9" (229mm)
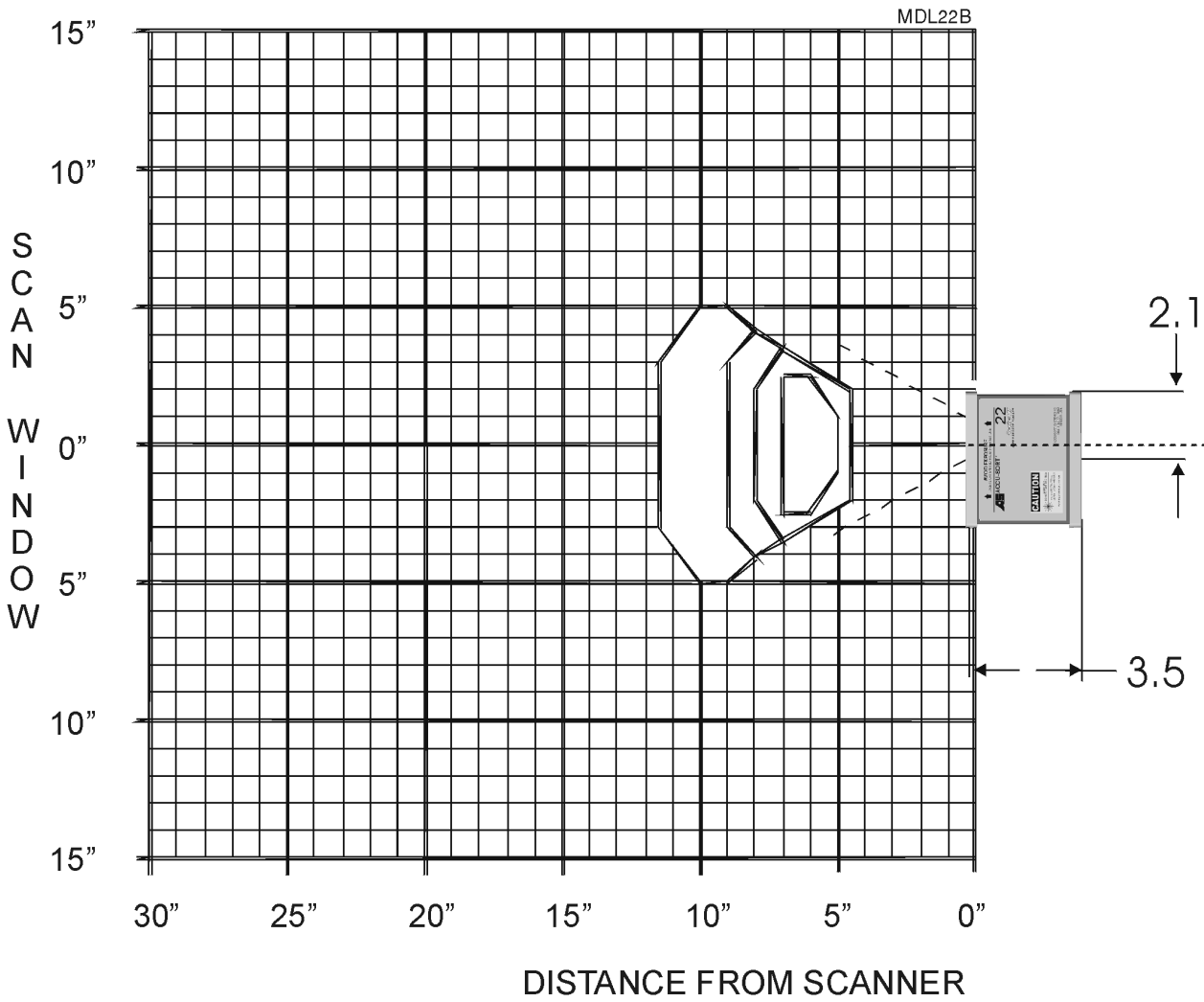
DISTANCE FROM SCANNER

Scan Rate = 300 Scans/Sec
+/- 10 degrees pitch, +/- 10 degrees skew
D.O.F. + Window based on ≥ 96% Scanning Efficiency

MODEL 22 SERIES II C – HIGH SPEED OPTICS

NARROW ELEMENT WIDTH	READING RANGE	DEPTH OF FIELD	MAXIMUM SCAN WINDOW
15.0 mil (.38mm)	6" - 15" (152-381mm)	9" (229mm)	10" (254mm)@15" (381mm)
20.0 mil (.5mm)	6" - 17" (152-432mm)	11" (279mm)	12" (305mm)@15" (381mm)
30.0 mil (.76mm)	6" - 21" (152-533mm)	15" (381mm)	14" (356mm)@15" (381mm)

MDL22C

SCAN WINDOW

DISTANCE FROM SCANNER
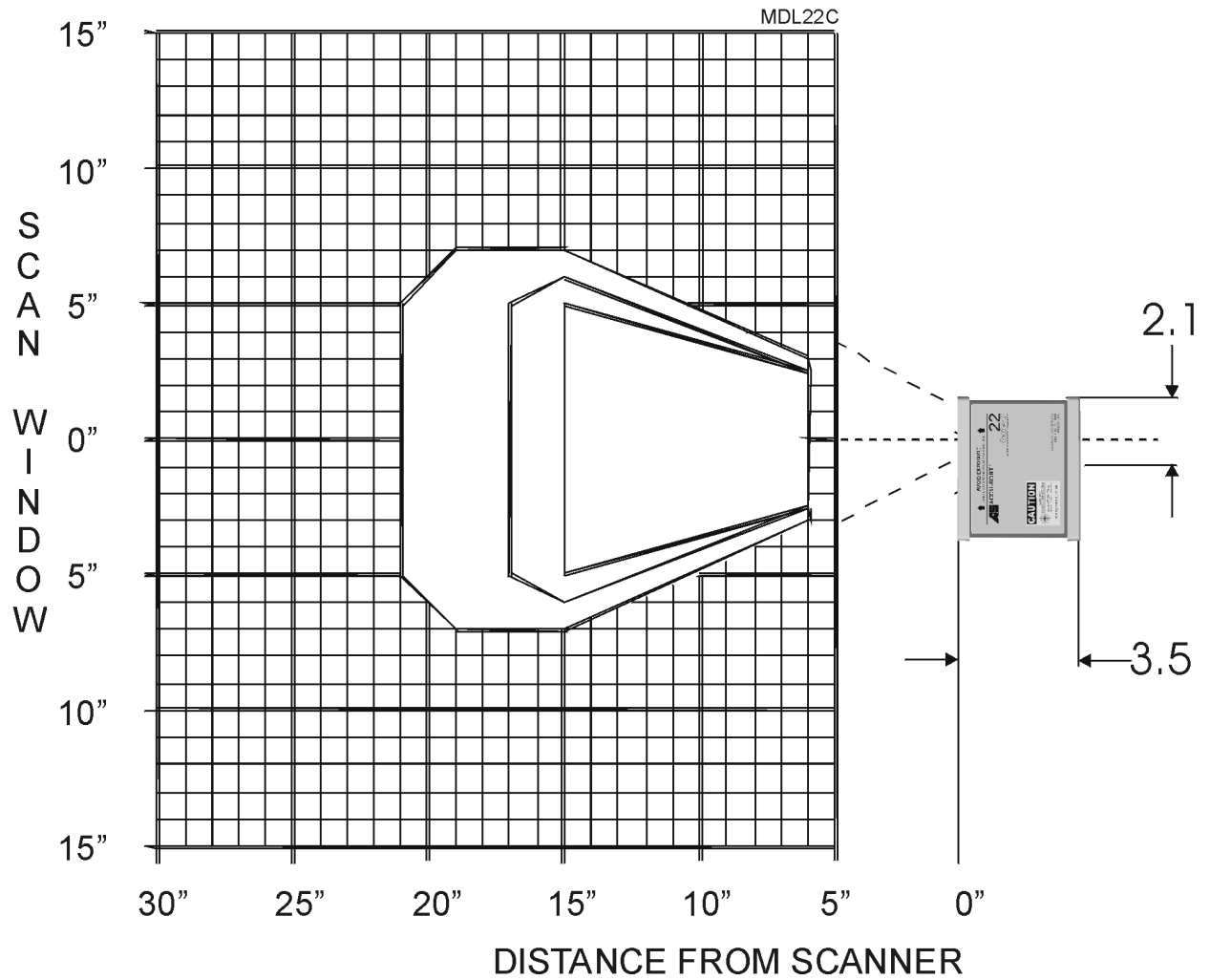
Scan Rate = 800 Scans/Sec
+/- 10 degrees pitch, +/- 10 degrees skew
D.O.F. + Window based on ≥ 96% Scanning Efficiency

MODEL 22 SERIES II D – LONG RANGE OPTICS

NARROW ELEMENT WIDTH	READING RANGE	DEPTH OF FIELD	MAXIMUM SCAN WINDOW
15.0 mil (.38mm)	8" - 20" (203-508mm)	12" (304mm)	16" (406mm)@18" (457mm)
20.0 mil (.5mm)	8" - 25" (203-635mm)	17" (432mm)	20" (508mm)@23" (584mm)
30.0 mil (.76mm)	8" - 36" (203-914mm)	28" (711mm)	24" (610mm)@27" (686mm)

DISTANCE FROM SCANNER

Scan Rate = 400 Scans/Sec
+/- 10 degrees pitch, +/- 10 degrees skew
D.O.F. + Window based on ≥ 96% Scanning Efficiency

Index ▼

Revision History ▼

Document Rev. No.	ECO No.	Date	Changes Made
1.0	6015	12/00	First release of Model 22 Series II manual
Chapter 1 1.1	5731	01/01	Release of Model 22 Off The Shelf Models
1.3	None	10/01	Read chart correction
1.4	None	09/02	Change to power-supply pin-out in Chap. 1. Change to reflect new Model 22-II labels
1.5, 1.6		12/02	Change to reflect new Model 22-II labels per UL changes
1.7		05/03	Change to reflect updated connector diagram in Chapter 3
1.8	04-1178	11/04	p.3-6: Correction to RS232 Handshaking RTS/CTS (J3 only, not J1 & J3)
	04-308		p. vii, 1-8: Laser power changed to <5.0mW peak from <3.8 mW peak
	None		Minor corrections to title page, front matter, and part numbers referenced in Chapters 1 and 3
1.9	04-1312	01/05	p.3-5: Correction to connector illustration for wiring power to reader
2.0	05-689	08/05	p.2-7: Add step to procedure with IMPORTANT notice to "wait at least 30 seconds before entering Set-up Mode."
	None		p.1-4: Added cradle mounting bracket PN to Ball and Socket Mounting Kit. p.2-4: Added section cross referencing available Ball and Socket Mounting Kit.
2.1	05-928	10/05	p. 1-8, 4-4, A-3: Added reference to baud rate limitation (38.4K) of Model 22 Series II
2.2	06-1016	10/06	p. 1-8: Removed references to power supply PNs 1000007010 and 1000007011
	06-146		p. 1-8: Removed reference to IC-22 cable PN 1000025363